

A Black-billed Cuckoo is perched on a thick, gnarled tree branch. The bird has a white body with dark wings and tail, and a dark cap. It is looking to the left. The background is a clear blue sky.

## Searching For Black-billed Cuckoos With New Technology

By Bo Crees

In the summer of 2007 and 2008 I was excited to be doing songbird surveys in Eastern Montana. At the time I was living in Missoula, so exploring and surveying diverse habitats in the eastern part of the state seemed quite exotic. Up until then I only birded around Western Montana, and it was thrilling to see my first Red-headed Woodpeckers east of Ashland, Field Sparrows near Broadus, Plumbeous Vireos, White-winged Juncos and Eastern Bluebirds in the Ekalaka Hills, and Black and White Warblers south of Glendive. The species I was hoping to encounter more than any other was the elusive Black-billed Cuckoo.

In Montana, cuckoos are most likely to be found in large cottonwood galleries along eastern portions of the Yellowstone and Missouri Rivers, but can also be found in other habitats, usually around deciduous trees. Although they range widely throughout the state, Black-billed Cuckoos are uncommon and secretive. My cuckoo search was unsuccessful, even though we surveyed extensively and spent much of our free time looking and listening in appropriate habitat.

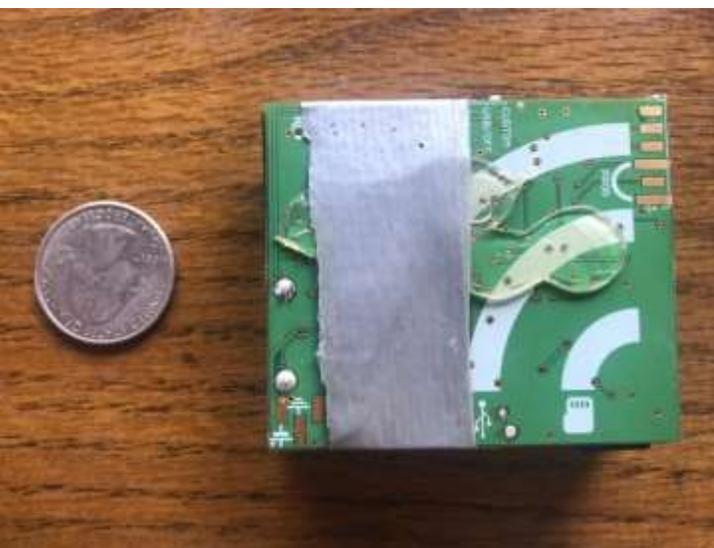
We know that some bird species are more difficult to detect and monitor than others when we use traditional survey techniques such as point counts and area searches. They may not be active or vocal when the surveys take place (nocturnal birds, for example), they may be shy and quiet down as soon as an observer approaches, or they may inhabit areas that are difficult to access and survey on a regular basis. In order to gain a better understanding of these species' distribution and population trends in the state we must come up with ways to better target these species. In the case of the Black-billed Cuckoo, one way is to target their preferred habitat and survey cottonwood galleries along our major rivers. This can be logistically complicated, but such surveys have been carried out in the past with moderate success; and some are tentatively planned for the summer of 2021. River surveys can be convenient because technicians are able to access survey sites by following the river instead of using limited roads and trails. But, they also require a lot of planning, and all sorts of things can go wrong. For example, water levels and river flow conditions that are ideal for river travel may not coincide with peak cuckoo activity, and adverse weather can make a multi-day river float extremely challenging.

There is also a fundamental problem we face while conducting bird surveys: we introduce bias to the data when our presence affects the behavior of the birds we are trying to observe. When technicians approach their survey location they inevitably make noise.



Cottonwood galleries along the banks of the Missouri River

Upon hearing an “intruder” curious birds will likely fly in to investigate while shy birds will probably leave the immediate area or quiet down, making them harder to detect. This means there is a good chance the presence of an observer will result in slightly skewed bird numbers in a given survey area when compared to the actual number of birds that use the area when no humans are around. Biologists are aware of this and can correct for this to some degree when analyzing the data, but it can still be a problem. If cuckoos fly into an area they do not normally occupy to investigate a technician crashing through the cottonwoods, we may end up assuming there are more cuckoos inhabiting our streamside habitat than there actually are. Conversely, if cuckoos leave the area as we approach, our population estimate may end up being too low. In an attempt to address this and other potential survey issues mentioned above, Montana Audubon has partnered with Montana Fish Wildlife and Parks, Smithsonian Conservation Biology Institute, and the University of Montana Bird Ecology Lab to experiment with an exciting new technology called Automated Recording Units.



An Automated Recording Unit



ARU installed near Loma

Earlier this summer several technicians, including myself, spent a few days installing dozens of Automated Recording Units, or “ARUs”, in cottonwood galleries along the Yellowstone and Missouri Rivers. These devices are slightly smaller than a pack of cigarettes and are very easy to install. We simply put them in small bags to keep them dry and secure each bag to a tree using a strap (interestingly, the plastic bags have minimal to no effect on the quality of the recordings). The entire installation process takes about 5 minutes, and much of that time is spent carefully documenting the precise location of the ARU for future retrieval.

ARUs have several notable advantages over traditional survey techniques. They can be installed at any convenient time- weeks before cuckoos return to their breeding grounds, for example- and be programmed in advance to begin recording at a desired future time. They can also be programmed to record at multiple times throughout the day, rain or shine, hundreds or even thousands of times over the course of several months. Compare this to the 1-2 brief survey visits technicians can carry out in a season!

And unlike technicians, ARUs are inconspicuous and have no effect on bird behavior. They can “hear” and record bird calls and songs from 150 meters away or more, depending on loudness, and in doing so they create a permanent record. This is extremely important. If a technician is unsure about the identity of a lone, distant bird call during a survey, there is not much they can do to confirm the identity of the bird. But when that mystery call is captured and recorded on an ARU, experienced birders can listen to it as many times as necessary, and also amplify it, isolate it from other background noises, view it (by converting it into a sonogram), and share it with others. This is particularly important for verifying the identity of uncommon or rare species such as the Black-billed Cuckoo. In addition, ARUs are immune to inconsistencies that may arise as a result of varying skill levels or hearing abilities of human observers. ARUs can allow us to monitor for long periods of time, uninterrupted, as long as the units are serviced every few months and supplied with new batteries and memory cards. Remarkably, an array of multiple ARUs covering a small area may allow us to localize an individual Black-billed Cuckoo within its home range by calculating the time difference of acoustic signals arriving at each unit. We may even be able to tell individuals apart by carefully analyzing their songs.



Typical Black-billed Cuckoo habitat: a healthy cottonwood gallery with dense understory along the Missouri River. Picture taken from the Auto Tour Route in Charles M. Russell National Wildlife Refuge

Although ARUs have a number of advantages over human observers, at this point they still have several notable limitations. In most traditional surveys, at least some of the birds are detected visually. Since ARUs only record sounds, a cuckoo can land inches away from a unit and we will never know about it unless it decides to vocalize. In addition, comparative studies showed that experienced technicians can usually hear birds from greater distances than ARUs. One of the main reasons for this pilot ARU Black-billed Cuckoo study and the upcoming 2021 cuckoo river surveys is to compare the efficacy of the two methods and see which will provide more robust information about Black-billed Cuckoos in Montana. Right now it appears that although ARU technology is exciting and full of potential, we certainly still need experienced field technicians with boots on the ground to do some of the monitoring. I'm thrilled to be involved in both studies, and hope that both, together, will significantly contribute to our understanding of cuckoos in Montana.

Our ARUs were passively doing their job for the past two months, "listening" for cuckoos in dense cottonwood galleries along the Missouri and Yellowstone Rivers. A couple of weeks ago we collected them (only one was found on the ground, in a ripped bag, thankfully without any obvious damage), and in the coming weeks we will begin to download and analyze the data.

I'm happy to report that twelve years after my initial, failed, Black-billed Cuckoo search, I finally got to see and hear my first cuckoo. I was in the middle of installing an ARU about a half mile away from the James Kipp Campground on the Missouri River when I heard that unmistakable call coming from dense nearby thickets. I dropped everything except for my camera and binoculars and ran to a small clearing near the thickets. The bird stopped calling. I stood there, excited and frustrated, knowing the cuckoo I've been waiting to see for so long was only a few feet away. Just when I thought I would have to settle for hearing it only, it flew out and landed in the upper branches of a mostly dead cottonwood, almost directly above me.

The cuckoo stayed for a moment and called several times. I watched it quietly- heart racing- and snapped a few photos. It wasn't long before it took off and disappeared back into dense thickets where it called a couple more times. I returned to the ARU and finished the installation process with shaky hands. I aimed the device towards the thickets, turned it on, and walked happily to my next ARU location.



I was installing this ARU when I heard my first Black-billed Cuckoo (see cover photo!)