

Finding and mapping Great Blue Heron rookeries from the comfort of the office chair: is it possible??

By Bo Crees



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During the harsh Montana winters, birders throughout the state can't wait for spring. It is always exciting to hear our beloved resident birds break into song - a sure sign the cold and snow will soon be gone and wave after wave of migrating birds are finally at our doorstep. When I go birding in spring and early summer one of my favorite things to see is nest-building. As a biological technician I've spent countless hours watching various birds build nests, incubate, and when all goes well, fledge young.

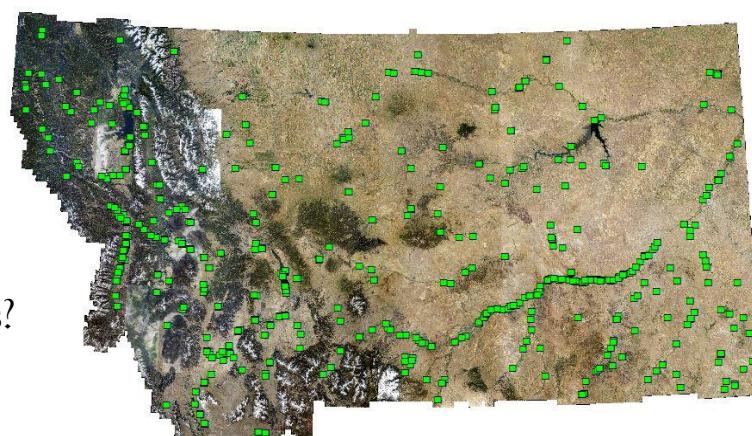
When monitoring nests, one quickly notices that some are relatively easy to find while others can be quite challenging. It's easy to overlook nests even when actively searching for them. Some can be small and well-hidden in dense vegetation, and others may be large and conspicuous, but located in hard-to-access areas with limited roads and trails, or in rough terrain.

One species that nests in locations that can be hard to survey is the majestic Great Blue Heron. The Great Blue Heron is a species of concern in Montana. Based on Breeding Bird Surveys data we know that heron populations have experienced significant decline of 2.2% per year between 1966 and 2010. In order to gain better understanding of Great Blue Heron population trend, it is important to monitor and protect their nesting colonies. Many observant people have seen a Great Blue Heron nesting colony, or “rookery” at some point. In Montana, herons usually establish rookeries along major waterways, most often in mature cottonwood galleries. Nests are large, usually 3-4 feet across and 1-2 feet deep, and rookeries can have anywhere from a handful to well over 100 nests. Nests are often built high in the canopy, and under good conditions, can be seen from hundreds of yards away. Seems like an easy species to monitor!



(Left) Great Blue Herons are the largest of Montana's wading birds. (Center) Their rookeries can be visible at a distance in the early spring before leaf-out. (Right) When the air is cool, herons can scrunch up, obscuring their long s-curved neck. Photos by Bob Martinika (left, and right), and Janice Miller (center)

The problem is, rookeries that are easy to spot from roads are only a small subset of our rookeries in Montana. Great Blue Herons are very sensitive to human disturbance during the incubation stage of their breeding season, and it is not uncommon for them to permanently abandon their rookeries when human activities encroach. As a result, they are more likely to establish and maintain rookeries in remote, undisturbed areas. So how can we keep track of our breeding herons in difficult-to-access areas such as remote river stretches, islands, and large tracts of private lands? Is there a good way to monitor rookeries from year to year without risking disturbing this sensitive species?



There are many historic Great Blue Heron Rookery locations in Montana.

One way to monitor remote rookeries is aerial surveys. Trained observers can and do periodically fly along major rivers in Montana and record rookery locations and status in hard to access areas. Many of our known rookeries have been found during aerial surveys, so this is clearly an effective way to survey Great Blue Herons. Unfortunately, it is also quite expensive and can be logically challenging. There are thousands of miles of rivers and creeks in our state that definitely- or potentially- have rookeries along them. To fly over all of them in a single year would be unrealistic, and to carry out such surveys in regular intervals, every year or two, would be just about impossible without a large budget. But what about satellite imagery and aerial photography? Would it be possible to "fly" over our waterways and search for rookeries using Google Earth, a free program available to everyone with internet access? If so, perhaps it would also be possible to locate remote rookeries that were not previously reported and ultimately gain better understanding of Great Blue Heron population trends in the state! This idea seemed almost too good to be true, so we had to look into it.

We first selected five major river stretches designated as Important Bird Areas that have cottonwood galleries: Yellowstone River Lower and Upper Reach, Charles M. Russell NWA, Tongue River, and Clark Fork River-Grass Valley. We then reviewed several known rookeries outside of the search area to become familiar with their visual signature (e.g. their average size, shape, contrast against the background), and to determine the optimal search scale- or zoom level: if we zoomed in too closely it would take much longer to scan the search area, and if the field of vision was too far above the surface, rookeries would not be detectable! We found that scanning from 700-1000 meter above the surface was ideal. We systematically scanned the cottonwoods along these river corridors using the highest resolution images available.



Would the heron's large nests be visible from space?

Photo by Janice Miller



Typical appearance of a rookery on aerial imagery: a cluster of small, round nests visible against a dark green backdrop. We know individual nests are ~3 ft. across, so we are able to precisely measure suspected nests in areas with low quality imagery to make sure they match the known dimensions. This specific rookery is along the Missouri River, within the Charles M. Russell NWA, and has not been previously reported.

We scanned for rookeries “blind”- without knowing the locations of historical rookeries reported over the years. We carefully followed a grid of small 270 x 400 meter cells to ensure thorough coverage. Sure enough, many rookeries were quite easy to detect, and sometimes, by looking at imagery from successive years, it was even possible to see whether a given rookery was growing, shrinking, or being established or abandoned. We could detect these changes because for most rookeries the aerial imagery quality was quite good, allowing us to get precise nest counts each year. Next, we wanted to see how many of the detectable rookeries we were overlooking. This survey method would not be worth pursuing if many existing rookeries were overlooked! We tested our search accuracy by comparing the locations of the rookeries we found during the “blind” search to the locations of known, historical rookeries along the same river corridors. To do this we overlaid a map of historical rookeries with the map of our newly-found rookeries

and were immediately able to see which of the rookery locations overlapped and which did not. An overlap of a new and historical rookery meant we found a historical rookery. When a new rookery did not overlap a historical rookery, we knew it had not been previously reported. When a historical rookery did not overlap a new rookery, we had to closely re-examine the imagery to make sure we did not overlook it. After re-examining all of the historical rookeries we potentially missed, we were happy to learn that during our “blind” survey we successfully detected 16 of 17 (94%) of rookeries that were actually detectable on the aerial imagery maps. Since rookeries have a distinctive, easily recognizable appearance, we are fairly confident the majority of historical rookeries we *did not* find were no longer present where they were originally reported. This is not necessarily a bad thing since Great Blue Heron are known to regularly abandon their rookeries for various reasons and establish new ones elsewhere.



Map showing historical rookeries (green squares), and rookeries found during blind aerial imagery search (yellow triangles) along a portion of the Yellowstone River.

In addition to finding 16 historical rookeries within the search area during the “blind” search, we also found 8 rookeries, some quite large, that were not previously reported. It is exciting to know that this new survey method is effective in finding remote rookeries, or rookeries in areas that lack ground and air surveys. This experimental mapping project is a collaboration between Montana Audubon and the Montana Natural Heritage Program, and both organizations are looking forward to the next step of field-testing the results. It is fun to find Great Blue Heron rookeries using aerial imagery, but it’s even more fun to head outdoors on a beautiful Montana spring day and confirm the findings while watching majestic, busy herons tend to their nests and young!