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History and Current Status of the Northern Saw-whet Owl (*Aegolius acadicus*) in Arkansas

Mitchell L. Pruitt

University of Arkansas, Fayetteville

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History and Current Status of the Northern Saw-whet Owl

(Aegolius acadicus) in Arkansas

Mitchell Pruitt

Dr. Kimberly Smith

Dr. Lisa Wood

Dr. Thad Scott

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Abstract: The secretive Northern Saw-whet Owl (*Aegolius acadicus*) is believed to be much more widespread during fall and winter than previously thought. Of the few places in the southern United States conducting research on this species, all have been successful at capturing birds. A total of 12 historic records existed for Arkansas until my work began in fall of 2014. The first confirmed record was in 1959 and the most recent was in 2010. Over the course of two field seasons, I captured and banded 24 saw-whet owls in rural Madison County. All birds were mist-netted along a trail, in woodland composed of pine and cedar with fairly dense undergrowth. Two were captured during our 2014 season after a late start and 22 were captured in 2015, likely the result of an earlier start. Comparing my data to that of several other banding operations in the south, it would appear that the peak of migration in Arkansas is late October through early November, with capture rates dropping by early December. Of the birds captured, all but one was female, the most common sex this far south. A variety of age classes were identified, with a fairly even distribution of hatch-year, second-year, and after-second-year birds. Exactly from where the saw-whets are migrating is unknown, although several foreign recoveries in Missouri and four recoveries in Arkansas suggest they are coming from the western Great Lakes region. Once considered a vagrant, based on my research, the saw-whet appears to be a fall migrant to the state of Arkansas.

Introduction

In eastern North America, Northern Saw-whet Owls (*Aegolius acadicus*) are primarily a denizen of the boreal forests of Canada during the breeding season, but birds migrate south in fall into the United States (Confer et al. 2014), sometimes in large “invasions” (Brinker et al. 1997). However, its distribution is poorly known in the southern part of the United States. Recently, attempts to capture birds during fall migration have been successful in Missouri (D. Ripper, unpublished data) and Alabama (R. Sargent, unpublished data), as was an earlier attempt in South Carolina, primarily in 1999 (W. Hilton, personal communication).

The first mention of a saw-whet in Arkansas was made by Howell (1911) although he doubted the authenticity of the report based on time of year. Since he worked closely with the National Museum at the Smithsonian Institute in his capacity as a scientist for the Bureau of Biological Survey in Washington, D.C., he knew of the report of a specimen of a saw-whet attributed to the Whipple Expedition from Fort Smith in early July of 1853. This specimen is indeed listed in the catalog of the museum (number 3891), but the specimen has been lost (Howell 1911; B. Schmidt, personal communication). The Whipple Expedition was one of several expeditions to find the best route for the railroad to extend to the West Coast and traveled through what is today Oklahoma, Texas, New Mexico, Arizona, and California. The major collector for the trip from Fort Smith to Albuquerque was Heinrich Balduin Möllhausen, but the missing specimen is attributed to the leader, Lt. Amiel Weeks Whipple, according to the Smithsonian catalog. There is no date associated with that record, but the expedition spent about 2 weeks in Fort Smith before departing on 15 July (Wright and Shirk 1949).

There is little support for the saw-whet record associated with the Whipple Expedition, reported by Howell (1911). It was the middle of the summer, the specimen has been lost, and

there is no mention of this bird in the report of the birds collected on the Whipple Expedition (Kennerly 1859). [Kennerly (1859) did mention a Carolina Parakeet (*Conuropsis carolinensis*) and a Yellow-crowned Night-Heron (*Nyctanassa violacea*) collected by Möllhausen from Fort Smith and they are both in the collection of the National Museum (B. Schmidt, personal communication).] Baird summarized the results of all birds collected on all the railroad expeditions and did not mention a saw-whet from the Whipple Expedition (Baird 1858:58). He did mention a saw-whet from “Texas” collected on the Pope Expedition, which was the route south of the Whipple route. This specimen is also listed in the Smithsonian catalog (number 5039), but it too has been lost (B. Schmidt, personal communication).

Between 1959 and 2010, there were 12 reports of saw-whets in Arkansas, most of which occurred in November and December (Figure 1). These records were scattered, but were mostly north of the Arkansas River, with an emphasis on the Ozarks, Crowley’s Ridge, and the tip of the Ouachita Mountains at Little Rock (Figure 2). The first specimen was a road-killed owl found by Trusten Holder, an Arkansas Game and Fish Commission employee, on 11 November 1959 in Reydell (Jefferson Co.). That unsexed specimen is in the University of Arkansas Museum (UAFMCZ 0085-0078-1802). A second specimen, also a road kill, was found by Keith Sutton, the noted outdoors writer, on 22 November 1976, 1 mile north of Harrisburg (Poinsett Co.). At the time, Sutton was an undergraduate at Arkansas State University and gave the specimen (AAS verification doc. #389) to Earl Hanebrink, the ornithologist there, who made a study skin of the bird. That specimen has apparently been lost as it is not in the Arkansas State University collection. While investigating the University of Arkansas Museum, another heretofore unreported specimen was discovered from Fayetteville (Washington Co.). The bird had been found along Tilly Willy Creek south of town, on 4 December 1993, with a broken wing and was

taken to a rehabilitation facility where it died on 21 January 1994. Then graduate student T. Scott Sillett prepared the study skin (UAFMCZ 0094-0009-0004) of the female owl.

Three other birds were found and taken to rehabilitation centers. On 25 November 1975, an injured bird was reported from North Little Rock (Pulaski Co.). It was taken to a veterinary clinic, where it died on 2 December. On 30 December 1999, a bird was captured by a dog patrol in West Memphis (Crittenden Co.) and taken to Knox Martin, a rehabilitator in Memphis, Tennessee. He fed the bird mice and released it on 3 January 2000. On 4 November 2005, Lynn Slater found a bird that had been hit by a car north of London on the Pope/Johnson Co. line. It was photographed in rehabilitation, but the fate of that bird was not recorded.

Two of the reports were foreign recoveries of birds banded elsewhere. The first was a bird “caught by hand” by Roman J. Selig, Jr., on 12 December 1969, 4 miles north of Rector (Clay Co.). The bird had been banded (U. S. Fish and Wildlife band 574-45418) the previous month, on 14 November 1969 at Cedar Grove, Wisconsin, by Daniel D. Berger. The distance between those 2 sites is 840 km, meaning the bird averaged at least 30 km/night. The second banded bird was brought by a dog to its owner on 23 February 1992, 6 miles south of Paragould on Highway 49. It had internal injuries and a broken wing and eventually was given to Karen Rowe, a wildlife biologist with the Arkansas Game and Fish Commission. She gave it to Heath Garner, a rehabilitator in Jonesboro, but the bird subsequently died that night and the specimen was destroyed. The bird had been banded (0614-45855) as an adult by W. N. Grigg on 9 October 1990 near Stonington on the Upper Peninsula of Michigan.

Of the remaining 4 records, 3 were sightings of single birds and one was a photograph. The first was a bird found by Douglas A. James, ornithologist at the University of Arkansas, and then student H. H. (Hank) Shugart, Jr., at Shores Lake (Franklin Co.) on 30 January 1967. Donna

O'Daniel, an excellent birdwatcher, reported one at her residence in the Crumpler Subdivision (Boone Co.) on the upper Bull Shoals reservoir near the Arkansas/Missouri border on 25 December 1997 (AAS verification doc. #900). A third sighting occurred predawn with a flashlight while Jack and Pam Stewart were owling during the Crooked Creek Christmas Bird Count on 15 December 2010. Larry Obsitnik, a photographer for the Little Rock newspaper, *Arkansas Gazette*, took a picture of a saw-whet sitting on a no parking sign during the day in Little Rock, on 7 November 1969, and it appeared on the front page on 8 November. Douglas James obtained a copy of the photograph for the AAS files (Figure 3).

With this information, the objective of my study was to attempt to document the occurrence of saw-whets in Arkansas during fall and winter, using mist-nets and audio lures for the first time. Prior to my research, saw-whets were considered a rare bird within the state of Arkansas (James and Neal 1986). James and Neal (1986) concluded that due to their nocturnal habit and secretive nature, saw-whets might be more common in Arkansas than records suggested. Nonetheless, my expectation was that I would capture no saw-whet owls.

Methods

My research used standard methods produced by a group of researchers in the northeastern United States (Project OwlNet 2016). Before beginning, banding permits were acquired from both the national and state governments, as well as from the particular organization on whose property we were netting. Standard equipment included four 12-meter mist nets with 60mm mesh, an audio lure to draw birds into the net area, and tools for processing upon capture. A typical night consisted of being in the field from 1900 until 2400 hours or later.

During fall and winter months, saw-whets seem to have a preference for woodland with a thick understory, ideally cedar or other coniferous component. Our field station was located at the Ozark Natural Science Center (ONSC) in rural Madison County, Arkansas, where the habitat is a mixture of pine/deciduous upland with a thick cedar understory. Four mist nets were arranged in a line down a trail through the cedars. The audio lure was placed at the center of this arrangement and played continuously during time afield. The use of an audio lure began in 1986, at the Little Suamico Ornithological Station near Green Bay, Wisconsin, as a method to increase saw-whet captures (Erdman and Brinker 1997). My lure was played on a FoxPro® brand predator caller programmed with several call types of the saw-whet. Call types played included the breeding male's *toot, toot, toot* as well as a whine call, which is often given during migration (Weidensaul 2015). Calls were obtained from the *Stokes Field Guide to Bird Songs* CDs, by Donald and Lillian Stokes, and are part of the standard procedures for capturing saw-whets.

Upon capture, a bird was taken inside a building for processing. Processing involved sexing, ageing, and banding. Like many raptors, saw-whet owls exhibit reverse sexual dimorphism meaning females are, on average, slightly larger than males (Weidensaul 2015). Accurate sexing of saw-whet owls can only be done by comparing a bird's closed wing-chord (CWC; maintains the wing's natural arc) and its weight. Brinker (2000) created a chart for sexing with ease; it has a >95% probability for accuracy. On average, females have a CWC of 120-141mm and weigh 88 to greater than 93g, while males have a CWC of 120-135mm and weigh less than 78-88g. All birds are weighed in a mesh banding bag using a Pesola spring scale.

Ageing saw-whets involves the use of ultraviolet (UV) light to fluoresce porphyrin pigment on the ventral surface of flight feathers (Primaries: P1-P10; Secondaries: S1-S12). In saw-whets, this pigment is pink when fluoresced by UV light. Once exposed to sunlight,

porphyrins begin to fade making different ages of feathers fairly distinct. New feathers fluoresce bright pink, middle-aged feathers are light pink, and old feathers may not show any pink (Weidensaul et al. 2011). Three distinct age classes can be identified using this method (Figure 4). Hatch year (HY) birds exhibit flight feathers of a single age. Second year (SY) individuals exhibit two distinct ages of flight feathers. After second year (ASY) birds exhibit three or more distinct ages of feathers (Pyle 1997). After a saw-whet's second year, its age cannot be identified more specifically unless it was previously banded. Finally, captured birds were banded using a size four short federal band, and released into the night.

Capture rates were calculated for the fall 2015 banding season based on birds captured per 100 net-hours, the standard way of reporting banding effort for saw-whets. Typically, 4 nets were open for 4 hours each night, or 16 net-hours per night. The season capture rate was calculated from the night with the first capture to the night of the last capture.

Results

Over the course of two field seasons, a total of 24 saw-whet owls were captured and banded at the Madison County field site. Ten more were detected vocally, resulting in 34 recorded individuals. In 2014, I did not begin netting efforts until 20 November due to issues in the permitting process. Even so, two individuals were captured and two others detected vocally. The first saw-whet owl was captured on 21 November and was in the company of another individual that was not captured. One of these birds responded to the audio lure earlier the same night. A second bird responded to the audio lure on 6 December, but was not captured. However, an individual was captured the following night of 7 December. Efforts continued through January 2015 and sporadically into February with no captures or vocal detections. With insight

from researchers in central Missouri, the second field season began earlier, on 25 October 2015, and continued through 3 December 2015 (D. Ripper, personal communication). During this time, 22 saw-whets were captured and banded; eight others were detected vocally (Figure 5). The 2015 field season consisted of 23 total nights afield, or 257.3 total net hours. Of these 23 nights, 10 nights had captures (43.5%) and 12 nights had captures or vocal detections (52.2%). On 75.0% of nights when saw-whets were captured or detected, there were more than two captures or detections per night.

The sex ratio of the birds was skewed towards females. Only one individual out of 24 total captures was identified as a male; 23 were females. The single male was captured 21 November 2015 and was aged as a hatch-year bird. The male had a closed wing chord (CWC) of 136mm and weighed 80g. The average CWC of captured females was 141.9mm (+/- 0.57 SE) with a range of 138-146mm. The average weight of captured females was 90.9g (+/- 1.16 SE) with a range of 80-105g.

The age distribution was evenly distributed between the three identifiable classes: HY (n=8), SY (n=7), ASY (n=8), and fourth year (n=1). A saw-whet captured on 7 November 2015, at ONSC, was previously banded at the Linwood Springs Research Station near Stevens Point, Wisconsin on 17 October 2013. It was banded as a second year bird, meaning it was in its fourth year at the time of recapture at my field site. Comparing the ages of captured saw-whets to date of capture, it would appear that hatch-year birds arrive at about the same time as adults (Figure 6).

The capture rate for 2015 was 8.6 birds per 100 net-hours. Records from this research were compared to Arkansas's historic records and show a peak in migration during November;

more specifically the first two weeks in November (Figures 1 and 5). Interestingly, most of the captures seemed to occur during the hours of 2100-2200 and again around midnight (Figure 7).

During the 2015 season, two captures were foreign recaptures (FRs), meaning they were banded somewhere other than the ONSC field site. First was the aforementioned 4-year-old bird banded (0914-53397) in October 2013 in Stevens Point, WI and captured at ONSC in November 2015 (Figure 8). This owl was an underweight (80g) female with a CWC of 144mm, aged fourth year. The second FR occurred on 21 November 2015 and was banded (0914-99385) on 30 September 2015 at Hawk Ridge Bird Observatory near Duluth, Minnesota (Figure 8). The distance between the two research sites is 1186 km indicating the bird averaged at least 23 km/night. This ASY female weighed 91g and had a CWC of 145mm. There was also a local recapture during our 2015 season. This saw-whet, a HY female, was banded at our field site on 7 November 2015. She weighed 86g, slightly underweight. The bird was recaptured the following night, 8 November, weighing 91g and had dried blood on her beak and talons suggesting that she had eaten.

Discussion

From this research, I am able to conclude that the Northern Saw-whet Owl is, in fact, more common in Arkansas than previously thought, at least during fall migration. With only 12 confirmed records throughout the history of bird documentation in Arkansas, capturing the species was not expected. However, with 24 total captures, and 10 additional vocal detections, it is reasonable to think the species previously went undetected, probably due to their secretive nature.

All but one of my captured saw-whets were females. Males are captured with much less frequency further south of the species' normal range (Brittain et al. 2009, Beckett and Proudfoot 2012). Brinker et al. (1997) suggested this is because males do not stray as far from prime breeding habitat, allowing for quicker reoccupation in spring when they are vying for precious cavities for nesting. Or the larger and heavier females may have dietary requirements that are met further south (Weir et al. 1980, Beckett and Proudfoot 2012). Such differential migration is not uncommon in birds and has been documented in the Boreal Owl (*Aegolius funereus*), a close relative of the saw-whet (Brinker et al. 1997).

Based on only one full field season, I cannot attribute much to the equal distribution of age classes that were found. Brittain et al. (2009) found that the number of HY birds fluctuated annually from about 30% to 50% in southern Indiana. At northern locations, HY birds usually appear first in the fall, but our limited data suggest that they arrive at the same time as adults in northwestern Arkansas.

Capture rates in my 2015 season started in late October, peaked during the first few weeks of November, and decreased to no captures after the first week of December. This trend is also similar to that of Missouri (D. Ripper, unpublished data) and slightly before that of northern Alabama, where captures continued into January (R. Sargent, unpublished data). This difference in Alabama might be because those birds are following a different migratory pathway (see below). This peak in early November coincides exactly with the prediction from the model presented in Beckett and Proudfoot (2011) for a northern latitude of about 36 degrees. Our results agree with those authors, that fall migration of saw-whet owls is a uniform front that moves southward as fall progresses.

Weather conditions also appear to play a role in successfully capturing saw-whets. The nights that most birds were captured followed cold fronts from the north, suggesting that migrating birds were riding those fronts. Brittain et al. (2009) also caught more birds in southern Indiana following the passage of fronts and on nights with calm winds (see also Weir et al. 1980). Nights with full moons are typically unproductive (Speicher et al. 2011), because birds can see the mist nets and/or are wary of larger, predatory owls, such as Barred Owls (*Strix varia*), which were commonly heard calling at the ONSC field site. However, four captures were made in late October when the moon was an 85% full waning gibbous. This was probably due to leaves still being on the trees, darkening the forest near our nets.

Based on 4 foreign recovery data from Arkansas and 3 of 4 from Missouri, it would appear that the saw-whets migrating to our region are coming from the western Great Lakes region (Figure 8). Four recoveries from Arkansas include two birds banded in Wisconsin, one from Duluth, MN, and another banded in the Upper Peninsula of Michigan. Three recoveries from Missouri include birds banded in Kellogg, MN, Collegeville, MN, and Silver Islet, Ontario (Figure 8). (The other Missouri bird came from Prince Albert, Saskatchewan, far to the northwest.) These data appear to establish a here-to-fore unknown migration route for saw-whets, flying south or southwest from the western Great Lakes to the Ozarks (see Confer et al. 2014). Birds in Alabama most likely are not coming from the western Great Lakes, but down the Appalachian Mountains, which might explain the longer banding season there.

The fact that 10 vocalizations were observed during this research should also be noted, as vocalizations are thought to be uncommon outside the species' breeding season. The saw-whet owl is so-named by its vocalizations reminiscent of whetting a saw, although it is unknown specifically for which call it was named (Weidensaul 2015). During the 2014 and 2015 field

seasons, several different vocalizations were documented. One of the vocalizations played by the audio lure is the male's territorial *toot, toot, toot* call. No response was heard to this call because it is rarely heard outside breeding season. The second vocalization played by the audio lure is an eerie, drawn out whine call that is heard most frequently in fall and could be a contact call used during migration to locate other individuals (Rasmussen et al. 2008). Most often a response to the whine call was heard, but I documented several other vocalizations as well. Another common call heard during field research was a quick *ksew* or chirping note. This was often elicited by flushing birds while checking nets. Both the *ksew* and squeak seemed to be given by agitated individuals. *Ksew* notes were also heard while listening from a distance, meaning they were probably given off in agitation towards other individuals as well. On one occasion, a two note, squeaking alarm call was heard from a flushing bird. On another occasion, two individuals were heard high up in a tree giving a series of soft chirping notes, seemingly talking back and forth to each other. The saw-whet owl is still vastly understudied outside migration, making it difficult to understand the social context behind most of their vocalizations.

Based on the scattered historic records, it would appear saw-whets could be found throughout Arkansas. There are also other large tracts of suitable cedar habitat in northwestern Arkansas. Thanks to publicity of this project, I was contacted by Becky Christenson, who had 2 images of a saw-whet owl from a trail camera that she had set up on her property approximately 16 km south of Kingston (Madison Co.) on County Road 3655. Presumably the same bird, the first image was taken at night on 23 December 2014 and the second image was taken on 12 January 2015. Her property is about 32 km due south of the research site at Ozark Natural Science Center. This is likely just one of several unknown and unreported individuals.

After early December, our capture rates drop to zero and saw-whets seem to vanish. I continued banding operations into January and early February of 2015, but caught or heard no birds. The banding station in Missouri also typically shuts down after the first week of December as they do not catch any birds after that time (D. Ripper, personal communication). However, sporadic records in Arkansas from December to February suggest that some individuals may spend the winter here. Is this suggestive of the population as a whole or just these few individuals?

There are several possibilities: First, they could be going further south, but there are no records in southern Arkansas and almost none in Louisiana. Second, they could be spending winter in the Ozarks, but they no longer respond to audio lures after late November. Third, they could be returning north in December, but that seems to oppose the logic behind migration. Or they could be doing something completely different, like wandering throughout winter, as has been found in Snowy Owls (*Bubo scandiacus*) (Norman Smith, pers. comm.).

From this study, it can be concluded that Arkansas is most likely in a previously unknown migratory pathway for the saw-whet owl. This research has more than doubled the state's previous 12 records in just two field seasons. One thing is certain, a species with such gaps in its natural history is dangerous in today's ever-progressing world. The goal of this research, and future projects, is to learn more about the migration of the Northern Saw-whet Owl in Arkansas and the southern region. Further research will be imperative to this secretive species' conservation in the future.

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Literature Cited

- Anonymous. 1857. Introduction. Pages xiii-xvii. In: Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean. Volume VIII. Part I. General report upon the zoology of the several Pacific railroad routes. A. O. P. Nicholson, Washington, D.C.
- Baird, S. F. 1858. Birds. Pages 1-1005. In: Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean. Volume IX. Part II. General report upon the zoology of the several Pacific railroad routes. Beverly Tucker, Washington, D.C.
- Beckett, S. R., and G. A. Proudfoot. 2011. Large-scale movement and migration of Northern Saw-Whet Owls in eastern North America. *Wilson Journal of Ornithology* 123:521-535.
- Beckett, S. R., and G. A. Proudfoot. 2012. Sex-specific migration trends of Northern Saw-Whet Owls in eastern North America. *Journal of Raptor Research* 46:98-108.
- Brinker, D. F., K. E. Duffy, D. M. Whalen, B. D. Watts, and K. M. Dodge. 1997. Autumn migration of Northern Saw-whet Owls (*Aegolius acadicus*) in the middle Atlantic and northeastern United States. Pages 74–89 in Duncan, J. R., D. H. Johnson, and T. H. Nicholls. [Eds.]. *Biology and conservation of owls of the northern hemisphere: second international symposium*. USDA Forest Service Gen. Tech. Rep. NC-190.
- Brinker, D. F. 2000. Sex Criteria for Northern Saw-whet Owls. Project OwlNet. Retrieved from www.projectowl.net
- Brittain, R. A., V. J. Meretsky, J. A. Gwinn, J. G. Hammond, and J. K. Riegel. 2009. Northern Saw-Whet Owl (*Aegolius acadicus*) autumn migration magnitude and demographics in south-central Indiana. *Journal of Raptor Research* 43:199-209.
- Confer, J. L., L. L. Kanda, and I. Li. 2014. Northern Saw-whet Owl: regional patterns for fall migration and demographics revealed by banding data. *Wilson Journal of Ornithology* 126:305-320.
- Erdman, T.C., & D. F. Brinker. 1997. Increasing mist net captures of migrant Northern Saw-whet Owls *Aegolius acadicus* with an audiolure. Pages 533-544 in Duncan, J. R., D. H. Johnson, and T. H. Nicholls. [Eds.]. *Biology and conservation of owls of the northern hemisphere: second international symposium*. USDA Forest Service Gen. Tech. Rep. NC-190.
- Howell, A. H. 1911. Birds of Arkansas. U.S. Department of Agriculture. Biological Survey – Bulletin No. 38.
- James, D. A., and J. C. Neal. 1986. Arkansas Birds – Their distribution and abundance. University of Arkansas Press, Fayetteville.
- Kennerly, C. B. R. 1859. Report on Birds collected on the route. Pages 19-35. In: Reports of Explorations and Surveys, to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean. Volume X. Part 6. Report of Exploration for a Railway Route (near the thirty-fifth Parallel of North Latitude) from the Mississippi River to the Pacific Ocean. Zoological Report. A. O. P. Nicholson, Washington, D.C.
- Project OwlNet. 2016. <http://www.projectowl.net>

- Pyle, P. 1997. Identification guide to North American birds. Volume 1. Slate Creek Press, Bolinas, California, USA.
- Rasmussen, J. L., S. G. Sealy, and R. J. Cannings. 2008. Northern Saw-whet Owl (*Aegolius acadicus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/042/>
- Speicher, J., L. Schreffler, and D. Speicher. 2011. Lunar influence on the fall migration of Northern Saw-whet Owls. *Wilson Journal of Ornithology* 123:158-160.
- Weidensaul, C. S. 2015. Peterson Reference Guide to Owls of North America and the Caribbean. Houghton Mifflin Harcourt, New York, New York.
- Weidensaul, C. S., B. A. Colvin, D. F. Brinker, J. S. Huy. 2011. Use of ultraviolet light as an aid in age classification of owls. *Wilson Journal of Ornithology*. 123:373-377.
- Weir, R.D., F. Cooke, M.H. Edwards, and R.B. Stewart. 1980. Fall migration of saw-whet owls at Prince Edward Point, Ontario. *Wilson Bulletin* 92:475–488.
- Wright, M. H., and G. H. Shirk. 1949. The journal of A. W. Whipple. *Chronicles of Oklahoma* 28:235-283.

Figures

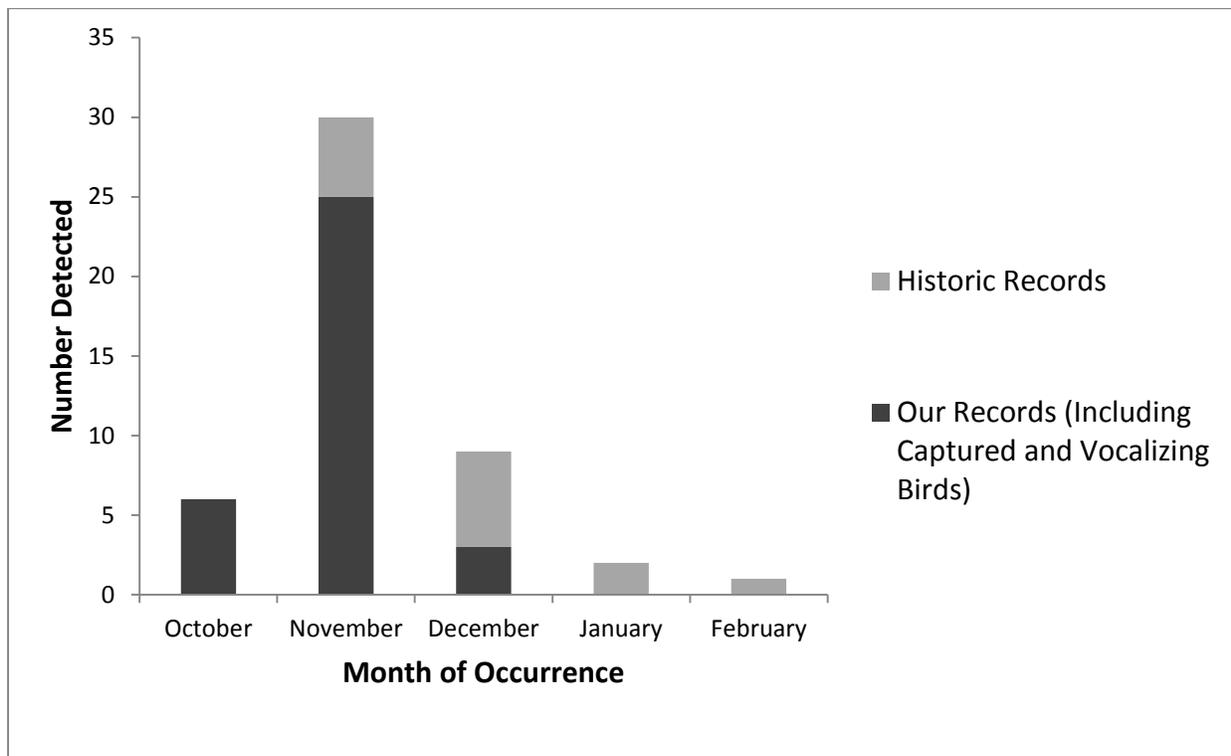


Figure 1. Arkansas saw-whet owl records from 1959 through 2015 by month. The historic records are from the Arkansas Audubon Society database and include the two game-camera records from Madison County in December 2014 and January 2015 mentioned in the text.

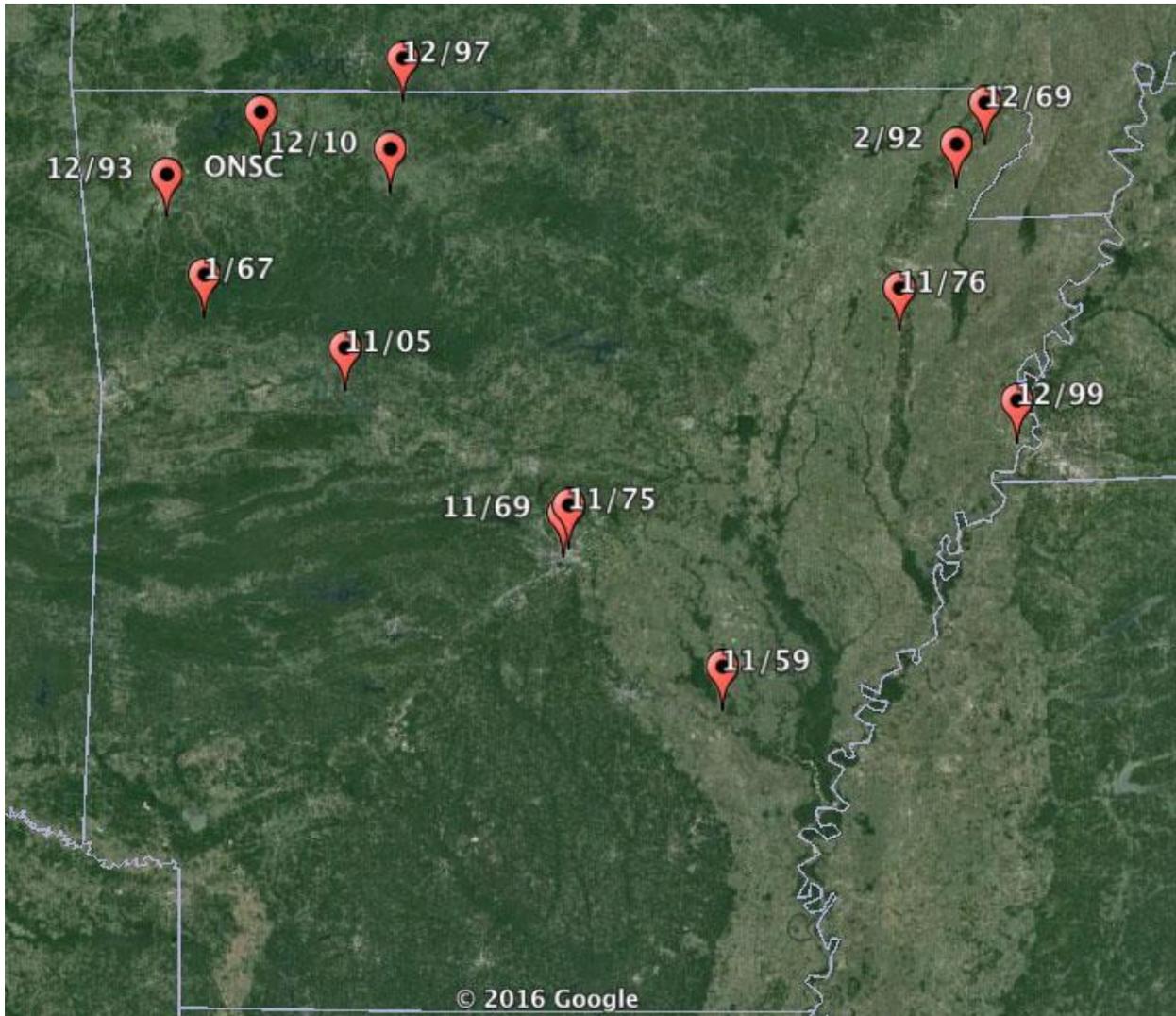


Figure 2. Distribution of the first 12 records from Arkansas with the month and year of each sighting. ONSC refers to the location of this field study. Note that most sightings are associated with heavily forested areas on the background map.



Figure 3. Photograph of saw-whet owl taken the day before by Larry Obsitnik that appeared on the front page of the *Arkansas Gazette* on 8 November 1969. He had no idea what the owl was and was making a joke about the owl not being able to read the sign. Doug James identified the bird from the picture in the newspaper and obtained a copy of the picture for the Arkansas Audubon Society files. (Photo courtesy of Lyndal York)

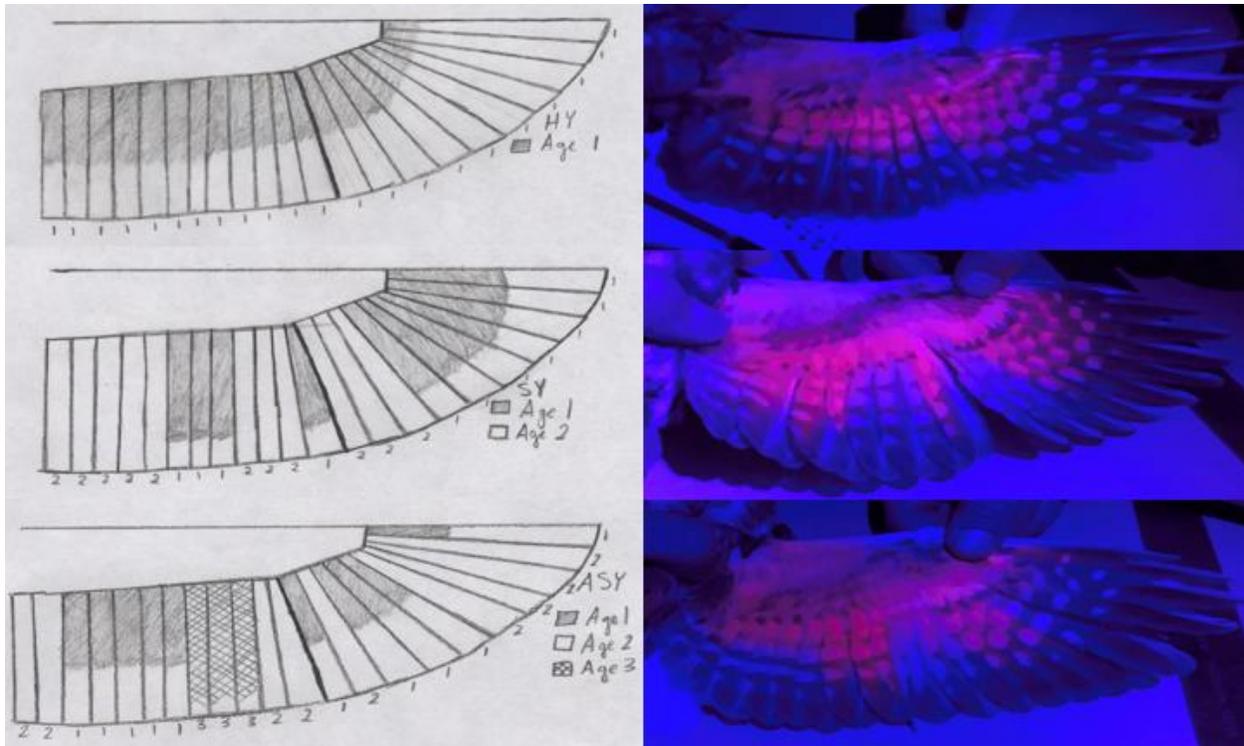


Figure 4. Age classes of the saw-whet owl based on fluorescence of porphyrin on the underwing. Top: Hatching-year bird with uniform color indicating that all feathers are new. Middle: Second-year bird with 2 different kinds of feathers: new feathers are bright while second-year feathers are faded. Bottom: After second-year bird with 3 different kinds of feathers: new feathers are bright, second year feathers are paler, and third year feathers hardly fluoresce. (Photos and drawings by Mitchell Pruitt 2015)

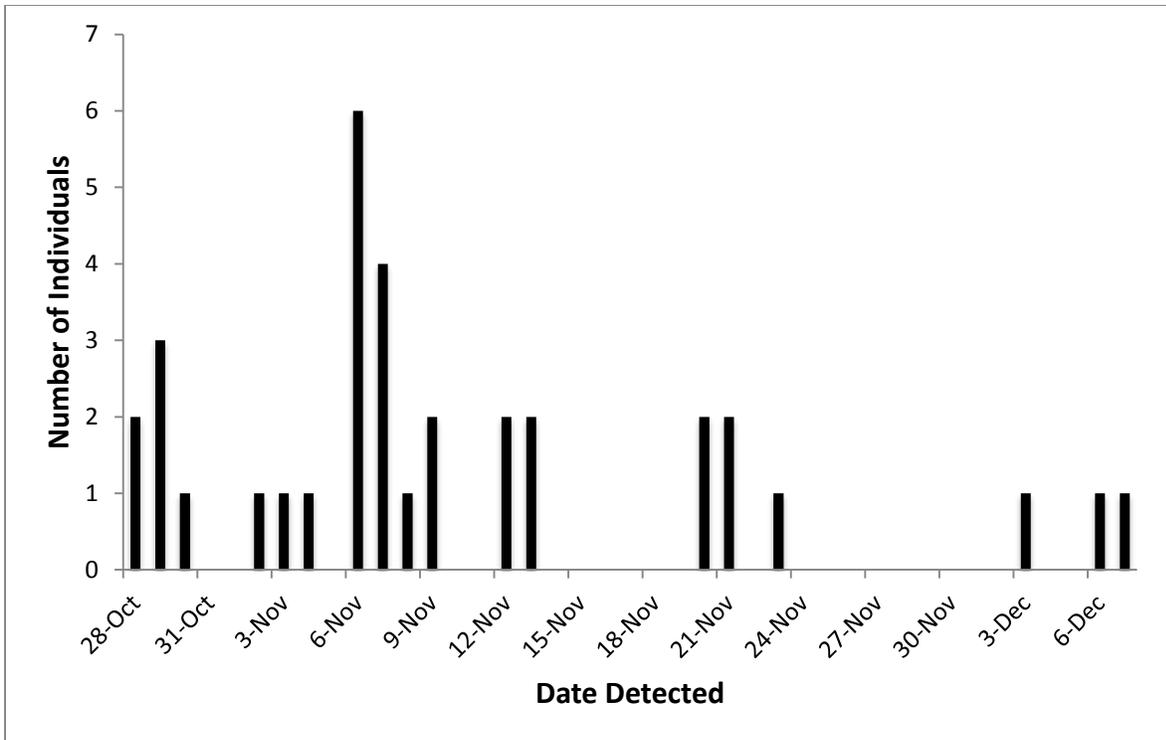


Figure 5. Saw-whet detections (capture or vocal) at Ozark Natural Science Center during November and December 2014 and October to December 2015 (combined).

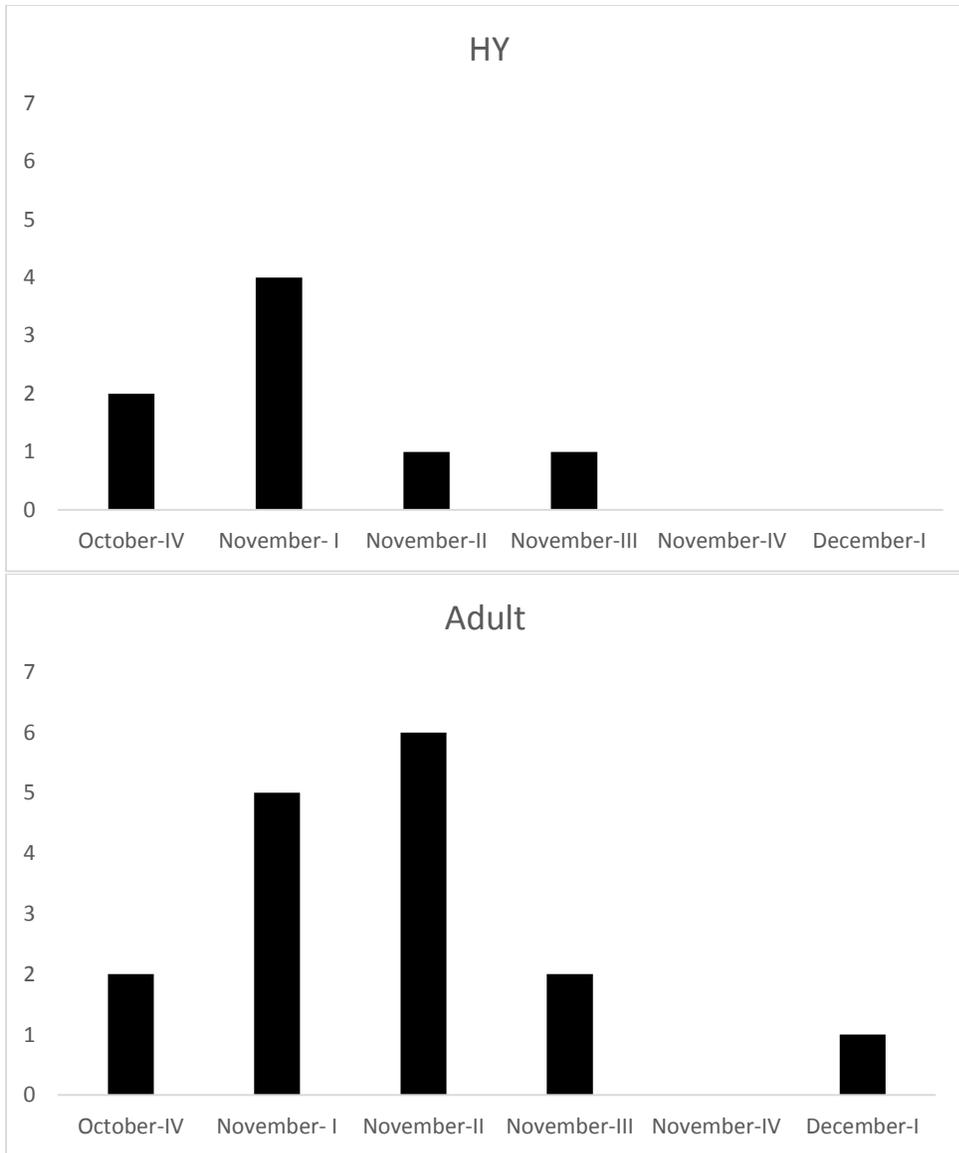


Figure 6. Arrival of hatch-year (HY) and adult saw-whet owls by week from the 4th week of October through the first week of December. Hatch-year birds appear to arrive at the same time as adults.

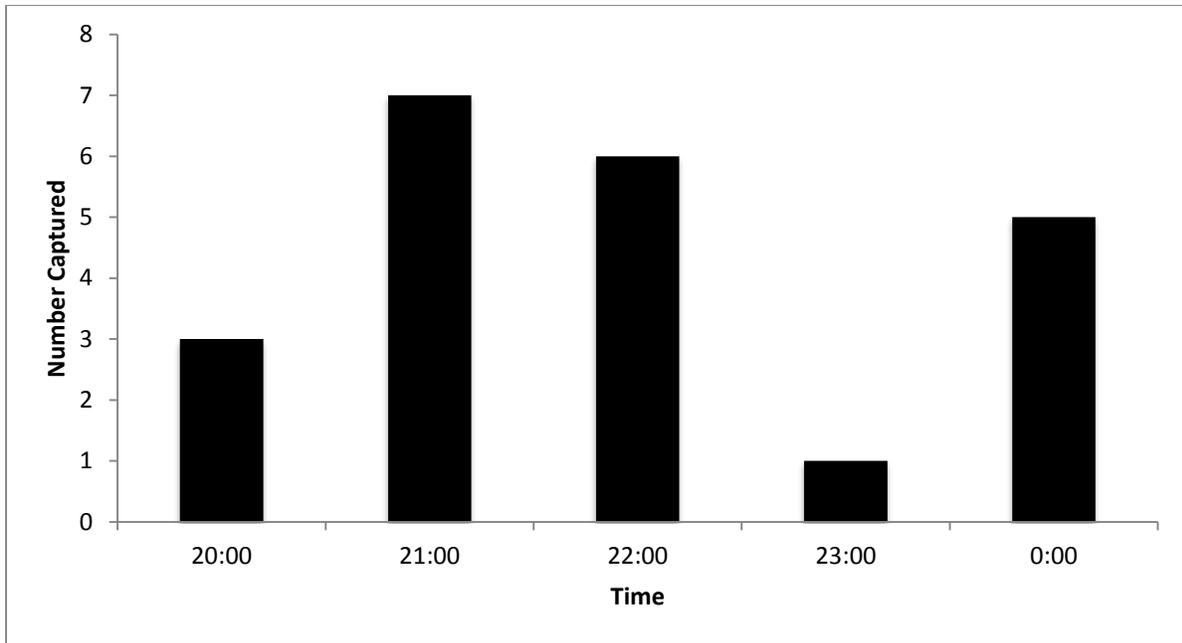


Figure 7. Saw-whets captured per hour at Ozark Natural Science Center during November and December 2014 and October to December 2015.

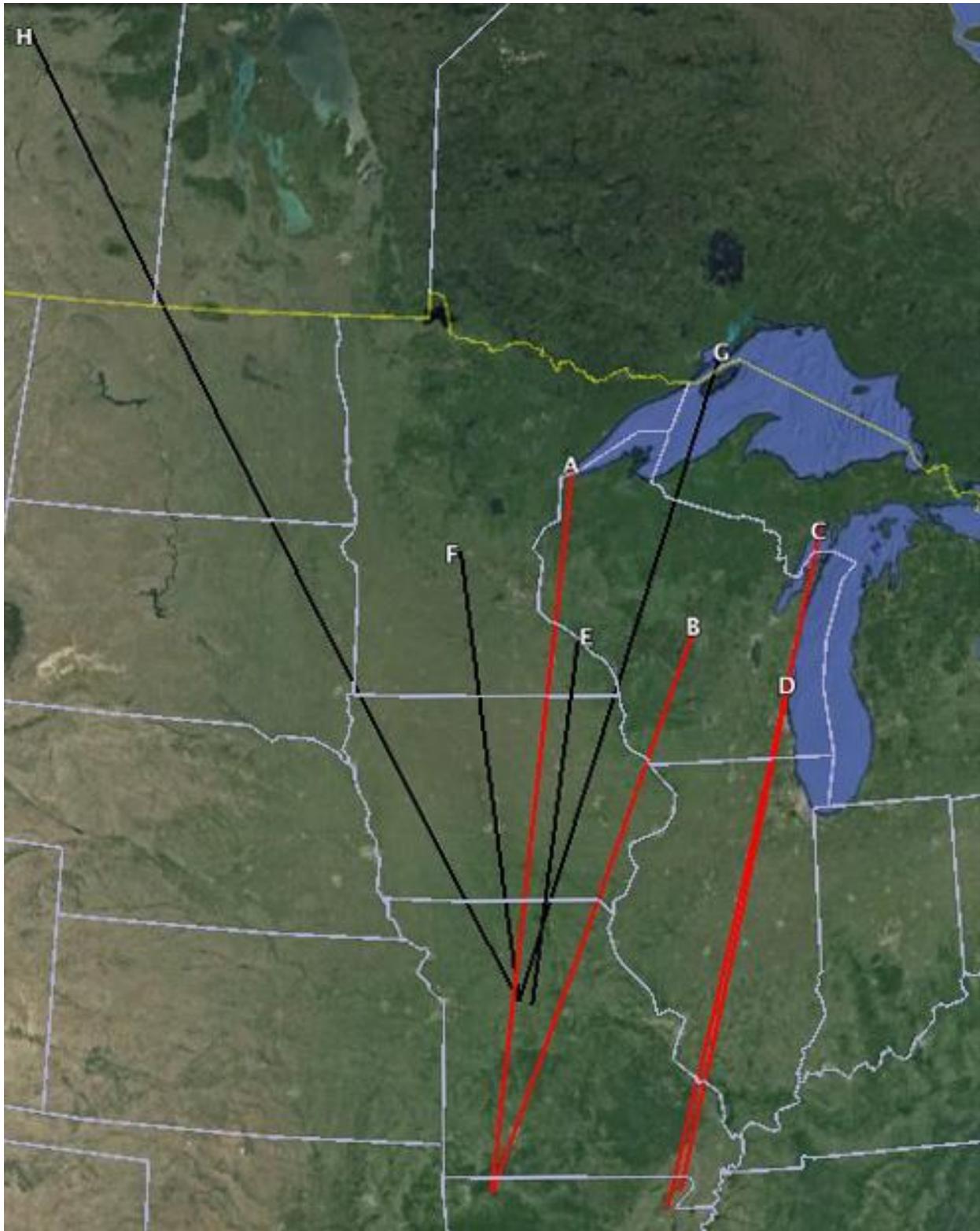


Figure 8. Banding recoveries from Arkansas (red) and from the Missouri River Bird Observatory (black). Most birds appear to be coming from the western Great Lakes region.

Key (banded, recovered): A (9/15, 11/15), B (10/13, 11/15), C (10/90, 2/92), D (11/69, 12/69), E (10/15, 11/15), F (10/15, 11/15), G (?/13, 10/14), H (9/12, 10/12)