Journal of the Arkansas Academy of Science

Volume 65

Article 26

2011

The Efficacy of Thermal Imaging Technology for Documenting American Woodcock on Pine Stands

A. Long
University of Arkansas at Monticello, aklong@ufl.edu

A. Locher
University of Arkansas at Monticello

Follow this and additional works at: https://scholarworks.uark.edu/jaas

Part of the Science and Technology Studies Commons, and the Zoology Commons

Recommended Citation

Long, A. and Locher, A. (2011) "The Efficacy of Thermal Imaging Technology for Documenting American Woodcock on Pine Stands," *Journal of the Arkansas Academy of Science*: Vol. 65 , Article 26.
DOI: https://doi.org/10.54119/jaas.2011.6521
Available at: https://scholarworks.uark.edu/jaas/vol65/iss1/26

This article is available for use under the Creative Commons license: Attribution-NoDerivatives 4.0 International (CC BY-ND 4.0). Users are able to read, download, copy, print, distribute, search, link to the full texts of these articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the author.
This General Note is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in Journal of the Arkansas Academy of Science by an authorized editor of ScholarWorks@UARK. For more information, please contact scholar@uark.edu.

The Efficacy of Thermal Imaging Technology for Documenting American Woodcock on Pine Stands

A. Long and A. Locher

University of Arkansas at Monticello, School of Forest Resources, P.O. Box 3468, Monticello, AR 71655

Correspondence: aklong@ufl.edu

Abstract

Thermal imaging technology provides a useful tool to understand nocturnal activity of wildlife. We used thermal imaging to document American woodcock use of pine stands in Arkansas. A thermal imaging camera was used along logging roads on sampling dates ranging from December 2009 – February 2010 and in February 2011. We located 4 woodcock in 2010 in 20.27 hours of sampling within all stand types. For 11.55 h we only sampled pine seedling/clearcut stands due to vegetation structure inhibiting our ability to identify woodcock with the camera. In 2011 we found 2 woodcock in 7.42 hours of sampling on pine seedling/clearcut stands. Detection was highest during the peak in woodcock courtship and it increased by 75% when only pine seedling/clearcut stands were sampled in 2010. We detected almost 2 times as many woodcock per hour in 2010 than 2011. We feel that thermal imaging is a viable tool for documenting woodcock. However, we suggest that a handheld thermal camera be used as this would likely increase woodcock detection.

Introduction

Thermal imaging technology provides wildlife researchers with an opportunity to study nocturnal species and document their activity. Most research regarding the efficacy of thermal imaging in wildlife population monitoring has focused on its use in studying mammals (e.g. deer). Less has been done to document the practicality of using this technique for birds. Research has shown mixed reviews regarding the utility of thermal imaging for locating birds, particularly with small bird species (Boonstra et al. 1995, Galligan et al. 2003, Locke et al. 2006) although studies completed documenting birds in flight during migration have been successful (Gauthreaux and Livingston 2006). As few studies on this have been completed, more needs to be done to understand thermal imaging and its use in surveying avian populations as it provides a non-invasive tool for wildlife researchers.

We used thermal imaging technology to document nocturnal habitat use of the American woodcock (*Scolopax minor*) on pine clearcuts in south-central Arkansas. The woodcock is a mid-sized gamebird whose cryptic coloration makes it difficult to locate (Keppie and Whiting 1994). During the nocturnal periods they will often use fields or clearcuts for feeding and roosting activities (Keppie and Whiting 1994). Thus, thermal imaging may provide a useful tool in detecting their nocturnal activity in lieu of other techniques which are more invasive (e.g. spot-lighting).

The goal of our study was to determine the feasibility of using thermal imaging technology in documenting woodcock use of pine plantations. In the future thermal imaging may provide a viable method for assessing woodcock use of vegetation, in censusing of their populations across their range, and in locating individuals for banding and telemetry studies particularly in areas with limited vegetation structure.

Materials and Methods

Our study site was located on privately owned land within the West Gulf Coastal Plain in Cleveland and Bradley Counties, Arkansas. The site (approximately 23,500 ha) was bordered on the east by the Saline River, 8 km north of Warren, Arkansas, in a portion of Arkansas deemed as a high-priority management area for woodcock (Myatt and Krementz 2007). The study area was comprised of approximately 35% bottomland hardwoods and 33 % loblolly pine (*Pinus taeda*) plantations. The remaining 32% was comprised of pines and mixed hardwood-pine stands.

We conducted thermal imaging along logging roads on 10 occasions between December 16, 2009 and February 6, 2010 and 7 occasions between February 7 and 22, 2011. We began thermal imaging approximately 1 hr after sunset and completed surveys by 2300. No set routes were followed but the individual clearcuts were surveyed > 2 nights apart to account for variation in detection due to migration. All stand types were surveyed on 16 December 2009 and 5 – 6 January 2010. Due to low visibility in mature forested vegetation, only new clearcuts and pine seedling stands were surveyed for the remaining surveys in 2010 and 2011.

We surveyed each route using a Mitsubishi IR-M700 thermal infrared imager (Mitsubishi Electric Corporation, Canada) equipped with a 50 mm lens. The camera was held by an observer on the edge of the field truck and the angle was adjusted relative to clearcut topography. Output was sent to a digital video cassette recorder (Sony DCR-TRV900) being monitored by a 2nd observer. When a potential woodcock was located, a 3rd observer used a spotlight and walked to the location to validate woodcock presence.

The number of woodcock/h was calculated when all stand types were sampled in 2010, only new clearcuts and pine seedling stands were sampled when no woodcock were courting, when woodcock were courting, and during the peak in woodcock courting. The peak in woodcock courting was based on woodcock counts from crepuscular surveys completed from January – February 2010 and 2011 during a concurrent study completed on the study site on woodcock migration.

Results

Four woodcock were located in pine seedling and clearcut stands from December 16th, 2009 – February 6th 2010 during 20.27 hours of sampling in all stand types. For 11.55 hours, only pine seedling and clearcut stands (0.35 woodcock/h) with less dense vegetation structure were sampled, and encounter rate was 75% greater than when all stands were sampled (0.2 woodcock/hr). Woodcock were courting for 9.88 of the 11.55 hours sampled and no woodcock were found when woodcock were not courting. Over twice as many woodcock were located during the peak in woodcock courting in early-February (Table 1).

In 2011, 2 woodcock were located in 7.42 hours. Number of woodcock located per hour was 0.27/h. There was a 50 % decrease in woodcock encounter rate in 2011 compared to 2010 (Table 1).

Discussion

Although our results show limited utility of thermal technology for making population inferences, we found that thermal imaging may provide a viable tool in locating woodcock during their peak use on new clearcuts and pine-seedling stands. We were able to document woodcock with comparable rates to capture rates associated with studies completed in Maine, New York, Pennsylvania, West Virginia, and Michigan (0.39 – 0.65 woodcock/man hour) (Hale and Gregg 1976). Moreover, our encounter rate exceeded capture rates in 2010 during the period of peak woodcock use. However, as probability of capture is not 100 percent, the encounter rate would need to exceed these capture rates to justify the use of thermal imaging due to the high cost differential.

Table 1. The number of woodcock found per hour using thermal imaging in new clearcuts/pine seedling stands when woodcock were not courting, during woodcock courting, and during the peak in woodcock courting in Warren, AR from January - February 2010 and 2011.

	Woodcock/h	
Sampling	2010	2011
Non-courting	0.00	-
Woodcock courting	0.41	0.27
Peak woodcock courting	1.14	-

Interestingly our detection rates in 2011 were much lower than in 2010. Berdeen and Krementz (1998) suggested that woodcock may be forced into less suitable habitat in the Southeastern United States due to the increased propensity of wintertime flooding of bottomland hardwoods, the woodcock's preferred diurnal grounds during winter (Keppie and Whiting 1994). As 2009 was a flood prone year and much of our study site was flooded, it is likely that woodcock in 2010 may have had less area available to them in 2010 causing their numbers to increase in other stands. Thus, detecting less woodcock with thermal imaging may be explained by flooding as we followed the same routes both years and sampled the same stands.

Several factors limited our ability to detect woodcock using thermal imaging. First, we found that thermal imaging was not useful in finding woodcock in stands greater than 1 year old due to the increased density of vegetation. Similarly, the topography of the clearcuts were so varied that this likely limited the range in which we could detect woodcock. Due to this and our survey methodology, we were limited to encountering woodcock along roads. If woodcock are less likely to use areas near roads, this may have affected our encounter rate. Moreover, we were often

https://scholarworks.uark.edu/jaas/vol65/iss1/26
DOI: https://doi.org/10.54119/jaas.2011.6521

confused by logs and other debris within the clearcut due to the woodcock's thermal signature not having a high enough contrast to distinguish between them and other debris (Figure 1).

We feel that the use of a handheld thermal imaging camera for documenting woodcock should be explored. This method would provide more versatility as it would account for variability in topography by allowing the individual to adjust the thermal camera more accurately than from a vehicle. Furthermore, a handheld thermal camera would allow for all woodcock to be sampled, not just individuals along the roads as the individual could walk through the stands. Using a handheld thermal camera would likely increase encounter rate making this technology useful in censusing woodcock populations and for woodcock banding and telemetry studies.

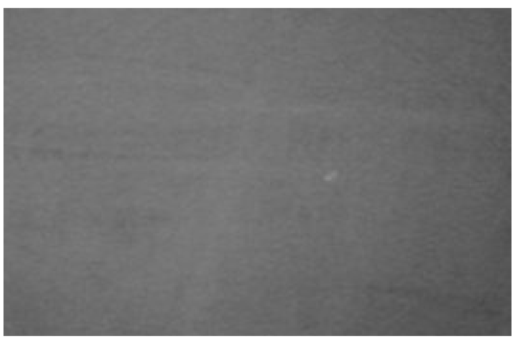

Figure 1. The thermal signature of a woodcock found in a pine seedling stand in Warren, AR in February 2011.

Acknowledgments

We thank the United States Fish and Wildlife Service Division of Migratory Birds, the Arkansas Audubon Society Trust, and the University of Arkansas at Monticello School of Forest Resources for their financial support. Also thanks to T. Holloway, C. Stehle, F. Stephens, C. Cormier, J. Whitaker, S. Breedlove, and other volunteers for their hours spent thermal imaging.

Literature Cited

Berdeen JB and **DG Krementz**. 1998. The use of fields at night by wintering American woodcock. Journal of Wildlife Management 62:939-47.

Boonstra R, **JM Eadie**, **CJ Krebs** and **S Boutin**. 1995. Limitations of far infrared thermal imaging in locating birds. Journal of Field Ornithology 66(2):192-8.

Galligan EW, **GS Bakken** and **SL Lima**. 2003. Using a Thermographic Imager to Find Nests of Grassland Birds. Wildlife Society Bulletin 31(3):865-9.

Gauthreaux SA and **JW Livingston**. 2006. Monitoring bird migration with a fixed-beam radar and a thermal-imaging camera. The Journal of Field Ornithology 77(3):319-28.

Hale JB and **LE Gregg**. 1976. Woodcock use of clearcut aspen stands in Wisconsin. Wildlife Society Bulletin 4(3):111-15.

Keppie DM and **RM Whiting**, **Jr**. 1994. American woodcock (*Scolopax minor*). *In:* A. Poole, editor. The birds of North America online. No. 100. Ithaca: Cornell Lab of Ornithology. Available at: http://bna.birds.cornell.edu/bna/species/100. Accessed 2009 Sept 15.

Locke SL, **RR Lopez**, **MJ Peterson**, **NJ Silvy** and **TW Schwertner**. 2006. Evaluation of portable infrared cameras for detecting Rio Grande wild turkeys. Wildlife Society Bulletin 34(3):839-44.

Myatt NA and **DG Krementz**. 2007. Fall migration and habitat use of American woodcock in the central United States. Journal of Wildlife Management 71(4):1197–205.