

Two additional methods warrant mention for their potential to complement the migrant censusing methods we analyzed: Radar images of nocturnal migrants and standardized daytime observations. Radar images cannot normally reveal the species identity of migrating birds, but they can be used to study overall densities of migrating birds over large spans of time and space (Gauthreaux Jr. et al. 2005). As such, they have tremendous value as a

way to analyze overall migrant flow over large areas, and the migration behavior of birds in relation to weather patterns.

Counts based on daytime acoustical/visual observations of birds by experienced observers can provide an important complement to mist-netting and nocturnal flight call recording as a species-specific migrant songbird censusing tool. Many of the species missed by the

latter methods are easily observable and countable, particularly species of the canopy or open country habitat that are either silent, or give unidentifiable calls while migrating at night, such as many species of warblers and vireos. In order to serve as an effective monitoring instrument, such observations would have to be conducted by experienced observers, and be highly standardized in terms of time, space, and sampling effort.

## Acknowledgements

Dawn Hutchinson, Chris Skan, and many other volunteers of the Shaw Woods Avian Monitoring Project (SWAMP) assisted with bird mist-netting and banding. The many volunteers associated with the Chicago Bird Collision Monitor and Rescue Project saved many birds' lives and produced many valuable museum specimens as they gathered the window collision data.

We thank the Lake Forest Open Lands Association for permitting and facilitating the completion of the mist-netting fieldwork on the Skokie River Nature Preserve.

Financial support for the completion of this research was provided by Lake Forest College, Chicago Wilderness Grant #FWS0411, and by the many donors to Lake Forest College's SWAMP fund.

## Literature Cited

Bueter, C., B. Larsen, K. Lawser, K. Nikogosian, C. Gordon. 2006. Arrival dates and recapture patterns of spring migrant songbirds in Northeastern Illinois. *Meadowlark* 15:2-9.

Charif, R.A., S. Mitchell, and C. W. Clark. 1995. CANARY 1.2 User's Manual. Cornell Laboratory of Ornithology, Ithaca, New York.

Clark, C.W., P. Marler, and K. Beeman. 1987. Quantitative analysis of animal vocal phonology – An application to Swamp Sparrow song. *Ethology* 76:101-115.

Derlindati, E. J., and S. M. Caziani. 2005. Using canopy and

understory mist nets and point counts to study bird assemblages in chaco forests. *Wilson Bulletin* 117:92-99.

Evans, W.R., and M. O'Brien. 2002. Flight calls of migratory birds: Eastern North American Landbirds. Old Bird Inc.

Farnsworth, A. 2005. Flight calls and their value for future ornithological studies and conservation research. *Auk* 122:733-746.

Gauthreaux Jr., S. A., J. E. Michi, and C. G. Belser. 2005. The temporal and spatial structure of the atmosphere and its influence on bird migration strategies. Pp 182-193 in R. Greenberg and P. P. Marra (eds.) *Birds of Two Worlds*. The Johns Hopkins University Press, Baltimore. 464 pp.

Gordon, C. E., B. Skinner, R. Gratis, 2002, Chicagoland's first spring migration bird banding station: first year of results and comparison with other North American data sets, *Meadowlark* 11:122-129.

Graber, R. R. 1968. Nocturnal migration in Illinois – different points of view. *Wilson Bulletin* 80:30-71.

Graber, R. R. and W. W. Cochran. 1959. An audio technique for the study of nocturnal migration of birds. *Wilson Bulletin* 71: 220-236.

Graber, R. R. and W. W. Cochran. 1960. Evaluation of an aural record of nocturnal migration. *Wilson Bulletin* 72:253-273.

National Audubon Society. 2005. State of the birds USA 2004. From *Audubon Magazine*, September-October 2004. <http://www.audubon.org/bird/stateofthebirds/>

National Audubon Society. 2007. Common birds in decline. From the National Audubon Society website. <http://stateofthebirds.audubon.org/cbid/>

Pyle, P. 1997. Identification Guide to North American Birds. Part 1. Slate Creek Press, California, 732 pp.

Remsen, Jr., J.V. and Good, D.A. 1996. Misuse of data from mist-net captures to assess relative abundance in bird populations. *Auk* 113:381-398.

Sibley, D.A. 2000. *The Sibley Guide to Birds*. Alfred A. Knopf, New York, 544 pp.

Syrinx. Version 2.5q. Copyright 1995-2005. John Burt.

Wang, Y., and D. M. Finch. 2002. Consistency of mist netting and point counts in assessing land-bird species richness and relative abundance during migrations. *Condor* 104:59-72.

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