The passenger pigeon. Vol. 51, No. 4 Winter 1989

Madison, Wis.: Wisconsin Society for Ornithology, Winter 1989

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THE PASSENGER PIGEON
Vol. 51 No. 4
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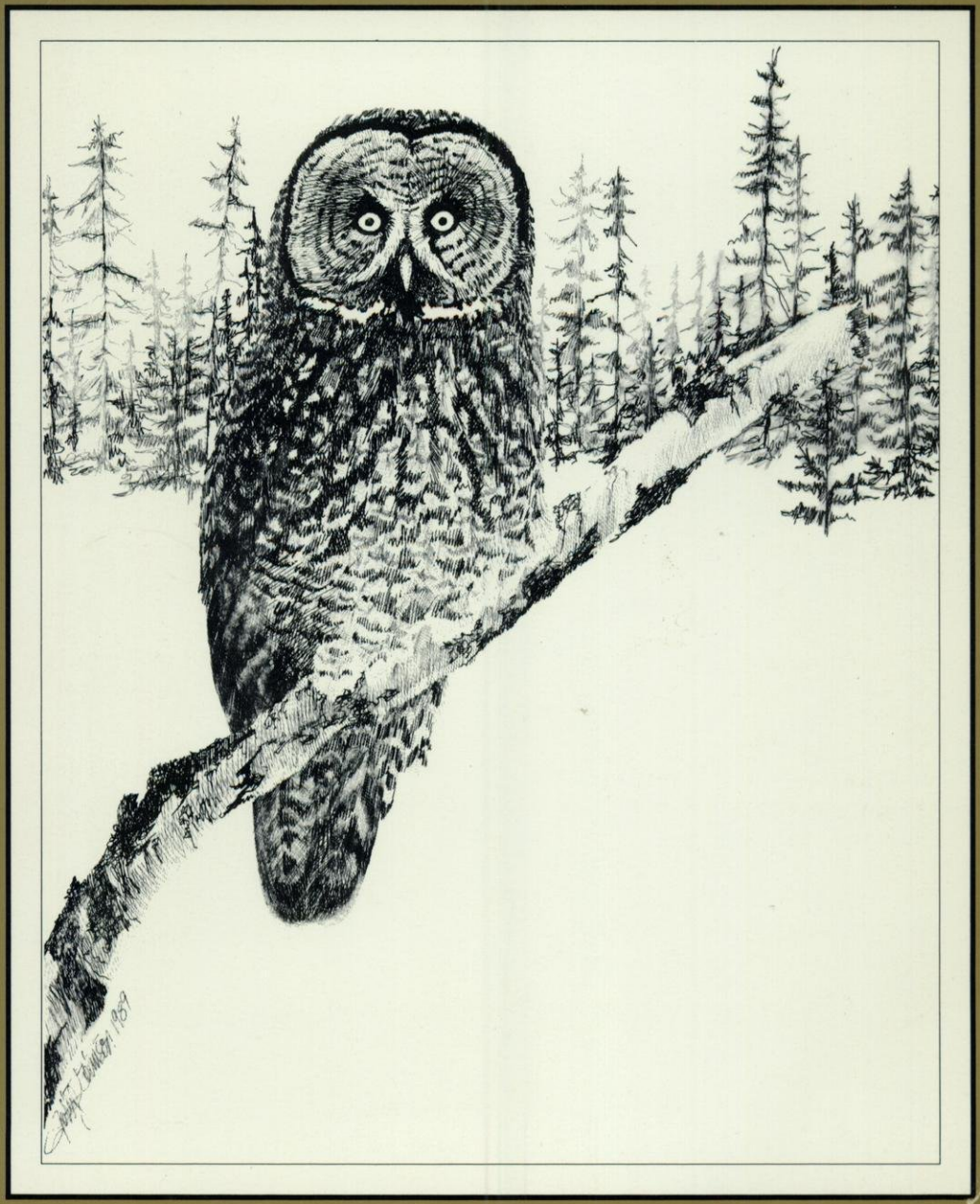
JOURNAL OF THE WISCONSIN SOCIETY FOR ORNITHOLOGY



1939 – 50th ANNIVERSARY – 1989

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The Passenger Pigeon (ISSN 0031-2703) is published quarterly (Spring, Summer, Fall, and Winter) by The Wisconsin Society for Ornithology, W330 N8275 West Shore Drive, Hartland, WI 53029. Subscription rates are: Individual, $12 per year; Family, $15 per year; Sustaining, $25 per year; Library, $18 per year; Life, $200; and Patron, $750. Back issues may be obtained from the Supply Department for $5.00 each. Send change of address requests to Memberships, W330 N8275 West Shore Drive, Hartland, WI 53029.

Send all manuscripts and correspondence to the Editor; information for "Seasonal Field-Notes" should be sent to the Associate Editor or the appropriate Field-Note Compiler. Manuscripts that deal with information on birds in the State of Wisconsin, with ornithological topics of interest to WSO members, or with activities of the WSO will be considered for publication. All manuscripts submitted for possible publication should be typewritten, double-spaced, and on only one side of page-numbered typing paper. Illustrations should be submitted as photographs or good-quality drawings. Keep in mind that illustrations must remain legible when reduced to fit on a journal page. All English and scientific names of birds mentioned in manuscripts should follow *The A.O.U. Checklist of North American Birds (6th Edition)*. Use issues after Vol. 50, No. 1, 1988, as a general guide to style.

Wisconsin's Favorite Bird Haunts: The Third Edition

Appreciation and understanding of Wisconsin's birdlife has increased immensely over the fifty-year history of this organization. Basic knowledge about the life histories of our birds has grown. Field identification techniques have become honed through the phenomenal accretion of plumage information and the proficiency of observational skills. Habitat needs and basic bird requirements are better known. Overall, these—along with other biological, social, and cultural factors—have increased the popularity of birding. With this rise in popularity, has come the desire of birders to know more and to share experiences with others.

WSO recognized these trends early on and with the help of Sam Robbins and a handful of volunteers published *Wisconsin's Favorite Bird Haunts* in 1961. This was a small publication covering about twenty-five areas. In 1976 (with a supplement in 1979) a Second Edition of *Wisconsin's Favorite Bird Haunts* was published. This edition contained 102 articles covering about 600 areas. The second edition greatly expanded the 1961 coverage, but it retained the general theme of providing site descriptions and accompanying maps. This edition was edited by Daryl Tessen, and it made extensive use of Wisconsin's burgeoning birding corps.

As with all site guides, after a period of time some descriptions became dated. Roads changed, woods were cut, and wetlands filled. The landscape in our times can go through rapid changes in a short time span. After 10 years the time had come to produce another edition of *Wisconsin's Favorite Bird Haunts.*

WSO needed a person to coordinate the production and edit the product. Daryl Tessen was asked to be editor again, and fortunately for us he accepted the task. The decision was made to keep the same format of site descriptions and maps. In addition, the paper and binding used in 1976 made for durability in the field, and they would be used again. New items would include complete revisions of articles, all new maps, art work and colored covers.

The Third Edition of *Wisconsin's Favorite Bird Haunts* is now completed. It is not just an update of the second edition; it is completely re-written with new maps and loaded with art work. This edition contains 120 articles covering approximately 900 areas within the state. Every county in Wisconsin is covered. These articles were written by more than sixty enthusiastic birders throughout the state. Each article is accompanied by at least one map. Every map is a new one developed and drawn by Rick Robbins. Liberally scattered throughout the book is the art work of Tom Schultz, Rockne Knuth and Carroll Rudy.

This edition has colored covers with a Wilson's Phalarope on the front cover and a waterfowl scene on the back cover. Both covers are the art work of Tom Schultz. The edition also contains a complete Wisconsin bird list, current as of September, 1989. Independent Printing of De Pere, with the support and help-

ful guidance of Ellen Everson and company president, Peter Thomson, has published the book again.

Although many people deserve accolades, none deserves more than Daryl Tessen. Daryl has spent a considerable portion of the past two and one-half years bringing this book together. His seemingly tireless efforts have truly made this book what it is. Asking only to be reimbursed for expenses, his time was entirely on a volunteer basis. In today's society, this kind of dedication is rarely given the recognition it deserves. The only appropriate recognition is to buy and use the book, and when the opportunity arises let Daryl know we appreciate his efforts. Daryl, WSO thanks you.

One final item, WSO regards this book as a service to the interested birders of the world. The $20.00 price tag will just barely recoup our costs over the next several years. It is not a money-making scheme for the organization. If any profits for the organization are made, they would have to come in the form of someone underwriting the book to help pay expenses.

Randy Hoffman

President

Surviving the Winter: The Physiology of Thermoregulation in Winter Birds

Winter is a stressful season of the year for birds of northern latitudes. Birds show many adaptations for winter survival, and some of these involve the challenge of maintaining body temperature. This article describes how birds regulate their body temperature in the cold of winter.

by Patrick T. Collins

The winter environment in arctic, subarctic, and temperate latitudes poses a number of challenges to small homeotherms. The combined factors of severe cold, lowered food availability, and shortened day length make maintenance of a high and constant body temperature much more challenging for these same animals than in the summer. There are three common strategies for dealing with the problems of winter. Mobile animals, such as birds can migrate to more hospitable climates. Less mobile animals, such as some small mammals, hibernate, and still others possess numerous adaptations which allow them to remain active in the temperate zone during winter. In this paper, I describe some of these adaptations as they relate to thermoregulation in birds. The primary focus is on physiological processes, but because both morphology and behavior are intimately tied to thermoregulation, I also will consider their importance.

Heat Production

There are two major methods involved in maintaining a high and constant body temperature in a cold environment, both of which are used by all birds to some degree when the temperature falls. The first one I will consider is the production of additional metabolic heat to compensate for the inevitable loss of heat to the environment.

The primary method of augmenting heat production in wintering birds is through muscular activity (Dawson and Hudson 1970). This muscular activity may be either shivering or exercise and must be fueled during the critical overnight period with stored energy in the form of either raw food items in the digestive tract or chemical stores in the body. Carey et al. (1978) found higher stores of glycogen in the pectoral muscles of winter goldfinches compared to summer individuals, and these winter

birds were able to use this glycogen and other stores of lipid for heat production when exposed to extremely low temperatures (−70°C). Summer goldfinches without these stores were unable to maintain thermal control at the same temperature. In mammals there is evidence for the production of heat which does not involve muscular activity; this takes place primarily in brown adipose tissue and has been termed non-shivering thermogenesis (Hill and Wyse 1989). This form of heat production, while it may not be completely lacking in birds (Barnett 1970), appears to be used very little.

There is little evidence that basal metabolism responds to cold by a significant increase during winter (Veghte 1964), or that arctic and temperate birds generally have a higher basal metabolism than tropical and sub-tropical birds to compensate for higher rates of heat loss (Scholander et al. 1950a). There is, however, a great deal of evidence that maintenance of thermoregulation depends on increased stores of lipid and muscle glycogen to sustain high rates of heat production (Carey et al. 1978). Schwan and Williams (1978) found that for the Common Raven in Alaska, thermoregulation depended on high rates of heat production rather than enhanced heat-conservation mechanisms.

High rates of heat production through muscular activity must be accompanied by increased food intake. This increased food intake also results in increased heat production from specific dynamic action (Brooks 1968) and may contribute significantly to the total increase in heat production required by small homeotherms.

There are relatively few studies published on unique mechanisms by which birds obtain the greater food requirements needed to increase heat production in an environment with lowered food abundance and fewer daylight hours in which to forage. Veghte (1964) reported that Gray Jays utilize pre-dawn and dusk hours to extend their available foraging time, and Brooks (1968) speculated that Common Redpolls may travel between overnight roosts and foraging areas in darkness to maximize the daylight hours spent searching for food. Cade (1953) has also seen redpolls feeding under the snowpack to exploit food resources which would otherwise be unavailable and speculates that the bold and inquisitive nature of these birds is an adaptation to an environment in which food must be obtained in an opportunistic manner. Whether these are common strategies for meeting the greater energy demands of winter is not yet clear, and further research needs to be done in this area.

Heat Conservation

The second major factor in maintaining a high and constant body temperature in winter is the conservation of metabolic heat. The loss of excess metabolic heat in birds during summer is accomplished to a great extent via evaporative cooling. It is intuitive, then, that minimizing evaporative heat loss is essential in conserving heat in a cold environment. A problem could rise, however, because an increase in metabolic activity to augment heat production requires an increase in oxygen consumption, and might entail an increase in evaporation in the respiratory passages. Evaporation in the respiratory passages is the primary mechanism of evaporative cooling for birds. Experimental data show, however, that evaporative water loss is constant or

decreases below the upper critical temperature for birds (Johnson 1968, Dawson and Hudson 1970, Mugaas and Templeton 1970). Mechanisms for minimizing evaporative heat loss have been speculated to be cooling of respired air via countercurrent heat exchange to lower the moisture holding capacity of the air and increasing the oxygen consumption efficiency rather than increasing the ventilation rate.

Another mechanism for conserving metabolic heat is increasing insulation. Birds have been shown to increase their insulation by adding feathers (Hutt and Ball 1938, Irving 1960, Veghte 1964, Barnett 1970, Dorst 1974), thereby increasing their tolerance to extremely low temperatures (Barnett 1970). They are able, with changes in posture, to change the surface area exposed to the environment. Birds often can be seen with one or both legs withdrawn into the plumage (Alder 1963) or with bills tucked beneath a wing or under the feathers of the back, effectively reducing conductance from these poorly insulated appendages (Veghte and Herreid 1965). Surface area can be reduced further and the boundary layer between the environment and the body interior can be increased with the erection of the feathers (Hill et al. 1980). This process makes a bird more spherical (Veghte 1964) reducing conductive and convective heat loss and trapping more air with the fluffed feathers as long as the wind speed is low. When wind speed is high, erect feathers are less effective at preventing convective heat loss than compressed feathers, and feather erection may cease to be advantageous (Veghte 1964).

Huddling is an important behavioral mechanism to reduce heat loss to the environment (Brenner 1965). Huddling may be especially important at night (Moore 1945) when energy conservation must be maximized so as not to deplete limited energy reserves before more can be obtained in the morning. Radiant energy is exchanged between the birds in a huddle, conserving much of the energy which would have been lost to the environment (Brenner 1965, Dawson and Hudson 1970). A bird completely surrounded by others benefits by receiving radiation from all sides, and losing none to the relatively greater radiation absorbers of the environment. A bird on the periphery of the group benefits less but still receives more radiant energy from its fellows than it would from most other environmental features, and may be able to exchange positions with those deeper in the huddle as the night goes on.

Comparisons of energy expended overnight by birds at a given environmental temperature in the laboratory with energy expended by birds in the wild often show significant differences (Chaplin 1974). Birds in the wild typically expend less energy overnight than do conspecifics in a metabolism chamber. One reason for this may be the use of huddling, but a more common procedure used by birds in the wild is the use of shelter or more favorable microclimates. Black-capped Chickadees and House Sparrows commonly use tree cavities for shelter in severe weather. These cavities protect the birds from effects of wind and from radiant heat loss to the night sky (Moore 1945). When environmental temperatures are—30°C, House Sparrows can conserve more than 13% of their normal overnight energy expenditure (Kendeigh 1961) by sheltering in cavities. Ruffed Grouse and Willow Ptarmigan (Irving 1960) dive into deep snow and tunnel into the snowpack so as to

use the insulating ability of the snow to their advantage, and chickadees and redpolls have been found to take shelter in the thickest parts of conifer trees at night (Odum 1949, Brooks 1968). Other features which birds may use to their advantage include thick grass, ground irregularities, and the shelter provided by a tree trunk (Moore 1945).

It is well known that birds which migrate long distances put on a large quantity of fat to sustain their energy needs on the journey. As much as 50% of their pre-migration body weight may consist of lipid (Welty 1982). Birds which remain in the temperate zone also may put on additional stores of lipid (White and West 1977, Carey et al. 1978). These stores may be more than 12% of the body weight (Chaplin 1974). Part of the need for this apparent surplus is in maintaining a heightened level of metabolism during the longer, colder winter nights but subcutaneous fat tissue also may function in increasing insulation in birds (Veghte 1964) as it does for many mammals, including humans (Cannon and Keatinge 1960). King and Farner (1966) found a significant negative correlation between subcutaneous fat and temperature below 3°C, indicating a response to cold of adding insulative fat tissue.

Heat loss is relative to the heat gradient between the bird's body and the environment. To reduce this gradient for appendages which cannot be adequately insulated (the legs, for example), homeothermy is relaxed for a region of the body in some birds. The legs of a Herring Gull standing in cold air may be near 0°C (Chatfield et al. 1953) but are still under thermal control. The mechanism which allows this is termed countercurrent heat exchange. In this process, the arteries carrying blood to the periphery lie in close proximity to the veins returning blood to the core. Heat from the warm outgoing blood diffuses into the cooler returning blood via the thermal gradient established in the periphery. In this way, heat is "spent" on warming the returning blood rather than on attempting to keep the periphery at the core body temperature where more of it would be lost to the environment (Chatfield et al. 1953). There are three obvious benefits in this system. First and foremost is the conservation of heat, second is the prevention of shock to the body core by cold blood which would need to be rewarmed and could lower the core temperature. Third is the benefit of keeping the periphery under thermoregulation, which prevents freezing which could occur if there were a simple reduction in blood flow as there is in many animal appendages such as in human fingers and toes.

Some birds may undergo controlled hypothermia (lowering of body temperature) to reduce the thermal gradient between their body and the environment. Black-capped Chickadees have been found to allow their body temperature to fall 10–15°C from a normal of 42°C (Chaplin 1974, 1976). This is essential for these small birds to conserve enough energy to survive the night. Chickadees are primarily insectivores which are unable, with this relatively low-calorie diet, to consume and store enough food energy to survive the night without lowering their body temperature to conserve energy (Chaplin 1974, 1976). Reduction in body temperature of this magnitude results in an energy savings of 23% per hour (Chaplin 1974). Redpolls, by comparison, feed on a higher-calorie diet of birch seeds and are able to consume and store a larger amount of energy. Redpolls can store

enough energy to maintain their temperature at the daytime level and so do not need to employ controlled hypothermia (Brooks 1968). This also appears to be the case of the Gray Jay which with its larger body size and behavioral adaptations (see above), can store enough energy to sustain significant heat loss overnight (Veghte 1964).

Summary

Many species of birds appear to be well adapted physiologically, morphologically, and behaviorally to the special conditions of the winter environment. Mechanisms for increasing heat production include shivering thermogenesis, exercise, specific dynamic action and may include non-shivering thermogenesis. Mechanisms for heat conservation include minimizing evaporative cooling, increasing insulation, specialized overnight behaviors such as huddling and seeking shelter, winter fattening, regional heterothermy, and controlled hypothermia. While each of these mechanisms is effective for helping to maintain thermal balance for winter birds, few if any birds rely solely on one. Many of these mechanisms are used as components in the overall, integrated strategy that a bird employs to survive the winter.

Literature Cited

Alder, L. P. 1963. Alternate leg positions of birds in cold weather. *British Birds* 56:219–220.

Barnett, L. B. 1970. Seasonal changes in temperature acclimatization of the house sparrow, *Passer domesticus*. *Comparative Biochemistry and Physiology* 33:559–578.

Brenner, F. J. 1965. Metabolism and survival time of grouped starlings at various temperatures. *Wilson Bulletin* 77:388–395.

Brooks, W. S. 1968. Comparative Adaptations of the Alaskan Redpolls to the arctic environment. *Wilson Bulletin* 80:253–280.

Cade, T. J. 1953. Sub-nivial feeding of the redpoll in interior Alaska: a possible adaptation to the northern winter. *Condor* 55:43–44.

Cannon, P. and W. R. Keatinge. 1960. The metabolic rate and heat loss of fat and thin men in heat balance in cold and warm water. *Journal of Physiology* 154:329–344.

Carey, C., W. R. Dawson, L. C. Maxwell, and J. A. Faulkner. 1978. Seasonal acclimatization to temperature in Cardueline finches II. changes in body composition and mass in relation to season and acute cold stress. *Journal of Comparative Physiology* 125:101–113.

Chaplin, S. B. 1974. Daily energetics of the Black-capped Chickadee, *Parus atricapillus*, in winter. *Journal of Comparative Physiology* 89:321–330.

Chaplin, S. B. 1976. The physiology of hypothermia in the Black-capped Chickadee, (*Parus atricapillus*). *Journal of Comparative Physiology* 112:335–344.

Chatfield, P. O., C. P. Lyman, and L. Irving. 1953. Physiological adaptation to cold of the peripheral nerve in the leg of the Herring Gull (*Larus argentatus*). *American Journal of Physiology* 172:639–644.

Dawson, W. R. and J. W. Hudson. 1970. Birds. Pp. 224–310. *In* G. C. Whittow (ed.). *Comparative physiology of thermoregulation* vol. 1: invertebrates and nonmammalian vertebrates.

Dorst, J. 1974. *The Life of Birds*. Columbia University Press.

Hills, R. W., D. L. Beaver, and J. H. Veghte. 1980. Body surface temperatures and thermoregulation in the black-capped chickadee (*Parus atricapillus*). *Physiological Zoology* 53:305–321.

Hill, R. W. and G. A. Wyse. 1989. *Animal Physiology*. Harper and Row, New York.

Irving, L. 1960. Birds of Anaktuvuk Pass, Kobuk and Old Crow: a study in arctic adaptation. *U.S. National Museum Bulletin* 217:1–409.

Johnson, R. E. 1968. Temperature regulation in the White-tailed Ptarmigan *Lagopus leucurus*. *Comparative Biochemistry and Physiology* 24:1003–1014.

Kendeigh, C. S. 1961. Energy of birds conserved by nesting in cavities. *Wilson Bulletin* 73:140–147.

King, J. R. and D. S. Farner. 1966. The adaptive role of winter fattening in the White Crowned Sparrow with comments on its regulation. *American Naturalist* 100:403–418.

Moore, A. D. 1945. Winter night habits of birds. *Wilson Bulletin* 57:253–260.

Mugaas, J. N. and J. R. Templeton. 1970. Thermoregulation in the Red-breasted Nuthatch (*Sitta canadensis*). *Condor* 72:125–132.

Odum, E. P. 1949. Annual cycle of the Black-capped Chickadee. *Auk* 59:499–531.

Scholander, P. F., R. Hock, V. Walters, and L. Irving. 1950. Adaptation to cold in arctic and tropical mammals and birds in relation to body

temperature, insulation, and basal metabolic rate. *Biological Bulletin* 99:259–271.
Schwan, M. W. and D. D. Williams. 1978. Temperature regulation in the Common Raven of interior Alaska. *Comparative Biochemistry and Physiology* 60A:31–36.
Veghte, J. H. 1964. Thermal and metabolic responses of the Gray Jay to cold stress. *Physiological Zoology* 3:316–328.
Veghte, J. H. and C. F. Herreid. 1965. Radiometric determination of feather insulation and the metabolism of arctic birds. *Physiological Zoology* 38:267–275.
Welty, J. C. 1982. *The Life of Birds*. Saunders College Pub., Philadelphia.
White, C. M. and G. C. West. 1977. The annual lipid cycle and feeding behavior of Alaskan Redpolls. *Oecologia* (Berl.) 27:227–238.

Patrick T. Collins
Department of Biology
University of Minnesota
Duluth, MN 55812

Quail *by Jonathan Wilde*

Patterns of Feeder Use by Wisconsin Birds: A Survey of WSO Members

A survey of 624 WSO members revealed several patterns in the use of winter bird feeders by Wisconsin birds. There were significant differences for some species between northern and southern Wisconsin and for others between urban, suburban, and rural areas.

by Margaret C. Brittingham and Stanley A. Temple

In 1983 we mailed questionnaires to members of WSO, asking about the birds they observed at their winter bird feeders. Part of the survey dealt with patterns of disease and mortality at feeders, and the results of that portion of the study have already been published (Brittingham and Temple 1986, 1988). In this paper we describe the frequencies at which various birds are observed at feeders and contrast the patterns of use in northern and southern Wisconsin and in rural, suburban, and urban habitats.

Methods

In October 1983, we mailed questionnaires to 1,145 members of WSO, who were distributed throughout the state and are among Wisconsin's most serious amateur ornithologists. We asked them to identify the species of birds that used their feeder and to estimate approximately the largest number of individuals of each species that used their feeder during a day. We also

Table 1. Frequency of observation of 21 species at winter bird feeders in Wisconsin

Species	Percent of respondents observing species
Mourning Dove	68%
Red-bellied Woodpecker	34%
Hairy Woodpecker	63%
Downy Woodpecker	79%
Blue Jay	94%
Black-capped Chickadee	95%
Tufted Titmouse	13%
White-breasted Nuthatch	82%
Red-breasted Nuthatch	42%
European Starling	64%
House Sparrow	80%
Common Grackle	55%
Northern Cardinal	81%
Evening Grosbeak	47%
Purple Finch	65%
Common Redpoll	46%
Pine Siskin	52%
American Goldfinch	87%
Crossbills	9%
Dark-eyed Junco	89%
American Tree Sparrow	55%

Table 2. Frequency of observations of 21 species at feeder sites in northern and southern Wisconsin

Species	Region of Wisconsin		Significance of difference		Region of greatest abundance
	Southern	Northern	χ^2	P^1	
Mourning Dove	73%	52%	17.4	<0.001	Southern
Red-bellied Woodpecker	36%	17%	13.8	<0.001	Southern
Hairy Woodpecker	54%	78%	19.8	<0.001	Northern
Downy Woodpecker	74%	86%	6.4	<0.05	Northern
Blue Jay	93%	96%	1.2	NS	
Black-capped Chickadee	95%	95%	0.04	NS	
Tufted Titmouse	16%	6%	7.6	<0.01	Southern
White-breasted Nuthatch	76%	90%	10.3	=0.001	Northern
Red-breasted Nuthatch	34%	63%	28.1	<0.001	Northern
European Starling	68%	48%	14.5	<0.001	Southern
House Sparrow	86%	60%	34.7	<0.001	Southern
Common Grackle	54%	49%	0.7	NS	
Evening Grosbeak	32%	75%	63.3	<0.001	Northern
Purple Finch	59%	81%	17.6	<0.001	Northern
Common Redpoll	41%	57%	8.8	<0.001	Northern
Pine Siskin	46%	60%	6.2	<0.05	Northern
American Goldfinch	86%	88%	0.3	NS	
Crossbills	7%	13%	4.5	<0.05	Northern
Dark-eyed Junco	90%	82%	6.2	<0.05	Southern
American Tree Sparrow	55%	48%	1.4	NS	
Northern Cardinal	89%	52%	72.6	<0.001	Southern

[1]NS indicates that the differences were not significant.

asked about the location of the feeder site within Wisconsin and whether the habitat around the feeder was primarily rural, suburban, or urban. We used Chi-square tests to determine the statistical significance of differences in frequencies of observations.

Results

A total of 624 WSO members responded to our questionnaire, a 54% response rate. Cary (1985) found that 34% of households in Wisconsin feed birds during the winter. Our results suggest that at least 54% of WSO members fed birds; we suspect that many of the 46% of members who failed to respond did not feed birds. Table 1 describes the proportion of respondents who reported each of 21 species at their feeders. Of these 21 species, Black-capped Chickadees were the most frequently observed (by 95% of all respondents) whereas crossbills (Red Crossbills and White-winged Crossbills) were seen least frequently (by 9% of respondents).

We divided Wisconsin into northern and southern regions on the basis of the "tension zone" dividing the state into northern and southern ecosystems. We used the map in Temple and Cary (1987) to identify the northern and southern counties. We had 313 feeder sites in southern Wisconsin and 114 in northern Wisconsin; the remaining 197 were within the zone of transition.

Table 2 compares the frequency with which species were observed at feeders in these regions. No species was restricted to only one region of the state. Nine species were observed more frequently at northern Wisconsin feeders: Hairy Woodpecker, Downy Wood-

Table 3. Frequency of observation of 21 species at feeder-sites in three habitat types in Wisconsin

Species	Habitat surrounding feeder			Significance of differences	
	Urban	Suburban	Rural	χ^2	P^1
Mourning Dove	85%	80%	51%	64.9	<0.01
Red-bellied Woodpecker	15%	23%	50%	63.5	<0.01
Hairy Woodpecker	38%	55%	80%	69.8	<0.01
Downy Woodpecker	61%	70%	93%	71.7	<0.01
Blue Jay	89%	91%	98%	14.3	<0.01
Black-capped Chickadee	82%	96%	98%	40.3	<0.01
Tufted Titmouse	10%	11%	17%	4.7	NS
White-breasted Nuthatch	63%	78%	93%	47.7	<0.01
Red-breasted Nuthatch	37%	44%	43%	1.5	NS
European Starling	79%	70%	52%	32.3	<0.01
House Sparrow	95%	90%	66%	61.1	<0.01
Common Grackle	70%	66%	40%	47.0	<0.01
Northern Cardinal	84%	87%	75%	12.8	0.002
Evening Grosbeak	31%	40%	58%	29.6	<0.01
Purple Finch	50%	62%	79%	20.6	<0.01
Common Redpoll	41%	47%	48%	1.5	NS
Pine Siskin	50%	58%	46%	5.5	0.07
American Goldfinch	78%	89%	90%	11.3	0.003
Crossbills	9%	10%	9%	0.3	NS
Dark-eyed Junco	81%	92%	88%	8.1	<0.05
American Tree Sparrow	35%	53%	65%	28.1	<0.01

[1]NS indicates that the differences were not significant.

pecker, White-breasted Nuthatch, Red-breasted Nuthatch, Evening Grosbeak, Purple Finch, Common Redpoll, Pine Siskin, and crossbills. Seven species were observed more frequently at southern Wisconsin feeders: Mourning Dove, Red-bellied Woodpecker, Tufted Titmouse, European Starling, House Sparrow, Northern Cardinal, and Dark-eyed Junco.

There were 107 feeder sites in urban areas, 230 in suburban areas, and 270 in rural areas. We found that no species was restricted to either urban, suburban or rural habitats. Most were, however, observed more frequently at feeders in one habitat (Table 3). Ten species were observed most frequently at rural feeders: Red-bellied Woodpecker, Hairy Woodpecker, Downy Woodpecker, Blue Jay, Black-capped Chickadee, White-breasted Nuthatch, Evening Grosbeak, Purple Finch, American Goldfinch, and American Tree Sparrow. Two species were most frequently observed at suburban feeders: Northern Cardinal and Dark-eyed Junco. Four species were most frequently observed at urban feeders: Mourning Dove, European Starling, House Sparrow, and Common Grackle. It appears that the availability of a feeder in urban or suburban areas will not attract many rural species because of their need for more undisturbed natural habitats.

Acknowledgments

We thank the 624 WSO members who responded to our survey questionnaire. Our research was supported by the UW-Madison's College of Agricultural and Life Sciences, Agricultural Experiment Station.

Literature Cited

Brittingham, M. C. and S. A. Temple. 1986. A survey of avian mortality at winter feeders. *Wildlife Society Bulletin* 14:445–450.

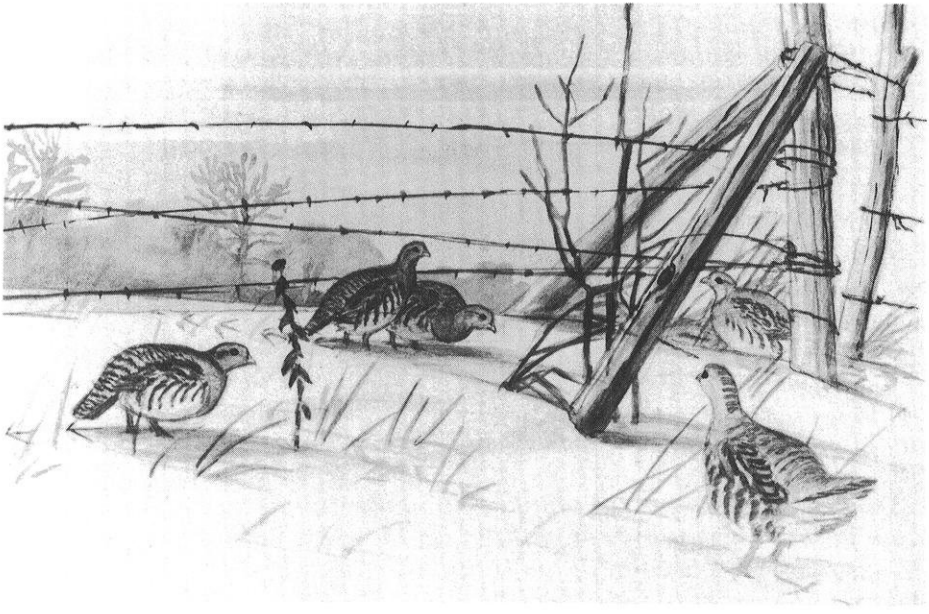
Brittingham, M. C. and S. A. Temple. 1988. Avian disease and winter bird feeding. *Passenger Pigeon* 50:195–203.

Cary, A. 1985. Evaluation of the 1983 Wisconsin tax check off for nongame and endangered resources. *Wisconsin Department of Natural Resources Resource Publication* 137. 37pp.

Temple, S. A. and J. R. Cary. 1987. *Wisconsin Birds: A Seasonal and Geographical Guide*. University of Wisconsin Press, Madison.

Margaret Clark Brittingham
School of Forest Resources
The Pennsylvania State University
University Park, PA 16802

Stanley A. Temple
Department of Wildlife Ecology
University of Wisconsin
Madison, WI 53706



Gray Partridge *by Jonathan Wilde*

Some Results of "Project FeederWatch" in Wisconsin

Project FeederWatch, a program of the Cornell Laboratory of Ornithology, uses volunteers to monitor the birds coming to bird feeders. During 1988–89 there were 109 participants in Wisconsin, and some of their results are summarized here.

by Stanley A. Temple

Project FeederWatch provides a way for volunteer observers to keep records of the bird species that visit their bird feeders during the winter. The project is administered by the Cornell Laboratory of Ornithology and involves thousands of volunteer observers across North America. During the winter of 1988–89, there were 109 participants in Wisconsin. This report summarizes the methods used by these participants and some of their results for 1988–89.

Project FeederWatch Methods

Volunteers sign-up for Project FeederWatch by contacting the Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14853. Project instructions and data forms are then provided.

Participating in Project FeederWatch is simple. You watch the birds at your feeders on one or two consecutive days during ten 2-week periods, keeping notes on the numbers and species of birds that you see. At the end of each two-day count, you transfer the data from your notes onto one of the computer-readable Data Forms. The following instructions for data-keeping are to be followed.

Where to count.—Define an area containing feeders that you can see all at once from one window. Observations are simplified if the area is one you glance at frequently during your daily routine (e.g. outside a window by the dining table or kitchen). The area may be large or small, depending on how much you feel you can observe consistently. Use obvious boundaries such as the limits of your yard or lines of vegetation to define the area. Count birds in the same area all winter, and ignore birds that are outside it.

What to count.—Record the peak number of each feeder-using species that you see in your count area at any one time. You may count all individuals

of a species using food placed in feeders or spilled from them, or drinking artificially-provided water. If individuals are coming and going, you may count all birds of that species seen in your count area at the same time. Thus, if 2 House Sparrows are on the feeder and 6 are in a nearby bush waiting their turn, count all 8, even though some may not actually get food before being scared away. If a bird was clearly attracted to your feeders (e.g., landed on feeder to investigate) but did not take food, you may still count it. Ignore birds, however, that simply fly through your area.

There is one exception to this method of counting. If it is clear that only one or two individuals of a flock ever use the feeder (as may occur, for example, with American Robins or Cedar Waxwings), record only the number of individuals actually seen using the feeder.

Do not count birds that feed on fruits of bushes or trees, or that drink water from streams or ponds. Predators perching in or swooping through the count area (not just flying over) may be counted if you feel they were attracted by birds or mammals at the feeders, even if no kill was made. Escaped cage birds living wild may be counted (e.g., parakeets), but don't include birds that are essentially captives (pets, wing-clipped waterfowl, guinea fowl, etc).

How to count.—Record the largest number of each species that you see in your defined count area during the two-day count period. For example: Let's say you see 40 Evening Grosbeaks and 6 European Starlings on the first day. Make a temporary note of this on your tally sheet—NOT on your Data Forms. The next day, you see 10 Evening Grosbeaks, 12 starlings, and a Downy Woodpecker. Add Downy Woodpecker to your notes and change the number for starling from 6 to 12. Do not add counts from the two days together. Don't alter the numbers for Evening Grosbeak unless you see more than 40 at one time. If your Downy Woodpecker is a male and later you see a lone female, leave your count at 1, since that is the highest number you saw at one time. At the end of the count period, record your final tallies on the Data Form.

Count as accurately as possible. Precise counts are difficult for certain species, so sometimes estimates must be made. A good method for estimating the numbers in flocks is to count off 10, 25 or 50 birds, make a mental note of the appearance or "look" of a group that size, then count up the number of groups of about the same size. If you do this several times, you can usually get a reasonable estimate. With mixed species flocks, you may wish to estimate the grand total of all birds, as above. Then carefully count the number of each separate species present in a manageable group (perhaps 25 or 50 birds). Finally, divide your total into species using the same proportions found in the smaller sample. The accuracy of this method depends on the species being well mixed together. Remember, it is better to have a carefully made estimate than a guess.

When to count.—Counts are made on two consecutive days in every 2-week period from November through March. Sightings from a single day are also acceptable. The dates of the 10 2-week periods are listed on the white Comment Form. If your last name begins with the letters A through K, your count dates are shown at the left on the Comment Form. If your last name begins with the letters L through Z, use the count dates on the right instead. We suggest you

Table 1. Numbers and percentages of observers who reported species in Wisconsin during 1988–89.

Species	Number of observers	Percentage of observers	Average number per observer
Canada Goose	2	2	<1
American Black Duck	1	1	<1
Mallard	1	1	<1
Sharp-shinned Hawk	8	7	<1
Cooper's Hawk	11	10	<1
Northern Goshawk	1	1	<1
Red-shouldered Hawk	1	1	<1
Red-tailed Hawk	7	6	<1
American Kestrel	8	7	<1
Merlin	1	1	<1
Peregrine Falcon	1	1	<1
Ring-necked Pheasant	2	2	<1
Ruffed Grouse	9	8	<1
Wild Turkey	1	1	<1
Northern Bobwhite	1	1	<1
Eastern Screech-Owl	1	1	<1
Great Horned Owl	1	1	<1
Barred Owl	1	1	<1
Rock Dove	7	6	<1
Mourning Dove	88	81	5
Red-headed Woodpecker	2	2	<1
Red-bellied Woodpecker	64	59	<1
Downy Woodpecker	102	94	1
Hairy Woodpecker	78	72	1
Northern Flicker	18	17	<1
Pileated Woodpecker	5	5	<1
Eastern Phoebe	1	1	<1
Gray Jay	1	1	<1
Blue Jay	103	95	2
American Crow	39	36	<1
Common Raven	1	1	<1
Black-capped Chickadee	107	98	4
Carolina Chickadee	1	1	<1
Tufted Titmouse	8	7	<1
Red-breasted Nuthatch	33	30	<1
White-breasted Nuthatch	91	83	1
Brown-headed Nuthatch	3	3	<1
Brown Creeper	13	12	<1
Carolina Wren	3	3	<1
House Wren	1	1	<1
Golden-crowned Kinglet	1	1	<1
Ruby-crowned Kinglet	1	1	<1
Eastern Bluebird	2	2	<1
Hermit Thrush	1	1	<1
American Robin	50	46	<1
Varied Thrush	1	1	<1
Brown Thrasher	1	1	<1
Cedar Waxwing	3	3	<1
Northern Shrike	1	1	<1
Loggerhead Shrike	1	1	<1
European Starling	79	72	2
Yellow Warbler	1	1	<1
Northern Cardinal	99	91	3
Rufous-sided Towhee	1	1	<1

(*cont*)

Table 1. *Continued*

Species	Number of observers	Percentage of observers	Average number per observer
American Tree Sparrow	40	37	1
Chipping Sparrow	5	5	<1
Field Sparrow	5	5	<1
Fox Sparrow	13	12	<1
Song Sparrow	27	24	<1
White-throated Sparrow	9	8	<1
White-crowned Sparrow	3	3	<1
Dark-eyed Junco	104	95	5
Vesper Sparrow	1	1	<1
Snow Bunting	1	1	<1
Red-winged Blackbird	41	38	<1
Brewer's Blackbird	1	1	<1
Common Grackle	53	49	<1
Brown-headed Cowbird	17	16	<1
Eastern Meadowlark	1	1	<1
Pine Grosbeak	2	2	<1
Purple Finch	42	39	1
House Finch	16	15	1
Common Redpoll	4	4	<1
Pine Siskin	21	19	<1
American Goldfinch	100	92	8
Evening Grosbeak	5	5	<1
House Sparrow	90	83	11

draw a slash through the set of dates that doesn't apply to you, and post the form to remind you of count dates. Because most people count at the start of each 2-week period, we have staggered the dates to insure that we get counts from every week in the season. Count periods start on Saturdays so that you may fit a 2-day count into either of 2 weekends.

You may choose any 2 consecutive days for your count during each 2-week count period. You don't have to count on the same days of the week each time. However, please choose your days at the start of each period and then stick with them. If you count every day and pick only the best to report, our results will be biased.

Don't worry if you miss a few counts because of other commitments or holidays, but try to avoid gaps of 2 or more counts in a row.

How long to observe.—You do not have to watch continuously, and many people observe only before and after work. You needn't get up early or come home for lunch to make observations. Go ahead and do your shopping! If you watch for only a short period each day, however, make an extra effort to count on 2 consecutive days. Try to put in about the same amount of effort each count period so that results are consistent.

How to keep notes.—Do not record anything on your Data Forms until your count is complete. Instead, keep notes, and update them throughout the count period. Many people find it convenient to take notes in a format they can keep for their own records, such as on the sample Tally sheet included in these materials. Feel free to photocopy this page

for your own use. Before you do so, you may wish to write in the species you are most likely to see. However, do not return these notes to FeederWatch.

At the end of the count days, fill in your Data Form promptly with your final tallies, in case your notes get misplaced.

1988–89 Results in Wisconsin

The 109 participants in Wisconsin observed 77 species during their feeder watches. The frequency of observation of various species and the average number of individuals seen are given in Table 1.

Discussion

These results can be compared with the results of the survey of WSO members carried out by Margaret C. Brittingham and Stanley A. Temple and reported upon elsewhere in this issue. There is broad agreement in the relative abundance pattern detected by these two surveys.

As Project FeederWatch continues in the future interesting comparisons between years, between regions in Wisconsin, and between different habitats will be possible. Even though Wisconsin had a relatively good rate of participation in Project FeederWatch, the program welcomes additional volunteer observers. Sign-up by contacting Project FeederWatch, Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14853

Stanley A. Temple
Department of Wildlife Ecology
University of Wisconsin
Madison, WI 53706

Short-eared Owl *by Sooil Kim*

Boreal Owl *by Deann L. DeLaRonde*

The 1988–89 Invasion of Great Gray Owls into Wisconsin

The winter of 1988–89 featured an invasion of Great Gray Owls into Wisconsin, particularly into Douglas County. This invasion was much more thoroughly studied than any previous one.

by Lawrence Semo

The Great Gray Owl (*Strix nebulosa*) is considered to be a sporadically irruptive or migratory species with irregular incursions into southern Canada (Nero 1969) and northern United States (Eckert 1984). Great Gray Owls feed primarily on microtine rodents (Brenton and Pittaway 1971) which undergo major population fluctuations every four years. The owl responds to these changes by dispersing in large numbers during years of low prey availability. Nero (1980) believes these winter invasions occur following years of high reproductive success which may explain the large number of birds involved in these movements. Major winter invasions of Great Gray Owls have been well documented in Minnesota (Eckert 1984), but no movements of any magnitude have been reported in Wisconsin. Follen (1987) reported that Great Gray Owl observations in Wisconsin were widespread but few in numbers. This paper reports on a recent significant Great Gray Owl invasion into Wisconsin.

Early in the winter of 1988–89 there was an apparent influx of Great Gray Owls into northeastern Minnesota. Many of these birds were reported in the Duluth area, and therefore it seemed reasonable that owls would be found in northwestern Wisconsin. I surveyed this area and found 2 owls near County Highway "W" in extreme northwestern Douglas County on 6 January. Continued surveillance revealed no fewer than 42 separate individuals were present in the state. Most birds were seen in a small geographical area of only about 6 square miles. Duplicate sightings may have occurred, but many birds probably went undetected because off-road areas were not surveyed. The invasion continued as the winter progressed, and Great Gray Owls began appearing farther south. The majority of the sightings, however, occurred along Highway "W."

The habitat in this area was composed primarily of Trembling Aspen (*Populus tremuloides*), Black Ash (*Fraxinus nigra*), and Balsam Fir (*Abies balsamea*) with a dense ground layer of tall grass. Birds were also observed in other habitats, in-

cluding Black Spruce (*Picea glauca*) and Tamarack (*Larix laricina*) bogs, and northern hardwood forests.

Trapping and banding was initiated to determine the size of the population, its sex and age composition, and its movement patterns. Fourteen individuals were trapped and banded. Birds were observed and trapped most often during dawn and dusk and during overcast days, when they were most active.

I was impressed with the large number of Great Gray Owls that seemed to be in the vicinity of Highway "W." Twenty-seven of the 42 owls that I observed were found along Highway "W." Most of the Great Gray Owls were found in northwestern Douglas County. At least 66 sightings of Great Gray Owls were reported statewide, and it is likely that many more were seen than were reported. A few additional individuals were seen south and east of this area, however. Neal Niemuth (personal communication) had reports of birds in Burnett and Bayfield Counties, and additional reports to the Wisconsin Society for Ornithology Records Committee came from Barron, Price, and Rusk Counties (Figure 1). Sightings continued throughout the winter and into early spring. The maximum number of owls that I observed in 1 day was 5 on 11 March. Birds were last observed on 8 April, when 2 owls were found calling on Highway "W." These birds appeared to be engaged in courtship behavior, but repeated visits during the summer failed to locate a much hoped for nest.

The invading population of Great Gray Owls was composed of all age and sex classes. Of the 10 owls that were captured, 4 (3 males, 1 female) were hatched the previous spring; the remainder were adults (2 males, 3 females). The sex of one bird was not determined. All birds appeared to be in good health as determined by subcutaneous fat deposits and keel prominence.

Figure 1. Great Gray Owl observations during the winter of 1988–89.

What attracted Great Gray Owls to this small geographical area of northwestern Wisconsin? Birds traveling southeast would encounter Lake Superior and then continue south along the shore. They may have been reluctant to travel through Duluth, Minnesota and Superior, Wisconsin at the southwestern terminus of the lake, so then circled around the cities and continued their southeast migration to the Highway "W" area. They may also have been attracted to the gas pipeline corridors that paralleled Highway "W" because of the potential food supply associated with these openings in the forest. A third theory for the occurrences of Great Gray Owls in northwestern Wisconsin is that microtine rodent populations were particularly high in the area.

I am not aware of any Great Gray Owl influxes to northeastern Wisconsin or to the Upper Peninsula of Michigan during 1988–89, so it appears this past winters

invasion was heaviest in the western Lake Superior region. Great Gray Owls may have appeared, and gone undetected in northwestern Wisconsin during the winters of 1978–79 and 1984–85 when they were common in northeast Minnesota. The 1988–89 invasion of Great Gray Owls is undoubtedly the largest ever reported in Wisconsin.

Acknowledgments

This paper could not have been compiled without the assistance of others. Many thanks go to Loren Ayers whose intense drive in field assistance helped gather this information. Thanks also go to Eugene Jacobs for the knowledge and support he offered. I thank Robbye Johnson, Neal Niemuth, and Bruce Bacon for providing data incorporated in this paper, and special thanks go to Dr. Raymond K. Anderson for reviewing this manuscript.

Literature Cited

Brenton, D. F. and R. Pittaway, Jr. 1971. Observations of the great gray owl in its winter range. *Canadian Field-Naturalist* 85:315–322.

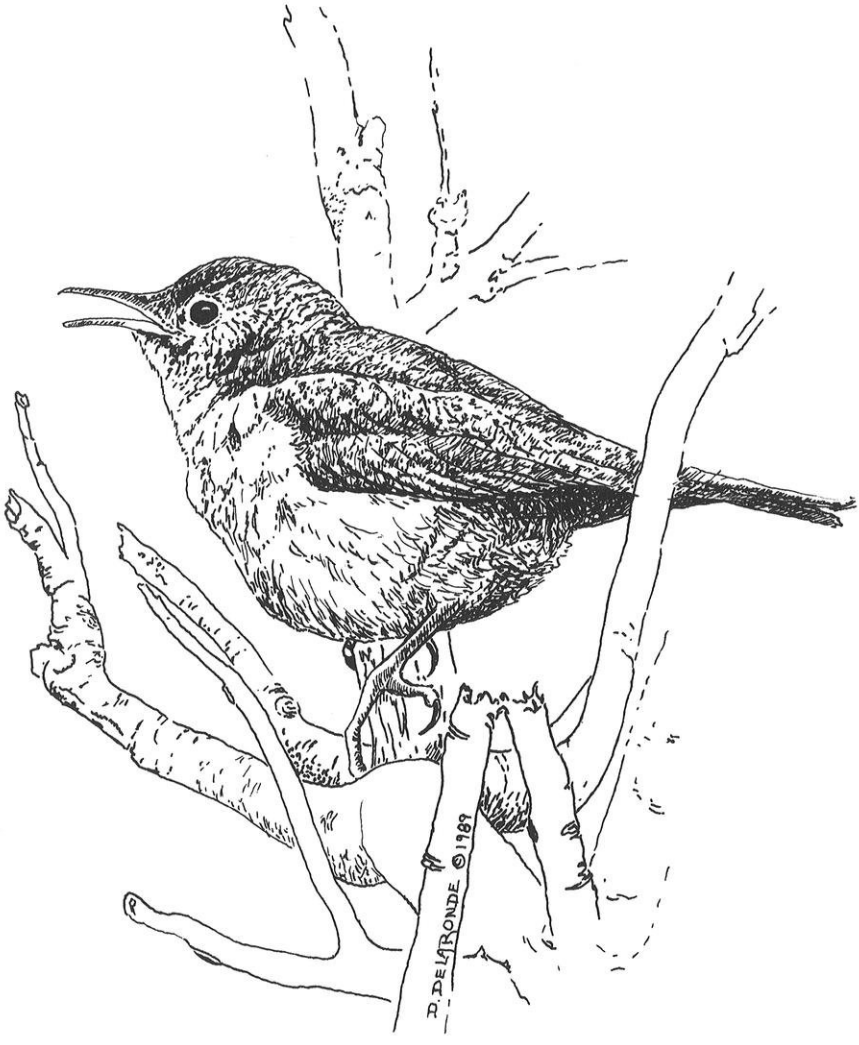
Eckert, K. 1984. A record invasion of great gray owls. *Loon* 56:143–147.

Nero, R. W. 1969. The status of the great gray owl in Manitoba, with special reference to the 1968–69 influx. *Blue Jay* 27:191–209.

Nero, R. W. 1980. *The Great Gray Owl: Phantom of the Northern Forest*. Smithsonian Institution Press, Washington, DC.

Lawrence Semo
Rt. 2 Box 435
Superior, WI 54880

White-throated Sparrow *by Sooil Kim*



House Wren *by Deann L. DeLaRonde*

Wisconsin Bald Eagle Recovery Plan

The Wisconsin Bald Eagle Recovery Plan describes actions to improve the status of Bald Eagles in Wisconsin. The main objective of this plan is to increase the self-sustaining population of Bald Eagles. The goal is to have 360 occupied breeding areas in Wisconsin by the year 2000, with an average annual productivity of at least 1.2 young per occupied nest.

by Charlene M. Gieck

The Wisconsin Bald Eagle Recovery Plan, from which this paper is extracted, was developed in general conformity with the U.S. Fish and Wildlife Service (USFWS) Northern States Bald Eagle Recovery Plan (Grier et al. 1983). Although written to supplement the Federal Plan, the Wisconsin Plan represents the opinion of the Wisconsin Department of Natural Resources (WDNR).

The Bald Eagle is restricted to North America. Its breeding range includes the coasts, inland lakes, and rivers from the Gulf of Mexico to the Arctic. Its former and current distribution is approximately the same; only the numbers are reduced. Wintering ranges are concentrated along the Alaskan coast and in a 12-state region in the Midwest.

Wisconsin's waterways supported Bald Eagles throughout the state before man's settlement. Urbanization, agriculture, environmental contaminants, and human population increases have reduced eagle breeding ranges to inland lakes and rivers in northern Wisconsin.

The U.S. Fish and Wildlife Service designed and conducted breeding surveys in Wisconsin from 1973–77. From 1978 to present, the surveys have been coordinated by the Department of Natural Resources. The U.S. Forest Service continues to survey forest lands surveyed since 1963. These are detailed aerial and ground checks of known nest sites.

Breeding pairs in Wisconsin appear to be steadily increasing (Table 1). In 1989, 336 occupied territories were noted, and 458 young were produced. Only 108 territories were occupied in 1973. The majority of the nest sites are in the counties of Douglas, Bayfield, Burnett, Ashland, Washburn, Iron, Vilas, Price, Sawyer, Oneida, and Forest. A total of 403 different breeding sites have been used since 1973, but only 83% of these showed "some degree" of activity in

Table 1. Results of the Wisconsin Breeding Bald Eagle Survey 1973–89

Year	Occupied territories	Nest success	Young produced	Young per occupied territory
1973	108	61%	107	0.94
1974	107	55%	101	0.94
1975	111	62%	112	1.0
1976	149	61%	139	0.95
1977	151	72%	181	1.2
1978	140	70%	168	1.2
1979	151	70%	179	1.2
1980	175	75%	231	1.3
1981	188	73%	227	1.2
1982	207	70%	251	1.2
1983	198	76%	252	1.3
1984	239	70%	271	1.2
1985	214	80%	282	1.3
1986	244	75%	294	1.2
1987	295	82%	420	1.4
1988	326	76%	430	1.3
1989	336	77%	458	1.3

1989. This includes: a) one or two adults near an obviously unrepaired nest; b) no adults seen around an obviously repaired nest; c) a new nest constructed; and d) one of two adults perched in a nest tree—nest gone.

The National Wildlife Federation has conducted Mid-winter Surveys since 1978. The surveys are designed to monitor winter concentration areas. In 1985, observers recorded 10,985 Bald Eagles in the entire U.S. The Wisconsin DNR's Bureau of Endangered Resources collaborates with the National Wildlife Federation during its mid-winter survey. Most birds are seen along the Wisconsin and Mississippi Rivers. A total of 211 Bald Eagles was counted in 1985.

Mortality Factors in Wisconsin

Mortality is high for first year birds with losses of 50% not unusual (Eckstein et al. 1983). Once an eagle reaches adulthood the mortality rate is much lower.

Wisconsin ranks high in both the number of dead eagles submitted for analysis and in the number diagnosed as gunshot, poisoned, or trapped. Wisconsin has done a better job of looking for and submitting good quality eagle carcasses than have most other states, consequently, a higher number of birds are submitted and a definitive cause of death can be determined in more of our birds than from most other states.

One hundred fifty-nine Wisconsin eagles were received by the U.S. Fish and Wildlife Service from 1963–1984. Wisconsin had the highest number of gunshot eagles (45). Wisconsin lost 28 eagles to various forms of traumatic injury. More cases of poisoning (18) came from Wisconsin than any other state. Wisconsin had the highest number of lead-poisoned birds (12). The number of lead-poisoned birds was disproportionately high for both Wisconsin and Minnesota. Ingestion of lead shot imbedded in dead/wounded waterfowl was the primary source of lead poisoning. Most deaths occurred during winter months. Wisconsin was third in number of cases

of electrocuted eagles with 11. Wisconsin was second in trap-related mortality with 14.

Bald Eagle Habitat in Wisconsin

Nesting habitat.—Most Bald Eagle nests are found in supercanopy, living white pine trees; however, red pine, aspen, and other hardwoods are also utilized. The eagle's food preference for fish draws them to large trees near open water. Areas isolated from human activities are preferred.

Migration habitat.—During fall migration, the eagles generally fly along waterways, moving southward as the rivers and lakes freeze over. Large congregations occur near dams and wildlife refuges (Steenhof 1978). Tall trees are used as perch sites to rest or to observe prey.

Wintering habitat.—Winter ranges vary greatly each year depending on weather and food availability. Both the range size and amount of movement within the range are affected. The same areas are believed to be used each year (Platt 1976). Most sites are occupied from October to February.

Preferred roost trees are large, living or dead, with open horizontal branches. In Wisconsin, the preferred species include oaks and cottonwoods. Protection from wind is the priority in site selection. Communal roost sites are generally separate from feeding sites (by approximately 10 miles in Wisconsin) (Ingram 1965). Closeness to water is not as important as it is in the breeding season.

Freedom from human disturbance also influences the roost site choice. Varying degrees of disturbance are tolerated with adults being more sensitive than immatures (Stalmaster and Newman 1978). Automobiles and planes do not disturb eagles as much as boats and people (Steenhof 1978).

Limiting Factors

Bald Eagles were able to breed across all of Wisconsin in the 1800's. In 1972, Wisconsin added the Bald Eagle to its list of endangered species. The main reason was poor reproduction caused by pesticide contamination. Not enough young were being produced to offset adult mortality, and the population was declining.

Wildlife populations, especially those such as Bald Eagles, are excellent biological indicators of environmental health. Environmental contaminants have been shown to be directly linked with reproductive failures in numerous avian predators.

Eagles have not nested along either Lake Michigan or Lake Superior for several decades. Environmental contamination has been suggested as the major contributing factor to this extirpation. It wasn't until the mid-1970's, when PCB's and many organochlorine pesticides were banned, that eagles again began establishing breeding territories on the Apostle Islands. Yet even as nests were built and egg laying was initiated, it wasn't until 1983 that the first young Bald Eagle in nearly two decades was produced.

In an effort to investigate these observations and identify the cause of reproductive problems in Wisconsin eagles, carcasses and addled eggs are collected and saved for necropsy and environmental contaminant analysis. Data from Bald Eagle eggs collected in Wisconsin by Charles Sindelar from 1976 to 1982 show that eggs collected from the south shore of Lake Superior have

higher levels of organochlorine pesticides, PCB's, and mercury than from the remainder of the state.

Chemical analysis of other Bald Eagles dying in Wisconsin has provided further data. Dieldrin, a pesticide banned in Wisconsin since 1972, has been identified as the cause of death in 7 Wisconsin eagles since 1974. This number may appear to be small; however, more eagles died of dieldrin poisoning in Wisconsin than any other state. Wisconsin is followed by 4 dieldrin deaths in Minnesota and 3 in Michigan. Where the eagles are picking up the dieldrin is unknown, no studies have been conducted as yet to determine its origin.

The Bald Eagle is a sensitive nesting species. Human activities near nest sites may mean failure for the breeding pair. Logging activity can disturb nesting eagles and can also remove their prime nesting trees. White pine management, including under planting, needs to be encouraged for eagles.

The use of lead shotgun pellets in waterfowl hunting has been found to affect Bald Eagles. Deadly accumulations of lead build up in eagles as they prey upon waterfowl that have ingested or been killed with lead shot.

All of these factors led to reduced Bald Eagle populations and continue to threaten their co-existence with man.

Research and Management

As the national symbol, the Bald Eagle has been researched extensively. Bald Eagles are also afforded special protection.

Protecting Bald Eagles.—Protection for Bald Eagles is established under the Bald Eagle Protection Act, the Migratory Bird Protection Act, the Endangered Species Act of 1973, the Lacey Act, and the Airborne Hunting Act (Mendoza 1984). These legal actions encourage people to report shootings or molestations of Bald Eagles to the nearest U.S. Fish and Wildlife Service agent. Rewards have been offered for information leading to conviction of violators. Criminal penalties include fines ranging from $2,000–20,000 and 1–5 years in prison.

Monitoring Bald Eagles.—To monitor population status, document population trends, and plan for nesting habitat protection and enhancement, data are required on annual breeding population size, recruitment, nesting territory locations, and wintering areas. A survey is required that will be systematic and easily coordinated with participating agencies and workers.

Annual aerial surveys are necessary to assess management efforts, monitor population trends, and identify active territories. Two annual surveys of nest territories will be conducted, an activity survey in early spring and a production survey in late spring and early summer.

The majority of eagle survey work has been conducted by Charles Sindelar utilizing WDNR or U.S. Fish and Wildlife Service aircraft and pilots. Mr. Sindelar has surveyed Wisconsin's Bald Eagles annually since the mid-1960's. Surveys from 1967 to 1973 were conducted in conjuction with the National Audubon Society's continental Bald Eagle project. From 1973 through 1978, the U.S. Fish and Wildlife Service employed Mr. Sindelar to conduct a Wisconsin Bald Eagle survey.

In 1980, WDNR assumed responsibility for the annual eagle survey. The transfer of this survey from federal to state control was in accordance with rec-

ommendations of the Northern Bald Eagle Recovery Team. The U.S. Forest Service has surveyed forest lands since 1963 and continue to do so.

Search flights concentrate on surveying suitable nest habitat along streams and lakes and in supercanopy pines. Flight plans are developed prior to each search flight. When new territories are located, they are incorporated into annual aerial surveys.

Overwintering populations are also monitored. Locations and numbers of Bald Eagles are located by periodic inspections of open water areas and surrounding land. Roost sites are also identified. The Wisconsin survey data are collected in cooperation with and supplied to the U.S. Fish and Wildlife Service and the National Wildlife Federation.

A winter eagle survey has been conducted annually by WDNR since before the endangered species program was established, as part of the USFWS Winter Waterfowl Inventory. In recent years, winter observations were continued and expanded.

Monitoring of migratory movements, mortality rates, and other ecological parameters of Bald Eagles are accomplished through nest visits and banding of nestlings. Active nests identified during earlier survey work are visited in June. The nest tree is climbed and nestlings are fitted with USFWS rivet-type leg bands. Compilation of observations on banded eagles yield information on longevity, migration routes used by specific populations, age-specific mortality rates, and possible causes of death. Most of these data can be obtained only through banding information. As nests are visited, addled eggs, feathers, and any sick, injured, or dead eagles are salvaged. Other data recorded at the nest site include site selection, food habits, habitats use, and tolerance to human disturbance.

Managing Bald Eagles.—An active Bald Eagle management program is necessary to preserve and promote the expansion of Wisconsin populations.

The management guidelines used by the Department have been adapted from those developed by the U.S. Fish and Wildlife Service and the U.S. Forest Service.

Management plans are compiled by WDNR wildlife managers for each active territory. A ground check of each territory is required. The following information are recorded on each territory plan:

1) Nest tree and habitat characteristics.
2) Greenline map or aerial photo showing exact location of the nest and all alternate sites.
3) Identification of all roads, trails, and dwellings.
4) Recommendations to reduce disturbance factors.
5) Reproductive history.

The following guidelines are adhered to on Department lands to reduce disturbances to nesting eagles:

1) Active nests are reported to the unit that manages the land involved so that buffer zones can be established.
2) Land use activity is not permitted at any time of year within 330 feet of any eagle nest. In cases of exceptional circumstances and need, and where prolonged inactivity of a particular nest has been documented, the district director may permit an exemption.
3) Land-use activity is permitted within ¼ mile of nests from August 1 to February 15 for eagles. This seasonally restricted zone may be extended by

the district director if justified. Timber harvests or other construction activity in this zone should be cleared with the district endangered species coordinator. If timber cutting is allowed, several supercanopy pine trees should be left for future nest and roost sites within the ¼-mile zone. In addition, for long-range management, some medium- and small-sized pine should be left for nest tree replacements as the old mature trees disappear.

4) Roads and trails, existing or planned for management purposes, that occur within ¼ mile of a nest site should be closed to vehicular traffic or relocated. This does not apply to travelways over which the DNR has no jurisdiction and where obvious public needs are involved without feasible alternatives. Road closures must be decided on a case-by-case basis, using information on past nesting success, visual buffers, and other special circumstances.
5) The use of pesticide sprays and fish toxicants that may affect the birds should be avoided.

Recovery Action Plan

The primary goal of the recovery plan is to increase the self-sustaining population of Bald Eagles to suitable habitat throughout Wisconsin. The goal is to have 360 occupied breeding areas in Wisconsin by the year 2000, with an average annual productivity of at least 1.2 young per occupied nest. To do this the following activities are required.

Determine current population and habitat status.—This includes aerial breeding surveys, banding young, winter surveys, observation of population trends, and identification of breeding and wintering habitat.

Determine population and habitat needed to achieve recovery.—This includes research of Bald Eagle ecology to determine what factors limit the population within Wisconsin.

Protect, enhance, and increase Bald Eagle populations and habitats.—This includes public education regarding shooting and trapping, continued emphasis on law enforcement, analysis of environmental contaminant problems, and development of site-specific management plans.

Communication to coordinate and conduct recovery efforts.—Communication will be maintained among all interested groups and individuals. Education of the general public will be a continuing effort.

Literature Cited

Eckstein, R. G., C. R. Sindelar, and D. L. Evans. 1983. *Bald eagle and osprey population status, nesting biology, and management in Wisconsin.* Madison Audubon Society. 4pp.

Grier, J. W., J. B. Elder, F. J. Gramlich, N. F. Green, J. V. Kussman, J. E. Mathisen, J. P. Mattsson. 1983. *Northern States Bald Eagle Recovery Plan.* U.S. Fish and Wildlife Service. 116pp.

Ingram, T. N. 1965. Wintering bald eagles at Guttenberg, Iowa—Cassville, Wisconsin, 1964–1965. *Iowa Bird Life* 35:66–78.

Mendoza, J. G. 1984. Federal laws protecting the American bald eagle. Pp.3–6. *In* Proceedings Midwest Workshop on bald eagle research and management. Ill. Department of Conservation, Division of Forest Resources and Natural Heritage. Springfield, IL.

National Wildlife Health Laboratory. 1985. *Bald eagle mortality from lead poisoning and other causes 1963–1984.* National Wildlife Health Laboratory, Madison, WI. 48pp.

Platt, J. B. 1976. Bald eagles wintering in a Utah desert. *American Birds* 30:783–788.

Stalmaster, M. V. and J. R. Newman. 1978. Be-

havioral responses of wintering bald eagles to human activity. *Journal of Wildlife Management* 42:506–513.

Steenhof, K. 1978. *Management of wintering bald eagles.* USFWS. U.S. Government Printing Office. Washington, DC. 59pp.

Charlene M. Gieck
Wisconsin Department of Natural Resources
Bureau of Endangered Resources
P.O. Box 7921
Madison, WI 53707

50 Years Ago in *The Passenger Pigeon*

Excerpts from The Passenger Pigeon Vol. 1, No. 10, 1939

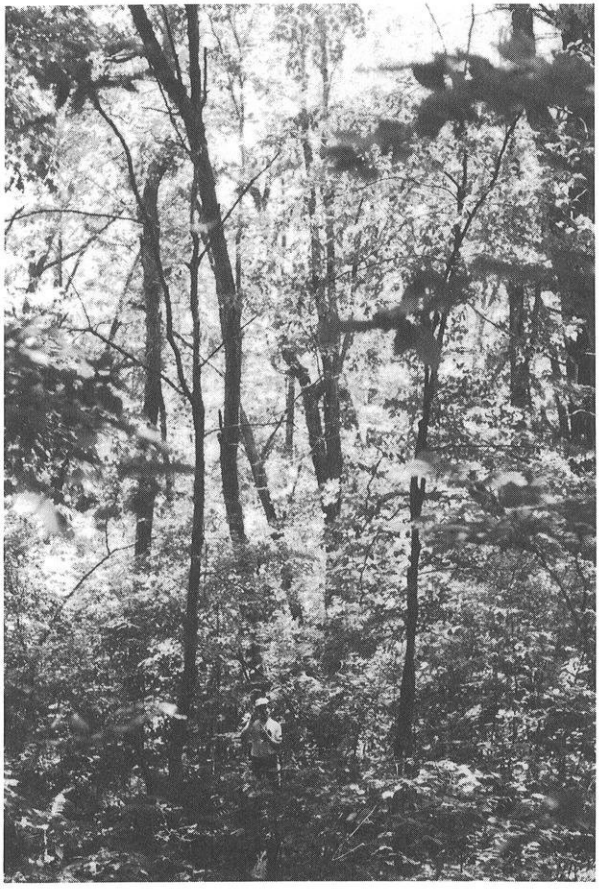
The use of guns to legally collect bird specimens as well as illegal shooting of birds were quite common in Wisconsin during the 1930s. The following news notes examine guns and shootings.

"A feather for the hat of Conservation Warden Bob Lake of West Bend for making what was probably the first state arrest of a hunter for shooting hawks or owls. On October 15 Lake arrested a Milwaukee hunter for shooting two Short-eared Owls out of a group of eight near Port Washington in Ozaukee County. The hunter pleaded guilty and was fined $10.00 and costs for his lack of knowledge.

"The Cinnamon Teal collected by Schorger and Main on May 7, 1939 in Dane County is now in the collection of the Milwaukee Public Museum and will eventually be placed in their case of rare Wisconsin records, according to Gromme.

"William Elder, member of the Kumlien Bird Club who this year added the Western Burrowing Owl to the Wisconsin list with his collected specimen, has been in the University infirmary with a case of tularemia for a considerable time. Elder contracted the disease while doing research zoology work involving the dissection of rabbits.

"Earl Loyster and Walter Mueller of the Milwaukee Bird Club went up to Cedar Grove to collect a Hudsonian Curlew on July 21 only to have Mueller accidentally collect Loyster, putting him in the hospital for three weeks. However, Loyster recovered and succeeded in collecting the bird on September 11."



Mesic Forest in Baxter's Hollow, Sauk County (*photo by Michael J. Mossman*)

Birds of Southern Wisconsin Upland Forests

by Michael J. Mossman and Randy M. Hoffman

Upland oak and maple woods are a dominant feature of southern Wisconsin. They range from the extensive, relatively undisturbed tracts of the Baraboo Hills and Kettle Moraine forests, to the long bands of ridgeside woods in Driftless Area coulees, to the smaller, scattered woodlots that break up agricultural or urban landscapes. Many of these forest sites are readily accessible by trail or road, so visitors can enjoy their birdlife with little difficulty and no need for equipment other than a pair of binoculars and an attentive ear. And yet some tracts are large and interesting enough for the curious birdwatcher to spend entire days wandering and observing. A slow, early morning walk in a southern upland forest in late May can be fascinating for novices and experienced naturalists alike, with Red-eyed Vireo songs emanating from among the canopy's new green foliage, an occasional Scarlet Tanager or Rose-breasted Grosbeak flashing by, the Ovenbird's songs of "teacher, teacher" ringing through the understory, and perhaps a Blue-gray Gnatcatcher or Eastern Wood-Pewee building its lichen-covered nest on an oak limb.

In addition to these relatively common, characteristic birds of southern upland forests, large tracts also harbor several breeding species that have recently been added to Wisconsin's endangered and threatened species lists, because of their rarity, population declines, or apparent requirements for extensive, often mature forests. These include some of the bird watcher's most sought-after subjects such as the endangered Worm-eating Warbler and the threatened Hooded Warbler, Kentucky Warbler, Cerulean Warbler, and Acadian Flycatcher.

Breeding birds have been studied more thoroughly in southern upland forests than in any other of Wisconsin's native habitats. These studies have helped ecologists and bird watchers understand how bird communities are influenced by factors such as habitat structure and size, nest parasitism, competition, and geography (Bond 1957, Mossman and Lange 1982, Ambuel and Temple 1983, Brittingham and Temple 1983). This knowledge allows land managers such as the Bureau

of Endangered Resources (BER) and The Nature Conservancy (TNC) to use breeding birds as indicators of forest quality. These agencies regularly use breeding bird surveys to help identify the most "intact" forest communities and thus set preservation and management priorities.

Wisconsin southern upland forests occur primarily south of the tension zone, on sites upon which rain water does not accumulate. Curtis (1959) distinguished three general types of southern upland forests based on dominant tree species (Table 1). Southern dry forest tends to occur on sandy or thin soils and south-facing slopes, although it may also pioneer more mesic sites. It is usually dominated by fire-tolerant, sun-loving trees such as white, black, and bur oaks. It tends to have an open canopy, which allows sunlight to penetrate into the understory and stimulate a relatively dense growth of shrubs and saplings, especially in the absence of ground fires. Because these tree species tend to grow poorly in their own shade, dry forest often succeeds to dry-mesic forest. This type is usually dominated by red oak, which has moderate shady tolerance and produces moderate canopy closure and understory growth. It is often succeeded by southern mesic forest, which typically has a fairly open understory beneath a relatively complete canopy of shade-tolerant species such as sugar maple and basswood. Near Lake Michigan, beech is often important as well. Mesic forest is most likely to occur on moist soils, especially in protected valleys and on north- and east-facing slopes. Bigtooth aspen (*Populus grandidentata*) is often an important pioneer species on mesic soils, especially those exposed by fire or mechanical disturbances; while quaking aspen (*P. tremuloides*) often pioneers drier soils.

Succession from one forest type to a more mesic type may be slowed by xeric site conditions, by disturbances such as logging or windthrow that open the canopy and sometimes allow more xeric species to thrive, or by ground fires, which suppress the growth of the more shade-tolerant, mesic tree species such as maples. Ground fires were fairly frequent prior to settlement, at least in dry forests,

Table 1. Ranking of the most important tree species in southern Wisconsin upland forests, based on average importance values of Curtis (1959).

Species	Dry forest	Dry-mesic forest	Mesic forest
Black oak (*Quercus velutina*)	1		
White oak (*Q. alba*)	2	2	
Bur oak (*Q. macrocarpa*)	3		
Black cherry (*Prunus serotina*)	4		
Red oak (*Q. borealis*)	5	1	5
Hills oak (*Q. ellipsoidalis*)	6		
Shagbark hickory (*Carya ovata*)	7		
Basswood (*Tilia americana*)		3	2
Sugar maple (*Acer saccharum*)		4	1
Slippery elm (*Ulmus rubra*)		5	4
White ash (*Fraxinus americana*)		6	7
Ironwood (*Ostrya virginiana*)		7	6
Beech (*Fagus grandifolia*)			3

but the more recent suppression of fire has encouraged forest succession throughout most of southern Wisconsin.

Fire suppression has allowed oak savanna to succeed to dry and especially dry-mesic forests, resulting in a postsettlement increase in forest cover in some areas, such as the southern Kettle Moraine. In general, dry-mesic forest acreage has increased since settlement while mesic forest cover has been reduced and fragmented substantially by agricultural and urban development (Table 2). The vast majority of all three types of remaining woods has been repeatedly disturbed by logging and—especially prior to 1960—grazing. However, a total of 5500 acres of high quality southern upland forest is formally protected by State Natural Area status. An even larger acreage of moderate to high quality forest is fairly well protected under other designations by TNC, BER, state parks, and some private landowners.

Many factors are important in determining which breeding bird species occur in a particular tract of forest. In general, each bird species' life history requirements suit it to a particular range of habitat structures, which we may recognize in terms of such variables as tree height, canopy closure, sapling density, prevalence of mature white oaks, depth of leaf litter, etc. Every forest tract provides its own variety of structure, as a result of forest age, successional trends, local or widespread disturbances, topography, moisture conditions, and other factors. The particular assemblage of birds breeding in a woods, then, depends on how well available habitat structures match those required or preferred by the various bird species. However, other factors may also come into play, including interspecific competition, regional breeding-population levels, tract size, and geographical setting.

Table 2. Presettlement and recent forest cover in southern Wisconsin uplands.

	Forest Acreage	
Forest Type	Presettlement	Recent[1]
Dry	971,000	1,800,000
Dry-mesic	416,000	
Mesic	3,432,500	640,000
Total	4,819,500	2,440,000

[1]Estimates derived from Lindberg and Hoving (1985).

Specifics on habitat-distribution of various breeding bird species comes from a number of studies in southern Wisconsin, as well as from the Natural Areas Breeding Bird Survey files (Mossman and Matthiae 1988). Bond (1957) surveyed breeding birds in Curtis' (1959) study areas and found that several species were more abundant in certain forest types than in others. He conjectured that breeding birds were actually responding to particular structural features that characterized each of the 3 forest types. He was among the first workers to detect an effect of tract size on forest interior birds.

Mossman and Lange (1982) conducted intensive surveys and habitat measurements in southern Wisconsin's largest forest tract, the Baraboo Hills. For most species they described breeding phenology, nest site characteristics, breeding-habitat structure (including comparisons with Curtis' forest types), and ecological relationships with other species. They also suggested preservation priorities based on bird survey data.

Ambuel and Temple (1982) compared their bird counts from southern upland forests in 1979 with a similar set of counts conducted in 1954 by Bond (1957). They concluded that during this period, long-distance migrants declined while several common, resident "edge" species increased; thus corroborating similar trends identified elsewhere in eastern North America. For fall migrations during the period 1965–1987, Wiese (1988) detected a 6% mean annual decline in neotropical migrants netted in upland hardwood edges and other habitats in Ozaukee County.

Ambuel and Temple (1983) characterized and compared breeding-habitat structures of several forest bird species, and also determined that bird species diversity increases with forest tract size, due primarily to an increase in forest-interior, long-distance migrants. They suggested that this pattern was due to increased pressure from competitors, predators, or brood parasites in small woodlots, where breeding territories are never far from the forest edge. In the Baraboo Hills, Brittingham and Temple (1983) found that rates of parasitism by Brown-headed Cowbirds did indeed increase with proximity to the forest boundary. Howe and Jones (1977) also correlated bird species diversity with tract size in Dane County woodlots, and discussed species distributions and their movements between isolated tracts.

Table 3 summarizes some of the results of these studies along with additional trend and abundance data. Table 4 summarizes what we consider important habitat features for each species, based on the above studies and our own experience. In the following discussion of upland forest breeding-bird communities, we will consider 5 major factors: forest type (dry to mesic); geographic location; forest age; disturbance; and tract size.

The most common species of southern upland forests occur throughout the continuum from dry to mesic, although most tend to exhibit a peak in abundance in one forest type or another. These nearly ubiquitous species include the Hairy Woodpecker and Downy Woodpecker, Eastern Wood-Pewee, Blue Jay, Black-capped Chickadee, White-breasted Nuthatch, Red-eyed Vireo, Ovenbird, Scarlet Tanager, and Rose-breasted Grosbeak. Most of these species are also common in southern Wisconsin floodplain forests, which have comparatively fewer ovenbirds and tanagers, and more Great Crested Flycatchers and House Wrens (Mossman 1988).

Dry southern forests are characterized by these "ubiquitous" species, especially Downy Woodpecker, Blue Jay, chickadee, pewee, tanager, and grosbeak, as well as by other species that prefer shrubby understory (Ruffed Grouse, Gray Catbird, Northern Cardinal, Indigo Bunting, Rufous-sided Towhee), and open canopy (Northern Flicker, Great Crested Flycatcher, Northern Oriole), or oaks (Blue-gray Gnatcatcher, Red-headed Woodpecker, and sometimes Red-bellied Woodpecker). The breeding bird community of dry-mesic forests is dominated by the same ubiquitous and oak-loving species, and by species such as Wood Thrush that prefer moister conditions and moderate understory growth.

In southern mesic forests, Ovenbirds and Red-eyed Vireos usually prevail, as they do in maple or beech forests north of the tension zone

Table 3. Abundance, population trends, and general habitat characteristics of birds breeding in southern Wisconsin upland forests.

	Population Trend				Most Common Forest Type	
Species[1]	Overall abundance[2]	Statewide[3]	So. Wisconsin forests[4]	Minimum tract size[5]	So. Wisconsin[6]	Baraboo Hills[7]
*Turkey Vulture	U	+6.5				
Cooper's Hawk	U	+0.1			SM	
*Broad-winged Hawk	R	+2.7		(+)		
Red-tailed Hawk	FC	+4.1			SD	
Ruffed Grouse	FC	+0.5				
Wild Turkey	FC	—				
American Woodcock	R	−0.3				G
Mourning Dove	FC	+1.6				
*Black-billed Cuckoo	FC	−2.9				
*Yellow-billed Cuckoo	FC	+1.2			SD	
Eastern Screech-Owl	U	+0.8				
Great Horned Owl	C	−0.0				
Barred Owl	U	+0.0		(+)		
*Whip-poor-will	FC	+1.6				
*Ruby-throated Hummingbird	FC	+0.4			SM	G
Red-headed Woodpecker	FC	−2.0			SD	SDM
Red-bellied Woodpecker	C	+2.3			SM	SDM
Yellow-billed Sapsucker	R	+0.5				
Downy Woodpecker	C	+1.2			SD	G
Hairy Woodpecker	C	+2.8		40	SM	G
Northern Flicker	C	−3.8				SDM
Pileated Woodpecker	FC	+1.8		240	SM	G
*Eastern Wood-Pewee	A	−0.9			G	SDM
*Acadian Flycatcher (T)	R	−0.6		240	SM	S/NM
*Least Flycatcher	U	−2.9	D	160	SDM	SM
Eastern Phoebe	U	−1.8				NM
*Great-crested Flycatcher	C	+0.4			G	SDM
Blue Jay	A	+0.1			SD	S/NDM
American Crow	FC	+1.6				
Black-capped Chickadee	C	+2.8			SD	G
Tufted Titmouse	R	−0.4		80	G	
White-breasted Nuthatch	A	+0.3			G	G
Brown Creeper	R	+3.9		(+)		
House Wren	FC	+0.3	I			
Winter Wren	R	+3.0				NDM
*Blue-gray Gnatcatcher	C	+1.6	D	80	SDM	G
*Veery	U	−2.2		60		SM
*Wood Thrush	FC	−2.2		20	SDM	G
American Robin	C	+1.2	I			SM
Gray Catbird	C	−0.5			SD	G
Brown Thrasher	U	−0.1				
Cedar Waxwing	U	+2.1				S/NDM
European Starling	FC	−0.6				
*Yellow-throated Vireo	U	+0.4	D	40	SDM	G
*Red-eyed Vireo	A	+1.0			SM	G

(*continued*)

Table 3. *Continued*

Species[1]	Population Trend				Most Common Forest Type	
	Overall abundance[2]	Statewide[3]	So. Wisconsin forests[4]	Minimum tract size[5]	So. Wisconsin[6]	Baraboo Hills[7]
*Blue-winged Warbler	U	+1.1				SM
*Golden-winged Warbler	R	−4.4		(+)		
*Chestnut-sided Warbler	R	−0.8		160		
*Cerulean Warbler (T)	U	+2.6	D	200	SM	SDM
*Black-and-White Warbler	R	−1.2				NDM
*American Redstart	R	−0.7	D	240	SDM	
*Worm-eating Warbler (E)	R	—		(+)		SDM
*Ovenbird	A	−0.1	D	80	SM	SM
*Louisiana Waterthrush	U	+1.6				S/NM
*Kentucky Warbler (T)	R	—		(+)		
*Mourning Warbler	R	+3.9		160		
*Hooded Warbler (T)	R		—		240	
*Scarlet Tanager	C	+0.4	D	40	SD	G
Northern Cardinal	C	+2.8			SD	NM
*Rose-breasted Grosbeak	A	+0.5			SD	G
*Indigo Bunting	C	+0.5			SD	
Rufous-sided Towhee	U	−4.0			SD	
Red-winged Blackbird	U	+0.7	I			
Common Grackle	FC	+2.9	I			
Brown-headed Cowbird	C	−3.7			G	G
*Northern Oriole	FC	+0.9	D		SD	G
American Goldfinch	FC	−0.5				NM
House Sparrow	U	+0.4				

[1]* = Long-distance migrant (no closer than Gulf Coast), (E) = Endangered in Wisconsin, (T) = Threatened in Wisconsin.

[2]A = Abundant, C = Common, FC = Fairly Common, U = Uncommon, R = Rare.

[3]Statewide trends are from federal Breeding Bird Survey data (Sam Droege in litt.) for period 1966–1987. Figures represent mean annual percent increase (+) or decrease (−).

[4]From Ambuel and Temple's (1982) comparison, 1954 vs. 1979. I = Increase, D = Decrease.

[5]Minimum size of a woodlot that has at least a 50% chance of supporting a breeding population (Temple 1988). (+) = additional species that rarely or never occur in southern upland forest tracts smaller than 100 acres (Natural Areas Breeding Bird Survey data).

[6]Bond (1957). SD = southern dry forest, SDM = southern dry-mesic forest, SM = southern mesic forest, G = generalized or indeterminant distribution.

[7]Mossman and Lange's (1982) information from Baraboo Hills stream gorges, where southern dry forest was rare and where northern forest types were also available. Additional codes: NDM = northern dry-mesic forest, NM = northern mesic forest.

(Mossman 1980, Hoffman 1988). Scarlet Tanager, Eastern Wood-Pewee, White-breasted Nuthatch, and Hairy Woodpecker are typically common as well. Acadian Flycatchers often nest in mesic sites within extensive forest tracts, and are more restricted to southern mesic forest than are any other Wisconsin birds.

The geographic location of southern upland forest tracts has a relatively minor bearing on their bird communities.

Table 4. Specific habitat associations of southern Wisconsin upland forests.

Species	Preferred Habitat
Turkey Vulture	Isolated, forest roosts; hills for thermals; isolated caves, shacks for nesting.
Cooper's Hawk	Generalized, increasing.
Broad-winged Hawk	Large tracts.
Red-tailed Hawk	Generalized.
Ruffed Grouse	Dense shrubs and/or saplings, especially aspen.
Wild Turkey	Increasing and expanding since reintroduced. Mixed oak forest and farmland.
American Woodcock	Near edge. Damp openings. Sometimes far from edge in damp stream bottoms.
Mourning Dove	Dry, open, or small tracts.
Black-billed Cuckoo	Shrubby woods and edges.
Yellow-billed Cuckoo	More often in forest interior than Black-billed Cuckoo.
Eastern Screech-Owl	Edges, small tracts, open woods.
Great Horned Owl	Generalized. Avoids forest interior.
Barred Owl	Forest interior, large tracts.
Whip-poor-will	Oak forest.
Ruby-throated Hummingbird	General, but more in mesic and near edges and watercourses.
Red-headed Woodpecker	Dry, open, and/or small tracts. Oaks. Bare snags for nesting.
Red-bellied Woodpecker	Large trees. Red oaks. Large broken limbs of live trees for nesting. Prefers large tracts.
Yellow-bellied Sapsucker	Occasional along river bluffs, where may spill over from floodplain, and in driftless area coulees.
Downy Woodpecker	Generalized. Often edge or small tracts. Prefers dry or pioneer stands.
Hairy Woodpecker	Generalized. Prefers moderate to large trees, large tracts. Often nests in mature aspen.
Northern Flicker	Dry, open woods, grassy understory, woods edge.
Pileated Woodpecker	Large trees. Extensive woods, but not necessarily continuous.
Eastern Wood-Pewee	Generalized, wherever medium to large trees. Oaks. Open spaces in lower canopy.
Acadian Flycatcher	Mature, mesic forest. Open understory. Interior of large tracts. Stream gorges.
Least Flycatcher	Pole-sized trees.
Eastern Phoebe	Bridges, buildings, or cliffs for nesting. Often near water.
Great Crested Flycatcher	Open or semi-open canopy. Edges and small openings.
Blue Jay	Generalized, but most common with open canopy, and in dry sites, edges, small tracts.
American Crow	Small tracts, edges, dry forest.
Black-capped Chickadee	Generalized, but most common in drier woods.
Tufted Titmouse	Large, moderately mature tracts.
White-breasted Nuthatch	Generalized, but most common in mature woods. Interior and edge.
Brown Creeper	Large woods. Snags with peeling bark for nesting.
House Wren	Shrubby woods and edges, especially with rock or wood piles, nest boxes.
Winter Wren	Rocky slopes of extensive forest in Wyalusing and Baraboo Hills.
Blue-gray Gnatcatcher	White oaks and ashes. Interior and edges of large tracts.
Veery	Cool, damp pockets and stream bottoms, often with dense understory. Dense understory of cutovers. Large tracts.
Wood Thrush	Closed or semi-open canopy with patches of dense saplings.
American Robin	Edges and small tracts. In large tracts where damp.
Gray Catbird	Shrubby woods, openings and edges.

(*continued*)

Table 4. *Continued*

Species	Preferred Habitat
Brown Thrasher	Edges.
Cedar Waxwing	Small, open-canopied tracts. Edges. Fruit-bearing trees and shrubs.
European Starling	Small, open-canopied tracts. Edges. Snags for nesting.
Yellow-throated Vireo	Large tracts. Interior and edge. Mature trees. Prefers semi-open canopy.
Red-eyed Vireo	Generalized. Most common in mesic forest, complete canopy. Maple and mature aspen.
Blue-winged Warbler	Large and small openings with some grassy cover, especially where mesic.
Golden-winged Warbler	Large, interior openings of large tracts with some grassy cover, especially where mesic.
Chestnut-sided Warbler	Shrubby, interior edges and openings. Large tracts.
Cerulean Warbler	Large trees. Large tracts. Prefers mesic sites.
Black-and-white Warbler	Rarely in dense saplings of cutovers, or where mature conifers are nearby.
American Redstart	Interior edge and openings with mixed shrubs, saplings, and trees. Large tracts.
Worm-eating Warbler	South- and west-facing slopes, semi-open canopy, mature oaks. Large tracts.
Ovenbird	Generalized. Most common in mesic forest with many small trees. Deep leaf litter. Large tracts.
Louisiana Waterthrush	Clear streams, especially with springs.
Kentucky Warbler	Dense shrubs of interior edges and openings, especially if damp. Damp, open-canopied sites with dense forbs. Large tracts.
Mourning Warbler	Dense shrubs of interior edges and openings. Large tracts.
Hooded Warbler	Dense shrubs and brambles of interior edges and openings, in mesic or dry-mesic sites. Large tracts.
Scarlet Tanager	Generalized, but most common around oaks.
Northern Cardinal	Generalized, mostly near edges and openings with tangles of brush and vines.
Rose-breasted Grosbeak	Generalized. Forest interior and edge. Prefers open canopy with moderate growth of saplings and shrubs.
Indigo Bunting	Open-canopied woods, openings, and edges, with abundant shrubs and some trees or saplings.
Rufous-sided Towhee	Shrubby openings and edges of dry woods, with grassy patches.
Red-winged Blackbird	Small woodlots and edges.
Common Grackle	Small woodlots and edges.
Brown-headed Cowbird	Generalized. Least common in interior of large tracts.
Northern Oriole	Open canopy. Mature trees. Edges, openings, and steep slopes.
American Goldfinch	Edges and small tracts, especially if mesic. Occasionally in canopy of stream gorges.
House Sparrow	Small woodlots and edges, near human habitations.

Southern species such as Northern Cardinal, Tufted Titmouse, Acadian Flycatcher, and Hooded Warbler are encountered less frequently northward, although Hooded Warblers, for example, can be found in appropriate habitat as far north as Shawano County. Large outliers of relatively undisturbed southern upland forest, for example at Tula Lake in Polk County, or McCaslin Mountain in Marinette County, may contain apparently intact

bird communities representative of more southern tracts, as indicated by the presence of species such as Red-bellied Woodpecker, Wood Thrush, and Cerulean Warbler.

Any southern upland forest, regardless of site condition or tree species composition, may occur at various ages, or it may comprise patches of variously aged stands. Young stands, characterized by many saplings and small trees, typically succeed major disturbances such as clearcutting, windstorm, or fire; or they may result from more gradual succession on oldfields. At the other extreme are mature forests, which are distinguished mainly by the occurrence of large trees. Least Flycatcher, American Robin, and Ovenbird are among those species that are often common in young stands with many pole-sized trees. Species that prefer large trees include Pileated Woodpecker, Red-belled Woodpecker, Eastern Wood-Pewee, Yellow-throated Vireo, and Cerulean Warbler. The Cerulean Warbler is more dependent on mature trees than is any other species of southern upland and lowland forests.

Disturbances other than large-scale clearing by saw, fire, or wind are also important in determining breeding-bird distributions. For example, in an area of relatively continuous forest cover, diseases such as oak wilt often create a patch of dead, standing trees with peeling bark, and a dense understory of shrubs, saplings, and brambles "released" by the canopy opening. The snags may attract woodpeckers and nesting Brown Creepers, while the understory may provide habitat for species such as Rufous-sided Towhee, Indigo Bunting, Gray Catbird, Mourning Warbler, or American Redstart. Similar effects on the understory avifauna can be created by other local disturbances such as powerline corridors, selective logging, lightning strikes, and the natural death or windthrow of old trees. With time, small openings of all types generally fill in with saplings and small trees, providing habitat that is especially favorable for species such as Rose-breasted Grosbeak and, if enough canopy has remained intact, Wood Thrush. Large forests that are allowed to mature without major disturbances eventually develop a diverse structure, and a rich breeding-bird community, with trees of all sizes, and a patchiness resulting from various microsite conditions and past local disturbances. Forests that are repeatedly logged tend to develop a simpler structure, and especially lack large trees, which are important to several canopy-dwelling species and others such as the woodpeckers and Great Crested Flycatcher that use dead trees or limbs for nesting or foraging.

Tract size is a very important factor affecting breeding-bird communities of southern upland forest (Temple 1988a). Isolated tracts less than 40 or even 80 acres in size—even those with Natural Areas status—are often dominated by "edge" species such as Blue Jay, House Wren, American Robin, Indigo Bunting, and Common Grackle. Many species (Tables 3, 4) occur only or primarily in tracts that are at least 100 acres in size. Several of these species, such as Kentucky Warbler, Hooded Warbler, and Worm-eating Warbler, breed consistently only in tracts that are over 500 acres in size, although they may occur sporadically in smaller tracts—appearing one or more years but not in others. Some of these forest birds are "area-depend-

ent' because they require large, forested feeding territories, for example large birds such as the Pileated Woodpecker, Broad-winged Hawk, and Barred Owl. Others have territories only a few acres in extent, but appear to be affected by size-related factors such as predation, cowbird parasitism, and competition with species of the forest edge. Several of these forest interior species are rare, declining, or of critical status (Table 3).

Some, including Acadian and Least Flycatchers, Yellow-throated Vireo, Ovenbird, and Cerulean and Worm-eating Warblers, live and nest within a moderate- to well-canopied forest. Others depend on southern upland forests on "interior edge": shrubby openings within extensive forest (Mossman and Lange 1982). These are, in approximate order of increasing tree cover or decreasing size of opening: Golden-winged Warbler, Blue-winged Warbler, American Redstart, Chestnut-sided Warbler, Mourning Warbler, Kentucky Warbler, and Hooded Warbler. For example, all 4 Hooded Warbler nests found in the Baraboo Hills by Brittingham and Temple (1980) "occurred in small openings which ranged in size from 0.01–0.03 hectares. These openings were created by selective logging 5–20 years ago. They contained primarily sugar maple saplings, but hop hornbeam [ironwood], green ash, red oak, maple-leaf viburnum, and other plants were also present. The density of saplings was extremely high (200–420 stems per 0.01 hectares). The height of the saplings ranged from 0.3–1.8 m."

Canopy openings thus have quite different effects on forest avifaunas, depending on the size of the tract and the extent of the openings. Small, shrubby openings 0.3–10 acres in size within extensive forest can help maximize diversity not only within the forest, but also regionally by providing for uncommon interior edge species. Such openings appear to occur naturally in sufficient abundance in undisturbed, old growth stands. Larger openings tend to encourage more common "exterior edge" species such as Gray Catbird, Indigo Bunting, and the parasitic Brown-headed Cowbird. Since small tracts tend to foster common forest and exterior edge species, openings in these woods have relatively little effect on local or regional diversity.

Many forest interior species, most of them long-distance migrants, have declined in Wisconsin and elsewhere during recent decades (Table 3). Are these declines due to the long-term effects of forest fragmentation here on the breeding grounds, to habitat deterioration on migration areas or tropical wintering grounds, or some combination of these factors? These questions have been asked repeatedly in recent years (Ambuel and Temple 1982, Temple 1988b, Terborgh 1989). They present an urgent challenge to researchers throughout the Americas, to provide answers that will best direct the efforts of land managers and conservation agencies to reverse this trend.

Regardless of the eventual outcomes of such research, we would be remiss not to maintain a system of protected and managed forests that incorporates what we already know about the habitat structure and size requirements of our native, breeding avifauna.

Haskell Noyes Memorial Woods

Size.—67 acres located within a mosaic of younger forest and adjacent to 600 acres of floodplain forest.

Location.—Eastern Fond du Lac County, within the northern unit of Kettle Moraine State Forest.

Access.—From the intersection of Highway 67 and County Highway SS, northeast of Campbellsport, go east 2.7 miles on Highway SS to the north boundary of the natural area. Turn south on Highway GGG and proceed less than 0.1 mile to a small parking lot with a historical marker.

Site Description.—This site lies on an interlobate moraine formed between the Green Bay and Lake Michigan lobes of the Wisconsin stage of glaciation. The soils are Casey, Redman, Fox, and Lapeer loams and silt loams. A high percentage of gravel is found in the soils; therefore, steep slopes are subject to erosion. With the exception of a small area of tamarack and swamp hardwoods on the north end, the forest type is upland hardwood forest, dominated by sugar maple and red oak. Next in importance is basswood, with smaller amounts of white ash, bitternut hickory (*Carya cordiformis*), ironwood, and red maple (*Acer rubrum*). The forest understory is open with few shrubs, a rich spring flora, and a variety of ferns.

Another area within the northern unit of the Kettle Moraine State Forest that should be investigated is a 2,000-acre complex of oak forest, on rugged glacial topography just south of Greenbush. The forests are dominated by relatively small oaks. The area is bisected by County Highway A and Kettle Moraine Drive.

Birds.—Considering its accessibility, Haskell Noyes Woods has a quite rich bird fauna, including forest interior and threatened species (Table 5). One of these is the Acadian Flycatcher, which occurs in the deep, mesic potholes under tall sugar maples and red oaks.

Olson Oak Woods (Madison School Forest)

Size.—A 90-acre State Natural Area within a 200-acre forest.

Location.—Western Dane County.

Access.—From Verona, go south on State Highway 69 for 2.3 miles, then west on Riverside Road 2 miles, then south on Woodside Road 1 mile to a parking area.

Site Description.—Olson Oak Woods is part of the Madison School Forest. The site was designated a State Natural Area in May 1980 and named in honor of conservationist Paul Olson, the original supervisor of the forest. He developed many environmental programs and was instrumental in developing the facilities.

The woods is a relatively large oak forest for this part of southern Wisconsin. Scattered open-grown white oaks dating to the 1750s remain as evidence of the former savanna conditions. Frequent multiple-trunked white and black oaks, along with bur oak, black cherry, red oak, and shagbark hickory comprise the forest. Occasional ironwood and basswood occur in ravines, on hills, and on remains of shaly limestone ridges. Abundant reproduction of white, red and black oaks occurs on a thin-soiled ridge over St. Peter sandstone. Nearly 300 species of vascular plants have been observed in the forest.

Birds.—A dense shrub and sapling layer provides excellent forest structure for certain nesting birds (Table 5), such as Veery, Wood Thrush, Gray Catbird, Mourning Warbler, Rose-breasted Grosbeak, Indigo Bunting, and Rufous-sided Towhee. Large oaks provide habitat for several woodpecker species, Eastern Wood-Pewee, Yellow-throated Vireo, and occasionally Cerulean Warbler. An Acadian Flycatcher is sometimes found in a mesic draw. This is an excellent location for Tufted Titmice.

Wyalusing Park State Natural Area

Size.—This comprises the Wyalusing Walnut Forest State Natural Area (140 acres), Wyalusing Hardwood State Natural Area (186 acres), and Wyalusing Public Use Natural Area (405 acres). These areas are part of nearly 2,000 acres of forest lying within the park, and additional contiguous forest extending along both river corridors.

Location.—Northwestern Grant County, near the confluence of the Wisconsin and Mississippi Rivers, within Wyalusing State Park.

Access.—The Walnut Forest is found along the north-facing hillside at the confluence of the rivers. Access is via Bluff, Flint Ledge and Old Immigrant Trails. The Hardwood Forest is farther upstream, extending south from the Wisconsin River into adjacent uplands. It can be reached by the Old Immigrant Trail. The Public Use Natural Area faces west, above the Mississippi River. It includes woods along and to the south of Long Valley Road, with access via Sugar Maple Nature Trail.

Site Description.—The main feature of the Walnut Forest is the excellent black walnut (*Juglans nigra*) component of the mature forest, including 2 nearly pure stands. Walnuts occupy the rich soil sites with red oak, basswood, and lesser numbers of elm, hackberry (*Celtis occidentalis*), butternut (*J. cinerea*), and sugar maple. Upslope are drier, thinner soils with white and black oaks predominating. Vertical cliffs below the summit, which is almost 500 feet above the Wisconsin River, contain a variety of species including yew (*Taxus canadensis*), sullivantia (*Sullivantia renifolia*), and amethyst shooting star (*Dodecatheon amethystinum*). At the base of the north-facing slope lies the floodplain forest composed of silver maple (*Acer saccharinum*), elm, and cottonwood (*Populus deltoides*). Spring wildflowers abound as well as significant populations of such uncommon species as walking fern (*Camptosaurus rhizophyllus*), narrow-leaved spleenwort (*Athyrium pycnocarpon*), Goldie's fern (*Dryopteris goldiana*), and dragon sagewort (*Artemisia dracunculoides*).

Wyalusing Hardwood Forest occupies the steep sides and top of a ridge just east of the confluence of the Wisconsin and Mississippi Rivers. The wooded bluffs rise more than 400 feet above the Wisconsin River and provide a variety of exposures over different bedrock types including Prairie du Chien and Platteville-Galena dolomites and St. Peter sandstone. The major soil types, Fayette and Seaton silt loams, developed in loess. The river bottoms have wet-mesic forest dominated by silver maple. Upslope there are areas of mesic, dry-mesic, and dry forest. The groundlayer species are

Table 5. Average numbers for species observed on breeding bird surveys conducted in June.

Species	Average number observed in indicated forest stand[1]:			
	Olson	Haskell Noyes	Wyalusing SNA's	Big Woods
Turkey Vulture	0	0	+	2
Cooper's Hawk	+	0	0	+
Broad-winged Hawk	0	0	0	1
Red-tailed Hawk	+	1	0	3
Ruffed Grouse	1	0	0	3
Wild Turkey	+	0	+	+
American Woodcock	0	0	0	1
Mourning Dove	0	0	1	0
Yellow-billed Cuckoo	+	+	1	4
Black-billed Cuckoo	+	0	1	2
Barred Owl	0	0	1	2
Whip-poor-will	0	0	1	+
Ruby-throated Hummingbird	1	0	0	+
Red-headed Woodpecker	+	+	0	6
Red-bellied Woodpecker	4	1	11	10
Downy Woodpecker	4	1	5	22
Hairy Woodpecker	5	2	2	7
Northern Flicker	1	1	1	7
Pileated Woodpecker	+	0	3	6
Eastern Wood-Pewee	14	2	17	87
Acadian Flycatcher	1	1	0	19
Least Flycatcher	0	0	0	10
Eastern Phoebe	1	0	2	+
Great Crested Flycatcher	4	2	11	5
Blue Jay	7	3	10	40
American Crow	0	2	5	7
Black-capped Chickadee	5	2	2	29
Tufted Titmouse	4	0	2	+
White-breasted Nuthatch	6	4	9	39
Brown Creeper	0	0	2	+
House Wren	7	2	18	0
Winter Wren	0	0	+	+
Blue-gray Gnatcatcher	6	0	5	19
Veery	6	1	0	35
Wood Thrush	5	0	6	25
American Robin	1	1	2	19
Gray Catbird	7	0	0	8
Cedar Waxwing	0	0	3	0
Yellow-throated Vireo	2	1	4	9
Red-eyed Vireo	8	10	15	64
Blue-winged Warbler	0	0	0	6
Golden-winged Warbler	0	0	0	1
Chestnut-sided Warbler	0	0	0	8
Cerulean Warbler	+	+	5	15
Black-and-white Warbler	0	0	0	1
American Redstart	0	1	2	19
Ovenbird	6	5	0	119
Louisiana Waterthrush	0	0	4	4
Kentucky Warbler	+	0	5	2
Mourning Warbler	2	0	0	6
Common Yellowthroat	0	0	0	1
Hooded Warbler	0	1	0	7
Canada Warbler	0	0	0	4

(*continued*)

Table 5. *Continued*

Species	Average number observed in indicated forest stand[1]: Olson	Haskell Noyes	Wyalusing SNA's	Big Woods
Scarlet Tanager	7	2	2	65
Northern Cardinal	5	1	10	5
Rose-breasted Grosbeak	5	0	3	40
Indigo Bunting	8	1	10	20
Rufous-sided Towhee	2	0	0	4
Brown-headed Cowbird	2	1	7	61
Northern Oriole	2	2	6	4
American Goldfinch	1	0	4	6

[1]+ = average of less than 1, or recorded during breeding season but not on formal survey.

equally diverse, varying in composition with microclimate.

The Public Use Natural Area contains a relatively young forest.

Birds.—Survey data in Table 5 represent only those species recorded in the upland sections of the Walnut and Hardwood Natural Areas. The diverse pattern of forest types contain a comparably diverse bird fauna, with more than 250 species recorded and nearly 50 species nesting in the area. Nesting birds are characteristic of locations much farther south and include many forest interior species. Cerulean Warbler, Kentucky Warbler, Acadian Flycatcher, Blue-gray Gnatcatcher, Tufted Titmouse, and Louisiana Waterthrush are common. Prothonotary Warblers and other floodplain species occur in the river bottom section of the Natural Areas. Winter Wrens can be found in a rocky area of the Hardwood Forest.

Baxter's Hollow Big Woods

Size.—Approximately 4,000 acres, within a 10,000 acre forest.

Location.—Sauk County, in the heart of the south range of the Baraboo Hills.

Access.—From the intersection of Highway 12 and County Highway C between Baraboo and Sauk City, adjacent to the Badger Ordinance Works, go west on Highway C 1.5 miles. Turn north on Stone's Pocket Road, and go 2 miles to the south boundary of the natural area at the first stream crossing. Continue up the Baxter's Hollow stream gorge 1 mile and park where the hollow expands and the road turns to gravel. From here, follow the gravel road through the former Klondike Campground, and perhaps venture into the woods on old logging roads. Contact TNC for more information on access and field trips.

Site Description.—Baxter's Hollow is the relatively undisturbed, 4,000-acre watershed of upper Otter Creek, which arises from springs and extensive forest in the Baraboo Hills and exits the hills into agricultural land through a mile-long rocky gorge. The clear, cold stream supports trout, but is better known for its diverse and unique aquatic insect fauna, which in-

cludes at least 78 species of caddisflies. The bird count data presented here do not include surveys conducted in the stream gorge itself, where cold air drainage and rocky substrates have permitted a forest most closely related to Curtis' northern dry-mesic type, dominated by oaks, maples, white pine (*Pinus strobus*), and other northern understory species. Rather, the counts were made in the extensive hardwood forests in the upper, less extreme but rocky reaches of the hollow, which are covered mainly by southern dry-mesic forest, much of which is succeeding to mesic forest.

Topography, microclimate, local site conditions, and various past management practices by numerous private landowners have resulted in a patchy forest structure that includes, among others: recently logged areas; young, even-aged stands recovering from former clearcuts; patches of mature aspen; stunted white oak woods on thin-soiled, southern exposures; protected slopes and draws with mature maple woods; large tracts of mature oak-maple forest cut only selectively since the wholesale logging and burning of the late 1800s.

This is a part of the Baraboo Hills "Big Woods," which extends beyond the watershed proper, and which is contiguous to other forests of the Baraboo Hills south range. Together these represent the largest tract of forest in southern Wisconsin.

Birds.—The Big Woods includes apparently healthy populations of all of southern Wisconsin's forest-interior bird species (Table 3), including Broad-winged Hawk, Acadian Flycatcher, Worm-eating Warbler, Hooded Warbler, Kentucky Warbler, Mourning Warbler, Golden-winged Warbler, and Cerulean Warbler. Louisiana Waterthrushes are common along streams, and Turkey Vultures are seen frequently. Data in Table 5 come from 8 nonoverlapping surveys run in 1981, and do not include birds of old fields. Most Canada Warblers noted in Table 5 were in shrubby areas, and were apparently birds associated with northern dry-mesic forests in the nearby stream gorge. The tract provides habitat for a total of 39 mammal, 92 nesting bird, 18 reptile, and 13 amphibian species. This area and its birdlife are described in detail by Mossman and Lange (1982).

ACKNOWLEDGMENTS

Eric Epstein made valuable comments on the manuscript. The following cooperators conducted breeding-bird surveys for 1 or more years: David Fallow (Olson Oak); Bruce Ambuel, Bill Volkert, Harold Bauers (Haskell Noyes); Eric Epstein, Karl and Dorothy Legler (Wyalusing).

LITERATURE CITED

Ambuel, B. and S. A. Temple. 1982. Songbird populations in southern Wisconsin forests: 1954 and 1979. *Journal of Field Ornithology* 53:149–158.

Ambuel, B. and S. A. Temple. 1983. Area dependent changes in the bird communities and vegetation of southern Wisconsin forests. *Ecology* 64:1057–1068.

Bond, R. R. 1957. Ecological distribution of breeding birds in the upland forests of southern Wisconsin. *Ecological Monographs* 27:351–384.

Brittingham, M. C. and S. A. Temple. 1983. Have cowbirds caused forest songbirds to decline? *BioScience* 33:31–35.

Curtis, J. T. 1959. *The vegetation of Wisconsin: an ordination of plant communities.* University of Wisconsin Press, Madison. 657pp.

Hoffman, R. M. 1989. Birds of Wisconsin north-

ern mesic forests. *Passenger Pigeon* 51:97–110.

Howe, R. W. and G. Jones. 1977. Avian utilization of small woodlots in Dane County, Wisconsin. *Passenger Pigeon* 39:313–319.

Lindberg, R. D. and H. J. Hovind. 1985. Wisconsin forests: an assessment. Wisconsin Department of Natural Resources, Bureau of Forestry. 86pp.

Mossman, M. J. 1980. Analysis of the breeding bird survey program on Wisconsin natural and scientific areas 1971–1977, with future program recommendations. *Wisconsin Department of Natural Resources, Research Report* 105. 59pp.

Mossman, M. J. 1988. Birds of southern Wisconsin floodplain forests. *Passenger Pigeon* 50:321–337.

Mossman, M. J. and K. I. Lange. 1982. *Breeding birds of the Baraboo Hills, Wisconsin: their history, distribution, and ecology.* Wisconsin Department of Natural Resources and Wisconsin Society for Ornithology, Madison. 197pp.

Mossman, M. J. and P. E. Matthiae. 1988. Wisconsin's bird habitats: introducing a new series. *Passenger Pigeon* 50:43–51.

Temple, S. A. 1988a. When is a bird's habitat not habitat? *Passenger Pigeon* 50:37–41.

Temple, S. A. 1988b. What's behind long-term declines in some breeding bird populations? *Passenger Pigeon* 50:133–138.

Terborgh, J. 1989. *Where have all the birds gone?* Princeton University Press, Princeton, NJ. 207pp.

Michael J. Mossman
Bureau of Research
Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, WI 53711

Randy M. Hoffman
Bureau of Endangered Resources
Department of Natural Resources
P.O. Box 7921
Madison, WI 53707

Wild Turkey *by Jonathan Wilde*

What to Do When You Encounter a Banded or Marked Bird

by Scott R. Craven

Much of our vast knowledge of avian life histories has come from studies that involved the banding or marking of individual birds. However, there is still much to be learned, and banding and marking are still essential research tools in ornithology. Many research projects use various types of bands and markers, and when amateur or backyard birders recover a banded bird or reobserve a marked bird they can help researchers by reporting their discoveries.

According to a United States Fish and Wildlife Service publication on bird watching, the marking of birds dates back to the care of the emperors' falcons during the Roman Empire. Apparently the originator of banding, as we know it today, was a Danish school teacher named Hans Christian Mortenson. During the 1890s, he placed metal bands, inscribed with his name and address, on several European species. As banded birds were recovered, the utility and popularity of the technique became apparent. Banding, known as "ringing" in Europe, quickly spread to the United states, and in only a few short years banders had formed the American Bird Banding Association. This activity predated the U.S. Fish and Wildlife Service, modern wildlife management, and the era of extensive banding regulations and permits by decades. It was then a popular hobby for many bird enthusiasts.

Government biologists soon recognized the scientific potential of banding and the complexities of maintaining adequate records as the number of banded birds increased. Thus, the banding of migratory birds has been under the joint direction of the Canadian and American governments since 1920, when the American Bird Banding Association accepted a federal offer of assistance. Today, bird banding in North America is directed by the Bird Banding Laboratory within the U.S. Fish and Wildlife Services' Office of Migratory Bird Management in Laurel, Maryland. The Bird Banding Lab processes permit applications, issues bands, and manages millions of records. The days of "recreational banding" are over. Permits (required for all work on migratory birds—songbirds, waterfowl, raptors, etc.) are issued only to highly qualified

individuals who have a specific need for banding techniques as part of a well organized research program.

Currently, there are 331 people authorized to band birds in Wisconsin; 203 residents and 128 non-residents. Of the 203 resident banders, 100 are master permittees and 103 are subpermittees (e.g., individuals who band under the direction of a master permittee). By comparison, there are 2,546 master permittees and 1,641 subpermittees in the United States.

The Bird Banding Lab currently dispenses 19 sizes of standard aluminum leg bands. These bands fit properly on the legs of birds ranging in size from hummingbirds to eagles. Most bands are simple aluminum strips bent into an open ring and closed tightly by the bander as the band is placed around the bird's leg. However, there are several special types, such as locking bands, useful for powerful raptors capable of removing the standard type. Stamped on all bands is a unique number and the notice "Avise Bird Band, Washington, DC." For example, a band on a Canada Goose might be numbered "628-07840." The third digit, "8," indicates the size of the band, and the rest of the code identifies for life the individual goose wearing it.

Other types of bands and markers may be used for long-distance recognition because the numbers on a standard band can only be read at close range. These bands and markers use different colors and various combinations of letters and numbers to make the individual identification at a distance easier. For example, a Ruffed Grouse could be marked with a blue and a red band on the left leg and a red band and the standard band on the right leg. This hypothetical bird could then be identified with binoculars without the need to recapture it or recover it dead. Another marking technique, using plastic neck-bands, has been used extensively on Canada Geese. In fact, it would be difficult to watch many geese at most Wisconsin sites without seeing a neck band. Most are blue with white code (e.g., "EA42") because that color combination is assigned to the Mississippi Valley Flyway by the Bird Banding Lab, but other colors (on birds marked in other flyways) may occasionally be observed. Colored leg bands, neck bands, wing tags, or other forms of markers are monitored by, and reported to, the Bird Banding Lab, but they are made or purchased by the researcher involved.

As of 1986, there were 37 million banding records on file at the Bird Banding Lab! Each year over a million new birds are added and about 65,000 recoveries are processed. The number of birds banded in Wisconsin in any given year is well into the thousands. In recent years, several thousand Canada Geese alone have been banded annually in Wisconsin.

What do we learn from these millions of records? Banding data can be used to study longevity, distribution, migration, and survival. Other forms of bird marking—including radio transmitters, neck collars, wing tags, and paint or dye—are used to augment traditional banding for the study of behavior, movement patterns, survival, and many other aspects of bird life that require multiple contacts with the bird.

Band recoveries led to the discovery of flyways and specific migration corridors. The timing of recoveries pro-

vides clues to the speed of migration and when it occurs. The time between banding and recovery of a band on a dead bird sets the life span of species in the wild. As of 1986, the longevity record was held by a Herring Gull banded in the nest on the coast of Maine in 1930 and found dead along the Lake Michigan shoreline in 1966—36 years later! While I have been banding geese at Horicon Marsh for the past 15 years, recoveries of banded geese 12–15 years old were not uncommon, and I suspect many of these are still flying. In the case of migratory waterfowl, band recoveries by hunters are critical to the determination of survival rates and the seasonal and geographic distribution of the waterfowl harvest; these statistics are essential in the setting of annual hunting regulations.

What should you do, for example, if you see a marked bird while you are watching a feeder outside your window, or watching birds in the field with a spotting scope, or if you find a dead bird that is wearing a band or marker. What can you do to satisfy your curiosity about the bird and complete the cycle of events that started when the bander first captured the bird? The following instructions are provided by the Bird Banding Lab.

"When you find a band, straighten it out and tape it securely to a piece of writing paper. With the band, send in the following information:

1. Your name and address (print plainly)
2. All numbers and letters on the band
3. The date you found the band
4. The place you found the band (mileage and direction from the nearest town, with County and State)
5. How you found the band (on a bird found dead, shot, or caught in some other way)
6. Place in an envelope, mark the envelope, "Hand Cancel," and send to the following address:
   Bird Banding Laboratory
   U.S. Fish and Wildlife Service
   Laurel, MD 20708"

Actually, most individuals who find a band have nothing more to go on than the inscription on the band. In fact, if the envelope says nothing more than "Bird Band, Washington, DC," it usually arrives at the Bird Banding Lab—sooner or later. The Bird Banding Lab prefers that the band be sent, but they will process records without the band if the number is carefully recorded. If you find a live banded or marked bird simply record the band number and the type of marker—as well as the pertinent details noted above—and release the bird. Do not attempt to remove the band. Even if you were able to remove the band without injuring the bird, the opportunity for future recoveries will be lost.

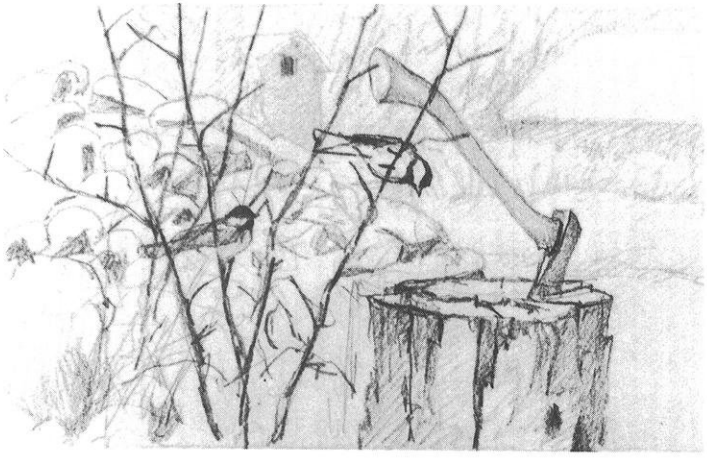
Following receipt of your information, the Bird Banding Lab will enter the data in their files and process two reports. You will receive a "Certificate of Appreciation" telling you where and when the bird was banded and by whom, as well as the sex and age of the bird at the time of banding. The bander will receive a report of the details of the band recovery. Banders and "finders" hope for the glamourous recoveries—tremendous distances, rapid movements, or bizarre locations—but the bread and butter of banding data analyses are the thousands of "routine" recoveries.

Observations of markers such as the plastic goose neckbands are handled in a similar fashion. In addition to the normal report, you may also receive a detailed record of the bird's wherea-

bouts over years of observations. I recently found out that a female Canada Goose I marked with blue collar "10K" in 1974 has been repeatedly seen in Wisconsin and Illinois as recently as 1988. These resightings of that bird have contributed important documentation of movement patterns of Canada Geese in the upper Midwest region.

The possibility of spotting or finding a banded or otherwise marked bird adds a new dimension to your bird watching. It also represents a chance to answer some very common questions about birds that we all wonder about: Where did it come from? Where is it going? How old is it? For a wonderful perspective on the excitement generated by a banded bird, I suggest that you read Aldo Leopold's classic description of chickadee number 65290 in "December" chapter of *A Sand County Almanac.*

Scott R. Craven
Department of Wildlife Ecology
University of Wisconsin
Madison, WI 53706



Black-capped Chickadees *by Jonathan Wilde*

What Constitutes a Viable Bird Population?

by Stanley A. Temple

As many bird populations decline in size and become endangered, conservationists have been faced with resolving an issue with biological and social implications: How many individuals are required to insure that a population has a high probability of persisting?

In the biblical account of Noah's exploits at saving endangered wildlife, no more than a few pairs of each species were rescued aboard the ark. Today, nature preserves often function as modern-day arks, providing safe refuge for small populations of endangered species in a rising sea of human development. Like Noah, modern-day conservationists need guidelines on how many individuals of each species must exist in a preserve, if the population is to survive for a reasonably long time, perhaps hundreds of years. Conservation biologists have termed this basic requirement for long-term survival a "minimum viable population" (Soulé) 1987).

The current advice provided by conservation biologists suggests that Noah's few pairs wouldn't constitute a viable population. They point out that animal populations composed of fewer than a few hundred breeding individuals have poor prospects for long-term survival. Such small populations—particularly when they are cut off from other populations, as they might be in an isolated nature preserve—are especially prone to local extinction. Their fate seems tied to the fact that small, isolated populations are particularly vulnerable to various stochastic events (unpredictable setbacks that result from the perverse uncertainties of nature).

Several things go awry in populations below a minimum viable size. Among the best known are the disastrous genetic consequences of inbreeding and loss of genetic variation in small populations. Other problems involve stochastic changes in a population's demography. Furthermore, small populations have a hard time recovering from environmental stochasticity, the unpredictable setbacks caused by epidemics, droughts, hard winters, and all the other natural and man-made vagaries of our worldly environment.

Genetics of Small Populations

Population geneticists have shown that small animal populations with less than 50 breeding individuals have high levels of inbreeding that result from the mating of close relatives. These high levels of inbreeding can produce several serious handicaps for the population. First, there is the risk of "inbreeding depression," the deterioration in the general fitness of offspring that are produced by closely related parents. Secondly, there is the problem of loss of genetic variation in the population. The genetic constitution of small isolated populations is always different from that of a larger population. By having less genetic variation the population loses its ability to evolve and cope with changes in its environment.

The smaller the population, the greater is the risk that genetic problems will result in the population's demise. Generally, populations with an effective population size (roughly the number of individuals that actually comprise the breeding segment of the population) greater than 50 avoid many of these genetic threats. But for a population to have an effective population size of 50 the total population usually has to be many times larger. In most populations there are many individuals that don't breed because they are sexually immature, of low social rank, or reproductively senile. It is not uncommon for the total population to have to number in the hundreds to achieve an effective population of 50.

Demographics of Small Populations

The events that surround births and deaths in populations often have an unpredictable nature. For example, the determination of the sex of an individual is a 50:50 proposition. At the time of conception there are equal odds of producing a male or a female; it's like flipping a coin. In large populations with many births per generation the result of this process is a 50:50 sex ratio, just like the ratio of heads-to-tails is 50:50 when a coin is flipped many times. But, in small populations with few births per generation, sex ratios can deviate markedly from 50:50, just as the ratio of heads-to-tails will not be 50:50 after only a few coin flips.

These types of deviations in small populations can have serious repercussions for the population's ability to survive. An unbalanced sex ratio could, for example, reduce the effective population size, and it could reduce the number of offspring produced per generation. Generally populations of hundreds of individuals can avoid demographic problems.

Environmental Problems for Small Populations

The worldly environment is variable and often unpredictable. The occurrence of such natural catastrophes as hard winters, drought, epidemics of disease, and the like, is likely to cause a population's size to drop, sometimes dramatically. Large populations can withstand such environmentally induced setbacks and recover their numbers because there are still a relatively large number of survivors from which to begin population growth. In small populations on the other hand, a major environmental setback could bring the population down to such a low size that recovery becomes unlikely. All populations face these occasional set-

backs, large ones survive whereas small ones go extinct. There is no way to estimate how many individuals are required to stand-up to environmental swings but certainly hundreds of individuals are relatively safe, under most circumstances.

A Wisconsin Example: Sharp-tailed Grouse

The Sharp-tailed Grouse is a classic example of an area-sensitive, habitat specialist whose future in Wisconsin is threatened by severe habitat fragmentation and a scarcity of habitat patches large enough to accommodate viable populations. Species, such as the Sharp-tailed Grouse, that are easily isolated in small, widely separated, remnant patches of habitat, and that exist there at low densities, are subject to a great risk of local extirpation. Disastrous stochastic events in the genetics, demography and environment of such small, closed populations are best avoided by maintaining these populations above a critical minimum size. Population viability analyses (Soulé) 1987) permit managers to answer two important questions: (1) What size must an isolated local population of Sharp-tailed Grouse maintain to achieve long-term viability, and (2) how large an area of suitable habitat is needed to accommodate such a viable population.

Population viability analysis.—Lacking much detailed information on the population genetics and demography of Sharp-tailed Grouse, I performed one of the simpler types of population viability analyses (i.e., Reed et al. 1986) for the Sharp-tailed Grouse using the following assumptions:

(1) The effective population size should be greater than 50 in order to avoid genetic problems (Soulé) 1987). A population of this size should avoid problems of inbreeding depression and loss or fixation of alleles, but it will not prevent long-term changes in gene frequencies as a result of genetic drift.
(2) The ratio of the number of breeding males to the number of breeding females is 1:10 (Robel 1972) because the operational sex ratio is skewed by the species' unusual mating system.
(3) The number of young males hatched per breeding female equals the number of young females hatched per breeding female and the average brood size is 6 (Robel et al. 1972; Hillman and Jackson 1973; Sisson 1976).
(4) The probability of a newly hatched male surviving to breed at 2 years of age is 0.135, and the probability of a newly hatched female surviving to breed at 1 year of age is 0.26 (Sisson 1976).
(5) The mean generation time for males (the average age at which they produce young) is 2.5 years and the mean generation time for females is 1.5 years (Sisson 1976).

A deterministic population viability analysis, following the method of Reed et al. (1986), indicates that to achieve an effective population size greater than 50 on May 1, the assumed date of breeding in a grouse population, the total population size at that time must be at least 280 birds. This spring breeding population is composed of 140 females (all of which breed) and

140 males (only 10% of which actually breed). A central goal of managing a viable local population of Sharp-tailed Grouse is, therefore, to maintain a spring breeding population of at least 280 birds. A population of this size has a high probability of avoiding stochastic catastrophes in its genetics and demographics, but it might still be vulnerable to environmental stochasticity.

We know that Sharp-tailed Grouse populations can fluctuate markedly in size; up to 50% swings have been recorded over just a few years in response to changes in the environment (Sisson 1976). Severe weather and periodic eruptions of predators (such as the every 10-year invasions of Goshawks and Great Horned Owls from the boreal forest) are two of the better known causes of these fluctuations. Normally, in a population viability analysis these swings in population size must be taken into consideration so that even during anticipated lows the population is still large enough to avoid genetic and demographic problems. However, in the case of Wisconsin Sharp-tailed Grouse for which there are few data on fluctuations, it is possible to address this problem primarily through careful regulation of hunting rather than by enlarging the average size of the breeding population. Because a substantial portion of the annual mortality in Wisconsin populations will be the result of regulated hunting, careful management of hunting pressure can dampen the magnitude of many types of population fluctuations. Especially, by reducing or curtailing hunting during low years, managers may be able to keep populations from dropping below safe levels.

Area required to accommodate a viable population.—A grouse population probably places its peak demand on the habitat in late summer and early fall when the population is composed of adults and full grown juveniles. At that time the biomass of grouse per unit area is probably at its annual peak. On October 1 our viable population would be composed of 628 individuals. Densities of Sharp-tailed Grouse in the forested eastern fringes of its range can reach 40 birds per square mile in good quality habitat (e.g., the population on Drummond Island, Michigan). At such a density, our hypothetical population would require 10,048 acres of habitat. By the next spring, the density of birds would have dropped to 17 birds per square mile (about 2 displaying males per square mile), a fairly typical spring density for Sharp-tailed Grouse (Hillman and Jackson 1973, Sisson 1976).

Currently, most of the Sharp-tailed Grouse populations in Wisconsin are restricted to habitat patches below this size (Gregg 1987). The Namekagon Barrens Management Area, for example, is presently too small. It seems an appropriate time to try to enlarge the area through negotiations with Burnett County. Other areas, such as Crex Meadows, Moquah Barrens, Riley Lake, Pershing, should also be considered for enlargement to near the 10,000-acre size. A reasonable goal might be to have 3–5 such areas in Wisconsin.

Prospects for Small, Isolated Populations

Clearly, it is important for conservationists to be aware of issues affecting the viability of small populations.

It would be a mistake to imagine, for example, that an isolated population of 25 birds has much of a future, even if its habitat is secure. We need to be sure that the nature preserves we design are large enough to accommodate viable populations of those species that are easily isolated as small populations. Advanced planning can insure that nature preserves function as we intended them to: for ensuring long-term survival of rare and endangered species.

Literature Cited

Gregg, L. 1987. Recommendations for a program of Sharp-tail habitat preservation in Wisconsin. *Wisconsin Department of Natural Resources Report* No. 141.

Hillman, C. N. and W. W. Jackson. 1973. The Sharp-tailed Grouse in South Dakota. *South Dakota Department of Fish, Game, and Parks, Technical Bulletin* No. 3.

Reed, J. M., P. D. Doerr, and J. R. Walters. 1986. Determining minimum population sizes for birds and mammals. *Wildlife Society Bulletin* 14:255–261.

Robel, R. J. 1972. Possible function of the lek in regulating tetraonid populations. *Proceedings 15th International Ornithologists Congress* 15:121–133.

Robel, R. J., F. R. Henderson, and W. Jackson. 1972. Some Sharp-tailed Grouse population statistics from South Dakota. *Journal of Wildlife Management* 36:87–98.

Sisson, L. 1976. *The Sharp-tailed Grouse in Nebraska.* Nebraska Game and Parks Commission, Lincoln, NE. 88pp.

Soulé, M. (ed.). 1987. *Viable populations for conservation.* Cambridge University Press. 189pp.

Stanley A. Temple
Department of Wildlife Ecology
University of Wisconsin
Madison, WI 53706

Burrowing Owl *by Deann L. DeLaRonde*

Aldo Leopold in the field (*photo courtesy of Wisconsin Department of Natural Resources*)

In the Words of Ornithologists Past . . .

Aldo Leopold's Avian Phenological Observations in Dane and Sauk Counties, Wisconsin

by Sumner W. Matteson

"Each year, after the midwinter blizzards, there comes a thawy night when the tinkle of dripping water is heard in the land. It brings strange stirrings, not only to creatures abed for the night, but to some who have been asleep for the winter. The hibernating skunk, curled up in his deep den, uncurls himself and ventures forth to prowl the wet world for breakfast, dragging his belly in the melting snow. His track marks one of the earliest dateable events in that cycle of beginnings and ceasings which we call a year."

So begins renowned conservationist Aldo Leopold's (1887–1948) gem of a treatise titled "A Phenological Record For Sauk And Dane Counties, Wisconsin, 1935–1945" (Leopold and Jones 1947). The purpose of the paper, which included spring arrival dates for 40 bird species, was to "assemble a composite phenological record for the wild plants, birds, and mammals of the region, with at least a sprinkling of items relating to other animals, waters, crop plants, and plants used in landscaping." His coauthor was University of Wisconsin zoology student Sara Elizabeth Jones (currently living in Bloomington, Indiana), who contributed plant observations from the UW Arboretum.

Leopold had planned a companion paper on bird song phenology for which he was still recording data on 20 April 1948, the day before he died suddenly while fighting a neighbor's grass fire. His bird song observations were partially summarized in an unfinished (largely handwritten) 1944 paper titled "Bird song Phenology in Southern Wisconsin." These observations were later incorporated by UW-Madison wildlife ecology graduate student Alfred E. Eynon (1918–1988) into a paper titled "Avian Daybreak and Evening Song in Relation to Time and Light Intensity" (Leopold and Eynon 1961).

Phenology is a science that records and interrelates the chronology, timing, and sequence of biological events as influenced by the seasons and weather. Commonly studied phenological events include the spring arrivals of migrant birds and the dates that plants flower; these are but two happenings in the myriad, rhythmic events of the natural world.

Leopold and Jones (1947) harbored no illusions about the enormity of gathering phenological data: "The events comprising the annual cycle are innumerable. Wisconsin, for example, has about 350 species of birds, 90 mammals, 174 fishes, 72 amphibians and reptiles, 20,000 insects, and 1,500 higher plants. The life of each of these 22,000 species consists of a sequence of events, each a response to the advancing season. No one phenologist can hope to recognize, much less to record, more than a very small fraction of this prodigious drama."

As a science, phenology has many practical applications. Setting the dates for bird surveys or determining the factors that influence bird migrations are just 2 examples. Most birdwatchers rely on phenological information—either published or based on personal records or experience—to know when and where to look for certain bird species.

By correctly documenting natural events, phenologists strengthen their ties to the land and are enriched by insights gained in the process. Leopold and Jones (1947) put it this way: "From the beginnings of history, people have searched for order and meaning in these [natural] events, but only a few have discovered that keeping records enhances the pleasure of the search, and also the chance of finding order and meaning. These few are called phenologists."

Leopold initiated his phenological observations during spring 1935 at "the shack," a former chicken coop on an abandoned Sauk County farmstead, immortalized in *A Sand County Almanac* (Leopold 1949). Two years earlier he had made history by accepting a position as the nation's first Professor of Game Management (later changed to Wildlife Management) at the University of Wisconsin-Madison (Meine 1987). But the year 1935 marked the beginning of something bold and exciting for Leopold: experiments in land restoration; the challenge of transforming a windswept piece of emptiness into a vibrant ecological community.

When the Leopold children first set eyes on the property their Dad had enthusiastically described adjacent to the sandy banks of the Wisconsin River, they were a little perplexed. Nina Leopold Bradley (1977) recalled the moment: "Probably there is nothing bleaker than a wornout and abandoned farm in a February ground blizzard. We found ourselves standing in a flat field, so poor that it could scarcely support marsh grass and a few scattered weeds, and facing a tumbledown shed filled with frozen cow manure and chicken droppings. What did my father see in this place that put the sparkle in his eyes?"

In April 1935, Aldo bought 80 acres at 8 dollars an acre (Bradley 1977, Meine 1987) and in later years added on another forty (Meine 1987). Working on weekends for the next 12 years, the Leopold family planted thousands of red, white, and jack pines and other trees, and experimented with plantings of prairie forbs and grasses. Slowly the land began to recover some of its former stature: a mosaic of forest, prairie, and marsh.

Leopold's first phenological observation recorded in his Sauk County journal came on 27 April 1935: "Violets and Indian Sweet Grass blooming." It was 3 years later, after suffering through huge losses of pines and shrubs to drought, which only

spurred more tree and shrub plantings, that birds began to receive more than incidental attention from him. First, came winter bird-banding; an event that would become a regular wintertime activity.

On 4 February 1938, a Black-capped Chickadee was banded, number 65290, a bird that would be recaptured in later years more than any other banded bird (Meine 1987). Then, in the early spring of 1938, Leopold discovered the American Woodcock. The event marked the beginning of earnest phenological studies. As Leopold biographer Curt Meine (1987) wrote: "From that point on he began to pay much more attention to the sequence of events of the days and seasons: the blooming of maples and alders, the swelling of willow buds, the piping of the first frogs, the running of the northern pike. These detailed phenological notes began to fill up the pages of Leopold's journal."

Leopold (1944) recalled his first moments with the crepuscular American Woodcock and his awakening to phenological study:

> "One evening at dusk in April 1938, I heard a peculiar call which emanated from a willow thicket on my farm in Sauk County, Wisconsin. I had been hearing this each spring for two years. It sounded like a nighthawk but came from the ground, hence I had ascribed it to a frog, but Herbert L. Stoddard had told me it might be a woodcock. I decided to investigate. In a few minutes I had stalked into a front row seat at a spectacular performance: the mating sky dance of the woodcock. I had learned that the call or "peent" is the announcement that the sky dance is about to begin.
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> "Who could creep closest to a peenting woodcock at once became a competitive game among my children. Each of them discovered an additional territory, in which [each] henceforth held a proprietary ownership. When total darkness finally brought them straggling home from the thickets, it was a question of who could report the most explicit description of the skydance and whose cock had uttered the most peents in the least time.
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> "We soon learned that in order to see the sky dance before darkness made it invisible, we had to be hidden on the peenting ground before the performer arrived, and this led to the discovery that he arrived and gave his first peent each evening precisely at seven o'clock, and at a light intensity which barely enabled us to see the bird on the ground. As spring advanced the peenting hour advanced, and we began to record the hour for use next year.
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> "This was my introduction to the study of light thresholds and the phenology of bird song. I remember feeling that I had wasted forty years in not sooner becoming aware [of] so entrancing a field for exploration and discovery."

In *A Sand County Almanac*, Leopold weaves phenological details into a marvelous description of the "sky dance" an account that has led countless readers to a deeper appreciation of spring's passage.

> "I owned my farm for two years before learning that the sky dance is to be seen over my woods every evening in April and May. Since we discovered it, my family and I have been reluctant to miss even a single performance.
>
> "The show begins on the first warm evening in April at exactly 6:50 P.M. The curtain goes up one minute later each day until 1 June, when the time is 7:50. This sliding scale is dictated by vanity, the dancer demanding a romantic light intensity of exactly 0.05 foot-candles. Do not be late, and sit quietly, lest he fly away in a huff.

"The stage props, like the opening hour, reflect the temperamental demands of the performer. The stage must be an open amphitheater in woods or brush, and in its center there must be a mossy spot, a streak of sterile sand, a bare outcrop of rock, or a bare roadway. Why the male woodcock should be such a stickler for a bare dance floor puzzled me at first, but I now think it is a matter of legs. The woodcock's legs are short, and his struttings cannot be executed in dense grass or weeds, nor could his lady see them there. . . .

"Knowing the place and the hour, you seat yourself under a bush to the east of the dance floor and wait, watching against the sunset for the woodcock's arrival. He flies in low from some neighboring thicket, alights on the bare moss, and at once begins the overture: a series of queer throaty peents spaced about two seconds apart, and sounding much like the summer call of the nighthawk.

"Suddenly the peenting ceases and the bird flutters skyward in a series of wide spirals, emitting a musical twitter. Up and up he goes, the spirals steeper and smaller, the twittering louder and louder, until the performer is only a speck in the sky. Then, without warning, he tumbles like a crippled plane, giving voice in a soft liquid warble that a March bluebird might envy. At a few feet from the ground he levels off and returns to his peenting ground, usually to the exact spot where the performance began, and there resumes his peenting.

"It is soon too dark to see the bird on the ground, but you can see his flights against the sky for an hour, which is the usual duration of the show. On moonlight nights, however, it may continue, at intervals, as long as the moon continues to shine.

"At daybreak the whole show is repeated. In early April the final curtain falls at 5:15 A.M.; the time advances two minutes a day until June, when the performance closes for the year at 3:15. Why the disparity in sliding scale? Alas, I fear that even romance tires, for it takes only a fifth as much light to stop the skydance at dawn as suffices to start it at sunset."

How did Leopold determine that the skydance ceased with only a fifth as much light at dawn as that needed to start it at sunset? And why was this the case? To find the answers he made intensive early morning and evening bird observations between 8 January 1944 and 20 April 1948 using a photometer to measure light intensity.

Leopold recorded the duration of song for 35 species in 1944 (Leopold 1944), and Leopold and Eynon (1961) reported data for 20 of these species singing on 804 mornings and 164 evenings during 1944–48. These observations occurred at two locations: Leopold's home in west Madison and at the shack 34 miles to the northwest. Commented Leopold and Eynon (1961): "These study areas . . . referred to as town and farm, respectively, . . . differ from one another by about one minute in their time of sunrise at the June solstice. Observations in the two study areas made possible the inclusion of more species than could be found at either area alone and at the same time allowed more or less daily observation of species common to both areas."

Leopold (1944) described his approach to gathering data. Anyone who has participated in a present-day breeding bird survey can appreciate his comments for the May–June period.

"In February and March, when only cardinal and pheasant are singing, the time of first song may be recorded safely from an open window, provided an active territory be near. All later records

require that the observer be up and out, lest faint or distant songs be overlooked.

"In May and June there is such a babel of voices at daybreak, that only the earliest and loudest singers can be heard at any distance. It is impossible, at this season, to record all of the species on forty acres, for if the observer rushes about trying to hear all, he will inevitably miss the first song of some. It is better to sit in one spot and attempt [to record] only those species having nearby territories, plus those loud enough to be heard from more distant points. At this season a good mosquito repellent greatly increases the legibility of notes.

"In July and August the bedlam has ceased, and distant recordings again become feasible. It is now safe to make a circuit of several hundred yards in order to cover several habitats.

"The start of daybreak song is simpler to record than the cessation of evening song. The cessation of evening song [can be documented] by writing a list of singing species in advance and recording the status of each every five minutes. The latest entry is then the time of cessation.

"Photometer readings at daylight are taken at the time each species begins to sing. At evening, when one never knows which five-minute entry will be the last, it is best to read the photometer every five minutes, and interpolate for intermediate points. . . ."

In 1944, the Professor, at age 57, was aware that his hearing was perhaps not as sharp as it had once been: "Individual ears differ in their ability to catch distant songs of particular species. I fail to hear distant whippoorwills, cardinals, and grouse. It is desirable to enlist a helper with a different ear, and ask him to listen for the species on which the observer is weak."

Leopold ended his discussion on methods by stating: "The data on a season's work in bird song phenology are massive. To avoid confusion it is essential to prepare in advance tables and graphs for condensing notes. Entries should be made daily and should adhere rigidly to uniform legends and procedures."

Leopold found that "with the single exception of [Mourning Dove], March and April migrants did not sing daily on first arrival in early spring, whereas most May migrants arrived in full song." He suggested that this difference might be due to bad weather. He also had the impression that "in many species the end of song does correlate rather closely with the end of nesting." But "it would be false to assume that no species nests in silence, or that no species sings after nesting is completed. I know of at least three species which end their nesting season in silence." The first was Brown Thrasher: "Song ceased June 22, 1944, but Robert McCabe found several nests active after that date, of which the last hatched on July 14, three weeks after the cessation of song." The two other birds were Northern Bobwhite and Mourning Dove.

Between January 1944 and June 1945, Aldo obtained close to a daily record on daybreak song (defined as "one occurring within the hour following the first singer at daybreak") for five breeding species: Mourning Dove, House Wren, Gray Catbird, American Robin, and Northern Cardinal. He found for Mourning Dove, American Robin, and Northern Cardinal that "there was not a single morning on which at least one failed to sing. Of the 40 dawns on which one of these three species failed to sing, two of the others sang on 33 mornings."

Leopold also learned that for 20

species (Ring-necked Pheasant, Mourning Dove, Great Crested Flycatcher, Eastern Wood-Pewee, House Wren, Gray Catbird, Brown Thrasher, American Robin, Eastern Bluebird, Warbling Vireo, Common Yellowthroat, Eastern Meadowlark, Redwinged Blackbird, Northern Oriole, Northern Cardinal, Indigo Bunting, Rufous-sided Towhee, Chipping Sparrow, Field Sparrow, and Song Sparrow), for which he felt he had sound data, most required more light to induce the first daybreak song in July than that needed in March. For example:

"The cardinal on clear days in March sings below the curve of equal light intensity [the beginning of civil twilight, i.e. when the sun is 6 degrees below the horizon]; by May he sings above it. Therefore his light threshold has changed; it requires *less* light to make him sing. By late July he is again below it; therefore his light threshold has again changed; it takes *more* light to make him sing." (Leopold 1944)

It would be interesting to follow Leopold's procedures during the breeding season and record the time of first song for each species in other study areas. For 23 species singing before sunrise in May and June 1942–1944, he found that the Indigo Bunting, American Robin, and Eastern Wood Pewee had the earliest average daybreak songs at 0424 hrs, 0426 hrs, and 0428 hrs, respectively. The latest daybreak singers, on average, were Northern Oriole (0457 hrs), Common Yellowthroat (0504 hrs), and Black-billed Cuckoo (0520 hrs) (Leopold 1944).

During the hour of daybreak song, "new species join the chorus at the rate of one per 1.5 minutes. The hour of song is most predictable in English sparrow, catbird, pheasant, [House] wren, and [Mourning] dove; least predictable in field sparrow, wood thrush, and cardinal."

Comparing daybreak song to evening song (defined by Leopold, 1944, as "one occurring within the last hour preceding the last singer at evening"), he found: ". . . song ceases in the evening at a light intensity 15–30 times greater in foot candles than the light intensity at which song starts in the morning.

"The human eye is again a pretty good photometer, for there is no evening song which one cannot record without artificial light, whereas at daybreak a light is required for all of the earliest singers. In June, [the House] wren is sometimes the first singer one can record without a light."

But Leopold was puzzled by his observations: "The fact that all diurnal species quit singing in stronger light than they begin, but not in the order which light alone would lead one to expect, raises the interesting question: why not? What factor is operating at evening which is absent, or different, at daybreak? Is this factor in the bird or 'in the evening?'

"The behavior of crepuscular species, which begin singing in the evening after a day's rest, should yield some insight into this question.

"The only crepuscular bird for which I have song data is the woodcock." And the Woodcock served as Leopold's test case (Leopold and Eynon 1961). Leopold and Eynon reported that the "times and light intensities of the first and last *peent* at evening and morning were used, respectively, as equivalents of the daybreak song and evening song of

diurnal species. . . . At the farm the first *peent* of the evening usually came well before the end of civil twilight, occurring later on only three evenings out of 61. The last *peent* at daybreak, however, occurred before civil twilight began on 22 mornings out of 45." Leopold's (1944) conclusions:

"The woodcock, at evening, is waiting for a certain intensity of darkness, and at daybreak he is inhibited by a certain intensity of light. If light alone governed his performance, the two sets of data points would be equidistant from sunrise and sunset. They are not equidistant: he quits in greater darkness at daybreak than suffices to start him at evening. Hence his disparity follows the same principle as that of diurnal birds: both are easier to stop than to start. Hence some internal factor, such as fatigue, must be operative at the end of the active period."

The fatigue theory, first proposed by Wright (1912), postulated that diurnal birds stopped singing in the evening with more light than that available to them when they started singing in the morning. Leopold was the first to test this theory on a crepuscular bird (Leopold and Eynon 1961). He did not, however, determine if fatigue or any "internal factor" was operative.

One area that fascinated Leopold was the effect of moonlight on daybreak song. Until his research, no one had produced data to show that a full moon influenced the song of diurnal species. He was hindered in this pursuit, however, by a photometer—primitive by today's standards—that was not sensitive enough to measure moonlight. Leopold (1944) suspected an effect on American Robins, Gray Catbirds, and Field Sparrows but was uncertain:

> ". . . I find it difficult to appraise the moon's role, for even in clear weather there are two variables: the fullness of the moon, and the time relations of moonset and sunrise. For example: which is more likely to affect a bird: a full moon setting just before the usual daybreak singing hour, or a quarter-moon persisting through the usual singing hour?
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> "If the weather remained constant one could let the bird answer by his performance, but the weather changes each day, while the moon changes fullness, and also sets an hour later each day. Hence, each experimental set-up has vanished before a significant number of performances can accumulate." But, still, it "was worth noting that during the May moon, the advanced songs did not all fall in clear weather, nor did cardinal and robin respond to the moon on the same days. The only deduction which seems warranted is that during the peak of the singing season the earliest singers, like cardinal and robin, seem to respond sporadically to moonlight by earlier song."

Eynon detected a definite effect of full moonlight on robin song during the spring months, based on Leopold's data. He added: "For those who might question the records as much as 2 and 3 days ahead of full moon, we point out that Leopold was often up and about more than an hour and a half before sunrise, or before the moon set." As an example of Leopold's nocturnal observations, he recorded his earliest Field Sparrow song on 15 June 1944, at 0256 hrs (Leopold and Eynon 1961).

During the summer of 1945, Leopold continued to document bird song periods, but he was immersed in the

phenology paper he would co-author with Jones. According to Meine (1987), Aldo "thought it would be a 'pushover,' but they were turning up unforeseen complications. From the immense store of field observations at their disposal, they were finding some birds and plants which responded to the changing length of the days, and others that 'jiggle all over the calendar' in response to weather. Reporting the evidence to [his son] Starker, Aldo confined his perplexity to a neat one-word question: 'Meaning?' "

When completed, the Leopold and Jones (1947) paper documented 328 events at two "stations": the "Sauk" station, an area 2–3 square miles around the Leopold shack in Sauk County, and the "Dane" station, an area of comparable size that included the UW Arboretum and parts of Madison and the UW campus in Dane County. "Scattered data" from outside these stations were also included.

Leopold, keenly mindful of ecological connections, viewed this paper as something considerably more than a record of phenological events:

"Such a record . . . . permits one to interpolate, for any given event or any given date, a background of contemporaneous events. For example, a game manager learns from the literature that in Dane County the most frequent date of first egg-laying in pheasant is May 6. What else of possible importance to nesting pheasants is going on at that time? A glance at [the data] shows that spring grain has been seeded two weeks ago and should be well up on May 6; . . . Franklin ground squirrel has already emerged; . . . bluegrass will head out in eight days; . . . alfalfa hayfields will be ready to cut in 38 days, which just about equals the time necessary to complete the clutch (12 days) and incubate it (21–24 days).

Regarding this latter fact, today, in Dane County, alfalfa fields can be cut as many as four times a summer (compared to two harvests during Leopold's time) because of new varieties developed since 1960. Most Dane County farmers harvest their first alfalfa crop during May 25–31, sometimes as early as May 15 (Sample 1989). The effect on birds nesting in these fields may be disastrous. In particular, hay-nesting species such as Dickcissel, Vesper Sparrow, Savannah Sparrow, Grasshopper Sparrow, Henslow's Sparrow, Bobolink, and Red-winged Blackbird, require, on average, 24–32 days to produce a brood; Eastern Meadowlarks need 28–48 days; and Upland Sandpipers require an incubation period alone of 17–26 days (Sample 1989). Even considering nest construction initiated by late April or early May for the earliest birds, it seems highly unlikely that most of Dane County's hay-nesting species today could fledge young.

With the above in mind, it is especially poignant to read Leopold's (1949) words on the Upland Sandpiper (commonly called Upland Plover when he wrote the essay "Back from the Argentine") from *A Sand County Almanac*:

> "When dandelions have set the mark of May on Wisconsin pastures, it is time to listen for the final proof of spring. Sit down on a tussock, cock your ears at the sky, dial out the bedlam of meadowlarks and redwings, and soon you may hear it: the flight-song of the upland plover, just now back from the Argentine.
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> ". . . . The county records may allege that you own this pasture, but the plover airily rules out such trivial legalities. He

has just flown 4000 miles to reassert the title he got from the Indians, and until the young plovers are a-wing, this pasture is his, and none may trespass without his protest.

"Somewhere near by, the hen plover is brooding the four large pointed eggs which will shortly hatch four precocial chicks. From the moment their down is dry, they scamper through the grass like mice on stilts, quite able to elude your clumsy efforts to catch them. At thirty days the chicks are full grown; no other fowl develops with equal speed. By August they have graduated from flying school, and on cool August nights you can hear their whistled signals as they set wings for the pampas, to prove again the age-old unity of the Americas. . . .

"The upland plover . . . . nests in hayfields as well as pastures, but, unlike the clumsy pheasant, does not get caught in hay mowers. Well before the hay is ready to cut, the young plovers are a-wing and away. In farm country, the plover has only two real enemies: the gully and the drainage ditch. Perhaps we shall one day find that these are our enemies, too."

Leopold and Jones (1947) reported the spring arrival dates of the following 40 species (average arrival dates for Dane and Sauk counties, respectively, are provided in parentheses):

Double-crested Cormorant (04-12; 04-16), American Bittern (04-13; 04-24), Great Blue Heron (03-24; 04-05), Canada Goose (03-11; 03-21), Northern Harrier (03-05; 03-06), Killdeer (03-06; 03-21), Upland Sandpiper (04-16—Jefferson County), Common Snipe (03-23; 04-7), American Woodcock 03-21; 03-25), Mourning Dove (03-17; 03-23);

Common Nighthawk (05-06; 05-14), Whip-poor-will (04-24; 05-10), Belted Kingfisher (03-24; 04-10), Yellow-bellied Sapsucker (04-01; 04-03), Eastern Phoebe (03-28; 04-07), Great Crested Flycatcher (05-03; 05-04), Eastern Kingbird (05-01; 05-04), Purple Martin (03-31; 04-19), House Wren (04-22; 05-01), Eastern Bluebird (03-09; 03-12);

Hermit Thrush (03-29; 04-18), Wood Thrush (04-28; 05-08), American Robin (03-07; 03-19), Gray Catbird (05-02; 05-13), Brown Thrasher (04-17; 04-22), Warbling Vireo (05-05; 05-05), Prothonotary Warbler (05-10—Sauk County), Common Yellowthroat (05-01; 05-07), Scarlet Tanager (05-09—Dane County), Rose-breasted Grosbeak (05-06; 05-06);

Indigo Bunting (05-10; 05-11), Rufous-sided Towhee (04-07; 04-18), Field Sparrow (03-30; 04-07), Fox Sparrow (03-21; 03-26), Bobolink (05-03; 05-06), Red-winged Blackbird (02-28; 03-18), Eastern Meadowlark (03-11; 03-17), Common Grackle (03-18—Dane County), Brown-headed Cowbird (03-24; 04-06), and Northern Oriole (05-03; 05-05).

It is beyond the scope of this paper to compare these data with recent observations of spring arrivals. Such a comparison will be left to a future paper.

Little more than a half-century ago, Aldo Leopold came to his farm with little interest in phenology. How unaware he was of this wellspring. But an indomitable curiosity and clear, accurate perceptions led to and inspired broader ecological perspectives, with phenological details masterfully incorporated into his later scientific and popular writings.

In the final analysis, phenology is an individualist's domain, wide open, forever stimulating, and accessible to the amateur and professional alike. Said Leopold (in Leopold and Jones 1947): "Phenologists are a heterogeneous lot,

and have found shelter under diverse intellectual roof-trees. Thoreau, the father of phenology in this country, scorned any roof-tree but his own, hence his records (for the period 1850 to 1861) remained unpublished for half a century." Phenology, the Professor said, "is a very personal sort of science . . . . Whoever sees the land as a whole is likely to have an interest in it."

Acknowledgments

I would like to express my gratitude to the staff at the University of Wisconsin-Madison Division of Archives for their assistance. A special thanks to Michael Mossman for reviewing the manuscript.

Literature Cited

Bradley, N. L. 1977. Afterword *in*, *A Sand County Almanac, Illustrated*. Tamarack Press, Madison.

Leopold, A. 1944. Bird song phenology in southern Wisconsin. Unpublished manuscript, 30 pp., Aldo Leopold Papers, University of Wisconsin-Madison Archives 10–6, 18.

Leopold, A. and S. E. Jones. 1947. A phenological record for Sauk and Dane counties, Wisconsin, 1935–1945. *Ecological Monographs* 17:81–122.

Leopold, A. 1949. *A Sand County Almanac and Sketches Here and There*, Oxford University Press, New York.

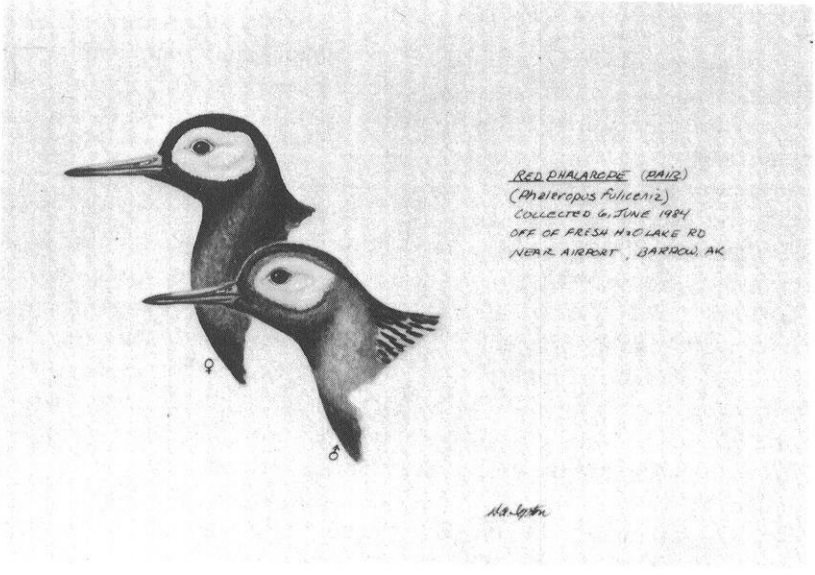
Leopold, A. and A. E. Eynon. 1961. Avian daybreak and evening song in relation to time and light intensity. *Condor* 64:269–93.

Meine, C. 1987. *Aldo Leopold, his life and work*. University of Wisconsin Press, Madison.

Sample, D. 1989. Grassland birds in southern Wisconsin: habitat preference, population trends, and response to land use changes. Master's thesis, University of Wisconsin-Madison.

Wright, H. W. 1912. Morning awakening and even-song. *Auk* 29:307–327.

Sumner W. Matteson
Bureau of Endangered Resources
Wisconsin DNR
Madison, WI 53703



Red Phalaropes *by Gregory A. Septon*

The Spring Season: 1989

by Allen K. Shea

Each spring, nature challenges us to solve the mysteries of spring migration. A variety of factors including: continental, regional and local weather patterns (particularly those preceding weekends when most observations occur), progression of leaf development, habitat disturbance, the timing and location of field excursions, and random chance, can influence an observers impression of peak migration events, relative species abundance and overall phenology. Thus, it is not surprising that spring, 1989, like most spring seasons, was lauded by some observers and bemoaned by others.

What were the factors, trends, and highlights of the 1989 spring season? Read on!

Weather Eye

In a State suffering from the accumulative effects of three years of drought conditions, spring got off to a promising start. A late winter storm brought snow and freezing rain to the entire state during the first week of March; a stormy mid–March brought a significant snowfall first to northern, and then 2–10 inches to southern Wisconsin. Unlike recent years, the first substantial flow of warm southerly air didn't arrive until the week of March 20–26; as you will see in the species accounts, this event brought the first substantial waves of migrant waterfowl, sandhill crane, killdeer, snipe, woodcock, phoebe, bluebird, hermit thrush, cedar waxwing, and several species of sparrow. By the 26th, temperatures had reached the 70's across southern Wisconsin.

After near normal early April conditions, the State's weather went steadily downhill during the first ten days of the month. Thunderstorms with marble sized hail and 40 mph winds were followed by a statewide rainfall of 0.5–1 inches during this period. A cold air mass moved back into the State accompanied by 2–3 inches of snow in the northwest. These precipitation events, combined with a relatively wet March, gave farmers and birders alike hope for an end to the three year drought siege. Alas, mid–April brought a return of below normal precipitation across the State; no significant weather patterns occurred until the last week of the month.

April went out like a lion: showers or thunderstorms were seen in some part of the State almost every day during the last week of the month. Hail, ranging from 0.5–1 inches in size, moved through the southern third of Wisconsin on the 24th and 5–9 inches of snow fell on northern Wisconsin on the 28th and 29th. Rainfall during this last week ranged from 1.5 inches in the west, to less than 0.5 inch in the eastern portions of the State. Overall, the month was characterized by a lack of significant southerly air flows.

May's weather teased the State's agricultural interests with spurts of rainfall but few periods of widespread soaking rain. When it did rain, it came with a vengeance and resulted in some flooding. Likewise, May teased the birding community with a small southerly air flow on the 3rd and 4th; as can be seen in the species accounts, this window of favorable migratory conditions resulted in the first influx of several of Wisconsin's neo-tropical species. However, following this first push, the next 11–16 days brought persistent and fairly strong easterly wind flow to most of the State. Little significant rain fell during this period, further exacerbating the poor migration conditions. The last ten days of the month were characterized by generally quiet weather—little rain and warm temperatures statewide—with one exception. On the 24th and 25th, a major storm angled across the State producing high winds, hail, very heavy rain and a few tornadoes. Despite this storm, the end of May found Wisconsin facing the specter of a fourth consecutive dry summer.

Potpourri

Seventy-four observers submitted 110 separate county field report forms. The number of observers represents a slight decrease from the ten year average of 77. Sixty-one counties received coverage of some extent; again a slight decrease from the ten-year average of 63. Reports were not received from the following counties: Buffalo, Calumet, Crawford, Florence, Iron, Lincoln, Pepin, Pierce, Rusk, Washburn, and Waushara. The counties receiving the most extensive coverage were as follows: Dane with 18 separate reports; Columbia and Milwaukee with 11 reports each; Sauk with eight reports; and Brown, Dodge, Ozaukee and Waukesha with seven reports each. A total of 298 species were reported during the period, again slightly down from the ten-year average of 300. This was not a particularly good season for rarities; the only notable rare birds were: Laughing Gull, Great Gray Owl, Boreal Owl, Mountain Bluebird, and Kirtland's Warbler.

The Migration at a Glance

The general consensus was that the entire spring migration was later than normal and was distinguished by its general lack of peak "waves" of passerines. May 3rd and 4th and the 13th-15th were the only two migrant peaks noted. Several observers additionally characterized the migration of some species (presumedly non-breeders) as being compressed, with species only being present during a narrow window of time or trickling through unnoticed or in small numbers. Below are summaries of the migration of selected groups of species:

Waterfowl.—Fewer than normal over-wintering records. Arrival dates substantially later that normal. Once

migration began, however, most observers thought that relative abundance of most species was either normal or above normal. Several species had later than normal departure dates.

Shorebirds.—Generally viewed as being late in arriving or non-existent. Numbers of species and relative abundance also appeared to be reduced, possibly a result of drought impacts on wetlands. Only White-rumped Sandpipers and Common Snipe were generally reported in above average numbers.

Gulls.—Several observers noted excellent gull migrations in late March–early April, with numbers rivaling those found in the 1950's and 60's.

Flycatchers.—Most flycatcher species arrived late; observers noted the bulk of the migration occurred in the later half of May. There appeared to be a consensus that the variety and relative of abundance of species was normal to above normal.

Thrushes.—Unanimously viewed as being "terrible" with one exception. The *Catharus* species were very late in arriving and extremely low in numbers. Eastern Bluebird provided a bright spot with several observers noting an increase in numbers.

Warblers.—Observers reported a mixed bag: Several noted the most impressive Yellow-rumped and Palm Warbler migration "ever" or "in years." There seemed to be a consensus that the variety of warblers was good, but that the relative abundance of most species (accept those noted above) was down. There was a fairly even split between observers who felt the warbler migration was "poor" and those that felt it was "the best in the past few years."

Miscellaneous.—The effects of the mid-west's third mild winter in a row is perhaps witnessed by the increased records of Carolina Wren and Loggerhead Shrike, and the unusually far northern records for Northern Cardinal, Blue-gray Gnatcatcher, Hooded Warbler, and Yellow-breasted Chat.

Kudos and Remonstrances

While the number of observers and extent of coverage was somewhat diminished from recent years, I found the overall quality of the field reports to be quite good. Many observers were quite conscientious in providing detailed, legible records on dates "first seen" and "last seen" for most species seen in their areas. This careful record keeping, while tedious, is vital to creating a picture of migration, whether on an individual seasonal basis or in establishing long-term trends. I extend my sincere appreciation to the many observers who submitted these detailed reports.

The documentation of rare, out-of-range or unseasonal observations was, for the most part, also quite good. Written descriptions, even if brief, are a great asset to any seasonal editor in determining the disposition of unusual records. In the case of some species, however, I found the lack of documentation prohibited me from including some records in the species accounts. This was specially true with early arrival records; an unfortunate occurrence, as it is possible that new

early arrival records may have gone unrecorded. To alleviate this situation in future spring seasons, I am requesting observers include documentation in their field report forms for observations of the following species/occurrences: Osprey in March; Broad-winged Hawk in March; either cuckoo species, Whip-poor-will, Eastern Wood-Pewee, Eastern Kingbird, Veery, Gray-cheeked Thrush, Swainson's Thrush and Wood Thrush prior to mid–April; and any other species which seems unusually early for your location.

Contrasting to the generally good record keeping on arrival and departure dates, there was generally a lack of reporting the maximum number of species observed. While this detail is probably the most tedious task of any observer, this information is perhaps the most vital of any collected if we hope to assist in the documentation of the effects of tropical deforestation, wetland habitat loss, pesticide and toxic chemical use, hunting pressure or any of the other myriad pressures on Wisconsin's avifauna. Please go the extra mile in the future to record species maximums wherever possible.

Finally, the substantial number of observers who took the time to note their perspective on the spring season's weather, migration, species abundance, etc. are to be commended. Despite my initial characterization of the vagaries of understanding bird migration, your personal observations and "gut" feelings are extremely valuable. I hope in future years, all of you will consider including a brief description of your impressions of migration along with your county field report forms.

Reports (March 1–May 31, 1989)

Red-throated Loon.—First reported in Manitowoc County, March 26 (C. Sontag). On April 30, 5 birds were sighted in Douglas County (L. Semo). Last reported in Douglas County, May 18 (R. Johnson).

Common Loon.—Present at the beginning of period in Kenosha County (H. Bishop). On April 1st, 11 birds were sighted in Dane County (P. Ashman).

Pied-billed Grebe.—First reported in Manitowoc County, March 20 (C. Sontag). On April 22, 18 birds were sighted in Monroe County (E. Epstein).

Horned Grebe.—First reported in Ozaukee County, March 25 (M. Bontly). On May 6, "100's" of birds were sighted in Douglas County (R. Johnson).

Red-necked Grebe.—First reported in Winnebago County, April 9 (T. Ziebell). On April 28, 49 birds were sighted in Douglas County (R. Johnson). Also reported in Chippewa, Columbia, Douglas, Oconto, St. Croix, Sawyer, Sheboygan, and Taylor Counties.

Eared Grebe.—Reported as follows: Dane County, May 20 (S. Robbins) and May 27 (A. & S. Shea).

Western Grebe.—First reported in Burnett County, May 11 (J. Hoefler). On May 13, 3 birds were sighted in Marathon County (D. Belter).

American White Pelican.—Reported as follows: Monroe County, April 8 (E. Epstein); Ashland County, April 20 (D. Verch); Douglas County, May 5 (R. Johnson); and Dane County, May 9 & 25 (S. Thiessen).

Double-crested Cormorant.—First reported in LaCrosse County, March 25 (F. Lesher). Reported in 29 other counties during the period.

American Bittern.—First reported on April 15, in Burnett (J. Hoefler); Oneida (B. Reardon); and Winnebago (T. Ziebell) Counties.

Reported in 22 other counties during the period.

Least Bittern.—First reported in Dodge County, May 14 (A. & S. Shea). Reported in 7 other counties during the period.

Great Blue Heron.—Present at the beginning of period in Brown (B. Mead) and Dane (E. Hansen) Counties. Many observers, however, reported their first observation of this bird between March 23 and April 1.

Great Egret.—First reported in Monroe County, March 24 (E. Epstein). Reported in 27 other counties during the period.

Snowy Egret.—Reported as follows: Manitowoc County, May 18 (J. Frank); Brown County, May 21 (B. Mead); and Bayfield County, May 22 (D. Verch & A. Knue).

Cattle Egret.—First reported in Door County, April 21 (R. & C. Lukes). Also reported during the period in Brown County, May 21–28 (Jeff Baughman, G. DeBoer, J. Frank, T. Soulen, and D. Tessen).

Green-backed Heron.—First reported on April 22 in Dane (E. Hansen and A. & S. Shea) and Walworth (D. Tessen) Counties. Many observers, however, reported their first observation of this bird between May 3 and May 11.

Black-crowned Night-Heron.—First reported in Winnebago County, April 5 (T. Ziebell). Reported in 17 other counties during the period.

Yellow-crowned Night-Heron.—Reported as follows: Racine County, May 6–7 (G. DeBoer); and Rock County, May 14 (G. DeBoer) and May 27 (D. Tessen).

Tundra Swan.—First reported in Columbia County, March 5 (M. Martin). On March 31, 7,000 birds were sighted in Outagamie County (D. Tessen). Last reported in Marathon County, May 28 (D. Belter). Several observers noted late lingering birds.

Mute Swan.—Reported during the period in Ashland, Columbia, Dane, Douglas, Portage, St. Croix, Shawano, Taylor, Walworth, Washington, and Waukesha Counties.

Greater White-fronted Goose.—First reported in Dane County, March 19 (A. & S. Shea and P. Lison & J. Ottinger). Also reported during the period in Brown, Burnett, Columbia, Douglas, Marathon, and Trempealeau Counties.

Snow Goose.—Present at the beginning of period in Dane County (B. Hilsenhoff). Reported in 20 other counties during the period.

Canada Goose.—Present at the beginning of period in Ashland, Brown, Burnett, Dane, Dodge, Door, Kenosha, Manitowoc, Milwaukee, Ozaukee, Polk, Portage, Sheboygan, Walworth, and Winnebago Counties.

Wood Duck.—Present at the beginning of period in Jefferson (K. Hale); Shawano (M. Peterson); and Trempealeau (T. Hunter) Counties. Many observers, however, reported their first observation of this bird between March 23 and April 1.

Green-winged Teal.—First reported in Dane County, March 16 (B. Isenring). On April 22, 379 birds were sighted in Burnett County (J. Robinson).

American Black Duck.—Present at the beginning of period in Ashland, Brown, Dane, Door, Dunn, Manitowoc, Milwaukee, Portage, and Winnebago Counties.

Mallard.—Present at the beginning of the period.

Northern Pintail.—Present at the beginning of period in Portage County (M. Berner). Many observers, however, reported their first observation of this bird between March 24 and April 1.

Blue-winged Teal.—First reported on March 23, in Dane County (E. Hansen and P. Lison & J. Ottinger); and in Manitowoc County (C. Sontag).

Cinnamon Teal.—Reported in Dunn County, April 14–21 (J. Polk, et al.).

Northern Shoveler.—Present at the be-

ginning of period in Dane County (several observers). Many observers, however, reported their first observation of this bird between March 24 and April 2.

Gadwall.—Present at the beginning of period in Dane County (several observers).

American Widgeon.—Present at the beginning of period in Dane County (several observers). Many reported this species at normal or above normal abundance.

Canvasback.—First reported in Waukesha County, March 14 (P. Sunby). On March 29, 400 birds were sighted in Winnebago County (D. Tessen).

Redhead.—First reported in Dane County, March 16 (B. Isenring and P. Lison & J. Ottinger). On March 29, 175 birds were sighted in Winnebago County (D. Tessen).

Ring-necked Duck.—Present at the beginning of period in Dane County (P. Ashman). On March 25, 660 birds were sighted in Dane County (A. & S. Shea).

Greater Scaup.—Present at the beginning of period in Door (R. & C. Lukes) and Milwaukee (S. Diehl) Counties. On March 16, 1,200 birds were sighted in Milwaukee County (P. Sunby). Present at the end of the period in Ashland County (D. Verch).

Lesser Scaup.—Present at the beginning of period in Milwaukee County (S. Diehl). On April 11, 6,200 birds were sighted in Winnebago County (T. Ziebell). Present at the end of the period in the following counties: Ashland, Brown, Dane, Manitowoc, and Sheboygan.

Harlequin Duck.—Reported as follows: Milwaukee County, March 16 (P. Sunby) and Sheboygan County, April 8 (Jeff Baughman).

Oldsquaw.—Last reported in Manitowoc County, May 6 (D. Tessen).

Black Scoter.—The sole report came from Manitowoc County, May 6 (D. Tessen).

Surf Scoter.—Reported as follows: Dane County, April 22 (E. Hansen, A. & S. Shea and D. Tessen); Washington County, April 23 (J. Haseleu), and April 24 (B. Cowart); and Ashland County, May 2 (D. Verch).

White-winged Scoter.—Reported as follows: Milwaukee County, April 1 (M. Bontly); Manitowoc County, April 2 (D. Tessen); Douglas County, April 30 (L. Semo); and Dunn County, May 2 (J. Polk). Present at the end of the period in Douglas County (R. Johnson).

Common Goldeneye.—Present at the beginning of period in Chippewa, Dane, Door, Dunn, Eau Claire, Manitowoc, Milwaukee, Ozaukee, Portage, and Sheboygan Counties. Present at the end of the period in Ashland (D. Verch) and Door (R. & C. Lukes) Counties.

Bufflehead.—Present at the beginning of period in Door, Manitowoc, Milwaukee, and Sheboygan Counties.

Hooded Merganser.—Present at the beginning of period in Door, Manitowoc, Milwaukee, and Sheboygan Counties.

Common Merganser.—Present at the beginning of period in Dane, Door, Manitowoc, Milwaukee, Portage, and Sheboygan Counties. Reported at the end of the period in several northern counties.

Red-breasted Merganser.—Present at the beginning of period in Door, Manitowoc, and Milwaukee Counties. Present at the end of the period in Ashland County (D. Verch).

Ruddy Duck.—First reported in Dane County, March 4 (E. Hansen). Present at the end of the period in Dane, Dunn, Portage, St. Croix, Shawano, and Winnebago Counties.

Turkey Vulture.—First reported in Dane County, March 19 (B. Hilsenhoff). Also reported as far north during the period as Bayfield, Burnett, and Douglas Counties.

Osprey.—First reported in Outagamie and Portage County, April 1 (D. Tessen and L. Semo). Reported in 28 other counties during the period.

Bald Eagle.—Present at the beginning of period in Ashland, Barron, Burnett, Chippewa,

Clark, Dane, Douglas, Dunn, Eau Claire, Polk, Portage, Price, Sawyer, Trempealeau, and Vilas. On March 19, 150 birds were sighted in Trempealeau County (T. Hunter).

Northern Harrier.—Present at the beginning of period in Dane County (B. Simandl). Reported in 41 other counties during the period.

Sharp-shinned Hawk.—Present at the beginning of period in Chippewa, Clark, Door, Dunn, Eau Claire, Outagamie, Ozaukee, Portage, Shawano, Taylor, Walworth, and Waukesha Counties. Reported in 21 other counties during the period.

Cooper's Hawk.—Present at the beginning of period in Chippewa, Clark, Dane, Door, Dunn, Eau Claire, Grant, Manitowoc, Portage, Shawano, and Waukesha Counties. Reported in 24 other counties during the period.

Northern Goshawk.—Present at the end of the period in Ashland (D. Verch), Door (R. & C. Lukes), and Taylor (S. & L. LaValley) Counties. Reported in 6 other counties during the period.

Red-shouldered Hawk.—Present at the beginning of period in Polk County (J. Hudick) and Taylor County (P. Risch). Reported in 20 other counties during the period.

Broad-winged Hawk.—First reported in Polk County, April 10 (J. Hudick).

Swainson's Hawk.—Reported as follows: Manitowoc County, May 22 (G. DeBoer); and a dark phased bird in Douglas County, May 23 (A. & S. Shea).

Red-tailed Hawk.—Present during the period throughout the state.

Rough-legged Hawk.—Last reported in Ashland County, May 18 (D. Verch).

Golden Eagle.—Reported as follows: Monroe County, beginning of period–March 25 (E. Epstein) (3 individuals); and Dane County, one immature bird on April 9 (A. & S. Shea).

American Kestrel.—Present during the period throughout the state.

Merlin.—First reported in Ashland County, March 16 (D. Verch). Also reported during the period in Bayfield, Burnett, Dane, Douglas, Marathon, Milwaukee, Portage, Price, Sauk, Shawano, Taylor, Vilas, and Wood Counties.

Peregrine Falcon.—First reported on March 26 in Milwaukee County (R. Gutschow) and St. Croix County (J. Smith). Also reported during the period in Brown, Burnett, Columbia, Dane, Douglas, LaCrosse, Marathon, and Sawyer Counties.

Gray Partridge.—Reported during the period in Columbia, Dane, Dodge, Monroe, Outagamie, Ozaukee, Shawano, Sheboygan, Trempealeau, and Walworth Counties.

Ring-necked Pheasant.—Reported in 29 counties during the period.

Spruce Grouse.—Reported in Vilas County, April 26 (Jim Baughman).

Ruffed Grouse.—Reported in 36 counties during the period.

Greater Prairie-Chicken.—Reported during the period in Burnett, Clark, Marathon, Portage, and Taylor Counties.

Sharp-tailed Grouse.—Reported during the period in Burnett, Douglas, and Taylor Counties.

Wild Turkey.—Reported during the period in Dane, Fond du Lac, Grant, Iowa, Jackson, Lafayette, Monroe, Richland, Sauk, Sheboygan, Trempealeau, Walworth, and Washington Counties.

Northern Bobwhite.—Reported during the period in Chippewa, Dane, Dunn, Eau Claire, Marquette, Richland, and Sauk Counties.

Yellow Rail.—Reported as follows: Vilas County, May 23 (G. DeBoer) and May 28 (Jeff Baughman and G. DeBoer); and Oconto County, May 31 (W. Norris). Due to high water levels, no reports were received from the usual Crex Meadows Wildlife Area location.

King Rail.—Reported as follows: Dodge County, May 14 (A. & S. Shea) and May 19, (Jeff

Baughman); and Dane County, May 20 (J. Frank and D. Tessen).

Virginia Rail.—First reported in Monroe County, April 16 (E. Epstein).

Sora.—First reported in Taylor County, April 16 (P. Risch).

Common Moorhen.—First reported in Dane County, April 20 (E. Hansen). On May 29, 6 birds were sighted in Dane County (P. Ashman). Also reported during the period in Brown, Columbia, Dodge, Oconto, and Winnebago Counties.

American Coot.—Present at the beginning of period in Dane County (P. Ashman, B. Hilsenhoff, S. Robbins, and A. & S. Shea); Eau Claire County (J. Polk); and Winnebago County (T. Ziebell). Many observers, however, reported their first observation of this bird between March 20 and April 1.

Sandhill Crane.—Present at the beginning of period in Richland County (B. Duerksen) and Taylor County (P. Risch). Many observers, however, reported their first observation of this bird between March 16 and March 28.

Black-bellied Plover.—First reported in Racine County, May 5 (D. Tessen). On May 20, 30 birds were sighted in Douglas County (R. Johnson). Present at the end of the period in Ashland County (D. Verch).

Lesser Golden-Plover.—First reported in Dane County, April 18 (B. Isenring). Last reported in Milwaukee County, May 25 (P. Sunby).

Semipalmated Plover.—First reported in Jefferson County, March 30 (J. Frank). Present at the end of the period in Ashland, Brown, Dane, Door, Eau Claire, and Monroe Counties.

Piping Plover.—Reported only in Racine County, May 7 (G. DeBoer). Averaging only one to three sightings in the past five years, this species is apparently in serious trouble in Wisconsin.

Killdeer.—Present at the beginning of period in Dane County (E. Hansen). Many observers, however, reported their first observation of this bird between March 22 and March 28.

American Avocet.—Reported as follows: Columbia County, April 22, 9 birds (D. Tessen); Milwaukee County, April 30, 16 birds (several observers); Bayfield County, May 26 (L. Semo); and Chippewa County, May 26 (J. Polk).

Greater Yellowlegs.—First reported in Jefferson County, March 20 (K. Hale). On April 17, 30 birds were sighted in Eau Claire County (J. Polk). Last reported in Sheboygan County, May 28 (D. Tessen).

Lesser Yellowlegs.—First reported in Lafayette County, March 27 (Jeff Baughman). Present at the end of the period in Burnett, Dane, Eau Claire Counties.

Solitary Sandpiper.—First reported in Dane County, April 2 (E. Hansen). Present at the end of the period in Barron County (A. Goff).

Willet.—First reported in Manitowoc County, April 27 (C. Sontag). Also reported during the period in Ashland, Brown, Chippewa, Dane, Eau Claire, Kewaunee, and Milwaukee Counties.

Spotted Sandpiper.—First reported in Taylor County, April 19 (S. & L. LaValley).

Upland Sandpiper.—First reported in Taylor County, April 15 (S. & L. LaValley). Reported in 19 other counties during the period.

Whimbrel.—Reported as follows: Manitowoc County, May 22–23 (G. DeBoer); Douglas County, May 27 (W. Mueller & A. Henning); and Door County, May 27–28, 13 birds (R. & C. Lukes).

Hudsonian Godwit.—First reported in Eau Claire County, May 4 (J. Polk). On May 21, 10 birds were sighted in Eau Claire County (J. Polk). Also reported during the period in Ashland, Brown, Chippewa, Dane, Dunn, and Portage Counties.

Marbled Godwit.—Reported as follows: Manitowoc County, May 15 (C. Sontag); Manitowoc County, May 19 (Jeff Baughman); Ashland County, May 20 (D. Verch); Brown County, May 20 (J. Frank, G. DeBoer, M. Peterson); and Chippewa County, May 22–25 (J. Polk).

Ruddy Turnstone.—First reported in Milwaukee County, May 12 (P. Sunby). On May 26, 1,200 birds were sighted in Manitowoc County (C. Sontag). Present at the end of the period in Manitowoc County (C. Sontag).

Red Knot.—Reported as follows: Manitowoc County, May 19 (Jeff Baughman); Manitowoc County, May 22-end of the period (C. Sontag); and Manitowoc County, May 22–23 (G. DeBoer).

Sanderling.—First reported in Milwaukee County, May 17 (P. Sunby). Also reported during the period in Ashland, Brown, Dane, Douglas, Eau Claire, Manitowoc, and Winnebago Counties.

Semipalmated Sandpiper.—First reported in Ashland County, May 4 (D. Verch). Present at the end of the period in Dane, Douglas, Eau Claire, Manitowoc, and Shawano Counties.

Western Sandpiper.—Reported as follows: Door County, May 19 (R. & C. Lukes); Taylor County, May 19 (P. Risch); Burnett County, May 23 (A. & S. Shea); and Brown County, May 28 (D. Tessen).

Least Sandpiper.—First reported in Dane County, April 30 (P. Ashman). Present at the end of the period in Ashland and Dane Counties.

White-rumped Sandpiper.—First reported in Columbia County, April 29 (D. Tessen). Present at the end of the period in Dane and Eau Claire Counties.

Baird's Sandpiper.—First reported in Eau Claire County, April 17 (J. Polk). Also reported during the period in Ashland, Dane, Fond du Lac, and Taylor Counties.

Pectoral Sandpiper.—First reported in Manitowoc County, March 28 (C. Sontag). Present at the end of the period in Ashland, Dane, and Eau Claire Counties.

Dunlin.—First reported in Dane County, May 6 (P. Ashman). Present at the end of the period in Ashland, Dane, Eau Claire, Manitowoc, and Sheboygan Counties.

Stilt Sandpiper.—Reported as follows: Dane County, May 13–27 (E. Hansen, T. Soulen, D. Tessen); Manitowoc County, May 15 (C. Sontag); and Brown County, May 19–21 (Jeff Baughman, J. Frank, D. Tessen).

Short-billed Dowitcher.—First reported in Dane County, May 6 (S. Robbins) and Dodge County, May 6 (J. Ottinger & P. Lison). Present at the end of the period in Brown and Dane Counties.

Long-billed Dowitcher.—Reported as follows: Eau Claire County, May 7 (J. Polk); Dane County, May 13 (D. Tessen); Lafayette County, May 13 (Jeff Baughman); Milwaukee County, May 16 (S. Diehl); and Burnett County, May 23 (A. & S. Shea).

Common Snipe.—Present at the beginning of period in Eau Claire County (J. Polk), Shawano County (M. Peterson) and Sheboygan County (Jeff Baughman). Many observers, however, reported their first observation of this bird between March 25 and April 4.

American Woodcock.—First reported in Dane County, March 19 (B. Isenring).

Wilson's Phalarope.—First reported in Eau Claire County, April 22 (J. Polk).

Red-necked Phalarope.—Reported as follows: Dane County, May 23–27 (E. Hansen); and Eau Claire County, May 25–31 (J. Polk).

Laughing Gull.—First reported in Milwaukee County, May 19 (G. DeBoer). Accepted by the Records Committee.

Franklin Gull.—First reported in Monroe County, May 5 (E. Epstein). Also reported during the period in Ashland, Brown, Manitowoc, Sheboygan, and Winnebago Counties. Present at the end of the period in Manitowoc County (C. Sontag).

Little Gull.—Reported as follows: Manitowoc County, May 5–14 (C. Sontag); Racine County, May 6 (G. DeBoer); and Manitowoc County, May 22–28 (Jeff Baughman and D. Tessen).

Bonaparte's Gull.—First reported in Milwaukee County, March 29 (P. Sunby). On May

9, 6,000 birds were sighted in Ashland County (D. Verch).

Ring-billed Gull.—Present at the beginning of period in 20 counties.

Herring Gull.—Present at the beginning of period along Lake Michigan shoreline north to Door County and in the following inland counties: Chippewa, Dane, Dunn, Eau Claire, and Portage Counties.

Thayer's Gull.—Reported as follows: Milwaukee County, March 12 (P. Sunby and D. Tessen); and Douglas County, April 24 (R. Johnson).

Glaucous Gull.—Reported as follows: Winnebago County, March 29 (D. Tessen); St. Croix County, April 1 (J. Robinson); Douglas County, April 1–June 2 (R. Johnson and A. & S. Shea); Manitowoc County, April 9 (C. Sontag); Milwaukee County, April 14 (P. Sunby); Door County, April 29 (J. Robinson); and Marathon County, May 7 (L. Semo).

Caspian Tern.—First reported in Manitowoc County, April 9 (C. Sontag). On May 21, 113 birds were sighted in Douglas County (J. Robinson). Reported in 16 other counties during the period.

Common Tern.—First reported in Winnebago County, April 10 (T. Ziebell). On May 18, "1,000's" were sighted in Douglas County (R. Johnson). Reported in 16 other counties during the period.

Forster's Tern.—First reported in Winnebago County, April 9 (T. Ziebell). On May 25, 58 birds were sighted in Manitowoc County (C. Sontag). Reported in 19 other counties during the period.

Black Tern.—First reported in Columbia County, April 24 (B. Cowart). On May 12, 250 birds were sighted in Columbia County (M. Martin). Reported in 26 other counties during the period.

Rock Dove.—Present during the period throughout the state.

Mourning Dove.—Present during the period throughout the state.

Black-billed Cuckoo.—First reported on May 14 in Columbia (A. & S. Shea); Racine (W. Mueller); and Walworth (P. Parsons) Counties.

Yellow-billed Cuckoo.—First reported on May 14 in Rock (D. Tessen); Sauk (A. & S. Shea); and Walworth (P. Parsons) Counties.

Eastern Screech-Owl.—Reported during the period in Columbia, Dane, Dodge, Jefferson, Milwaukee, Portage, Walworth, and Winnebago Counties.

Great Horned Owl.—Present during the period throughout the state.

Snowy Owl.—Reported as follows: Milwaukee County, March 1 (P. Sunby); Winnebago County, March 1–April 25 (T. Ziebell); Fond du Lac County, March 10 (D. Tessen); Douglas County, March 12 (L. Semo); and Price County, April 11 (M. Hardy).

Barred Owl.—Present during the period throughout the state.

Great Gray Owl.—Reported as follows: Douglas County, March 1–April 8, maximum of 5 birds (R. Johnson, J. Robinson, and L. Semo); and a road-killed bird in LaCrosse County, March 24 (F. Lesher).

Long-eared Owl.—Reported as follows: Milwaukee County, March 10 (S. Diehl); and Columbia County, May 19 (Jeff Baughman).

Short-eared Owl.—Reported as follows: Portage County, April 11–May 29 (M. Berner); Oneida County, April 15 (B. Reardon); Ozaukee County, April 16 (B. Cowart); Milwaukee County, April 30 (M. Bontly); and Taylor County, May 3 (P. Risch).

Boreal Owl.—Two specimens were found during the period: Portage County, March 8 (fide L. Semo), and Douglas County, March 19 (fide L. Semo). Both birds had apparently succumbed to starvation.

Northern Saw-whet Owl.—Reported during the period in Ashland, Chippewa, Douglas, Marathon, Outagamie, Portage, Sawyer, Taylor, and Waukesha Counties. Present at the end

of the period in Ashland County (D. Verch) and Taylor (P. Risch).

Common Nighthawk.—First reported in Portage County, April 26 (M. Berner).

Chuck-will's-widow.—The Polk County bird returned for the fourth (?) straight year. Reported from May 17–June 7 (J. Hudick).

Whip-poor-will.—First reported in Douglas County, April 22 (R. Johnson).

Chimney Swift.—First reported in Ozaukee County, April 16 (B. Cowart).

Ruby-throated Hummingbird.—First reported in Dane County, May 6 (P. Ashman).

Belted Kingfisher.—Present at the beginning of period in Dane, Jefferson, Manitowoc, Milwaukee, Portage, Richland, and Trempealeau Counties.

Red-headed Woodpecker.—Present at the beginning of period in Dane, Door and Trempealeau Counties. Many observers, however, reported their first observation of this bird between May 3 and May 11.

Red-bellied Woodpecker.—Present at the beginning of period as far north as Price County and in 20 other counties.

Yellow-bellied Sapsucker.—Present at the beginning of period in Outagamie County (J. Anderson & S. Petznick). Many observers, however, reported their first observation of this bird between April 10 and April 18.

Downy Woodpecker.—Present during the period throughout the state.

Hairy Woodpecker.—Present during the period throughout the state.

Black-backed Woodpecker.—Reported as follows: Douglas County, March 18–May 23 (R. Johnson and A. & S. Shea); Sawyer County, April 22 (K. Merkel); and Forest County, May 23 (B. Reardon).

Northern Flicker.—Present at the beginning of period in Clark, Dane, Fond du Lac, Milwaukee and Outagamie Counties.

Pileated Woodpecker.—Present during the period throughout the state.

Olive-sided Flycatcher.—First reported in Portage County, May 10 (L. Semo). Many observers, however, reported their first observation of this bird between May 20 and May 28.

Eastern Wood-Pewee.—First reported in Trempealeau County, April 20 (T. Hunter). Many observers, however, reported their first observation of this bird between May 15 and May 21.

Yellow-bellied Flycatcher.—First reported in Walworth County, May 6 (P. Parsons). Many observers, however, reported their first observation of this bird between May 18 and May 28.

Acadian Flycatcher.—First reported in Sauk County, May 15 (S. Robbins). On May 27, 7 birds were sighted in Grant County (D. Tessen). Reported during the period in Fond du Lac, Milwaukee, Monroe, Ozaukee, Sauk, and Sheboygan Counties.

Alder Flycatcher.—First reported in Oconto County, May 18 (W. Norris). Present at the end of the period in Ashland, Burnett, Douglas, Eau Claire, Fond du Lac, Milwaukee, Polk, Sawyer, Shawano, Sheboygan, Taylor, Vilas and Washington Counties.

Willow Flycatcher.—First reported in Dane County, May 6 (P. Ashman). Northerly counties include Marathon, Oconto, St. Croix, and Taylor Counties.

Least Flycatcher.—First reported in Dane County, April 27 (B. Isenring). Many observers, however, reported their first observation of this bird between May 12 and May 16.

Eastern Phoebe.—First reported in Richland County, March 24 (B. Duerksen).

Great Crested Flycatcher.—First reported in Dane County, April 22 (B. Isenring).

Western Kingbird.—Reported in Green County, May 27 (D. Tessen).

Eastern Kingbird.—First reported in Milwaukee County, April 24 (N. Zehner).

Horned Lark.—Present during the period throughout the state.

Purple Martin.—First reported in Polk County, April 3 (J. Hudick).

Tree Swallow.—First reported in Dane County, March 21 (P. Sunby). On April 22, 600 birds were sighted in Dane County (D. Tessen).

Northern Rough-winged Swallow.—First reported in Dane County, April 8 (P. Ashman).

Bank Swallow.—First reported in Dane County, April 17 (S. Robbins). On April 26, 182 birds were sighted in Winnebago County (T. Ziebell).

Cliff Swallow.—First reported in Portage County, April 12 (M. Berner). On May 23, 500 birds were sighted in Marathon County (D. Belter).

Barn Swallow.—First reported in Dane County, April 9 (P. Ashman). On May 20, 120 birds were sighted in Winnebago County (T. Ziebell).

Gray Jay.—Reported during the period in Douglas and Forest Counties and present at the end of the period in Price, Sawyer, and Vilas Counties.

Blue Jay.—Present during the period throughout the state.

American Crow.—Present during the period throughout the state.

Common Raven.—Reported in 22 counties during the period. Reported as far south as Door, Eau Claire, Jackson, and Portage Counties.

Black-capped Chickadee.—Present during the period throughout the state.

Boreal Chickadee.—Reported as follows: Ashland County, beginning of the period–May 3 (D. Verch); Sawyer County, March 11–April 1 (K. Merkel); Vilas County, April 24–May 27 (Jeff Baughman); Oneida County, May 27–28 (G. DeBoer and T. Soulen); and Forest County, May 28 (Jeff Baughman).

Tufted Titmouse.—Present at the beginning of period in Chippewa, Dane, Portage, Richland, St. and Croix Counties. Reported during the period in Columbia, Grant, Jefferson, Lafayette, Oconto, Rock, and Walworth Counties.

Red-breasted Nuthatch.—Present during the period throughout the state.

White-breasted Nuthatch.—Present during the period throughout the state. On April 29, 27 birds were sighted in Door County (J. Robinson).

Brown Creeper.—Present during the period throughout the state.

Carolina Wren.—Reported as follows: Door County, March 1–April 29 (J. Robinson); Dane County, March 17-end of the period (E. Hansen, T. Soulen and D. Tessen); Jefferson County, March 25 (G. DeBoer); Manitowoc County, May 4 (C. Sontag); Grant County, one to two individuals, May 6–27 (Jeff Baughman, F. Lesher, A. & S. Shea and D. Tessen); and Sauk County, May 15 (S. Robbins).

House Wren.—First reported in Outagamie County, April 14 (J. Anderson & S. Petznick). Many observers, however, reported their first observation of this bird between April 29 and May 7.

Winter Wren.—First reported in Trempealeau County, March 20 (T. Hunter).

Sedge Wren.—First reported in Ashland County, May 3 (D. Verch). Many observers, however, reported their first observation of this bird between May 17 and May 28.

Marsh Wren.—First reported in Dane County, April 30 (P. Ashman). Many observers, however, reported their first observation of this bird between May 13 and May 21.

Golden-crowned Kinglet.—Present at the beginning of period in Dane, Milwaukee, Portage, and Sawyer Counties. Present at the end of the period in Door, Forest, Oneida, Sawyer, and Vilas Counties.

Ruby-crowned Kinglet.—Present at the beginning of period in Dane County. Many observers, however, reported their first observation of this bird between April 15 and April 20. Present at the end of the period in Ashland, Douglas, Manitowoc, Oneida, Taylor, and Vilas Counties. A late individual was present in Milwaukee County on May 27 (R. Gutschow).

Blue-gray Gnatcatcher.—First reported on April 17 in St. Croix (J. Smith) and Winnebago (T. Ziebell) Counties. Reported as far north as Douglas County, May 23 (A. & S. Shea).

Eastern Bluebird.—First reported in Milwaukee County, March 10 (M. Bontly). Many observers, however, reported their first observation of this bird between March 23 and March 28.

Mountain Bluebird.—Reported in Waukesha County, May 29 (D. Tessen). Accepted by the Record Committee.

Veery.—First reported on May 4 in Dane (E. Hansen S. Robbins); Manitowoc (C. Sontag); and Milwaukee (M. Bontly) Counties.

Gray-cheeked Thrush.—First reported in LaCrosse County, May 4 (F. Lesher).

Swainson's Thrush.—First reported in Portage County, April 23 (L. Semo).

Hermit Thrush.—First reported on March 26 in Dane (J. Ottinger & P. Lison); and Outagamie (J. Anderson & S. Petznick) Counties.

Wood Thrush.—First reported in Door County, April 20 (R. & C. Lukes).

American Robin.—Present at the beginning of period in Clark, Dane, Milwaukee, Polk, Portage, Sheboygan, and Winnebago Counties. Many observers, however, reported their first observation of this bird between March 20 and March 26.

Gray Catbird.—First reported in Dane County, May 2 (B. Hilsenhoff).

Northern Mockingbird.—Reported as follows: Dane County, April 14 (D. Fallow); Racine County, April 27 (G. DeBoer); and Waupaca County, May 9–10 (J. Anderson).

Brown Thrasher.—Present at the beginning of period in LaCrosse County (F. Lesher). Many observers, however, reported their first observation of this bird between April 16 and April 28.

Water Pipit.—Reported as follows: Ozaukee County, April 2 (D. Tessen); St. Croix County, April 16–23 (J. Smith); Burnett County, April 22 (T. Soulen) and May 26 (J. Robinson); Ashland County, May 12 (D. Verch); and Dane County, May 13 (T. Soulen).

Bohemian Waxwing.—Reported during the period in Ashland, Douglas, Polk, Portage, and Price Counties. On March 23, 85 birds were sighted in Douglas County (L. Semo). Last reported in Ashland County, April 18 (D. Verch).

Cedar Waxwing.—Present at the beginning of period in Barron, Dane, Door, and Portage Counties. Many observers, however, reported their first observation of this bird between March 21 and April 1.

Northern Shrike.—Last reported in Door County, April 23 (R. & C. Lukes).

Loggerhead Shrike.—Reported as follows: Portage County, April 8 (M. Berner); Dane County, April 13–14 (S. Thiessen); Dane County, a pair attempting to nest, April 16–May 13 (A. & S. Shea); St. Croix County, May 24–28 (J. Smith); Green County, May 27 (D. Tessen); and Lafayette County, May 27 (N. Barger).

European Starling.—Present during the period throughout the state.

White-eyed Vireo.—Reported as follows: Milwaukee County, May 7 (R. Gutschow); Lafayette County, May 19 (N. Barger); and Lafayette County, May 27 (D. Tessen).

Bell's Vireo.—Reported as follows: Dane County, May 11–13 (A. & S. Shea and D. Tes-

sen); Sheboygan County, May 19 (the Kuhns); and Grant County, May 20–27 (A. & S. Shea and D. Tessen).

Solitary Vireo.—First reported in Dane County, April 28 (E. Hansen).

Yellow-throated Vireo.—First reported in Grant County, April 30 (J. Kopitzke).

Warbling Vireo.—First reported in La-Crosse County, April 25 (F. Lesher).

Philadelphia Vireo.—First reported on May 14 in Portage (M. Berner); St. Croix (J. Smith); and Walworth (P. Parsons) Counties. Reported in 7 other counties during the period.

Red-eyed Vireo.—First reported in Grant County, April 30 (J. Kopitzke).

Blue-winged Warbler.—First reported on May 4 in Dane; Fond du Lac, Milwaukee; Monroe, Outagamie; and Racine.

Golden-winged Warbler.—First reported on May 4 in Brown (M. Wierzbicki); and Outagamie (J. Anderson & S. Petznick) Counties.

Blue-winged × Golden-winged Hybrids.—A Brewsters' Warbler was reported in Ozaukee County on May 20 (M. Bontly) and a Lawrence's Warbler was reported in Washington County on May 14 (N. Zehner).

Tennessee Warbler.—First reported on May 4 in Dane (S. Robbins) and Portage (M. Korducki) Counties.

Orange-crowned Warbler.—First reported in Sauk County, April 22 (D. Tessen).

Nashville Warbler.—First reported in Portage County, April 24 (L. Semo).

Northern Parula Warbler.—First reported in Dane County, May 2 (B. Isenring).

Yellow Warbler.—First reported in Dane County, April 25 (E. Hansen, S. Robbins and A. & S. Shea).

Chestnut-sided Warbler.—First reported on May 4 in Dane (S. Robbins); Outagamie (J. Anderson & S. Petznick); and Ozaukee (J. Frank) Counties.

Magnolia Warbler.—First reported on May 4 in Milwaukee (M. Bontly and R. Gutschow).

Cape May Warbler.—First reported on May 4 in Door (R. & C. Lukes); and LaCrosse (F. Lesher) Counties. On May 19, 100+ birds were sighted in Douglas County (L. Semo).

Black-throated Blue Warbler.—First reported in Sauk County, May 14 (A. & S. Shea). Reported in 15 other counties during the period.

Yellow-rumped Warbler.—First reported in Door County, April 5 (R. & C. Lukes). On May 5, 450 birds were sighted in Ashland County (D. Verch).

Black-throated Green Warbler.—First reported in Dane County, April 26 (E. Hansen).

Blackburnian Warbler.—First reported on May 4 in Ashland (D. Verch); Brown (M. Wierzbicki); Milwaukee (M. Bontly); and Ozaukee (J. Frank) Counties.

Yellow-throated Warbler.—Reported in Rock County at the Avon Bottoms location, May 14–27 (G. DeBoer, F. Lesher, S. Robbins and D. Tessen).

Pine Warbler.—First reported on April 22 in Dane (E. Hansen and A. & S. Shea) and Rock (D. Tessen) Counties.

Kirtland's Warbler.—Reported in Douglas County, May 21–22 (R. Johnson and L. Semo). Accepted by the Records Committee.

Prairie Warbler.—Reported as follows: Ozaukee County, May 17–28 (G. DeBoer, J. Frank, S. Robbins and D. Tessen); Rock County, May 20 (S. Robbins); and Milwaukee County, May 31 (R. Gutschow).

Palm Warbler.—First reported on April 22 in Burnett (J. Robinson); Dane (E. Hansen); and Rock (D. Tessen) Counties. On May 21, 100

birds/acre! were sighted in the Port Wing area of Bayfield County (L. Erickson).

Bay-breasted Warbler.—First reported in Portage County, May 5 (M. Berner).

Blackpoll Warbler.—First reported in Grant County, May 7 (Jeff Baughman).

Cerulean Warbler.—First reported in Grant County, April 29 (J. Kopitzke). Many observers, however, reported their first observation of this bird between May 14 and May 20.

Black-and-white Warbler.—First reported in Dane County, April 22 (B. Isenring).

American Redstart.—First reported in Dane County, May 4 (E. Hansen).

Prothonotary Warbler.—First reported in Dane County, May 5 (P. Ashman). Also reported during the period in Grant, Monroe, Polk, Racine, Richland, Rock, and Trempealeau Counties.

Worm-eating Warbler.—Reported in Sauk County as follows: an individual at Hemlock Draw, May 13 (M. Peterson); up to two individuals at Baxter's Hollow, May 13–20 (Jeff Baughman, J. Frank, S. Robbins, A. & S. Shea and D. Tessen); and one individual in Grant County, May 27 (D. Tessen).

Ovenbird.—First reported in Richland County, April 26 (B. Duerksen).

Northern Waterthrush.—First reported on April 25 in Dane (A. & S. Shea) and Monroe (M. Bontly) Counties.

Louisiana Waterthrush.—First reported in Dane County, April 17 (B. Isenring). Also reported during the period in Fond du Lac, Grant, Manitowoc, Polk, Portage, Rock, St. Croix, Sauk, and Sheboygan Counties.

Kentucky Warbler.—First reported in Grant County, May 13 (S. Thiessen). On May 20, 18 birds were sighted in Grant County (A. & S. Shea). Also reported during the period in 13 other counties.

Connecticut Warbler.—First reported in Portage County, May 14 (M. Berner). On May 21, 13 birds were sighted in Douglas County (J. Robinson).

Mourning Warbler.—First reported in Taylor County, May 9 (S. & L. LaValley).

Common Yellowthroat.—First reported on May 4 in Dane, Kenosha, Manitowoc, Milwaukee, and Walworth Counties.

Hooded Warbler.—First reported in Dane County, May 8 (S. Thiessen). Also reported during the period in Grant, Milwaukee, and unusually far north, Shawano Counties.

Wilson's Warbler.—First reported in Milwaukee County, May 6 (M. Bontly).

Canada Warbler.—First reported in Sheboygan County, May 7 (the Kuhns).

Yellow-breasted Chat.—First reported in Racine County, May 6 (G. DeBoer). Also reported during the period in Dane, Lafayette, Milwaukee, Sheboygan, and unusually far north, Taylor Counties.

Scarlet Tanager.—First reported on May 4 in Brown, Dane, Fond du Lac, and Jefferson Counties. On May 20, 7 birds were sighted in Manitowoc County (C. Sontag).

Northern Cardinal.—Northerly counties include: Ashland, Burnett, Douglas, Polk, Price, and Vilas Counties.

Rose-breasted Grosbeak.—First reported in Dane County, April 28 (B. Isenring). Many observers, however, reported their first observation of this bird between May 5 and 10.

Indigo Bunting.—First reported in Jackson County, May 1 (D. Harmer).

Dickcissel.—First reported in Eau Claire County, May 21 (J. Polk). This normally late migrant appeared even later than usual with reports received from only three other counties: Green, Monroe, and St. Croix.

Rufous-sided Towhee.—Present at the

beginning of period in Walworth County (P. Parsons). Another bird present March 25 in Milwaukee County (M. Bontly) may have overwintered. Many observers, however, reported their first observation of this bird between April 15 and April 30.

American Tree Sparrow.—Last reported in Door County, on the very late date of May 27 (R. & C. Lukes). Noted to linger quite late by other observers including May 6 in Racine and Sauk Counties and May 11 in Milwaukee County.

Chipping Sparrow.—First reported in Sheboygan County, March 26 (D. & M. Brasser). On May 7, 125 birds were sighted in Sawyer County (K. Merkel).

Clay-colored Sparrow.—First reported on April 24 in Burnett (J. Hoefler) and Sauk (B. Cowart) Counties.

Field Sparrow.—First reported in Ozaukee County, March 28 (J. Frank).

Vesper Sparrow.—First reported in Door County, March 28 (R. & C. Lukes).

Lark Sparrow.—First reported in Sauk County, May 6 (A. & S. Shea). Also reported during the period in Burnett, Ozaukee, and Rock Counties.

Savannah Sparrow.—First reported in Clark County, March 24 (L. Risch). On May 20, 155 birds were sighted in Winnebago County (T. Ziebell).

Grasshopper Sparrow.—First reported in Dane County, April 25 (B. Isenring). Reported in 14 other counties during the period.

Henslow's Sparrow.—First reported in Portage County, April 29 (M. Berner). Also reported during the period in Dane, Fond du Lac, Ozaukee, and Sheboygan Counties.

LeConte's Sparrow.—First reported in Ashland County, May 7 (D. Verch). Also reported during the period in Burnett, Milwaukee, Oneida, and Vilas Counties.

Sharp-tailed Sparrow.—Reported in Vilas County, May 28 (Jeff Baughman and G. DeBoer).

Fox Sparrow.—First reported on March 23 in Dane (E. Hansen); and Portage (M. Berner) Counties. Many observers, however, reported their first observation of this bird between March 25 and March 27. On March 29, 290 birds were sighted in Shawano County (M. Peterson).

Song Sparrow.—Present at the beginning of period in Dane County (E. Hansen and A. & S. Shea) and Sheboygan (the Kuhns). On May 20, 120 birds were sighted in Winnebago County (T. Ziebell).

Lincoln's Sparrow.—First reported in Milwaukee County, April 22 (N. Zehner). Many observers, however, reported their first observation of this bird between May 4 and May 9.

Swamp Sparrow.—First reported on March 23 in Dane (J. Ottinger & P. Lison) and Winnebago (T. Ziebell) Counties.

White-throated Sparrow.—Present at the beginning of period in Dane (B. Hilsenhoff and B. Simandl); Milwaukee (N. Zehner); Outagamie (D. Tessen); and Portage (M. Korducki) Counties. On May 5, 325 birds were sighted in Outagamie County (D. Tessen).

White-crowned Sparrow.—First reported in Richland County, April 15 (B. Duerksen).

Harris' Sparrow.—Reported as follows: Shawano County, March 2–May 8 (M. Peterson); Ashland County, March 5–May 8 (D. Verch); Richland County, May 7 (J. & C. Blain); Price County, May 8 (M. Hardy); Douglas County, May 15–20 (R. Johnson); and Monroe County, May 27 (E. Epstein).

Dark-eyed Junco.—Present at the end of the period in Vilas County (Jim Baughman). On April 19, 2,100 birds were sighted in Sawyer County (J. Robinson).

Lapland Longspur.—Present at the beginning of period in Portage and Winnebago Counties. Last reported in Ozaukee County, May 16 (J. Frank).

Snow Bunting.—Present at the beginning of period in Ashland, Barron, Burnett, Clark, Door, Dunn, Portage, Sawyer, and Taylor Counties. Last reported in Ashland County, May 12 (D. Verch).

Bobolink.—First reported in Richland County, May 1 (B. Duerksen).

Red-winged Blackbird.—First reported in Dane County, March 3 (E. Hansen). Many observers reported their first observation of this bird between March 9–10.

Eastern Meadowlark.—Present at the beginning of period in Dane and Dunn Counties.

Western Meadowlark.—Present at the beginning of period in Dane County (B. Simandl).

Yellow-headed Blackbird.—First reported in Columbia and Rock Counties, March 22 (D. Tessen).

Rusty Blackbird.—First reported in Dodge County, March 12 (D. Tessen). Last reported in Ozaukee County, May 10 (J. Frank).

Brewer's Blackbird.—First reported in Dodge County, March 12 (D. Tessen).

Common Grackle.—Present at the beginning of period in Ashland, Dane, and Sheboygan Counties. Many observers, however, reported their first observation of this bird between March 9–15.

Brown-headed Cowbird.—Present at the beginning of period in Jefferson County (K. Hale). Many observers, however, reported their first observation of this bird between March 24 and April 1.

Orchard Oriole.—First reported in Dane County, May 5 (E. Hansen). Also reported during the period in Columbia, Dunn, Eau Claire, Green, Green Lake, Kenosha, Ozaukee, Racine, Shawano, and Trempealeau Counties.

Northern Oriole.—First reported in Walworth County, April 29 (D. Tessen).

Pine Grosbeak.—Reported as follows: Douglas County, beginning of period–March 22 (R. Johnson); Taylor County, March 11 (S. & L. LaValley); and Sawyer County, March 12 (K. Merkel).

Purple Finch.—Present at the end of the period in Ashland, Barron, Chippewa, Clark, Door, Douglas, Fond du Lac, Portage, Price, Sawyer, Taylor, and Vilas Counties.

House Finch.—Reported in 17 Counties during the period. This bird has a solid footing in southeastern and south central Wisconsin and continues to expand north (Marathon, Price, and Shawano) and west (Monroe and Trempealeau). We should continue to document its colonization of the state.

Red Crossbill.—Present at the end of the period in Vilas County (Jim Baughman). Reported in 4 other counties during the period as far south as Dane (S. Robbins) and Milwaukee (A. Henning & W. Mueller) Counties.

White-winged Crossbill.—Last reported in Forest County, May 28 (Jeff Baughman and G. DeBoer). Reported in 14 other counties during the period as far south as Columbia and Ozaukee Counties.

Common Redpoll.—Present at the beginning of period in Door, Douglas, Sawyer, and Vilas Counties. Last reported in Douglas County, May 13 (R. Johnson).

Hoary Redpoll.—First reported in Douglas County, April 18–19 (R. Johnson).

Pine Siskin.—Present at the end of the period in Ashland, Barron, Douglas, Forest, Langlade, Oneida, Portage, Shawano, and Vilas Counties.

American Goldfinch.—Present during the period throughout the state.

Evening Grosbeak.—Present at the end of the period in Ashland, Douglas, Forest, Price, Sawyer, Taylor, and Vilas Counties.

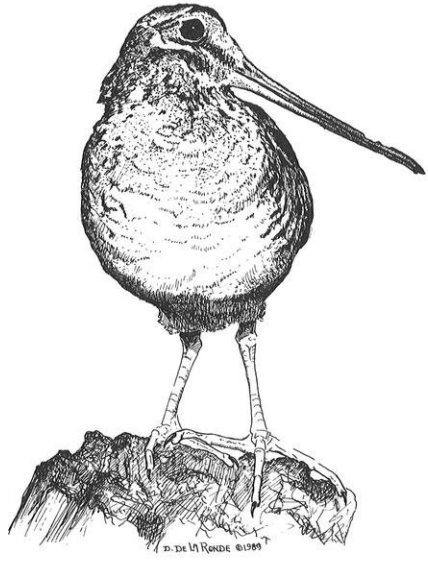
House Sparrow.—Present during the period throughout the state.

Contributors

James Anderson, Philip Ashman, Norm Barger, Jeff Baughman, Jim Baughman, Dan Belter, Murray Berner, Homer Bishop, Jeff & Carol Blain, Marilyn Bontly, David & Margaret Brasser, Bill Cowart, Gerald DeBoer, Scott Diehl, Bill & Jason Drazkowski, Barbara Duerksen, Eric Epstein, Laura Erickson, Marty Evanson, Dave Fallow, James Frank, Alta Goff, Ronald Gutschow, Karen Hale, Ellen Hansen, Maybelle Hardy, Dorothy Harmer, Judy Haseleu, Anita Henning, Bill Hilsenhoff, Jim Hoefler, Joseph Hudick, Thomas Hunter, Becky Isenring, Robbye Johnson, Jim Kopitzke, Mark Korducki, the Kuhns Family, Steve & Laura LaValley, Fred Lesher, Peggy Lison, Roy & Charlotte Lukes, Mark Martin, Bob Mead, Keith Merkel, William Mueller, William Norris, Dwight Offord, John Ottinger, Patricia Parsons, Mark Peterson, Steve Petznick, Janine Polk, Mary Jean Raile, Bill Reardon, Leonard Risch, Paul Risch, Sam Robbins, John Robinson, Clark Schultz, Larry Semo, Al & Sue Shea, B. Kay Simandl, Jerry Smith, Charles Sontag, Tom Soulen, Paul Sunby, Daryl Tessen, Steve Thiessen, Dick Verch, Mary Ellen Whitty, Melvin Wierzbicki, Norma Zehner, and Tom Ziebell.

I would be remiss if I failed to thank Suzan Shea for her extensive assistance in preparing this report, and Sam Robbins for his counsel on some unusual northern Wisconsin records.

Allen K. Shea
2202 Manor Green Drive
Madison, WI 53711



American Woodcock *by Deann L. DeLaRonde*

Big Day Counts: 1989

by Jim Frank

Interest in Big Day Counts continues to grow in Wisconsin and with it the lists turned in each spring. There are birders who consider the event sheer lunacy, an exhausting grind, one more way to promote listing, or of no ornithological significance. Proponents either ignore these remarks, engrossed in the enjoyment they find in planning and participating in this challenge, or defend it on several grounds. Big Days can represent the synthesis of many aspects of a birder's skills, including split-second identification ability, knowledge of bird distributions in their area, and knowledge of avian behavior. In essence, where can it be found? What is the best time of day (or night)? When does it migrate through the state? What does it look or sound like? Admittedly, there is some strategic planning involved, driving skill, and ability to forego some sleep.

This year 21 counts were made in Wisconsin (Table 1); three lists of greater than 170 were compiled, in three different regions of the state. The Baughman, Schultz, Baughman, and Stott team racked up 179 species in their south central to northeast route. This eclipsed the two old records, by American Birding Association standards, of 178 from 1985. It still falls short of the 182 list from a 1981 Big Day. In the other favorite route, in the northwest corner of the state, Shea and Shea found 176 species this year. The third 170+ list came from DeBoer and Baughman running a relatively little explored route in the northeastern part of the state for a 174 list.

In total, 252 species were reported on Big Day Count Lists. The most surprising were a Swainson's Hawk at Superior, a Kirtland's Warbler in Douglas County, and a Chuck-will's-widow in Polk County.

Judging by some of the "holes" in the larger lists, another 180 or even 185 list would seem to be just a matter of time and of course a little luck. Here are the details of the 21 counts in 1988; birds in italics were unique to 1989 Big Day Counts, groups in italics were the largest number of that group seen on 1989 Big Day Counts:

East Region

Bernie Brouchoud's count on May 16 yielded 145 species. He covered

Table 1. Details of the 1989 Big Day Counts.

Observers	Date	Region	Time	Sky	Wind	Temp.	Miles		Species
							Car	Foot	
Baughman, Schultz, Baughman, Stott	5/19/89	SC	0:00–20:30	Clo.	NW15	58–71	513	2.5	179
Shea, Shea	5/23/89	NW	2:30–22:15	Fair	? 10	?	342	3.0	176
DeBoer, Baughman	5/28/89	NE	0:00–21:00	?	?	?	490	10.0	174
Shea, Shea	5/14/89	SC	1:45–21:40	P.Cl.	NW10	46–72	326	3.0	168
Tessen, Frank	5/20/89	SC	0:00–21:00	P.Cl.	NW25	52–76	485	4.0	168
Peterson, Hoffman	5/20/89	NC	0:01–21:30	P.Cl.	NW20	60–75	350	5.0	160
Frank	5/18/89	SE	3:45–19:15	P.Cl.	S 8	?	275	3.0	159
DeBoer, Howard	5/19/89	SE	0:00–21:30	?	?	?	380	0	158
Donald, Sundell	5/20/89	SE	3:30–21:30	P.Cl.	SW12	54–67	187	5.0	153
Risch, Risch, Risch	5/20/89	NC	3:00–21:00	P.Cl.	W10	62–70	279	3.0	153
Foster, Robbins	5/15/89	SC	3:00–18:30	?	?	?	?	?	147
Brouchoud	5/16/89	E	3:00–20:30	Fair	SW 5	45–65	158	6.0	145
Johnson, Semo	5/22/89	NW	2:00–20:00	P.Cl.	SW ?	45–80	180	1.0	143
Frank	5/16/89	SE	3:45–19:15	Fair	SE 8	?	331	3.0	142
Idzikowski, Robbins	5/17/89	SE	3:00–21:00	?	?	?	?	?	138
Tessen	5/14/89	SC	5:00–17:30	P.Cl.	N 5	42–70	150	5.0	137
Hudick, Honetschlager	5/17/89	NW	4:45–21:00	Fair	?10	55–85	385	3.0	126
Woodcock	5/27/89	E	4:30–22:30	Fair	NW15	43–72	226	5.2	125
Brasser, Brasser	5/20/89	E	5:30–22:00	P.Cl.	NW20	50–70	185	4.5	113
Isenring, McNamara	5/24/89	SC	4:45–19:30	P.Cl.	?	?	150	10.0	109
Diehl	5/21/89	SE	6:30–20:30	P.Cl.	?	70–82	78	4.0	100

Woodland Dunes, Manitowoc Harbor, and Collins Marsh. Highlights were Willet, Red Knot, Yellow-bellied Flycatcher, Dark-eyed Junco; 9 ducks, 11 shorebirds, 8 flycatchers, *5 vireos*, 19 warblers, and 11 sparrows.

John Woodcock's count on May 27 yielded 125 species. He covered Manitowoc Harbor, Woodland Dunes, Collins Marsh, Green Bay, Oconto Marsh, Little Maiden Lake, Jones Spring, and Archibald Lake. Highlights included: Bald Eagle, Pine Warbler, Cerulean Warbler; 6 ducks, 9 shorebirds, 20 warblers, and 8 sparrows.

David Brasser and Margaret Brasser's count on May 20 yielded 113 species. They covered Horicon NWR, Riveredge Nature Center, Harrington Beach S.P., Terry Andrae S.P., Sheboygan Co. Manitowoc Harbor, and Maywood Park. Highlights included: 8 ducks, 10 shorebirds, and 17 warblers.

North Central Region

Debbie Risch, Paul Risch, and Nick Risch's count on May 20 yielded 153 species. They covered Pershing Wildlife Area, Chequamegon Waters, Chequamegon Nat. Forest, Stettsonville Sewage Ponds, and Mead Wildlife Area. Highlights included: Mute Swan, Osprey, Bald Eagle, *Greater Prairie-Chicken*, *Sharp-tailed Grouse*, Western Sandpiper, Baird's Sandpiper, Northern Saw-whet Owl, Common Raven, Olive-sided Flycatcher, Cerulean Warbler, LeConte's Sparrow, Evening Grosbeak; 9 ducks, 8 hawks, 15 shorebirds, 21 warblers, 8 sparrows, and 9 blackbirds.

Northeast Region

Jerry DeBoer and Jeff Baughman's count on May 28 produced 174 species. They covered Powell Marsh, Nicolet Nat. Forest, northeast Lake

Michigan counties, and Upper Kettle Moraine. Highlights included: *Cattle Egret*, Osprey, Bald Eagle, Peregrine Falcon, Wild Turkey, *Yellow Rail*, White-rumped Sandpiper, *Franklin's Gull*, Little Gull, Common Raven, Black-throated Blue Warbler, Pine Warbler, Cerulean Warbler, Connecticut Warbler, Henslow's Sparrow, LeConte's Sparrow, *Sharp-tailed Sparrow*, Red Crossbill, *White-winged Crossbill*, Evening Grosbeak; 10 ducks, 8 hawks, 14 shorebirds, *5 gulls*, 10 flycatchers, 21 warblers, *13 sparrows*, 9 blackbirds, and *7 finches*.

Mark Peterson and Randy Hoffman's count on May 20 produced 160 species. They covered Powell Marsh, Thunder Marsh, Three Lakes, Hiles, Menominee Co., Shawano Co., Atkinson Marsh, Manitowoc Harbor, Woodland Dunes, and Collins Marsh. Highlights included: Tundra Swan, Common Merganser, Osprey, Bald Eagle, Red Knot, *Hudsonian Godwit*, Yellow-bellied Flycatcher, Common Raven, *Boreal Chickadee*, Pine Warbler, Black-throated Blue Warbler, LeConte's Sparrow, Red Crossbill, Evening Grosbeak; 12 ducks, 16 shorebirds, *5 vireos*, 21 warblers, 11 sparrows, and 5 finches.

Northwest Region

Al Shea and Sue Shea's count on May 23 produced 176 species. They covered Brule River, Solon Springs, St. Croix Flowage, Gordon Barrens, Wisconsin Point, Superior, Crex Meadows, Fish Lake Wildlife Area, and Interstate Park. Highlights included: Mute Swan, Greater Scaup Duck, Canvasback, Common Merganser, Osprey, Bald Eagle, *Swainson's Hawk*, Peregrine Falcon, Western Sandpiper, Long-billed Dowitcher, Glaucous Gull, *Black-backed Woodpecker*, Olive-sided Flycatcher, Gray Jay, Common Raven, Pine Warbler, Cerulean Warbler, Louisiana Waterthrush, Connecticut Warbler, Lark Sparrow, LeConte's Sparrow; *17 ducks*, *11 hawks*, 12 shorebirds, 4 gulls, *7 woodpeckers*, 7 flycatchers, *6 thrushes*, 25 warblers, *13 sparrows*, 9 blackbirds, and 3 finches.

Robbye Johnson and Larry Semo's count on May 22 produced 142 species. They covered Brule River, St. Croix River, and Wisconsin Point. Highlights included: Mute Swan, Osprey, Bald Eagle, White-rumped Sandpiper, Glaucous Gull, Northern Sawwhet Owl, Olive-sided Flycatcher, Yellow-bellied Flycatcher, Gray Jay, Common Raven, *Kirtland's Warbler*, Pine Warbler, Evening Grosbeak; 11 ducks, 7 hawks, 12 shorebirds, 4 gulls, 8 flycatchers, 18 warblers, 10 sparrows, 9 blackbirds, and 4 finches.

Joe Hudick and Dean Honetschlager's count on 17 May produced 126 species. They covered western Polk Co., northern St. Croix Co., Fish Lake Wildlife Area, Crex Meadows, and Wisconsin Point. Highlights included: Red-necked Grebe, Tundra Swan, Osprey, Bald Eagle, *Chuck-will's-widow*, Pine Warbler; 11 ducks, 8 shorebirds, *7 woodpeckers*, 5 flycatchers, 13 warblers, 7 sparrows, and 9 blackbirds.

South Central Region

Jeff Baughman, Thomas Schultz, Scott Baughman, and William Stott's count on May 19 produced 179 species. They covered Horicon Marsh, Grassy Lake, Mud Lake, Grand River Marsh, Baxter's Hollow, PF prairies, Mazomanie Bottoms, Goose Pond, Atkinson Marsh, Kewaunee, and Mani-

towoc. Highlights included: Red-necked Grebe, Osprey, Wild Turkey, King Rail, Willet, Marbled Godwit, Red Knot, White-rumped Sandpiper, Baird's Sandpiper, Stilt Sandpiper, *Long-eared Owl*, Olive-sided Flycatcher, Yellow-bellied Flycatcher, Pine Warbler, Worm-eating Warbler, Louisiana Waterthrush, Lark Sparrow, Henslow's Sparrow, Orchard Oriole; *6 herons*, 12 ducks, 8 hawks, 16 shorebirds, *4 owls*, *7 woodpeckers*, *10 flycatchers*, *5 vireos*, 27 warblers, 12 sparrows, and 9 blackbirds.

Al Shea and Sue Shea's count on May 14 produced 168 species. They covered Waunakee Marsh, Mazomanie Bottoms, Devil's Lake S.P., Baxter's Hollow, PF prairies, Crystal Lake, UW Arboretum, Goose Pond, Grassy Lake, Mud Lake, and Horicon Marsh. Highlights included: *Horned Grebe*, Mute Swan, Osprey, Wild Turkey, King Rail, Baird's Sandpiper, Stilt Sandpiper, Black-throated Blue Warbler, Cerulean Warbler, Worm-eating Warbler, Louisiana Waterthrush, Lark Sparrow, Orchard Oriole; *6 herons*, 12 ducks, 14 shorebirds, *7 woodpeckers*, 6 flycatchers, *6 thrushes*, 25 warblers, 12 sparrows, and 9 blackbirds.

Daryl Tessen and Jim Frank's count on May 20 produced 168 species. They covered Cedarburg Bog, Mud Lake Wildlife Area, Waunakee Marsh, Laws Bottoms, Baxter's Hollow, UW Arboretum, Picnic Point, Arlington ponds, Horicon Marsh, Theresa Marsh, Cleveland, Manitowoc Harbor, Two Rivers, and Atkinson Marsh. Highlights included: Red-necked Grebe, Mute Swan, Greater Scaup Duck, Osprey, Bobwhite, Wild Turkey, King Rail, Marbled Godwit, White-rumped Sandpiper, Stilt Sandpiper, Acadian Flycatcher, *Bell's Vireo*, Prothonotary Warbler, Worm-eating Warbler, Louisiana Waterthrush, Connecticut Warbler, Henslow's Sparrow, Orchard Oriole; *6 herons*, 12 ducks, *4 Galliformes*, *17 shorebirds*, *7 woodpeckers*, 8 flycatchers, *5 vireos*, 22 warblers, 9 sparrows, and *10 blackbirds*.

Bill Foster and Sam Robbins' count on May 15 produced 147 species. They covered Mazomanie Bottoms, Prairie du Sac, Baxter's Hollow, Roxbury, Columbia Co. ponds, and Madison. Highlights included: Mute Swan, Northern Bobwhite, Willet, Acadian Flycatcher, Carolina Wren, Worm-eating Warbler, Louisiana Waterthrush, Lark Sparrow, Henslow's Sparrow, Orchard Oriole; 12 ducks, 6 hawks, 11 shorebirds, *5 wrens*, 19 warblers, 11 sparrows, and 9 blackbirds.

Daryl Tessen's count on May 14 produced 137 species. He covered 1918 Marsh, Picnic Point, UW Arboretum, Arlington ponds, and Sugar River. Highlights included: Mute Swan, White-rumped Sandpiper, Baird's Sandpiper, Stilt Sandpiper, Long-billed Dowitcher, *Tufted Titmouse*, Carolina Wren, *Yellow-throated Warbler*, Cerulean Warbler, Prothonotary Warbler, Louisiana Waterthrush, Yellow-breasted Chat, Orchard Oriole; 9 ducks, 14 shorebirds, *6 thrushes*, 29 warblers, and 9 sparrows.

Becky Isenring and Peg McNamara's count on May 24 produced 109 species. They covered Mud Lake, Mackenzie Environmental Center, Arlington ponds, Devil's Lake S.P., Steinke Basin, Baxter's Hollow, PF prairies, and Wisconsin River. Highlights included: Gray Partridge, Northern Bobwhite, White-rumped Sandpiper, Baird's Sandpiper, Pectoral Sandpiper, Gray-cheeked Thrush, Prothonotary Warbler, Worm-eating

Warbler, Louisiana Waterthrush, Henslow's Sparrow; 9 shorebirds, 6 flycatchers, 15 warblers, and 9 sparrows.

Southeastern Region

Jim Frank's count on May 18 produced 159 species. He covered Cedarburg Bog, Kletzsch Park, Schlitz Audubon Center, Virmond Park, Riveredge Nature Center, Belgium Pond, Horicon NWR, Theresa Marsh, and Manitowoc Harbor. Highlights included: *Snowy Egret*, Gray Partridge, Stilt Sandpiper, Yellow-bellied Flycatcher, Acadian Flycatcher, Prairie Warbler, Cerulean Warbler, Yellow-breasted Chat, Henslow's Sparrow; *6 herons*, 11 ducks, 16 shorebirds, 8 flycatchers, 24 warblers, 9 sparrows, and 9 blackbirds.

Jerry DeBoer and Greg Howard's count on May 19 produced 158 species. They covered Racine Co., Waukesha Co., Milwaukee Co., Theresa Marsh, Horicon NWR, Columbia Co., and Sauk Co. Highlights included: Mute Swan, *Common Goldeneye*, Wild Turkey, Northern Bobwhite, *Laughing Gull*, Yellow-bellied Flycatcher, Acadian Flycatcher, Black-throated Blue Warbler, Louisiana Waterthrush, Connecticut Warbler, *Hooded Warbler*, Lark Sparrow, Henslow's Sparrow; 12 ducks, 13 shorebirds, 8 flycatchers, 27 warblers, and 12 sparrows.

Mary Donald and Roger Sundell's count on May 20 produced 153 species. They covered Cedarburg Bog, Ehler's Park, Harrington Beach S.P., Milwaukee River parks, and Milwaukee Coast Guard Impoundment. Highlights included: *Surf Scoter*, King Rail, White-rumped Sandpiper, Baird's Sandpiper, Little Gull, Olive-sided Flycatcher, Yellow-bellied Flycatcher, Prairie Warbler, Cerulean Warbler, Henslow's Sparrow; 9 ducks, 12 shorebirds, 4 gulls, 8 flycatchers, 24 warblers, and 12 sparrows.

Jim Frank's count on May 16 produced 142 species. He covered Cedarburg Bog, Kletzsch Park, Estabrook Park, Schlitz Audubon Center, Virmond Park, Riveredge Nature Center, Horicon NWR, Theresa Marsh, Arlington ponds, and Milwaukee Harbor. Highlights included: Gray Partridge, Cerulean Warbler, *Lapland Longspur*; 12 ducks, 12 shorebirds, *6 thrushes*, 19 warblers, 10 sparrows, and 9 blackbirds.

John Idzikowski and Sam Robbins' count on May 17 produced 138 species. They covered Milwaukee Co. and southern Ozaukee Co. Highlights included: Gray-cheeked Thrush, Prairie Warbler, Henslow's Sparrow, Orchard Oriole; 8 ducks, 12 shorebirds, *6 thrushes*, 19 warblers, and 11 sparrows.

Scott Diehl's count on May 21 produced 100 species. He covered Milwaukee County only. Highlights included: Upland Sandpiper; 7 ducks, 9 shorebirds, 7 flycatchers, and 15 warblers.

Jim Frank
4339 W. Laverna Ave.
Mequon, WI 53092

Cooper's Hawk *by Deann L. DeLaRonde*

May Day Counts: 1989

by Jim Frank

The 23 May Day Counts conducted this year represent an average number over the past seven years. Of these, 17 counts reported for at least the seventh consecutive year. Leading the list for participation was Oxbo/Fifield with 31 observers followed by Portage County with 29. Total species lists were generally above average, seven counts exceeding 150. Milwaukee/Ozaukee led the way at 174, Woodland Dunes NE followed at 169, with Fond du Lac and Winnebago Counties at 165 each. The total reported species was 244. A special mention should be made of the twenty observers on the Racine/Kenosha count who must have been a bit unsure if they were on a May Count or a Christmas Count as they watched snow fall with temperatures around freezing. Their surprising list of 157 species

Table 1. Details of the 1989 May Day Counts.

Count	Date	Time	Sky	Wind	Temp.	Observ.	Parties	Species	7-yr. avg.
Ashland/Bayfield	5/18/89	4:00–16:00	Clo.	SW5	52–84	23	5	156	146
Black River Falls	5/16/89	4:30–?	Clo.	0	48–?	3	1	50	—
Brown Co.	5/20/89	?	P.Cl.	?	48–62	8	5	134	—
Burnett Co.	5/22/89	4:40–21:10	P.Cl.	S10	45–75	3	1	123	120
Calumet Co.	5/13/89	4:30–22:00	P.Cl.	S 5	50–60	6	3	104	114
Fond du Lac Co.	5/20/89	5:00–21:00	P.Cl.	SW20	46–68	21	7	165	151
Lake Geneva	5/14/89	4:30–19:00	?	SW 2	45–69	3	3	109	105
Lake Mills	5/7/89	6:00–17:35	P.Cl.	NW10	30–58	2	1	82	—
Marathon Co.	5/13/89	4:00–18:00	Clo.	SE10	50–68	11	7	131	128
Milwaukee/Ozaukee	5/20/89	3:30–21:30	P.Cl.	SW12	54–67	9	5	174	164
Oconomowoc	5/14/89	5:30–19:00	P.Cl.	NW 5	44–68	23	8	147	134
Oxbo/Fifield	5/20/89	7:30–21:00	Fair	NW15	50–72	31	26	106	97
Plymouth	5/20/89	4:00–21:00	P.Cl.	SW10	57–67	12	7	143	136
Portage Co.	5/13/89	6:00–23:00	P.Cl.	SE 8	45–70	28	14	150	136
Racine/Kenosha	5/6/89	4:30–20:30	Clo.	NW15	31–40	20	7	157	156
Rock Co.	5/9/89	13:00–18:00	Fair	? 5	30–50	15	?	54	—
Shawano Co.	5/20/89	6:00–20:30	P.Cl.	?	?	12	8	111	131
Shiocton	5/20/89	7:00–15:00	P.Cl.	NW15	50–60	7	1	77	—
Taylor Co.	5/28/89	0:00–24:00	Fair	S15	45–72	3	1	119	115
Waukesha Co.	5/21/89	?–13:50	Fair	SW10	47–78	17	6	127	110
Winnebago Co.	5/20/89	5:30–20:30	P.Cl.	W25	63–74	22	9	165	163
Woodland Dunes NE	5/20/89	5:00–20:00	P.Cl.	S 5	50–62	15	8	169	129
Woodland Dunes SE	5/20/89	5:30–20:30	P.Cl.	SW 3	50–54	4	2	87	—

must represent a lot of confused birds too.

Table 1 has the counts listed alphabetically; however, the species lists of Tables 2 and 3 have the counts grouped geographically for comparison purposes. The 55 most unusual species, seen on four or less counts, are in Table 4. Though the list has numerous interesting birds, none is exceptionally outstanding. Perhaps more interesting is which birds appear here rather than in the preceding tables. Wilson's Phalaropes, Sanderlings, Olive-sided Flycatchers, Gray-cheeked Thrushes, and Connecticut Warblers seem misplaced?

As you examine the following tables of count lists, perhaps some of you will take up a challenge. Looking back over the past 15 years of May Count data, I note that the top four list totals range from 190 down to 183. All of these occurred between 1975 and 1980. No May Count has surpassed 175 since 1980.

Jim Frank
4339 W. Laverna Ave.
Mequon, WI 53092

Table 2. Species found on 5 or more counts in northern Wisconsin and the Fox Valley.

Species	Ashland/Bayfield	Burnett Co.	Oxbo/Fifield	Taylor Co.	Black River Falls	Marathon Co.	Portage Co.	Shawano Co.	Brown Co.	Calumet Co.	Shiocton	Winnebago Co.	Fond du Lac Co.
Common Loon	X	X	X	X	–	X	X	X	–	–	X	X	–
Pied-billed Grebe	–	X	X	X	–	X	X	–	–	X	–	X	X
Double-crested Cormorant	X	X	–	X	–	X	X	X	X	–	–	X	X
American Bittern	X	X	X	X	X	X	X	X	–	–	–	X	X
Great Blue Heron	X	X	X	X	X	X	X	X	X	X	X	X	X
Great Egret	–	X	–	–	–	–	–	–	–	–	X	X	X
Green-backed Heron	X	X	–	X	–	X	X	X	X	X	X	X	X
Black-crowned Night-heron	–	–	–	–	–	X	–	–	X	X	–	X	X
Mute Swan	X	–	–	–	–	–	X	X	–	–	–	–	–
Canada Swan	X	X	–	X	X	X	X	X	X	X	–	X	X
Wood Duck	X	X	X	X	–	X	X	X	X	X	X	X	X
Green-winged Teal	–	X	–	–	X	–	X	–	X	X	–	–	X
American Black Duck	X	–	–	–	–	–	–	–	X	–	–	–	–
Mallard	X	X	X	X	–	X	X	X	X	X	X	X	X
Blue-winged Teal	X	X	X	X	–	X	X	X	X	X	X	X	X
Northern Shoveler	X	X	–	–	–	X	–	–	X	X	–	–	X
Gadwall	X	X	–	–	–	–	–	–	X	–	–	X	X
American Wigeon	X	X	X	–	–	X	X	–	X	X	–	X	–
Redhead	X	–	–	–	–	X	–	X	X	–	–	X	X
Ring-necked Duck	–	X	–	–	–	X	X	–	–	–	–	X	X
Lesser Scaup Duck	X	–	–	–	–	X	X	–	X	–	–	X	–
Common Goldeneye	X	–	–	–	–	X	X	X	–	–	–	–	–
Bufflehead	X	–	–	–	–	X	X	–	–	–	–	–	–
Hooded Merganser	X	–	X	–	–	X	X	X	–	–	X	–	–
Red-breasted Merganser	X	–	–	–	–	–	–	–	–	–	–	–	–
Ruddy Duck	–	X	–	–	–	X	X	X	X	–	–	X	X
Turkey Vulture	X	–	–	–	X	X	X	X	–	X	X	X	X
Osprey	–	X	X	X	–	X	X	–	–	X	–	–	–
Bald Eagle	X	X	X	X	–	–	X	–	–	–	–	–	–
Northern Harrier	X	X	X	X	–	X	X	X	–	–	X	X	X
Sharp-shinned Hawk	X	–	X	X	–	–	X	–	–	X	–	X	–
Cooper's Hawk	–	–	X	X	–	X	X	–	X	–	X	X	–
Red-shouldered Hawk	–	–	–	–	–	–	X	–	–	–	X	–	X
Broad-winged Hawk	X	X	X	X	–	X	X	–	–	–	–	X	X
Red-tailed Hawk	X	X	X	X	–	X	X	X	X	X	X	X	X
American Kestrel	X	X	X	X	–	X	X	X	X	X	X	X	X
Ring-necked Pheasant	–	–	X	–	–	–	–	X	–	X	–	X	X
Ruffed Grouse	X	X	X	X	X	X	X	X	–	X	X	X	X
Virginia Rail	–	–	X	–	–	X	–	–	–	–	–	X	X
Sora	X	X	–	X	–	X	X	–	–	X	–	X	X
American Coot	–	X	–	X	–	X	X	–	X	–	–	X	X
Sandhill Crane	–	X	X	X	X	X	X	X	X	–	–	X	X
Black-bellied Plover	X	–	–	–	–	–	–	–	–	–	–	X	X
Semipalmated Plover	X	X	–	–	–	–	–	X	X	–	–	X	X
Killdeer	X	X	X	X	–	X	X	X	X	X	–	X	X
Greater Yellowlegs	X	–	–	–	–	X	X	–	–	X	–	X	X
Lesser Yellowlegs	X	X	–	–	–	X	X	X	X	X	–	X	X
Solitary Sandpiper	X	–	–	–	–	X	–	–	X	X	–	X	–
Spotted Sandpiper	X	X	X	X	–	X	X	X	X	X	X	X	X
Upland Sandpiper	X	X	–	–	–	–	X	–	–	–	–	X	–
Ruddy Turnstone	X	–	–	–	–	–	–	–	–	–	–	X	–
Semipalmated Sandpiper	–	–	–	–	–	–	X	X	X	–	–	X	X
Least Sandpiper	X	X	–	–	X	X	X	–	X	X	–	X	X
Pectoral Sandpiper	X	–	–	–	–	–	–	–	–	X	–	X	X
Dunlin	X	–	–	–	–	–	–	–	X	–	–	X	X
Short-billed Dowitcher	X	–	–	–	–	–	–	–	X	–	–	–	X
Common Snipe	X	X	X	X	X	X	X	X	–	X	–	X	X
American Woodcock	X	–	X	–	–	X	–	–	–	X	–	X	X
Bonaparte's Gull	X	–	–	–	–	–	–	–	–	–	–	X	–
Ring-billed Gull	X	–	–	–	–	X	X	–	X	X	–	X	X
Herring Gull	X	–	–	–	–	–	–	–	X	–	–	X	X
Caspian Tern	X	–	–	–	–	–	–	–	X	–	–	X	–
Common Tern	X	–	–	X	–	–	X	–	–	–	–	X	X
Forster's Tern	X	–	–	–	–	–	–	–	X	–	–	X	X
Black Tern	–	X	–	X	–	X	X	X	X	–	–	X	X

(*continued*)

Table 2. *Continued*

Species	Ashland/Bayfield	Burnett Co.	Oxbo/Fifield	Taylor Co.	Black River Falls	Marathon Co.	Portage Co.	Shawano Co.	Brown Co.	Calumet Co.	Shiocton	Winnebago Co.	Fond du Lac Co.
Rock Dove	X	X	X	X	X	X	X	X	X	X	X	X	X
Mourning Dove	X	X	X	X	X	X	X	X	X	X	X	X	X
Black-billed Cuckoo	X	X	—	X	—	—	—	X	—	—	X	X	X
Yellow-billed Cuckoo	—	—	X	X	—	—	—	—	—	—	—	X	X
Eastern Screech Owl	—	—	—	—	—	—	—	—	—	—	—	—	—
Great Horned Owl	—	X	X	X	—	X	X	—	—	—	—	X	X
Barred Owl	X	X	—	X	—	X	X	—	—	—	—	—	X
Common Nighthawk	X	X	—	X	X	—	—	—	—	—	X	X	—
Whip-poor-will	—	X	X	X	X	X	X	X	—	X	—	—	X
Chimney Swift	X	X	X	X	—	X	X	X	X	X	X	X	X
Ruby-throated Hummingbird	—	X	X	X	X	—	X	X	X	X	—	X	X
Belted Kingfisher	X	X	X	X	—	X	X	X	X	—	X	X	X
Red-headed Woodpecker	X	X	X	X	X	X	X	X	X	X	X	X	X
Red-bellied Woodpecker	—	X	X	X	X	X	X	X	X	X	X	X	X
Yellow-bellied Sapsucker	X	—	X	X	—	X	X	X	—	X	—	X	—
Downy Woodpecker	X	X	X	X	X	X	X	X	X	X	X	X	X
Hairy Woodpecker	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Flicker	X	X	X	X	—	X	X	X	X	X	X	X	X
Pileated Woodpecker	X	—	X	X	—	—	X	X	—	—	—	X	X
Eastern Wood-Pewee	—	X	—	X	—	X	X	X	X	X	X	X	X
Alder Flycatcher	—	X	—	X	—	—	—	—	X	—	—	—	X
Willow Flycatcher	—	—	—	X	—	—	—	—	—	X	—	X	X
Least Flycatcher	X	X	X	X	—	X	X	X	X	X	X	X	X
Eastern Phoebe	X	X	X	X	X	X	X	X	X	X	X	X	X
Great Crested Flycatcher	X	X	X	X	—	X	X	X	X	X	X	X	X
Eastern Kingbird	X	X	X	X	X	X	X	X	X	X	X	X	X
Horned Lark	X	X	—	X	—	X	X	X	X	X	—	X	X
Purple Martin	X	X	X	X	—	X	X	X	X	X	—	X	X
Tree Swallow	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Rough-winged Swallow	X	X	X	X	X	X	X	X	X	X	—	X	X
Bank Swallow	X	X	—	X	—	—	X	X	X	—	—	X	X
Cliff Swallow	X	X	X	X	—	X	X	X	X	X	—	X	X
Barn Swallow	X	X	X	X	—	X	X	X	X	X	X	X	X
Blue Jay	X	X	X	X	X	X	X	X	X	X	X	X	X
American Crow	X	X	X	X	X	X	X	X	X	X	X	X	X
Common Raven	X	X	X	X	X	X	X	X	—	—	—	—	—
Black-capped Chickadee	X	X	X	X	X	X	X	X	X	X	X	X	X
Red-breasted Nuthatch	X	—	X	X	—	X	—	X	—	—	—	—	X
White-breasted Nuthatch	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown Creeper	X	X	—	—	—	X	X	X	X	—	—	—	—
House Wren	X	X	X	X	X	X	X	X	X	X	X	X	X
Winter Wren	X	X	—	X	—	—	—	—	—	—	—	—	X
Sedge Wren	X	X	—	X	—	—	X	—	—	—	—	X	X
Marsh Wren	—	—	—	—	—	—	—	—	X	—	—	X	X
Golden-crowned Kinglet	X	—	—	—	—	—	X	—	—	—	—	—	—
Ruby-crowned Kinglet	X	—	—	—	—	X	X	—	X	X	—	X	X
Blue-gray Gnatcatcher	—	—	—	—	—	X	X	—	X	X	X	X	X
Eastern Bluebird	X	X	X	X	X	X	X	X	X	X	X	X	X
Veery	X	X	—	X	—	X	X	—	X	X	—	X	X
Swainson's Thrush	—	—	—	—	—	X	—	—	X	—	—	X	X
Hermit Thrush	X	—	X	X	—	X	X	—	—	—	—	X	—
Wood Thrush	X	—	X	X	—	X	X	—	X	X	X	X	X
American Robin	X	X	X	X	X	X	X	X	X	X	X	X	X
Gray Catbird	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown Thrasher	X	X	X	X	X	X	X	X	X	X	X	X	X
Cedar Waxwing	—	—	X	X	—	X	—	X	X	—	X	X	X
European Starling	X	X	X	X	X	X	X	X	X	X	X	X	X
Solitary Vireo	X	—	—	X	—	—	X	—	—	—	—	—	X
Yellow-throated Vireo	—	X	X	X	—	X	X	X	X	—	X	X	X
Warbling Vireo	X	X	—	X	—	X	X	—	X	—	X	X	X
Philadelphia Vireo	—	—	—	—	—	—	—	—	X	—	X	—	X
Red-eyed Vireo	X	X	X	X	X	X	X	X	X	—	X	X	X
Blue-winged Warbler	—	—	—	—	—	—	X	—	—	—	—	X	X
Golden-winged Warbler	X	X	—	X	X	X	X	—	X	—	X	—	X
Tennessee Warbler	X	X	—	—	—	—	X	X	X	X	X	X	X

(*continued*)

Table 2. *Continued*

Species	Ashland/Bayfield	Burnett Co.	Oxbo/Fifield	Taylor Co.	Black River Falls	Marathon Co.	Portage Co.	Shawano Co.	Brown Co.	Calumet Co.	Shiocton	Winnebago Co.	Fond du Lac Co.
Orange-crowned Warbler	–	–	–	–	–	–	X	–	X	–	–	–	X
Nashville Warbler	X	X	–	X	–	X	X	X	X	X	–	X	X
Northern Parula Warbler	X	X	–	X	–	X	X	–	X	–	–	X	–
Yellow Warbler	X	X	X	X	–	X	X	X	X	X	X	X	X
Chestnut-sided Warbler	X	X	X	X	–	–	X	X	X	–	X	X	X
Magnolia Warbler	X	–	–	–	–	X	X	–	X	X	X	X	X
Cape May Warbler	X	–	–	–	–	–	–	–	X	X	X	X	X
Black-throated Blue Warbler	–	–	–	–	–	–	X	–	–	–	–	–	X
Yellow-rumped Warbler	X	–	X	–	–	X	X	X	X	X	X	X	X
Black-throated Green Warbler	X	X	–	–	–	X	X	X	X	X	X	X	X
Blackburnian Warbler	X	–	–	X	–	–	–	–	X	–	–	X	X
Pine Warbler	X	X	X	X	–	–	X	X	–	X	–	X	X
Palm Warbler	X	–	–	–	–	X	X	–	X	X	–	X	X
Bay-breasted Warbler	X	–	–	–	–	X	X	–	X	–	–	X	X
Blackpoll Warbler	X	X	–	–	–	–	–	–	X	–	–	–	X
Cerulean Warbler	–	–	–	–	–	–	–	–	X	–	X	X	X
Black-and-white Warbler	X	X	X	X	–	X	X	X	X	X	–	X	X
American Redstart	X	X	X	X	–	X	X	X	X	–	X	X	X
Prothonotary Warbler	–	–	–	–	–	–	–	–	–	–	–	X	X
Ovenbird	X	X	X	X	X	X	X	X	X	X	–	X	X
Northern Waterthrush	X	–	–	X	–	–	X	–	–	X	–	X	X
Louisiana Waterthrush	–	–	–	–	–	–	X	–	–	–	–	–	X
Mourning Warbler	X	–	–	X	–	X	–	–	X	–	X	X	X
Common Yellowthroat	X	X	X	X	–	X	X	X	X	X	X	X	X
Wilson's Warbler	X	–	–	–	–	–	–	–	X	–	X	X	X
Canada Warbler	X	–	–	–	–	–	–	–	X	–	–	X	X
Scarlet Tanager	–	X	X	X	X	–	X	X	X	X	–	X	X
Northern Cardinal	X	X	X	–	X	X	X	X	X	X	X	X	X
Rose-breasted Grosbeak	X	X	X	X	X	X	X	X	X	X	X	X	X
Indigo Bunting	X	X	X	X	X	–	X	X	X	–	X	X	X
Rufous-sided Towhee	X	X	–	–	–	X	X	X	X	–	X	X	X
Chipping Sparrow	X	X	X	X	X	X	X	X	X	X	–	X	X
Clay-colored Sparrow	X	X	X	X	–	X	X	X	X	–	–	X	–
Field Sparrow	–	X	–	–	X	X	X	X	X	X	X	X	X
Vesper Sparrow	X	X	–	–	–	X	X	X	–	X	–	X	X
Savannah Sparrow	X	X	–	X	–	X	X	X	X	X	–	X	X
Grasshopper Sparrow	–	–	–	–	–	–	–	X	–	–	–	–	X
Fox Sparrow	–	–	X	X	–	–	X	–	–	–	–	X	–
Song Sparrow	X	X	X	X	X	X	X	X	X	X	X	X	X
Lincoln's Sparrow	–	–	–	–	–	–	X	X	X	–	–	X	X
Swamp Sparrow	X	X	X	–	–	X	X	–	X	X	X	X	X
White-throated Sparrow	X	–	X	X	–	X	X	X	X	X	–	X	X
White-crowned Sparrow	X	–	–	–	–	X	X	–	X	X	–	–	X
Dark-eyed Junco	X	–	X	–	–	–	X	–	–	–	–	–	–
Bobolink	X	X	X	X	–	X	X	X	X	X	–	X	X
Red-winged Blackbird	X	X	X	X	X	X	X	X	X	X	X	X	X
Eastern Meadowlark	X	X	–	X	X	X	X	X	X	X	–	X	X
Western Meadowlark	X	X	–	X	–	–	X	–	–	–	–	X	X
Yellow-headed Blackbird	X	X	X	X	–	X	X	X	X	X	–	X	X
Brewer's Blackbird	X	X	X	X	–	X	X	X	X	–	–	X	X
Common Grackle	X	X	X	X	X	X	X	X	X	X	X	X	X
Brown-headed Cowbird	X	X	X	X	X	X	X	X	X	X	X	X	X
Northern Oriole	X	X	X	X	X	X	X	X	X	X	X	X	X
Purple Finch	X	–	X	X	–	X	X	X	–	–	–	–	X
House Finch	–	–	X	–	–	–	X	X	X	–	–	X	X
American Goldfinch	X	X	X	X	X	X	X	X	X	X	X	X	X
House Sparrow	X	X	X	X	X	X	X	X	X	X	X	X	X

Table 3. Species found on 5 or more counts in southeastern Wisconsin.

Species	Woodland Dunes NE	Woodland Dunes SE	Plymouth	Milwaukee/Ozaukee	Racine/Kenosha	Waukesha Co.	Oconomowoc	Lake Geneva	Lake Mills	Rock Co.
Common Loon	—	—	—	X	X	—	—	—	—	—
Pied-billed Grebe	—	—	X	X	X	X	X	X	X	—
Double-crested Cormorant	X	—	—	—	X	—	—	—	—	—
American Bittern	X	—	X	X	X	X	X	—	—	—
Great Blue Heron	X	X	X	X	X	X	X	X	X	—
Great Egret	X	X	X	—	X	X	X	X	—	—
Green-backed Heron	X	X	X	X	X	X	X	X	X	X
Black-crowned Night-Heron	X	—	—	X	—	X	—	—	—	—
Mute Swan	X	—	—	—	X	X	—	X	—	—
Canada Goose	X	—	X	X	X	X	X	X	X	—
Wood Duck	X	X	X	X	X	X	X	X	—	X
Green-winged Teal	X	—	X	—	X	—	X	—	—	—
American Black Duck	—	—	X	—	—	X	X	—	—	—
Mallard	X	X	X	X	X	X	X	X	X	X
Blue-winged Teal	X	—	X	X	X	X	X	X	X	—
Northern Shoveler	X	—	X	—	X	—	—	—	X	—
Gadwall	—	—	—	—	X	X	X	—	X	—
American Wigeon	—	—	X	—	X	—	X	—	—	—
Redhead	—	—	—	X	X	—	—	X	—	—
Ring-necked Duck	—	—	—	X	X	—	—	X	X	—
Lesser Scaup Duck	—	—	—	X	X	—	—	—	X	—
Common Goldeneye	—	—	—	—	X	—	—	—	—	—
Bufflehead	—	—	—	—	X	X	X	—	—	—
Hooded Merganser	—	—	—	X	X	—	—	—	—	—
Red-breasted Merganser	—	X	—	X	X	—	—	—	X	—
Ruddy Duck	—	—	X	X	X	—	—	—	—	—
Turkey Vulture	X	—	X	X	X	X	X	X	—	—
Osprey	X	X	X	X	—	—	X	—	—	—
Bald Eagle	—	—	—	—	—	—	—	—	—	—
Northern Harrier	X	—	—	X	X	—	X	—	—	—
Sharp-shinned Hawk	—	—	—	X	X	X	X	—	—	—
Cooper's Hawk	X	X	—	X	—	X	X	—	—	—
Red-shouldered Hawk	X	—	—	X	—	—	—	—	—	—
Broad-winged Hawk	X	—	—	X	—	—	X	—	X	X
Red-tailed Hawk	X	X	X	X	X	X	X	X	X	—
American Kestrel	X	—	X	X	X	X	X	X	X	X
Ring-necked Pheasant	X	—	X	X	X	X	X	X	X	—
Ruffed Grouse	X	—	X	X	—	—	X	—	—	—
Virginia Rail	X	—	X	X	—	—	—	X	—	—
Sora	X	—	X	X	X	X	X	X	—	—
American Coot	X	—	X	X	X	X	X	X	X	—
Sandhill Crane	X	—	X	X	X	X	X	X	X	—
Black-bellied Plover	—	—	—	X	X	—	—	—	—	—
Semipalmated Plover	X	—	—	X	X	—	X	X	—	—
Killdeer	X	X	X	X	X	X	X	X	X	X
Greater Yellowlegs	—	—	X	X	X	—	X	—	—	—
Lesser Yellowlegs	X	—	—	—	X	—	X	—	X	—
Solitary Sandpiper	—	—	X	—	X	X	—	—	X	—
Spotted Sandpiper	X	X	X	X	X	X	X	—	—	—
Upland Sandpiper	X	X	—	X	X	—	—	—	—	—
Ruddy Turnstone	X	—	X	X	X	—	—	—	—	—
Semipalmated Sandpiper	X	—	—	—	X	—	—	X	—	—
Least Sandpiper	—	—	—	X	X	—	X	—	X	—
Pectoral Sandpiper	—	—	X	—	X	—	X	—	—	—
Dunlin	X	—	—	X	X	—	X	—	—	—
Short-billed Dowitcher	X	—	—	—	X	—	X	—	—	—
Common Snipe	X	—	X	X	X	—	X	—	X	—
American Woodcock	X	—	X	X	—	X	X	—	—	—
Bonaparte's Gull	X	X	X	X	X	—	—	—	—	—
Ring-billed Gull	X	X	X	X	X	—	—	X	X	—
Herring Gull	X	X	—	X	X	X	—	X	—	—
Caspian Tern	X	X	—	X	X	—	—	—	—	—
Common Tern	X	X	X	X	X	—	—	—	—	—

(*continued*)

Table 3. *Continued*

Species	Woodland Dunes NE	Woodland Dunes SE	Plymouth	Milwaukee/Ozaukee	Racine/Kenosha	Waukesha Co.	Oconomowoc	Lake Geneva	Lake Mills	Rock Co.
Forster's Tern	X	–	–	X	X	–	–	–	–	–
Black Tern	X	X	X	X	X	X	X	X	X	–
Rock Dove	X	–	X	X	X	X	X	X	X	X
Mourning Dove	X	X	X	X	X	X	X	X	X	X
Black-billed Cuckoo	X	X	X	X	–	X	X	X	–	–
Yellow-billed Cuckoo	–	–	X	–	–	–	–	X	–	–
Eastern Screech-Owl	X	–	–	X	–	X	X	X	–	–
Great Horned Owl	X	X	X	X	X	X	X	X	–	–
Barred Owl	X	–	–	X	–	X	X	–	–	–
Common Nighthawk	X	–	X	X	X	X	–	–	–	–
Whip-poor-will	X	–	X	X	–	–	–	–	–	–
Chimney Swift	X	X	X	X	X	X	X	X	X	X
Ruby-throated Hummingbird	X	–	X	X	–	–	X	–	–	–
Belted Kingfisher	X	X	X	X	X	X	X	X	X	X
Red-headed Woodpecker	X	–	X	X	X	X	X	X	X	–
Red-bellied Woodpecker	X	X	X	X	X	X	X	X	–	–
Yellow-bellied Sapsucker	–	–	X	–	X	–	–	–	–	–
Downy Woodpecker	X	X	X	X	X	X	X	X	X	X
Hairy Woodpecker	X	–	X	X	X	X	X	X	–	X
Northern Flicker	X	X	X	X	X	X	X	X	X	X
Pileated Woodpecker	X	–	–	X	–	–	–	–	–	–
Eastern Wood-Pewee	X	X	X	X	X	X	–	–	–	–
Alder Flycatcher	X	X	–	X	–	–	–	X	–	–
Willow Flycatcher	X	–	X	X	–	X	X	–	–	–
Least Flycatcher	X	X	X	X	–	X	X	X	–	–
Eastern Phoebe	X	–	X	X	–	X	X	X	–	–
Great Crested Flycatcher	X	X	X	X	X	X	X	X	X	–
Eastern Kingbird	X	X	X	X	X	X	X	X	–	–
Horned Lark	X	X	X	X	X	X	X	X	X	–
Purple Martin	X	X	X	X	X	X	X	X	X	X
Tree Swallow	X	–	X	X	X	X	X	X	X	–
Northern Rough-winged Swallow	X	X	X	X	X	X	X	X	X	–
Bank Swallow	X	X	X	X	X	–	X	X	–	X
Cliff Swallow	X	–	X	X	X	–	X	–	–	–
Barn Swallow	X	X	X	X	X	X	X	X	X	X
Blue Jay	X	X	X	X	X	X	X	X	X	X
American Crow	X	X	X	X	X	X	X	X	X	X
Common Raven	–	–	–	–	–	–	–	–	–	–
Black-capped Chickadee	X	X	X	X	X	X	X	X	X	X
Red-breasted Nuthatch	X	–	–	–	X	–	–	X	X	–
White-breasted Nuthatch	X	X	X	X	X	X	X	X	X	X
Brown Creeper	X	X	X	X	X	X	X	–	–	–
House Wren	X	X	X	X	X	X	X	X	X	X
Winter Wren	X	–	X	X	X	–	–	X	–	–
Sedge Wren	X	–	X	X	–	X	–	–	–	–
Marsh Wren	X	–	X	X	–	X	–	–	–	–
Golden-crowned Kinglet	X	–	X	X	X	–	–	–	–	–
Ruby-crowned Kinglet	X	–	X	X	X	–	X	X	X	X
Blue-gray Gnatcatcher	X	X	–	X	X	X	X	X	X	–
Eastern Bluebird	X	–	X	X	X	X	X	–	X	X
Veery	X	–	X	X	X	X	X	–	X	X
Swainson's Thrush	X	X	X	X	X	–	X	–	X	–
Hermit Thrush	X	–	X	X	X	–	X	X	–	X
Wood Thrush	X	X	X	X	X	X	X	X	X	–
American Robin	X	X	X	X	X	X	X	X	X	X
Gray Catbird	X	X	X	X	X	X	X	X	X	X
Brown Thrasher	X	–	X	X	X	X	X	–	X	X
Cedar Waxwing	X	–	X	X	X	X	X	X	–	–
European Starling	X	X	X	X	X	X	X	X	X	X
Solitary Vireo	X	–	–	X	X	–	X	–	–	X
Yellow-throated Vireo	X	–	X	X	–	X	X	X	–	–
Warbling Vireo	X	–	X	X	X	X	X	X	–	–
Philadelphia Vireo	X	–	X	X	–	–	–	X	–	–

(*continued*)

Table 3. *Continued*

Species	Woodland Dunes NE	Woodland Dunes SE	Plymouth	Milwaukee/Ozaukee	Racine/Kenosha	Waukesha Co.	Oconomowoc	Lake Geneva	Lake Mills	Rock Co.
Red-eyed Vireo	X	X	X	X	–	X	X	X	–	–
Blue-winged Warbler	X	–	X	X	X	X	X	X	–	–
Golden-winged Warbler	X	X	X	X	–	X	X	–	–	X
Tennessee Warbler	X	X	X	X	X	X	X	X	–	–
Orange-crowned Warbler	X	X	X	X	X	–	–	–	X	–
Nashville Warbler	X	–	X	X	X	X	X	X	X	–
Northern Parula Warbler	X	X	–	–	–	–	X	–	–	–
Yellow Warbler	X	X	X	X	X	X	X	X	X	X
Chestnut-sided Warbler	X	X	X	X	X	X	X	X	–	–
Magnolia Warbler	X	–	X	X	X	X	X	X	X	–
Cape May Warbler	X	–	X	X	X	–	X	X	–	X
Black-throated Blue Warbler	X	–	X	–	X	X	X	–	–	–
Yellow-rumped Warbler	X	X	X	X	X	X	X	X	X	X
Black-throated Green Warbler	X	X	–	X	X	X	X	X	–	X
Blackburnian Warbler	X	X	X	X	X	X	X	X	–	–
Pine Warbler	–	–	–	–	–	–	–	–	–	–
Palm Warbler	X	X	X	X	X	X	X	X	X	X
Bay-breasted Warbler	X	X	X	X	X	X	X	X	–	–
Blackpoll Warbler	X	–	X	X	X	X	X	X	–	–
Cerulean Warbler	X	X	–	X	–	–	X	–	–	–
Black-and-white Warbler	X	X	X	X	X	X	X	X	X	X
American Redstart	X	X	X	X	X	X	X	–	X	X
Prothonotary Warbler	–	–	X	X	X	X	X	–	–	–
Ovenbird	X	X	X	X	X	X	X	X	X	–
Northern Waterthrush	X	–	–	X	X	–	X	–	X	X
Louisiana Waterthrush	X	–	X	X	–	–	–	–	–	–
Mourning Warbler	X	X	X	X	–	–	–	–	–	–
Common Yellowthroat	X	X	X	X	X	X	X	X	X	X
Wilson's Warbler	X	X	X	X	–	X	X	X	–	–
Canada Warbler	X	–	X	X	–	X	X	–	–	–
Scarlet Tanager	X	–	X	X	X	X	X	X	–	–
Northern Cardinal	X	X	X	X	X	X	X	X	X	X
Rose-breasted Grosbeak	X	X	X	X	X	X	X	X	X	X
Indigo Bunting	X	X	X	X	X	X	X	X	–	–
Rufous-sided Towhee	X	–	X	X	X	X	X	X	X	–
Chipping Sparrow	X	X	X	X	X	X	X	X	X	–
Clay-colored Sparrow	X	X	–	X	–	–	–	–	–	–
Field Sparrow	X	X	X	X	X	X	X	X	X	–
Vesper Sparrow	X	–	X	X	X	X	X	–	X	–
Savannah Sparrow	X	X	X	X	X	X	X	X	X	–
Grasshopper Sparrow	X	–	–	X	X	X	X	–	–	–
Fox Sparrow	X	–	X	–	–	–	X	–	–	–
Song Sparrow	X	X	X	X	X	X	X	X	X	X
Lincoln's Sparrow	X	–	–	X	X	X	X	X	X	–
Swamp Sparrow	X	X	X	X	X	X	X	X	X	–
White-throated Sparrow	X	–	X	X	X	X	X	X	X	–
White-crowned Sparrow	X	–	X	X	X	X	X	X	X	X
Dark-eyed Junco	–	–	–	–	X	X	X	–	–	X
Bobolink	X	X	X	X	X	X	X	X	–	–
Red-winged Blackbird	X	X	X	X	X	X	X	X	X	X
Eastern Meadowlark	X	X	X	X	X	X	X	–	–	–
Western Meadowlark	X	–	–	X	X	–	X	X	X	–
Yellow-headed Blackbird	X	–	X	–	X	X	X	X	–	–
Brewer's Blackbird	X	–	X	–	X	X	X	X	–	–
Common Grackle	X	X	X	X	X	X	X	X	X	X
Brown-headed Cowbird	X	X	X	X	X	X	X	X	X	X
Northern Oriole	X	X	X	X	X	X	X	X	X	–
Purple Finch	–	–	–	–	X	–	X	–	–	–
House Finch	X	X	–	X	–	X	X	–	–	–
American Goldfinch	X	X	X	X	X	X	X	X	X	X
House Sparrow	X	X	X	X	X	X	X	X	X	X

Table 4. Species found on 4 or fewer counts.

Species	Number of counts	Count Areas
Horned Grebe	1	Ashland/Bayfield
Red-necked Grebe	1	Winnebago
Western Grebe	1	Marathon
Least Bittern	3	Winnebago, Milwaukee/Ozaukee, Waukesha
Cattle Egret	1	Brown
Yellow-crowned Night-Heron	2	Milwaukee/Ozaukee, Racine, Kenosha
Tundra Swan	4	Burnett, Marathon, Portage, Winnebago
Snow Goose	1	Calumet
Canvasback	3	Ashland/Bayfield, Marathon, Winnebago
Greater Scaup Duck	1	Ashland/Bayfield
Surf Scoter	2	Milwaukee/Ozaukee, Racine/Kenosha
White-winged Scoter	1	Oxbo/Fifield
Common Merganser	4	Ashland/Bayfield, Burnett, Oxbo/Fifield, Oconomowoc
Northern Goshawk	1	Oxbo/Fifield
Rough-legged Hawk	1	Ashland/Bayfield
Merlin	3	Ashland/Bayfield, Oxbo/Fifield
Gray Partridge	3	Woodland Dunes NE, Woodland Dunes SE, Plymouth
Greater Prairie-Chicken	4	Burnett, Taylor, Marathon, Portage
Sharp-tailed Grouse	2	Burnett, Taylor
Wild Turkey	3	Fond du Lac, Oconomowoc, Lake Geneva
King Rail	2	Plymouth, Milwaukee/Ozaukee
Common Moorhen	4	Brown, Winnebago, Racine/Kenosha, Waukesha
Lesser Golden-Plover	1	Ashland/Bayfield
Hudsonian Godwit	2	Calumet, Winnebago
Marbled Godwit	1	Brown
Red Knot	1	Woodland Dunes NE
Sanderling	2	Woodland Dunes NE, Waukesha
Western Sandpiper	1	Milwaukee/Ozaukee
White-rumped Sandpiper	2	Fond du Lac, Milwaukee/Ozaukee
Baird's Sandpiper	2	Brown, Milwaukee/Ozaukee
Stilt Sandpiper	1	Brown
Long-billed Dowitcher	1	Oconomowoc
Wilson's Phalarope	4	Taylor, Calumet, Winnebago, Fond du Lac
Franklin's Gull	2	Winnebago, Woodland Dunes NE
Little Gull	2	Milwaukee/Ozaukee, Racine/Kenosha
Northern Saw-whet Owl	1	Oxbo/Fifield
Olive-sided Flycatcher	3	Oxbo/Fifield, Woodland Dunes NE, Milwaukee/Ozaukee
Yellow-bellied Flycatcher	3	Woodland Dunes NE, Plymouth, Milwaukee/Ozaukee
Acadian Flycatcher	4	Fond du Lac, Milwaukee/Ozaukee, Waukesha, Rock
Gray Jay	1	Oxbo/Fifield
Tufted Titmouse	2	Woodland Dunes NE, Oconomowoc
Gray-cheeked Thrush	4	Shiocton, Woodland Dunes NE, Oconomowoc, Rock
Water Pipit	1	Ashland/Bayfield
Bell's Vireo	1	Winnebago
Prairie Warbler	1	Milwaukee/Ozaukee
Connecticut Warbler	2	Woodland Dunes NE, Milwaukee/Ozaukee
Dickcissel	1	Waukesha

(*continued*)

Table 4. *Continued*

Species	Number of counts	Count Areas
American Tree Sparrow	2	Shawano, Racine/Kenosha
Lark Sparrow	1	Milwaukee/Ozaukee
Henslow's Sparrow	4	Portage, Fond du Lac, Milwaukee/ Ozaukee, Racine/Kenosha
Le Conte's Sparrow	2	Ashland/Bayfield, Burnett
Orchard Oriole	3	Brown, Plymouth, Racine/Kenosha
Red Crossbill	1	Shawano
Pine Siskin	4	Ashland/Bayfield, Oxbo/Fifield, Portage, Shawano
Evening Grosbeak	4	Ashland/Bayfield, Oxbo/Fifield, Taylor, Shawano

Song Sparrow *by Jonathan Wilde*

"By the Wayside"

Laughing Gull, Boreal Owl, Mountain Bluebird, Kirtland's Warbler and a successful Honey Creek Birdathon/Bandathon were highlights of the past spring season.

LAUGHING GULL (*Larus atricilla*)

19 May 1989, Milwaukee County.—I first saw a gull perhaps ⅓ to ½ larger than nearby Bonaparte's Gulls with a much darker mantle. It had a large, thick red bill. In flight it showed black wing tips, blending into dark of mantle, rather than a sudden change or separated by white as in Franklins. White border at rear of wing. I concluded it was a Laughing Gull.—*Gerald DeBoer, 2406 Kinzie Avenue, Racine, WI 53405.*

BOREAL OWL (*Aegolius funereus*)

8 March 1989, Portage County, Boston School Forest, and 19 March 1989, Douglas County, Pattison State Park.—On 8 March, 1989, I was notified that a dead Boreal Owl had been brought into Dr. James Hardin at the University of Wisconsin-Stevens Point. The bird had a white face bordered by black and a dark forehead covered with many white spots. The bill was pale yellow or straw colored throughout, unlike the dark bill of the Saw-whet Owl. The back was darker brown than a saw-whet and was scattered with white spots. The breast was streaked with dark brown. This individual was collected by the foresters at the Boston School Forest in Plover, Wisconsin just south of Stevens Point. Apparently the foresters found the owl laying dead in a Red Pine plantation. The bird was in immature plumage and appeared to be a male. It had lost considerable weight as it had no visible fat deposits and showed an extremely extended keel. It may have succumbed to starvation. This individual has been prepared and will remain in the ornithological collection at the University of Wisconsin-Stevens Point.

The second Boreal Owl was turned in to Pattison State Park south of Superior in Douglas County on 19 March, 1989. This bird may have flown into a clothesline at a private residence near Pattison Park. This was also an immature, sex was unknown, and was again in poor health. This individual will be mounted and put on permanent display at Pattison State Park.—*Larry Semo, Route 2, Box 435, Superior, WI 54880.*

MOUNTAIN BLUEBIRD (*Sialia currucoides*)

20 May 1989, Waukesha County, Lapham Peak Road and County Highway "C".—After successfully listening to a Hooded Warbler at Lapham Peak I was

heading for the interstate and Cedarburg Bog in search of a Prairie Warbler. As I was about to turn onto County Highway "C" from Lapham Peak Road a brilliant blue (sky blue) bird flew in front of the car and into a pine tree across the junction. Slamming on the brakes, I was shocked to have a male Mountain Bluebird in view.

The bird was bluebird size and shape with a sky blue back, wings, tail and head, somewhat paler upper breast with a whitish lower belly. Bill, eyes and legs were black.

The bird remained in the pine until approaching cars flushed it. It flew further into the pines and out of sight.—*Daryl Tessen, 2 Pioneer Park Place, Elgin, IL 60123.*

Kirtland's Warbler (*Dendroica kirtlandii*)

21 May 1989, Douglas County.—On 21 May, I heard the song of the Kirtland's Warbler in Douglas Co. the call was reminiscent of a Northern Waterthrush or Connecticut Warbler. The bird's back was blue-gray and streaked on the back. The head was blue-gray except for the throat which was yellow. A broken white eye-ring was present. The wings and tail were blue-gray with two almost indistinct white wing bars. The breast was bright yellow with dark streaking along the flank. This bird was color banded on the left leg with two red color bands. The bird was in 6–12 foot high Jack Pines in a xeric community. Robbye Johnson and I heard this individual again the following morning on 22 May.—*Larry Semo, Route 2, Box 435, Superior, WI 54880.*

Honey Creek Birdathon/Bandathon Results

21 May 1989, Sauk County, Honey Creek.—The evening of May 20—a time of anticipation—What would be tomorrow's weather? Would the Honey Creek Valley hold oodles of migrants as it had the previous Sunday for the Convention field trip? Would the mist nets of the Peartrees hold warblers or June bugs or—horrors—nothing? Following some excellent slides by Gordie Kratzat in the Cox Nature Center, the campers retired to their trailers, truck campers, tents, or the backs of their cars for a Whip-poor-will serenade that lasted throughout the night on a full moon.

Sunday morning—38 degrees F!! I don't really want to get up. I decide that I'll get up only after I get the Birdathon list up to 15 species. As I hurriedly dressed, I wished I had set my target at 25. But by 6:30 A.M., the list hit 42 and the temperature was rising rapidly. Several Great Blue Herons were flying back and forth across the valley, with as many as five in sight at one time, and a Warbling Vireo was singing its "wigglity-pig, wigglity-pig" song from a tree along Alder Drive. I watched as a Pileated Woodpecker flew low away from the mist nets (the Peartrees caught one in 1987) and then settled into a large tree with a pair of Red-headed Woodpeckers. At the base of the tree in a newly erected nest box, a male bluebird announced its presence loudly. Throughout the morning the gobbling of Wild Turkeys echoed through the hills.

By the time the hikers assembled with Harold Kruse and were greeted by a pair of displaying Black-billed Cuckoos, the list total hit 57, and the Peartrees had "promised" that they would band 30 species.

Stream crossings were generally easy, wood tick numbers were low, and there were enough birds and wildflowers for everyone. Certain species like the Field Sparrow in openings and Blue-winged

Warblers in brushy areas seemed to be less common than in previous years, and Kentucky and Cerulean warblers were "missed." However, American Redstarts were everywhere and Wood Thrushes were more common. A short side trip up a wooded hillside near the bird's-foot violet bluff yielded a singing Acadian Flycatcher. One individual that had been seen the previous three years—a 3-legged cow on a private parcel of land through which we hike—was now food for the many Turkey Vultures that soar over the Valley.

As we ascended up the Valley and ticked the birds off on the list, I wondered if we would reach 80 species or 80 degrees first. As the hikers were enjoying their lunches at the Cox Building, the building's two thermometers both showed 86 degrees, but a nice breeze and low humidity made for a very pleasant afternoon. The list total didn't quite match the temperature, but the 84 species set a new record by 1 (83 in 1985 and 1988), and the Peartrees tallied 31, breaking the old record of 30 in 1987. Exciting nettings included a Sharp-shinned Hawk, Black-billed Cuckoo, and Connecticut Warbler.

For the five years of the event that have been held between May 15 and May 25, some interesting patterns are emerging. Of the 11 seen or banded at least once, 63 have been recorded every year. The Peartrees have banded 51 species during the five Bandathons. Twenty-two warblers have been tallied.

Again this year over $1,000 was pledged, and I believe we might top $1,500 when all the money comes in. Many thanks to all who pledged and helped.—*Noel J. Cutright, 3352 Knollwood, West Bend, WI 53095.*

U.S. Postal Service

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Required by 39 U.S.C. 3685

1A. Title of Publication	1B. PUBLICATION NO.	2. Date of Filing
PASSENGER PIGEON	4 2 2 8 2 0	9/22/89
3. Frequency of Issue	3A. No. of Issues Published Annually	3B. Annual Subscription Price
QUARTERLY	4	$12-$18

4. Complete Mailing Address of Known Office of Publication (*Street, City, County, State and ZIP+4 Code*) (*Not printers*)
W330 N8275 W SHORE DR HARTLAND WI 53029

5. Complete Mailing Address of the Headquarters of General Business Offices of the Publisher (*Not printer*)
W330 N8275 W SHORE DR HARTLAND WI 53029

6. Full Names and Complete Mailing Address of Publisher, Editor, and Managing Editor (*This item MUST NOT be blank*)

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WISCONSIN SOCIETY FOR ORNITHOLOGY W330 N8275 W SHORE DR HARTLAND WI 53029

Editor (*Name and Complete Mailing Address*)
STANLEY A TEMPLE DEPT OF WILDLIFE ECOLOGY UNIV OF WISCONSIN MADISON WI 53706

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10. Extent and Nature of Circulation (*See instructions on reverse side*)	Average No. Copies Each Issue During Preceding 12 Months	Actual No. Copies of Single Issue Published Nearest to Filing Date
A. Total No. Copies (*Net Press Run*)	1414	1372
B. Paid and/or Requested Circulation 1. Sales through dealers and carriers, street vendors and counter sales	0	0
2. Mail Subscription (*Paid and/or requested*)	1218	1246
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2. Return from News Agents	0	0
G. TOTAL (*Sum of E, F1 and 2—should equal net press run shown in A*)	1414	1372

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ABOUT THE AUTHORS AND ARTISTS

Margaret Brittingham is a professor in the School of Forest Resources at Pennsylvania State University. She has both master's and doctorate degrees from the Department of Wildlife Ecology at the University of Wisconsin-Madison. Her research on diseases at bird-feeders relied extensively on volunteers from WSO.

Patrick T. Collins is a graduate student in the Natural Resources Research Institute at University of Minnesota-Duluth. He has a B.S. degree from the University of Minnesota. He is studying the relationship between forest insect abundance and bird populations.

Scott R. Craven is an Associate Professor and Extension Wildlife Specialist in the UW-Madison's Department of Wildlife Ecology. Scott is well known among naturalists around the state because of his extension publications and frequent radio shows. He is particularly interested in urban wildlife and wildlife damage problems.

Deann L. De La Ronde is a Wisconsin wildlife artist whose studio is in rural Footville. She has illustrated several DNR publications on wildlife subjects. She has also been the illustrator for several books.

Jim Frank has recently taken on the task of improving the quality of our reports on May Day Counts and Big Day Counts. His first efforts are a great improvement.

Charlene Gieck is a Nongame Biologist with the Wisconsin DNR's Bureau of Endangered Resources, where she has been involved in preparing "recovery plans" for 5 endangered species in Wisconsin. She is concurrently working on her undergraduate degree in Wildlife Ecology at the UW-Madison.

Randy M. Hoffman is our current president. He is a biologist with the Wisconsin DNR's Bureau of Endangered Resources where he is in charge of managing State Natural Areas.

Robbye Johnson is an active birder in northern Wisconsin who has a degree in Fine Art from the UW-Superior. Between birding and teaching metalwork at UW-Superior, she finds time to produce a few bird drawings.

Sooil Kim is a graduate student in the UW-Madison's Institute for Environmental Studies. A native of Korea, he is an accomplished wood carver, and he does wildlife sketches. The material in this issue illustrates both North American and Korean birds.

Sumner W. Matteson works for the DNR's Bureau of Endangered Resources. He is a graduate of the UW-Madison and has a master's degree in Agricultural Journalism and Environmental Studies.

Michael J. Mossman is a Nongame Biologist with the DNR's Bureau of Research. He has a master's degree in Wildlife Ecology from the UW-Madison. He is a frequent contributor to *The Passenger Pigeon* and is the coauthor of *Breeding Birds of the Baraboo Hills.*

Lawrence Semo is a native of Superior, Wisconsin. He is currently completing his undergraduate degree in the college of Natural Resources at UW-Stevens Point. He plans on attending graduate school in the future.

Gregory A. Septon has been a taxidermist at the Milwaukee Public Museum since 1976. He attended the UW-Parkside. His interests are in birds of prey and gamebirds; he is an accomplished photographer.

Al Shea is our Vice President and the new Spring Field-note Compiler. He is the Assistant to the Director of the DNR Bureau of Water Resources Management. He has a M.S. degree in Water Resource Management from UW-Madison.

Stanley A. Temple is Editor of *The Passenger Pigeon.* He is a Professor in the UW-Madison's Department of Wildlife Ecology. He is coauthor of *Birds of the Apostle Islands, Wisconsin Birds: A Seasonal and Geographical Guide,* and *Wisconsin Birds: A Checklist with Migration Charts.*

Jonathan Wilde is one of Wisconsin's finest wildlife artists, and he is also an active ornithologist. He received his training at the UW-Madison and has subsequently exhibited his work in a variety of shows, including the "Birds in Art" exhibition.

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NOTICES AND ADVERTISEMENTS

Announcements of WSO Grants

Although funds are short for ornithological research and education projects, WSO is pleased to announce the availability of two types of grants: one for graduate students and professionals and another for those not professionally engaged in ornithology.

Steenbock Awards.—A $200 grant will be awarded annually in May to support the work of a nonprofessional ornithologist (beginner or advanced, young or old). Graduate students and professionals may not apply, except for projects not associated with their work. There is no requirement for a letter of recommendation; the committee will follow up if one is desired.

WSO Scholarships.—A $200–400 scholarship will be awarded annually in May. Anyone may apply. The scholarship may be used to provide additional support for a project that has other sources of funding. Provide names and address of two references who are familiar with you and your project.

Application Procedures.—To apply, provide a cover letter giving your name, address, telephone number, occupation, and indicating which type of grant you are applying for. On a single typewritten page, describe what you want to do and how you propose to do it. Applications must be received by April 1, 1990. Send your application to:

John H. Idzikowski
2558 South Delaware Avenue
Milwaukee, WI 53207

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