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FINAL PERFORMANCE REPORT

FEDERAL AID GRANT NO. T-25-P-1

OKLAHOMA WINTER BIRD ATLAS

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

December 1, 2004 through November 30, 2010

FINAL REPORT

State: Oklahoma **Grant Number:** T-25-P-1

Grant Program: State Wildlife Grants Program

Grant Name: Oklahoma Winter Bird Atlas

Grant Period: December 1, 2004 to November 30, 2010

A. ABSTRACT:

Winter bird distributions are less well understood than breeding season distributions. A multi-year, statewide, systematic inventory was made of birds wintering in Oklahoma. Distribution and abundance data were collected to serve as a baseline upon which future changes in bird distribution and abundance can be measured. Range and abundance maps were prepared for each species recorded during systematic surveys. These maps complement those previously published for birds occupying Oklahoma during the breeding season.

B. NEED:

Whereas studies of breeding birds are commonplace in North America, populations in winter are generally less well studied. For example, nearly every state has completed a breeding bird atlas, and several states have now completed a second breeding bird atlas, while winter bird atlas projects are underway in only a few locations. Increased monitoring of birds during the nonbreeding season has been identified as a critical research and monitoring need in the Partners in Flight North American Landbird Conservation Plan (Rich et al. 2004).

Existing information for the winter distributions of most bird species in Oklahoma are limited to general statements of occurrence within broad regional areas based upon many decades of sightings that are often opportunistic and anecdotal. Christmas Bird Count data are often used to indicate winter bird distribution, but there are only about 20 such count areas in Oklahoma, and these counts take place in the early winter. The use of a standardized methodology to survey systematically nearly 600 locations across the entire state, during both early and late winter, within the relative confines of a five year period, provides an accurate snapshot of current bird distribution within Oklahoma during the winter. The Oklahoma Winter Bird Atlas project (OWBA) provides the robust survey design and exhaustive statewide coverage needed for a meaningful inventory. This baseline information can be used as a planning tool to develop appropriate conservation and management priorities, including land acquisition and targeted habitat protection. Such information also serves as an important benchmark for evaluating future changes in winter bird distributions in the context of land use change and other processes affecting bird populations.

The Oklahoma Winter Bird Atlas project also complements the existing *Oklahoma Breeding Bird Atlas* (OBBA; Reinking 2004), and makes Oklahoma one of very few locations in North America to have completed both breeding and wintering bird atlases.

C. OBJECTIVE:

Complete intensive, statewide inventories for birds wintering in Oklahoma using standardized survey methods to detect current bird distributions and abundances in both early winter and late winter periods. Examine and map patterns of current, statewide winter bird distribution and abundance as they vary from year to year and from early to late winter within the winter season, and provide these analyses for incorporation into future updates of Oklahoma's Comprehensive Wildlife Conservation Strategy.

D. APPROACH:

Methods

The only completed and published project of this nature of which we are aware took place in Britain and Ireland (Lack 1986). In addition, San Diego County, California was recently surveyed (Unitt 2004) and the state of Ohio (Fazio 2002) is currently wrapping up a winter bird atlas project. Methodologies used in these three projects were examined to develop methods for the Oklahoma Winter Bird Atlas. The Oklahoma Winter Bird Atlas innovations include collecting distribution data for both early and late winter periods, collection of distribution information on rare and local species from anywhere in the state, and the collection of distribution information for aquatic species through requests for lake reports from throughout Oklahoma. Given the massive scale of the statewide standardized surveys to be conducted during the OWBA, surveys were conducted jointly by volunteer birders and George M. Sutton Avian Research Center staff, under the oversight and with the participation of the principal investigator. Data entry was completed by Sutton Center staff. This combination of skilled volunteers, trained and deployed by a principal investigator, was used successfully for the completion of the *Oklahoma Breeding Bird Atlas* (Reinking 2004) surveys which were completed from 1997 through 2001. Participants in the Oklahoma Winter Bird Atlas were provided with a 14-page detailed instruction handbook.

Definition of Winter Season

The small number of winter bird atlas projects completed or in progress differ in how they define the winter period. Oklahoma's mid-south latitude means fall migration in many species continues well into November, and spring migration for some species begins in late February (Oklahoma Bird Records Committee 2009). Because the objective of mapping distributions of wintering birds would be hampered by the inclusion (to an unknown extent) of migrants, the OWBA winter season was defined as 1 December–14 February, a period believed to capture wintering species with minimal data corruption from migrants. A major difference between the OBBA and the OWBA is that in contrast to the breeding season when most individual birds remain on local territories, birds in winter may be more mobile in response to regional or local weather and foraging conditions. Thus, winter distributions may be more plastic, leading to

distributional differences between early and late winter periods, particularly for irruptive species (e.g., Snowy Owl, Red-breasted Nuthatch, Evening Grosbeak, or Pine Siskin) or "half-hardy" species (e.g., some shorebirds, Sedge Wren, Eastern Phoebe, etc.). To account for such intra-winter distributional patterns, the OWBA season and survey effort were equally divided into early winter (1 December–7 January) and late winter (8 January–14 February) periods.

Sampling Design

The previously completed Oklahoma Breeding Bird Atlas provided valuable information on several issues pertaining to OWBA methods, including the level of sampling that can realistically be obtained given the size of Oklahoma and its human (i.e., birder) population. It was projected accurately at the start of the OBBA that complete coverage of an atlas block within each 7.5-minute Oklahoma quad would not be possible and that a stratified random sampling design consisting of one atlas block within each adjoining pair of 7.5-minute quads should instead be the goal, yielding 583 survey blocks (Figure 1). The 97% completion rate for surveying OBBA blocks within the five years of the project indicates that this was the practical maximum strategy for survey effort. The same blocks used for the OBBA were surveyed for the OWBA (see Figure 1). A seasonal, full-time employee supplemented the volunteer survey personnel to ensure completion of the surveys within the desired five-year time frame.

As with the Oklahoma Breeding Bird Atlas and other atlas projects, the sampling design has an effect on the results. For many atlas projects, including the OBBA, the stratified random sampling design leads to poor detection of rare and local species, and in the case of the Oklahoma Winter Bird Atlas it was recognized that it also would lead to poor detection of several wintering water birds (e.g. loons, grebes, waterfowl, gulls, etc.) because few large lakes fall within the atlas blocks. These sampling problems were to a significant extent overcome during the Oklahoma Breeding Bird Atlas by requesting observers to submit observations of "special interest species" from anywhere in Oklahoma. This allowed data for rare and local species to be collected and mapped; these data would otherwise have gone unreported in the project publication. A list of special interest species was incorporated into the Oklahoma Winter Bird Atlas design, and requests for bird reports from lakes across the state were also collected to enhance detection and reporting of aquatic species.

Amount and Distribution of Effort

The Oklahoma Breeding Bird Atlas required observers to make a minimum of two visits totaling 10 hours of survey time in each block (Reinking 1998). Breeding bird atlas methodologies are based on the hierarchical classification of breeding evidence derived from observing bird behavior, and observers are instructed to attempt to elevate the known breeding status of each species in a block from Possible to Probable to Confirmed whenever possible. The significant amount of time spent in observing bird behavior in order to upgrade breeding status for each species was not required during the OWBA, which simply recorded a species' presence in a block along with a measure of abundance. This enabled blocks to be surveyed effectively in less time than was required for the OBBA, and a total of 8 hours per block (minimum) instead of 10 was specified. Because of the desire to balance potential differences in bird distributions during early winter and late winter periods, a minimum of 4 hours was spent surveying each block during each of the two winter periods. The first early period visit and the last late period visit were further required to be a minimum of 14 days apart.

Abundance Measures

Both breeding bird atlas projects and winter bird atlas projects have differed in collection of abundance data from blocks, ranging from no data collection at all to complete counts of each species. Most projects have used either an order of magnitude scale (1–9; 10–99; 100–999, 1000-9999, ≥10000) or some other scale with several numerical range categories for the number of individuals observed (the OBBA used optional abundance categories of 1–2; 3–30; and >30). Given the rather loose survey methods used for atlasing (e.g., broad latitude for timing and duration of visits, and freewill movements of an observer within a block) and the wide variation in observer skills (including bird identification, bird finding, and estimating large numbers in flocks), an order of magnitude scale seemed best suited for the OWBA project. This resulted in five abundance categories and five corresponding colors of markers on the distribution maps, and provided useful information on broad abundance patterns without overwhelming observers with the need to count each individual bird.

E. RESULTS AND DISCUSSION:

Although the first season of field surveys for this project (winter 2003-2004) was completed prior to the start of this grant, results for the full five field seasons are summarized here. The surveys were successfully completed as intended. A total of 577 blocks out of the 583 selected for sampling were actually surveyed, for a completion rate of 99% (Figure 2). This compares favorably to the 97% completion rate obtained during the OBBA which surveyed the same set of blocks during the breeding season. Figures 3-7 show the survey results on a year-by year basis. Efforts were made to geographically distribute the surveyed blocks as evenly as possible each year, although the constraints of using many volunteer surveyors meant that full control was not possible. More than 75 volunteers participated by surveying or helping to survey one or more atlas blocks. Given the significant time and travel commitment involved in performing these surveys, this indicates a high level of interest in and dedication to this project by Oklahoma's birders.

Over 26,000 species observation records were collected from the 577 surveyed blocks, yielding an average of about 45 bird species recorded per atlas block. The surveys resulted in 184 species being found within the survey blocks during the five winters of field work. A complete set of distribution maps for these species is provided in Appendix 1, and these maps represent the core objective and primary result of this project. In brief summation, the most widely distributed species was Red-tailed Hawk, which was recorded in 551 blocks. Dark-eyed Junco, Northern Flicker, American Crow, Northern Cardinal, and American Kestrel were also among the most widely distributed species. The type and intensity of stratified random sampling used in our project is most effective for detecting species of high to moderate distribution and abundance, but our survey effort was clearly intensive enough to pick up a number of species of very limited winter occurrence in the state such as Blue-headed Vireo, Cassin's Finch, Lewis's Woodpecker, Western Scrub-Jay, and Verdin. Not surprisingly, there were also a few species known to have very limited distribution in the state that surveys did not record, including Bushtit, Pinyon Jay, and Red-cockaded Woodpecker. As is typical of any large-scale effort to get skilled observers in the field and reporting observations, several unusual (outside of normal winter range) records

were unearthed, including a Green-tailed Towhee and Gray Catbird in central Oklahoma, a Sage Thrasher and Rufous Hummingbird in the northeast, a Say's Phoebe in the southeast, and a Pyrrhuloxia and Blue-gray Gnatcatcher in the southwest.

The maps in Appendix 1 represent the first and only standardized, statewide survey of winter bird distributions in Oklahoma. Taken over a single, five-year time frame, these survey results provide a snapshot of current winter bird distributions in the state and will provide a baseline upon which to evaluate future changes in the abundance or distribution of Oklahoma's bird populations. Urban expansion, rural development, land use change, climate change, and other factors are expected to modify habitats in the coming decades, and understanding how bird populations are responding to these changes is an essential first step before informed prioritization and implementation of research and conservation actions can be taken. These data will be useful for evaluating future changes on a species-by-species basis as individual conservation questions arise, but atlas projects are also designed to be repeated at intervals of about 20 years, ultimately yielding a more comprehensive assessment of range or population changes for most species within the state.

While the maps in Appendix 1 were the main objective of this project, and were gathered through carefully designed, standardized surveys to ensure that the data collected are robust and that the methods are repeatable, we also recognized that having skilled observers in the field provided an opportunity to collect additional data that, while less structured, could still be of value. Two types of additional data were collected. **1)** The atlas blocks that were selected for sampling represent only one-twelfth of Oklahoma's total geographic area, and all or parts of many of Oklahoma's major reservoirs did not fall within the boundaries of these blocks. This resulted in a potentially incomplete picture of the distributions of many waterbirds species such as ducks, gulls, grebes, etc. from the survey block data. Observers were asked to visit Oklahoma lakes and record the aquatic-associated species present. These lake surveys were secondary to the atlas methodology and therefore varied in number and location each winter. However, 103 water bodies were surveyed at least once during the five years of field work and a total of over 3000 bird observations of 80 species were recorded (Table 1). **2)** Many species with very local distributions or that occur only in small numbers are not well recorded with atlas style surveys. A list of such species was provided to project volunteers and staff, with a request that sightings of these species anywhere in the state be reported, along with any more common species that were found outside of their normal range. Nearly 1000 records for nearly 130 species were received through this request (Table 2). Most of these data were for species of accidental or transient winter occurrence in Oklahoma. These data were not incorporated into the maps of atlas blocks because the relatively small number of occurrences for most species would not substantially alter their mapped distribution.

Additional stated objectives for the project included evaluating year to year variations in distribution and abundance of irruptive species, and looking for any changes in distribution from early winter to late winter in cold-sensitive species. Table 3 lists the species that were examined for irruptive distributions. Mountain Bluebird, Pine Siskin, Purple Finch, Red-breasted Nuthatch, and Rusty Blackbird all showed strong patterns of year to year variation in their frequency of occurrence (with some years more than double others). A number of species were examined with regard to early winter versus late winter distribution, but no patterns were detected. This

may be due to such patterns not existing, or the sampling design may not have been rigorous enough to detect small differences in distribution, or perhaps the date cutoff for the early versus late winter record keeping periods did not align well with any existing seasonal movements of half-hardy species.

The Principal Investigator, Dan Reinking, was assisted by seasonal employees Doug Tozer and Eric Beck who completed surveys of large numbers of blocks in areas of the state not well covered by volunteers. Over 75 volunteers from Oklahoma, Arkansas, Missouri, and Kansas generously helped conduct bird surveys. Landowners across the state provided both access to and useful information about birds on their properties. Additional financial support for this project was received from the World Publishing Company and from individual donors to the Sutton Avian Research Center.

F. SIGNIFICANT DEVIATIONS:

None.

G. COST: 211,750.25
FED SHARE: 158,812.68

H. PREPARED BY:

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I. DATE: 28 January 2011

J. APPROVED BY:

Wildlife Division Administration
Oklahoma Department of Wildlife Conservation

John D. Stafford, Federal Aid Coordinator
Oklahoma Department of Wildlife Conservation

K. LITERATURE CITED:

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Rich, T. D., C. J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E.E. Inigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

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Figure 1. Blocks selected for Oklahoma Winter Bird Atlas surveys.

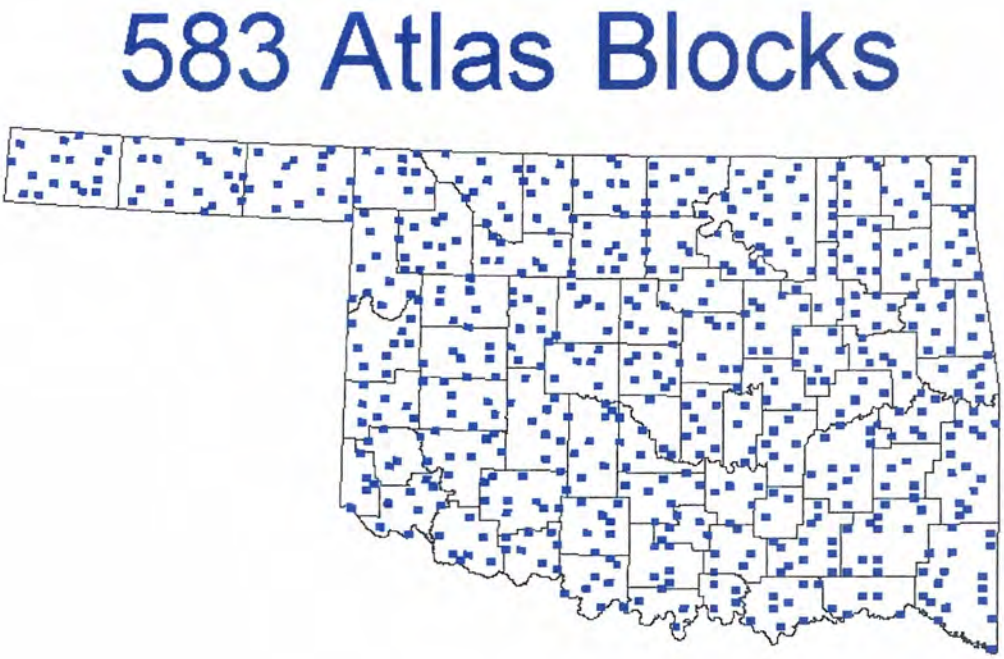

Figure 2. Final status of surveys in Oklahoma Winter Bird Atlas blocks.

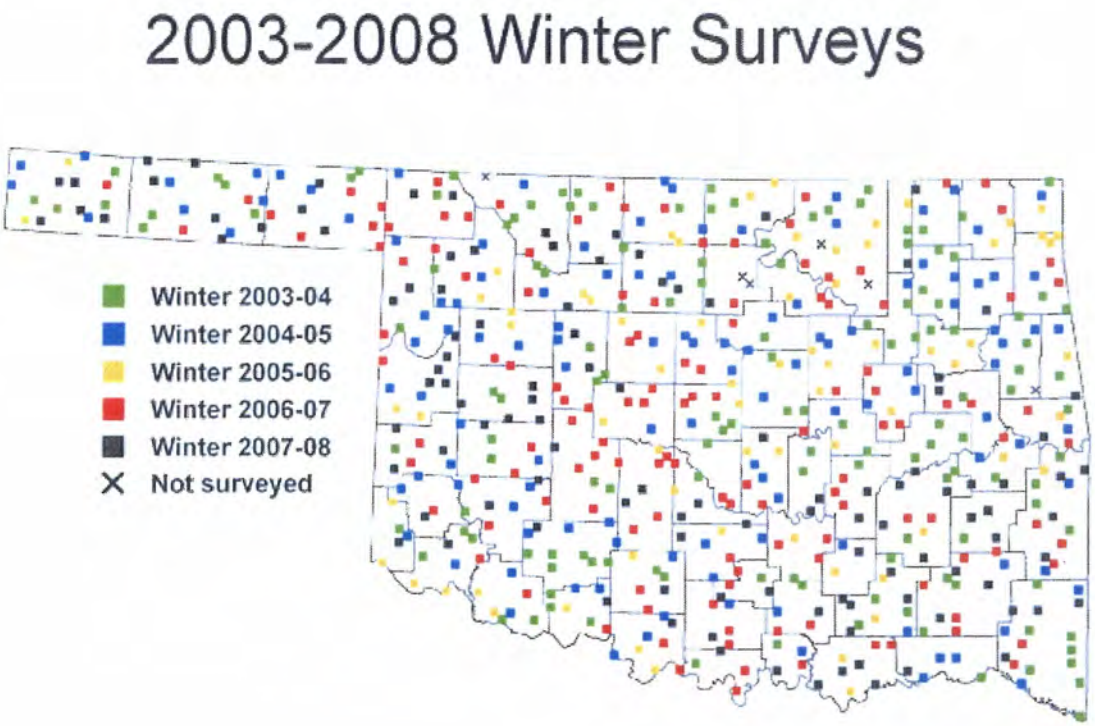

Figure 3. Blocks surveyed during winter 1 of the Oklahoma Winter Bird Atlas project.

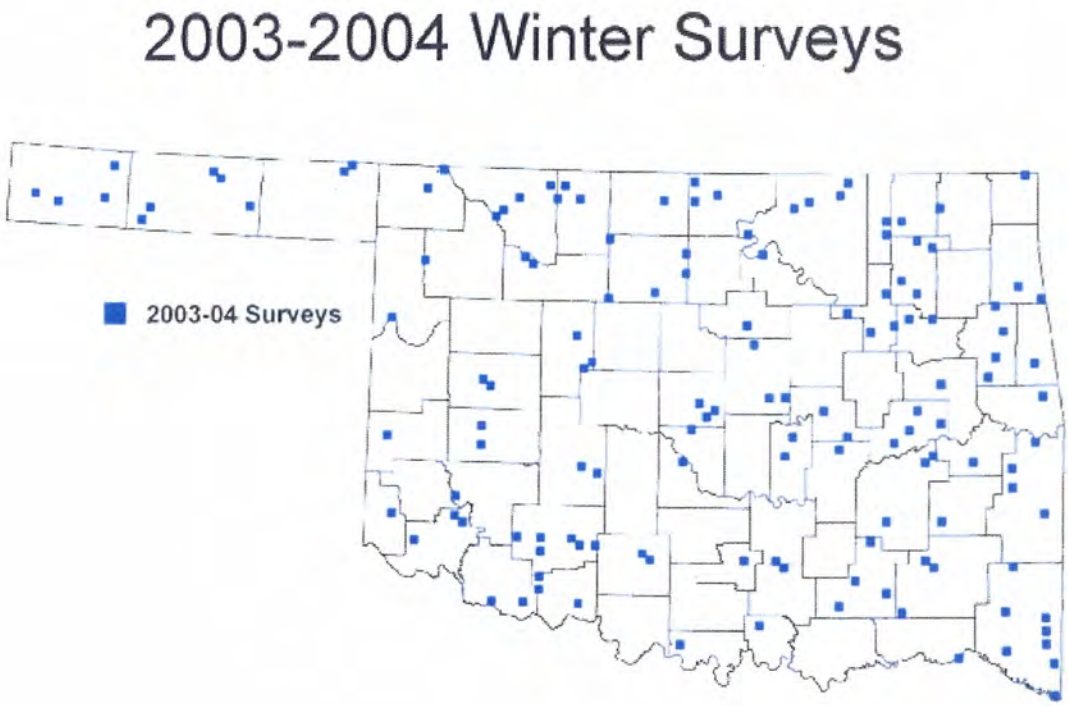

Figure 4. Blocks surveyed during winter 2 of the Oklahoma Winter Bird Atlas project.

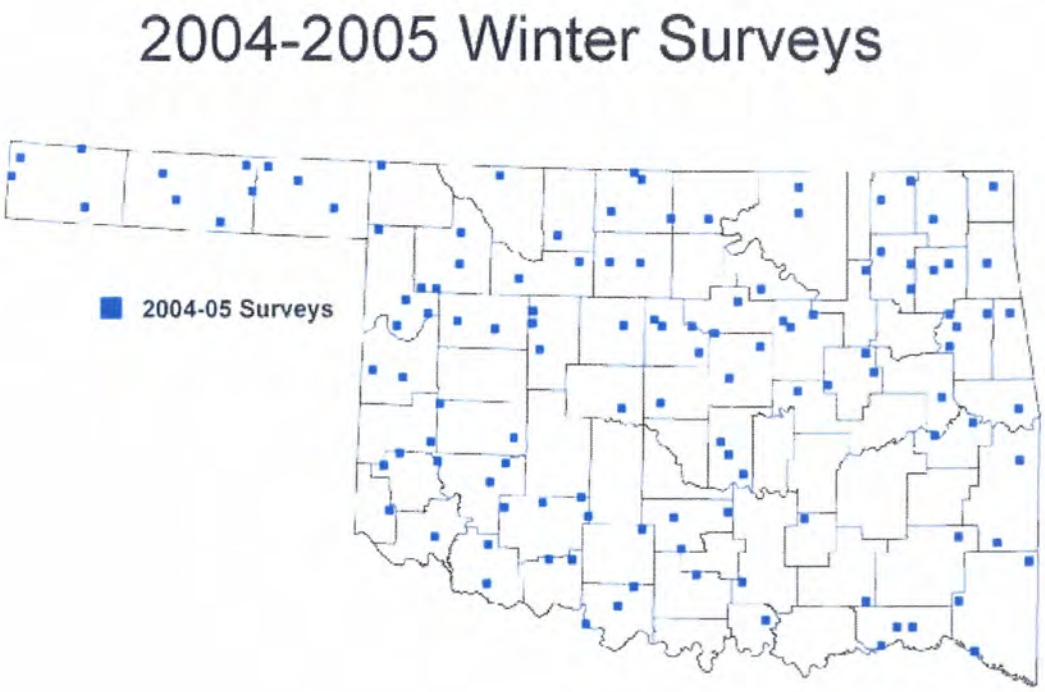

Figure 5. Blocks surveyed during winter 3 of the Oklahoma Winter Bird Atlas project.

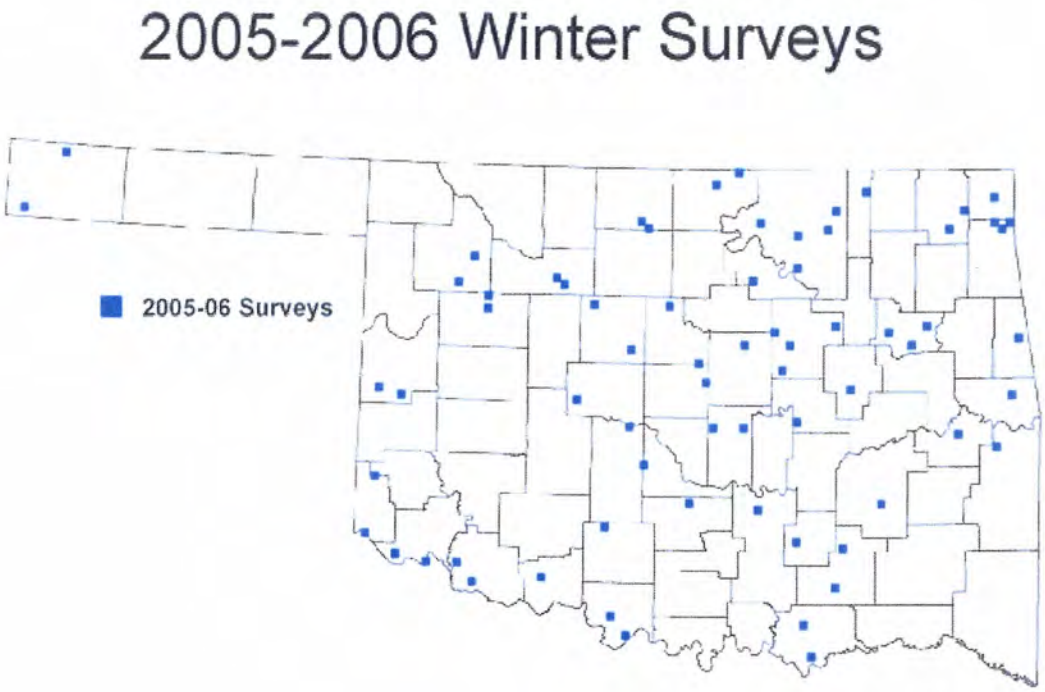

Figure 6. Blocks surveyed during winter 4 of the Oklahoma Winter Bird Atlas project.

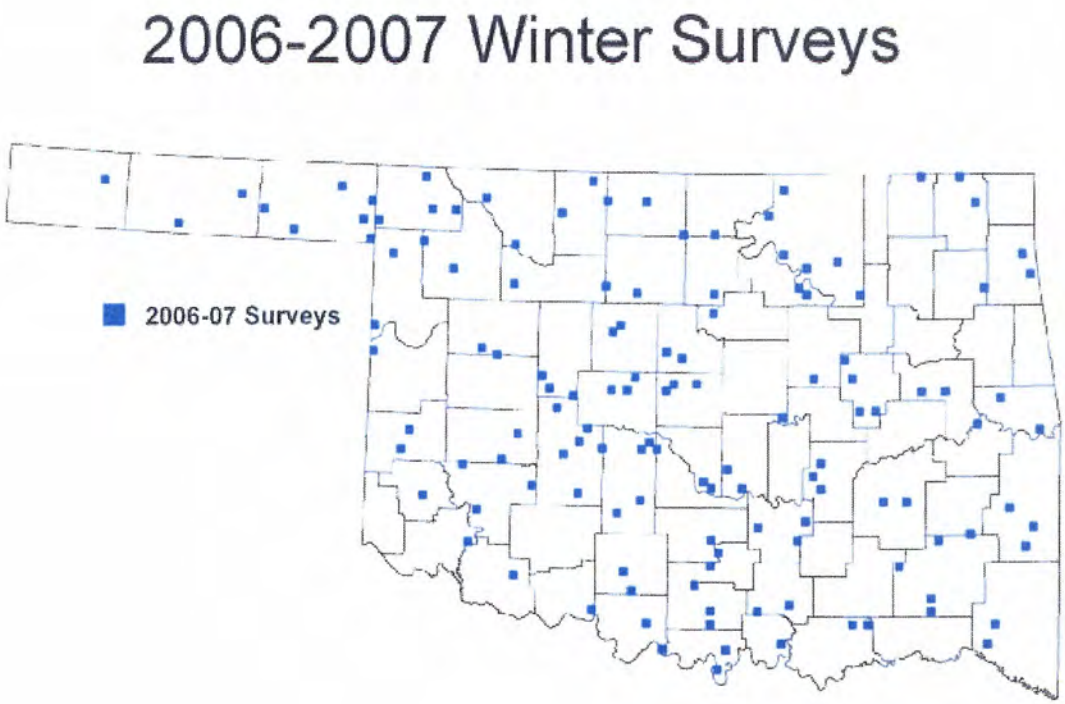

Figure 7. Blocks surveyed during winter 5 of the Oklahoma Winter Bird Atlas project.

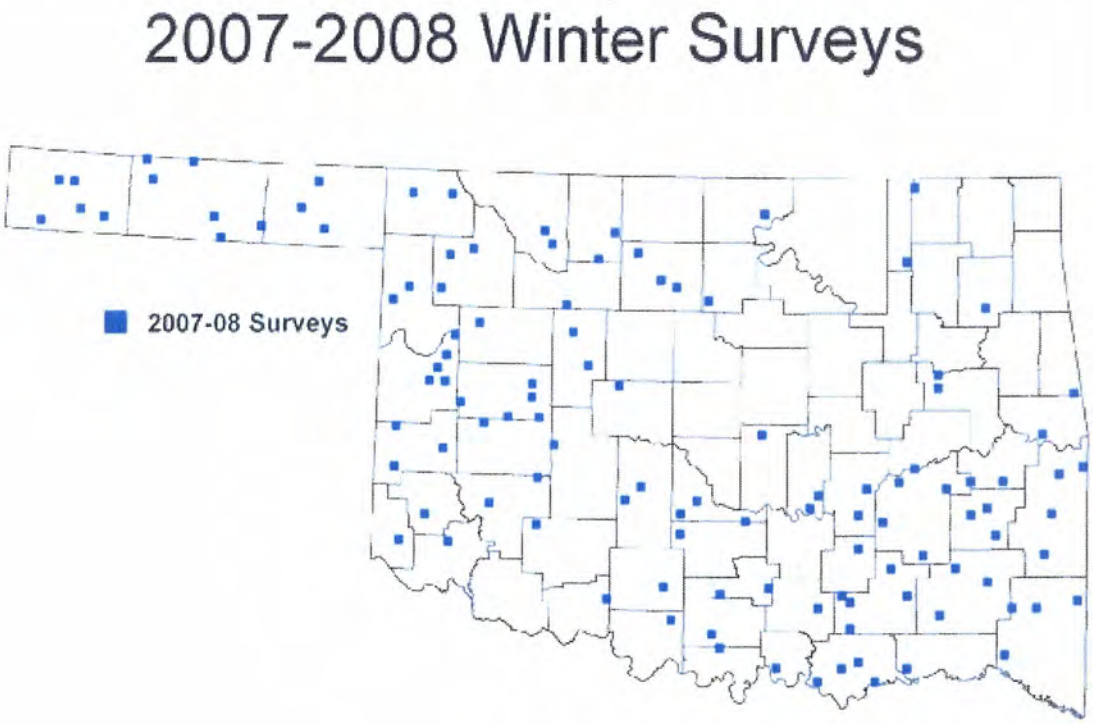

Table 1. Species recorded during lake surveys for the Oklahoma Winter Bird Atlas Project. Species names in boldface type are designated as Species of Greatest Conservation Need in the Oklahoma Comprehensive Wildlife Conservation Strategy document.

Species Name	Number of Records Reported from Lakes
American Avocet	1
American Black Duck	1
American Coot	104
American Pipit	11
American White Pelican	61
American Wigeon	89
Bald Eagle	100
Belted Kingfisher	41
Black Scoter	1
Black-legged Kittiwake	1
Blue-winged Teal	9
Bonaparte's Gull	83
Brant	2
Brown Pelican	1
Bufflehead	121
Cackling Goose	51
Calidris Species	1
California Gull	2
Canada Goose	134
Canvasback	52
Cinnamon Teal	2
Clark's Grebe	1
Common Goldeneye	122
Common Loon	40
Common Merganser	74
Double-crested Cormorant	124
Duck species	3
Dunlin	4
Eared Grebe	11
Forster's Tern	29
Franklin's Gull	2
Gadwall	138
Glaucous Gull	6
Great Blue Heron	143
Great Egret	1
Greater Scaup	15
Greater White-fronted Goose	35
Greater Yellowlegs	19

Green-winged Teal	90
Gull species	3
Herring Gull	55
Hooded Merganser	91
Horned Grebe	53
Killdeer	28
Laughing Gull	2
Least Sandpiper	15
Lesser Black-backed Gull	1
Lesser Scaup	94
Lesser Yellowlegs	1
Little Gull	1
Long-billed Dowitcher	1
Long-tailed Duck	3
Mallard	168
Marsh Wren	8
Mew Gull	2
Northern Pintail	72
Northern Shoveler	81
Osprey	2
Pacific Loon	8
Pectoral Sandpiper	1
Pied-billed Grebe	120
Red-breasted Merganser	48
Redhead	46
Red-throated Loon	5
Ring-billed Gull	144
Ring-necked Duck	104
Ross's Goose	35
Ruddy Duck	32
Sandhill Crane	8
Snow Goose	51
Sora	1
Spotted Sandpiper	6
Swan Species	1
Thayer's Gull	5
Trumpeter Swan	4
Tundra Swan	6
Virginia Rail	4
Western Grebe	7
Western Sandpiper	1
White-winged Scoter	2
Wilson's Snipe	5
Wood Duck	18

Table 2. Special Interest Species (SIS) reports received during the Oklahoma Winter Bird Atlas Project. These reports represent either species for which additional information was requested by the project organizer, or species that observers felt warranted filing a special report due to a perceived unusual date or location of observation. In some cases, multiple observers reported the same individual bird. Species in boldface type are designated as Species of Greatest Conservation Need in the Oklahoma Comprehensive Wildlife Conservation Strategy document.

Species Name	Number of SIS Reports Received
American Avocet	4
American Black Duck	1
American Woodcock	20
Anhinga	2
Ash-throated Flycatcher	1
Barn Owl	2
Barn Swallow	1
Barrow's Goldeneye	3
Bewick's Wren	1
Black Phoebe	7
Black Scoter	3
Black-and-White Warbler	1
Black-bellied Plover	1
Black-crested Titmouse	10
Black-crowned Night-Heron	2
Black-legged Kittiwake	2
Blue-gray Gnatcatcher	1
Blue-headed Vireo	6
Blue-winged Teal	3
Bohemian Waxwing	2
Brant	4
Brown Pelican	1
Brown-headed Nuthatch	6
Burrowing Owl	7
California Gull	3
Cassin's Finch	4
Cattle Egret	3
Chihuahuan Raven	4
Cinnamon Teal	2
Clark's Grebe	3
Common Ground-Dove	2
Common Moorhen	2
Common Yellowthroat	3
Dunlin	4

Eared Grebe	1
Eurasian Wigeon	1
Fish Crow	57
Forster's Tern	37
Franklin's Gull	1
Glaucous Gull	11
Golden Eagle	6
Gray Catbird	2
Great Blue Heron	2
Great Egret	9
Greater Prairie-Chicken	14
Greater Scaup	9
Greater Yellowlegs	1
Green-tailed Towhee	1
Harris's Hawk	2
Harris's Sparrow	2
Henslow's Sparrow	3
House Wren	4
Inca Dove	47
King Rail	4
Lapland Longspur	1
Lark Bunting	29
Lark Sparrow	1
Laughing Gull	2
Least Sandpiper	2
LeConte's Sparrow	2
Lesser Black-backed Gull	9
Lesser Goldfinch	1
Lesser Prairie-Chicken	7
Lesser Yellowlegs	1
Lewis's Woodpecker	5
Lincoln's Sparrow	2
Long-billed Curlew	2
Long-billed Dowitcher	3
Long-eared Owl	4
Long-tailed Duck	10
Marsh Wren	50
Mew Gull	3
Mottled Duck	1
Mountain Chickadee	4
Northern Goshawk	5
Northern Shrike	7
Osprey	1
Pacific Loon	14
Palm Warbler	1

Pectoral Sandpiper	2
Peregrine Falcon	1
Pileated Woodpecker	1
Pine Grosbeak	2
Pine Siskin	1
Pine Warbler	1
Plegadis Ibis	4
Prairie Falcon	3
Purple Finch	188
Pygmy Nuthatch	2
Pyrrhuloxia	2
Red Crossbill	10
Red-breasted Merganser	1
Red-cockaded Woodpecker	1
Red-shouldered Hawk	1
Red-throated Loon	13
Rock Wren	3
Rufous Hummingbird	1
Rusty Blackbird	3
Sage Thrasher	11
Sandhill Crane	8
Say's Phoebe	3
Sedge Wren	25
Short-eared Owl	64
Smith's Longspur	3
Snow Bunting	1
Snowy Owl	1
Sora	7
Spotted Sandpiper	11
Spotted Towhee	2
Sprague's Pipit	1
Swan Species	1
Thayer's Gull	10
Trumpeter Swan	21
Tundra Swan	9
Verdin	3
Vesper Sparrow	3
Virginia Rail	15
Western Bluebird	1
Western Grebe	5
Western Meadowlark	1
Western Sandpiper	1
Western Screech-Owl	4
White Ibis	4
White-tailed Kite	1

White-winged Dove	24
White-winged Scoter	8
Yellow Rail	2
Yellow-bellied Sapsucker	1
Yellow-billed Loon	3

Table 3. Species examined for irruptive distribution patterns, and the percentage of surveyed blocks in which each species occurred during each of the five winters of the Oklahoma Winter Bird Atlas Project.

Species	Winter 1	Winter 2	Winter 3	Winter 4	Winter 5
American Goldfinch	81	91	87	75	84
American Tree Sparrow	52	51	45	46	34
Cedar Waxwing	50	66	59	55	57
Mountain Bluebird	2	12	0	14	3
Pine Siskin	4	18	7	3	24
Purple Finch	18	25	7	4	30
Red-breasted Nuthatch	1	4	3	0	17
Rusty Blackbird	7	12	16	9	8