South Dakota Breeding Bird Atlas II
2008 Field Season Report

December 31, 2008

Rocky Mountain Bird Observatory
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In Cooperation With:

South Dakota Game, Fish, and Parks
Division of Wildlife
Wildlife Diversity Program

ROCKY MOUNTAIN BIRD OBSERVATORY

***Mission**: To conserve birds and their habitats*

***Vision**: Native bird populations are sustained in healthy ecosystems*

***Core Values**: (Our goals for achieving our mission)*

1. ***Science** provides the foundation for effective bird conservation.*
2. ***Education** is critical to the success of bird conservation.*
3. ***Stewardship** of birds and their habitats is a shared responsibility.*

RMBO accomplishes its mission by:

***Partnering** with state and federal natural resource agencies, private landowners, schools, and other nonprofits for conservation.*

***Studying** bird responses to habitat conditions, ecological processes, and management actions to provide scientific information that guides bird conservation efforts.*

***Monitoring** long-term trends in bird populations for our region.*

***Providing** active, experiential, education programs that create an awareness and appreciation for birds.*

***Sharing** the latest information in land management and bird conservation practices.*

***Developing** voluntary, working partnerships with landowners to engage them in conservation.*

***Working** across political and jurisdictional boundaries including, counties, states, regions, and national boundaries. Our conservation work emphasizes the Western United States, including the Great Plains, as well as Latin America.*

***Creating** informed publics and building consensus for bird conservation needs.*

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EXECUTIVE SUMMARY

The Breeding Bird Atlas is a relatively simple, repeatable, grid-based survey that aims to monitor and document changes in the distribution of breeding birds on a large scale. Results of the first South Dakota Breeding Bird Atlas, begun 20 years ago, were extremely valuable in describing the status and distribution of South Dakota's breeding birds at the end of the 20th century and established a baseline against which future changes in breeding bird populations will be measured. Since the first Breeding Bird Atlas, South Dakota's landscape has changed, and most likely, these changes are impacting South Dakota's breeding birds. A second Breeding Bird Atlas in South Dakota will not only describe the changes in distribution of all breeding birds over the past 20 years, but will serve as the next baseline to which future changes can be compared. The second South Dakota Breeding Bird Atlas (SDBBAII), funded primarily by State Wildlife Grants and coordinated by Rocky Mountain Bird Observatory, is scheduled for 2008 - 2012 and aims to survey 425 3mi x 3mi blocks. The goal of SDBBAII is to document the current distribution of every bird species that nests in South Dakota and to compare these distributions to those of the first South Dakota Breeding Bird Atlas. These data will support the efforts of land-use planners, conservation decision-makers, researchers, educators, students, and bird enthusiasts to maintain healthy bird populations and conserve avian diversity within the state.

In summer 2008, the first year of data collection for the SDBBAII, 11 volunteers and five paid staff visited 104 random and special blocks at least once, with a total of 205 visits and 1,036 hours spent on blocks. Observers submitted 4,437 records from blocks and an additional 419 extra observations from off blocks. A total of 206 species were detected; 75% were confirmed as breeding within the state. Mourning Dove was the most frequently reported species (92 blocks), Common Grackle was confirmed breeding in the most blocks (52) and most counties (35), and Brown-headed Cowbird were reported from the most counties (40). Four species were reported in 2008 that were not reported during the first South Dakota Breeding Bird Atlas: Sandhill Crane, Herring Gull, Cassin's Sparrow, and Eurasian Collared-Dove. In addition, Caspian Tern was never confirmed nesting during the first atlas but was confirmed nesting on Lake Oahe in 2008.

In 2009, planned activities to increase the scope and participation in SDBBAII include special owl counts, point counts within all blocks, increased training and recruitment, presentations at club meetings, an enhanced web site, and newspaper and newsletter articles published throughout the state.

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The second South Dakota Breeding Bird Atlas (SDBBA2) is a team effort, both organizationally and financially. Initial funding has been provided by the South Dakota Department of Game, Fish, and Parks.

Atlas Supporters:

- SD Dept. of Game, Fish, and Parks (SDGFP)
- South Dakota Ornithologists' Union
- Rocky Mountain Bird Observatory

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SDBBA2 Logo design: Michael Retter

We also thank the following people for their contributions to the planning and execution of SDBBA2: Dave Ode, Chuck Hundertmark, Rosemary Draeger, David Pavlacky, David Hanni, Jennifer Blakesley, Anna Ball, Jacquie Ermer, Doug Chapman, Tim Hajda, Kelly Preheim, Jim Taulman, Connie Vicuna, and Kyle Rodenberg. We especially thank the 11 volunteers and 16 observers who submitted data for the summer 2008 season.

TABLE OF CONTENTS

INTRODUCTION

The Breeding Bird Atlas is a relatively simple, repeatable, grid-based survey that aims to monitor and document changes in the distribution of breeding birds on a large scale (Smith 1990). The first South Dakota Breeding Bird Atlas (SDBBA) began 20 years ago (Peterson 1995). During that ambitious project, 71 volunteers collected data over six years of fieldwork and submitted more than 24,000 breeding records, representing 219 bird species. The resulting resource has been extremely valuable in describing the status and distribution of South Dakota's breeding birds, both game and nongame species, at the end of the 20th century. The first atlas database also is a baseline against which future changes in breeding bird populations can be measured.

Since the first Breeding Bird Atlas commenced in 1988, South Dakota's landscape has changed (e.g., Bakker and Higgins, 1998, Higgins *et al*. 2002, Grant *et al*. 2004). In addition, land-use changes in the upcoming few years could be staggering, with increasing CRP conversion, biofuels production, wind farm development, and urbanization, to name a few trends of concern (e.g., Stephens et al. 2006, Stubbs 2007). South Dakota's Wildlife Action Plan (SD GFP 2006) explicitly notes the link between habitat quality/quantity and the health of animal populations. Most likely, these landscape-level changes are impacting South Dakota's breeding birds. Regular monitoring of all breeding species on a large scale allows us to detect impacts of such large-scale landscape changes. Repeating the Breeding Bird Atlas approximately every 20 years not only documents bird response to habitat deterioration and loss, but also can improve our understanding of bird response to management actions designed to improve wildlife habitat quality and quantity. A second Breeding Bird Atlas in South Dakota will not only describe the changes in distribution of all breeding birds over the past 20 years, but will serve as the next baseline to which future changes can be compared.

The goal of the second South Dakota Breeding Bird Atlas is to document the current distribution of every bird species that nests in South Dakota and to compare these distributions to those of the first South Dakota Breeding Bird Atlas (1988-1992). These data will support the efforts of land-use planners, conservation decision-makers, researchers, educators, students, and bird enthusiasts to maintain healthy bird populations and conserve avian diversity within the state. Specific objectives include:

1. Document current distribution of all breeding bird species, including under-surveyed species such as owls and secretive marshbirds.
2. Assess changes in distributions of breeding birds since the first SDBBA (1988-1992).
3. Identify habitat associations and requirements for all breeding species.
4. Produce a report and interactive web site with species distribution maps and analyses.

Scientific questions to be addressed:

1. What is the current statewide distribution of occurrences and nesting of every breeding bird species?
2. Which species have declined or increased in distribution since 1988-1992?
3. Are non-native bird species increasing as a component of the state's avifauna?
4. What are the habitat associations or requirements of each breeding species?

Expected Benefits include:

1. More complete and up-to-date knowledge of breeding bird species status and distribution.
2. More complete understanding of changes in breeding bird populations over last 20 years.
3. More complete knowledge of bird-habitat associations.
4. Identification of species that have declined over the past 20 years and may be in need of management to keep from becoming a SoGCN.
5. Establishment of a baseline for future surveys and atlases.
6. Contribute to understanding of regional breeding bird status and distribution, in conjunction with simultaneous atlases being conducted in Minnesota, Iowa, and Nebraska.
7. Provide a valuable resource for researchers, land managers, land-use planners, students, agency personnel, educators, and others.
8. Increased interest in birds by the general public and a citizen science opportunity for knowledgeable birders.

METHODS

GENERAL METHODS

Data collection for the Breeding Bird Atlas involves visiting pre-selected 3-mile x 3-mile areas ('blocks') and surveying all habitats within each block for bird presence and evidence of breeding for all bird species. Each summer, 2-5 paid full-time technicians survey atlas blocks for 4-10 weeks. The target is for paid technicians to survey 200 - 250 blocks during the 4 - 5 year atlas period. The remaining 175 - 225 blocks will be surveyed by volunteers, including agency personnel and both novice and experienced birders. A special emphasis will be to encourage young people to participate.

Surveys during SDBBA2 follow the standardized protocols as recommended by the North American Ornithological Atlas Committee (Smith 1990) with some minor modifications. Atlasers are encouraged to visit their block during the breeding season at least three times plus a nocturnal visit; each visit should be at least 10 days apart. These visits can be spread out over more than one breeding season. Atlasers are asked to keep track of the number of person-hours and to tally at least 20 hours on their block. The entire block does not need to be surveyed; rather, efforts are focused on surveying each habitat type within a block.

Primary focus of surveys is to document all breeding birds in a block. Bird observations are categorized as *Possible* breeding, *Probable* breeding, or *Confirmed* breeding, based on a series of standardized criteria, within that species' breeding season, which is defined by 'safe dates'. To document breeding phenology, emphasis is on recording ALL observations, not just the 'highest' breeding category observed for each species. In addition, the habitat within which each bird is observed is recorded.

Outside of designated blocks, the atlas encourages all interested persons to submit observations of *Confirmed* breeding by any species anywhere within the state. Special forms are available for recording these data.

ATLAS BLOCK SELECTION

How many? The second breeding bird atlas will attempt to completely survey 425 random blocks and eight special blocks (Figure 1). Of these blocks, 124 are the same 124 random blocks covered in the first South Dakota Breeding Bird Atlas. The remaining 301 random blocks are newly selected for the second atlas. Because we were not certain that we would be able to adequately cover 425 blocks in five years, not all blocks were 'available' in the early stages of the project. Thus, in 2008, the 124 original random blocks plus 176 new blocks and six

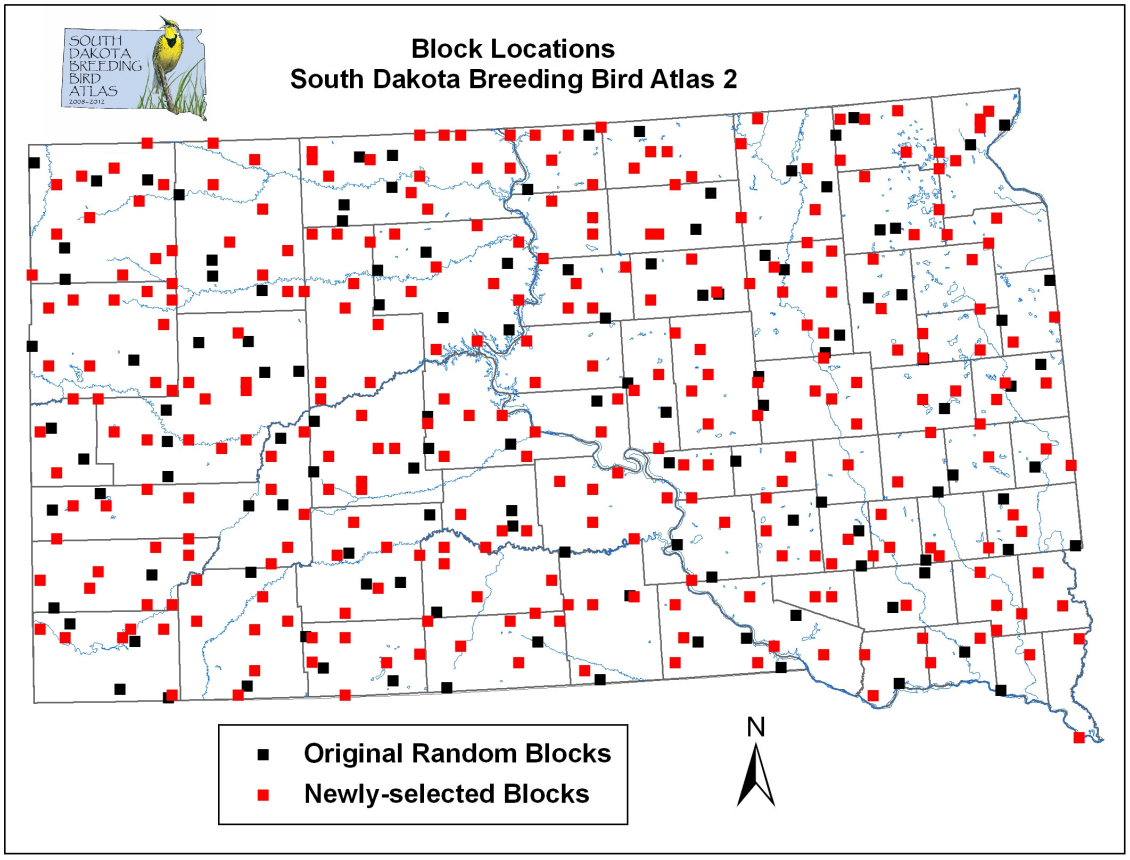

Figure 1. Location of random blocks to be surveyed during the second South Dakota Breeding Bird Atlas. Note that block size is enlarged and not to scale.

special blocks were available for survey. The remaining 125 random and 2 special blocks will be available beginning in 2009. The reason for this is described under the 'Selection of new blocks' section. The eight special blocks were added because they contain rare habitats that are not represented in the randomly-chosen blocks. These blocks include forested buttes in Harding County (3 blocks), mountain mahogany shrubland in Custer County (1 block), bluffs of the Missouri River (1 block), southwest sage grassland-sage shrubland in Fall River (2 blocks) and coteau forested ravines in Roberts County (1 block).

Block size and grid system. All blocks are 3 miles x 3 miles in size. However, blocks selected in the two different atlases are based on different grid systems. The original blocks are comprised of nine Public Land Survey System (PLSS) sections. The new blocks are not based on the PLSS but rather on a uniform 3x3 mile grid placed on the entire state.

Selection of original random blocks. The original 124 blocks were selected in 1988 and surveyed during 1988 - 1992 (Peterson 1995). The state was divided

into 62 equal-sized 'superblocks' and two 3 section x 3 section blocks were randomly selected within each superblock.

Selection of new blocks. The 301 new blocks were selected using a spatially-balanced sampling design (Stevens *et al*. 2004, Theobald *et al*. 2007). This type of sampling design is random, but accounts for the fact that sites closer together are probably more similar and results in a sample distribution that is less clumped. In ArcGIS v.9.0, a uniform grid of 8,819 3-mile x 3-mile blocks was placed over the entire state. Eight hundred blocks were randomly selected using the RRQRR algorithm developed by David Theobald at Colorado State University (Theobald *et al*. 2007). The first 301 samples 'drawn' in this procedure constitute the 301 new blocks to be surveyed during the second atlas. The center points of seven selected blocks were outside the state border. These samples were discarded and the next seven samples in the 800 sample list became their replacements. One important assumption of spatially-balanced sampling is that blocks are surveyed in the order in which they are drawn. If they are not, the resulting design is not spatially balanced nor is it random. Thus, block # 276 only can be surveyed if blocks 1-275 are also surveyed. For this reason, new blocks will be 'released' on a staggered basis, depending on how rapidly blocks are completed, as described in the first paragraph. This limitation does not apply to the original 124 blocks and all original blocks will be available in all years.

PROJECT ORGANIZATION

The second South Dakota Breeding Bird Atlas is administered by two committees - a Steering Committee and a Technical Committee. The Steering Committee is responsible for overall guidance of project planning and implementation, as well as publicity and fund-raising. Members of the Steering Committee include a project director, project coordinator, representatives of federal, state, and tribal agencies, representatives of scientific and ornithological organizations and universities, and at-large and youth representatives. The Project Coordinator is in charge of actual planning, implementation, and coordination of all aspects of the Atlas. The Technical Committee is responsible for providing guidance on all scientific issues, such as appropriate methods of block selection and data collection, and data analyses and presentation. Members of the Technical Committee include the project coordinator, SD GFP Wildlife Diversity scientists, and three University scientists. If necessary, two - four regional coordinator positions will be created who will be responsible for data collection by volunteers within their geographic region, including training, assisting with block selection and other issues, and ensuring adequate data quality.

RESULTS

Personnel: Thus far, 17 volunteers have signed up for 32 blocks (Figure 2). In summer 2008, 11 of these volunteers spent a total of 175.5 hours conducting surveys on blocks and submitted 1,010 bird records. Five paid staff spent a total of 860.5 hours on blocks and submitted 3,737 records. An additional 419 Extra Observations were submitted by 16 observers.

Blocks (Figure 2): During summer 2008, 101 blocks were visited at least once: 37 1st atlas random blocks, 59 2nd atlas random blocks, and five special blocks. Volunteers visited 17 blocks totaling 40 visits while paid staff visited 84 blocks totaling 165 visits. Most blocks were visited twice (53% of blocks), while 26% were visited once and 22% were visited three or more times. At least one visited block occurred in 40 counties.

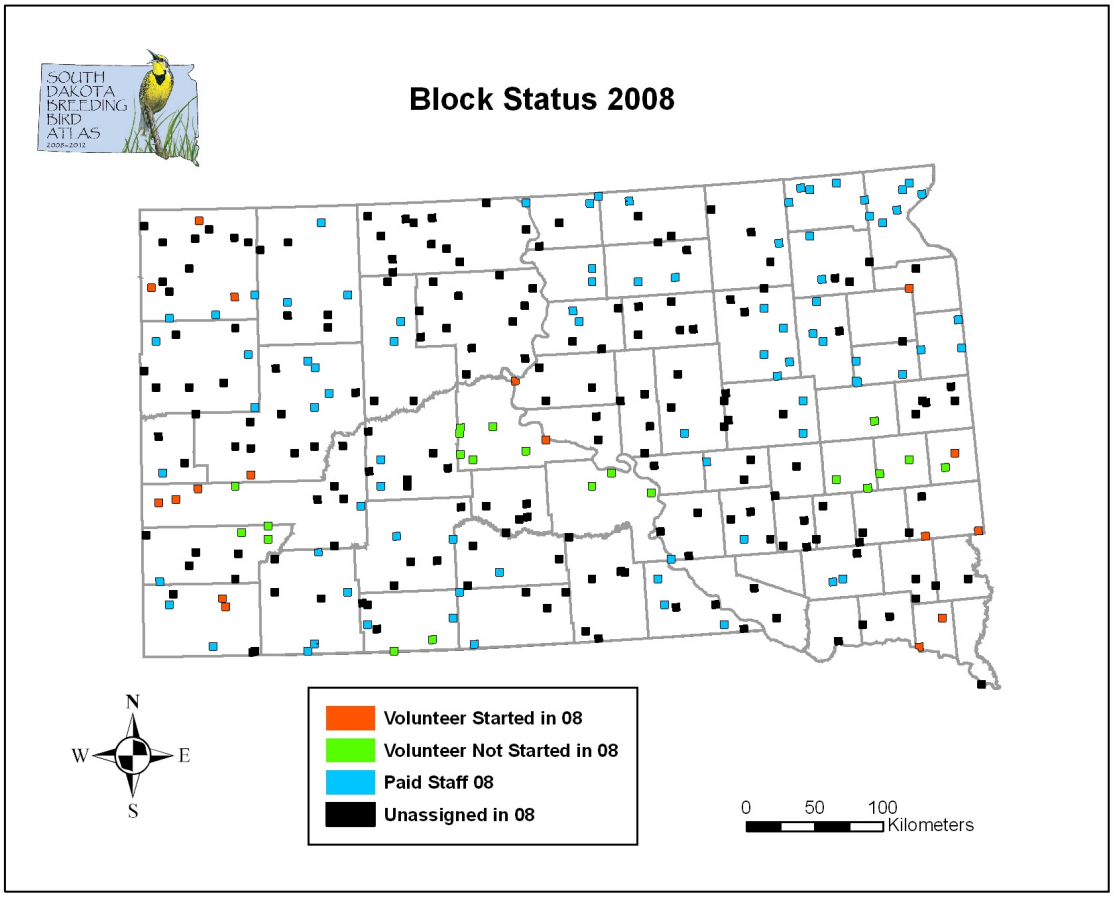

Figure 2. Location of blocks and their survey status in 2008. Blue blocks were surveyed by paid staff, orange blocks were surveyed by volunteers, green blocks were assigned to volunteers but not surveyed, and black blocks were not surveyed and were not assigned to anyone. Note that block size is not to scale.

For all blocks, atlasers detected an average of 42 species per block and confirmed breeding by an average of 24% of species detected per block. The highest species total for a block occurred at Sieche Hollow (78 spp), followed by 2 blocks in Marshall Co. with 76 and 69 species each. Paid staff recorded an average of 44 species per block and confirmed breeding by an average of 23% of observed species per block while volunteers recorded an average of 33 species per block and confirmed breeding by an average of 29% of observed species per block.

Species: A total of 206 species were recorded at least once. Of these, 190 species were recorded at least once on blocks while 16 species were only reported as extra observations (Table 1). At least one confirmed breeding was recorded for 154 species, 75% of all species recorded.

Table 1. Species only recorded as extra observations in summer 2008.

Species	# Extra Observat.	# Extr Obs confirmed	# County detected	# County confirmed
Barn Owl	16	16	7	7
California Gull	2	2	1	1
Black-necked Stilt	2	0	1	0
Caspian Tern	1	1	1	1
Cassin's Sparrow	1	1	1	1
Clark's Nutcracker	1	1	1	1
Eastern Screech-owl	1	1	1	1
Herring Gull	1	1	1	1
Sandhill Crane	1	1	1	1
Snowy Egret	1	1	1	1
Trumpeter Swan	1	1	1	1
Bufflehead	1	0	1	0
Barred Owl	1	0	1	0
Hooded Merganser	1	0	1	0
Least Tern	1	0	1	0
Little Blue Heron	1	0	1	0

On blocks, Mourning Dove was the most frequently recorded species (92 blocks) and an additional 15 species were recorded in at least 70 blocks (Table 2). Common Grackle was most frequently confirmed as breeding (52 blocks); an additional nine species were confirmed breeding in at least 30 blocks (Table 3). Double-crested Cormorant colonies were the most frequently reported extra observation; observers reported at least 10 extra observations for an additional five species (Table 4). Combining block and extra observation records, observers recorded 29 species in each of at least 70% of all counties (Table 5) and confirmed breeding by 11 species in each of at least half of all counties (Table 6).

Table 2. Species that were recorded in at least 70% of all blocks surveyed (N=101 blocks).

Species	# Blocks detected	# Blocks confirmed	# County detected	# County confirmed
Mourning Dove	92	35	39	24
Red-winged Blackbird	90	44	38	26
Western Meadowlark	89	39	38	27
Brown-headed Cowbird	89	6	40	7
American Robin	87	46	36	22
Eastern Kingbird	87	33	39	22
Killdeer	86	31	36	21
Barn Swallow	81	37	36	24
Common Grackle	79	52	35	30
Orchard Oriole	77	19	35	17
Western Kingbird	75	33	36	24
Mallard	74	23	34	20
Brown Thrasher	73	12	36	12
European Starling	72	41	35	27
Yellow Warbler	71	14	35	15
Red-tailed Hawk	70	6	35	8

Table 3. Species that were confirmed breeding in at least 30 blocks.

Species	# Blocks confirmed	# Blocks detected
Common Grackle	52	79
American Robin	46	87
Red-winged Blackbird	44	90
European Starling	41	72
Western Meadowlark	39	89
Barn Swallow	37	81
Mourning Dove	35	92
Western Kingbird	33	75
Eastern Kingbird	33	87
Killdeer	31	86

Table 4. Species for which at least 10 Extra Observations were submitted by observers.

Species	# Extra Observat.	# Extr Obs confirmed
Double-crested Cormorant	32	32
Long-eared Owl	25	19
Great Blue Heron	24	24
Red-necked Grebe	17	7
Barn Owl	16	16
Cliff Swallow	12	12

Table 5. Species recorded in at least 70% of all counties for which data were submitted (N=40).

Species	# County detected	# County confirmed
Brown-headed Cowbird	40	7
Mourning Dove	39	24
Eastern Kingbird	39	22
Western Meadowlark	38	27
Red-winged Blackbird	38	26
Western Kingbird	36	24
Barn Swallow	36	24
American Robin	36	22
Killdeer	36	21
Brown Thrasher	36	12
Common Grackle	35	30
European Starling	35	27
Orchard Oriole	35	17
Yellow Warbler	35	15
Red-tailed Hawk	35	8
Mallard	34	20
Upland Sandpiper	34	7
House Wren	33	6
Horned Lark	33	4
American Goldfinch	33	4
Common Yellowthroat	33	2
Gadwall	32	9
Grasshopper Sparrow	32	7
Ring-necked Pheasant	31	16
Northern Harrier	30	2
House Sparrow	29	16
Blue-winged Teal	29	14
Tree Swallow	29	9
Vesper Sparrow	28	1

Of the 132 Species of Special Concern delineated by various state and federal agencies, 98 were recorded at least once in 2008 (Appendix 1A) while 34 species were not detected (Appendix 1B).

Four species were reported in 2008 that were not reported during the first South Dakota Breeding Bird Atlas: Sandhill Crane (confirmed nesting), Herring Gull (confirmed nesting), Cassin's Sparrow (confirmed nest), and Eurasian Collared-Dove (probable breeder). In addition, Caspian Tern was never confirmed nesting during the first atlas but was confirmed nesting on Lake Oahe in 2008.

Table 6. Species confirmed breeding in at least 50% of all counties for which data were submitted (N=40).

Species	# County confirmed	# County detected
Common Grackle	30	35
Western Meadowlark	27	38
European Starling	27	35
Red-winged Blackbird	26	38
Mourning Dove	24	39
Western Kingbird	24	36
Barn Swallow	24	36
Eastern Kingbird	22	39
American Robin	22	36
Killdeer	21	36
Mallard	20	34

DISCUSSION

With a total of 101 blocks receiving at least one visit in the first year of data collection, the SDBBAII is off to a good start. However, less than 25% of these blocks (5% of project goal's 425 blocks) received enough coverage to be considered 'finished'. Because of a late organizational start, little atlasing occurred before June. In addition, there was little time to recruit and train large numbers of volunteers. In future years, we expect the number of volunteers to increase and atlasers to begin earlier in the spring, thereby increasing the number of blocks 'finished' each year.

With just one year of data collection, the SDBBAII already has a list of 206 breeding species. This compares favorably with the 219 breeding species list collated 20 years ago during the first atlas. Species that have been 'missed' in SDBBAII are rarer species, especially those with limited and local distribution within the state such as American Dipper and Virginia's Warbler. For common species, first and second atlas results are similar. Peterson (1995) reports the following were most frequently reported on the 124 1st atlas random blocks (in decreasing order of frequency): Mourning Dove, Western Meadowlark, Brown-headed Cowbird, Killdeer, Red-winged Blackbird, Eastern Kingbird, Barn Swallow, Common Grackle, American Robin, and Mallard. This list is almost identical to the 2008 data, shown in Table 2.

Although current species distributions are difficult to analyze with just 5% block completion, a few interesting findings were reported in 2008. Several reports of Red-bellied Woodpecker in Shannon, Jackson, and eastern Pennington Counties suggest that this species has expanded into the Badlands region. Blue Grosbeak were encountered more frequently than expected along the Missouri River near North Dakota. Cooper's Hawk were reported in more locations than during all of the first atlas, but none of the 2008 reports were from the Black Hills or Harding County, where almost all first atlas records occurred. Finally, the newly-arrived introduced species Eurasian Collared-Dove was reported most frequently along the Nebraska border, but one singing bird was recorded near North Dakota. None of the 2008 Collared-Dove records were from towns or urban areas.

Besides block data, final species distribution maps will incorporate information from Extra Observation Reports and other monitoring and research projects conducted within the state during atlas years. The main purpose of Extra Observation reports is to gain additional information on species less likely to be detected on blocks - because they are rare or secretive, have large home ranges, or breed in colonies. In 2008, most Extra Observations were of species in one of these categories. However, few observers submitted reports. Many South Dakota birders submit their observations to the SDOU online database or Cornell University's E-Bird. Possibly, observers don't wish to be bothered with another form or submitting the same records multiple times. Upcoming discussions with a

variety of birders and birding groups hopefully will result in a system that will be used by more people and result in better distributional information for these species.

Evaluations by both volunteers and paid staff revealed few difficulties during the summer. There was some confusion about the breeding code 'Observed' and more confusion over various habitat codes. These should be resolved with more training and more detailed written explanations. Atlasers experienced a few isolated incidents of local persons' displeasure or denied access permission, while a few atlasers were not able to reach their blocks because of weather-related road and bridge closures. Many West River atlasers consumed a large amount of time acquiring multiple landowner permissions before visiting their blocks. In upcoming years, efforts will be made to initiate landowner contacts before the field season to save breeding season time for field work.

In the upcoming year, we will be conducting the following activities to improve the scope, efficiency, and usefulness of SDBBAII:

1. Owl transect surveys in the Pine Ridge and Black Hills areas
2. Point counts in every block to obtain uniform effort, detectability and occurence probabilities, and abundance estimates
3. Training at SDOU meetings
4. Presentations at bird club and other club meetings
5. Newspaper and newsletter articles
6. Increased volunteer recruitment
7. Enhanced web site, including better downloadable maps

LITERATURE CITED

Bakker, K.K. 2005. South Dakota all bird conservation plan. SDGFP, Pierre, SD.

Bakker, K.K. and K.F. Higgins. 1998. Are South Dakota's native prairie birds in jeopardy? *South Dakota Conservation Digest* 65(2):16-18.

Grant, T. A., E. Madden, and G. B. Berkey. 2004. Tree and shrub invasion in northern mixedgrass prairie: implications for breeding birds. Wildlife Society Bulletin 32:807-818.

Higgins, K.F., D. E. Naugle, and K. J. Forman. 2002. A case study of changing land use practices in the northern Great Plains, U.S.A.: an uncertain future for waterbird conservation. *Waterbirds* 25 (Special Publication 2): 42-50.

Peterson, R. A. 1995. The South Dakota Breeding Bird Atlas. South Dakota Ornithologists' Union. 276 pp.

Smith, C. R. (ed). 1990. Handbook for Atlasing North American Breeding Birds. North American Ornithological Atlas Committee. URL: http://www.bsc-eoc.org/norac/atlascont.htm (accessed March 31, 2008).

South Dakota Department of Game, Fish and Parks. 2006. South Dakota Comprehensive Wildlife Conservation Plan. South Dakota Dept. of Game, Fish and Parks, Pierre, Wildlife Division Report 2006-08.

Stephens, S., J. Walker, D. Blunck, A. Jayaraman, and D. Naugle. 2006. Grassland conversion in the Missouri Coteau of North and South Dakota 1984 - 2003. Preliminary Report, September 2006. Ducks Unlimited, Bismarck, ND.

Stevens, D. L., Jr. and A. R. Olsen. 2004. Spatially balanced sampling of natural resources. *J. Amer. Statistical Assoc.* 99(465): 262-278.

Stubbs, M. 2007. Land conversion in the Northern Great Plains. Congressional Report Service report to Congress, April 5, 2007. Online at http://www.nationalaglawcenter.org/assets/crs/RL33950.pdf (accessed April 30, 2008)

Theobald, D. M., D. L. Stevens Jr., D. White, N. S. Urquhart, A. R. Olsen, and J. B. Norman. 2007. Using GIS to generate spatially balanced random survey designs for natural resource applications. *Environ. Manage.* 40: 134-146.

APPENDIX A.

Summary of data collected in 2008 for Species of Special Concern, including species monitored by the South Dakota Natural Heritage Program, species listed as Species of Special Concern by the South Dakota Wildlife Action Plan (2006), South Dakota Bird Conservation Plan (Bakker 2005), U.S. Forest Service, U.S. Fish and Wildlife Service, Bureau of Land Management, or U.S. National Park Service.

Appendix 1A: Species of Special Concern that were reported at least once.

Species	Number Blocks observed	Number Blocks confirmed	Num. Extra Obs	Num. Extr. Observ. confirmed	Num. Counties observed	Num. Counties confirmed
Red-necked Grebe	2	1	17	7	3	2
Eared Grebe	5	2	5	5	7	6
Clark's Grebe	1	0	0	0	1	0
American White Pelican	12	0	0	0	9	0
American Bittern	18	0	0	0	10	0
Least Bittern	4	0	0	0	4	0
Great Blue Heron	31	3	22	22	25	13
Great Egret	4	0	4	4	5	3
Snowy Egret	0	0	1	1	1	1
Little Blue Heron	0	0	1	0	1	0
Green Heron	4	1	2	0	5	2
Black-crowned Night-Heron	12	0	1	1	9	1
White-faced Ibis	3	0	2	2	4	2
Trumpeter Swan	0	0	1	1	1	1
Bufflehead	0	0	1	0	1	0
Hooded Merganser	0	0	1	0	1	0
Osprey	1	0	1	1	2	1
Bald Eagle	2	0	3	3	5	3
Cooper's Hawk	8	0	3	2	8	1
Northern Goshawk	1	0	0	0	1	0
Broad-winged Hawk	3	0	0	0	2	0
Swainson's Hawk	31	5	2	2	18	6
Ferruginous Hawk	3	0	5	2	6	2
Golden Eagle	4	2	4	3	5	2
Prairie Falcon	2	1	5	3	5	3
Sharp-tailed Grouse	23	6	0	0	14	4
Greater Sage-Grouse	1	0	0	0	1	0
Northern Bobwhite	3	0	0	0	2	0
Sandhill Crane	0	0	1	1	1	1
Piping Plover	1	0	1	0	2	0
Black-necked Stilt	0	0	2	0	1	0
Upland Sandpiper	61	12	2	2	34	7

Species	Number Blocks observed	Number Blocks confirmed	Num. Extra Obs	Num. Extr. Observ. confirmed	Num. Counties observed	Num. Counties confirmed
Long-billed Curlew	6	1	3	0	7	1
Marbled Godwit	18	2	0	0	12	2
Willet	13	1	1	1	10	2
Wilson's Phalarope	34	9	1	0	20	5
California Gull	0	0	2	2	1	1
Herring Gull	0	0	1	1	1	1
Franklin's Gull	4	0	1	1	5	1
Forster's Tern	2	0	0	0	2	0
Caspian Tern	0	0	1	1	1	1
Common Tern	1	0	6	5	4	3
Least Tern	0	0	1	0	1	0
Black Tern	23	4	2	2	17	4
Black-billed Cuckoo	8	0	0	0	7	0
Yellow-billed Cuckoo	6	2	0	0	6	2
Barn Owl	0	0	16	16	7	7
Burrowing Owl	8	1	8	5	11	6
Long-eared Owl	1	0	25	19	3	2
Northern Saw-Whet Owl	1	1	7	7	2	2
Short-eared Owl	5	0	5	0	6	0
Common Poorwill	2	0	0	0	2	0
Common Nighthawk	35	0	2	2	19	2
Ruby-throated Hummingbird	2	0	2	1	3	1
White-throated Swift	2	0	0	0	2	0
Red-headed Woodpecker	32	5	1	1	22	6
Red-naped Sapsucker	2	2	0	0	2	2
Willow Flycatcher	25	3	0	0	15	3
Say's Phoebe	17	7	1	1	10	7
Eastern Kingbird	87	33	4	4	39	22
Olive-sided Flycatcher	1	0	0	0	1	0
Loggerhead Shrike	20	3	2	2	14	5
Black-billed Magpie	3	1	0	0	3	1
Clark's Nutcracker	0	0	1	1	1	1
Horned Lark	59	6	0	0	33	4
N. Rough-winged Swallow	22	5	1	0	17	3
Purple Martin	3	3	3	3	5	5
Pygmy Nuthatch	1	0	0	0	1	0
Brown Creeper	1	0	0	0	1	0
Sedge Wren	22	1	0	0	16	1
Golden-crowned Kinglet	1	0	0	0	1	0
Veery	2	0	0	0	2	0
Mountain Bluebird	8	5	1	1	6	4
Northern Mockingbird	1	0	1	0	2	0
Brown Thrasher	73	12	1	1	36	12
Sprague's Pipit	1	0	0	0	1	0
Bell's Vireo	12	1	0	0	8	1
Yellow-throated Vireo	2	1	2	0	4	1

Species	Number Blocks observed	Number Blocks confirmed	Num. Extra Obs	Num. Extr. Observ. confirmed	Num. Counties observed	Num. Counties confirmed
Black-and-White Warbler	1	0	0	0	1	0
Yellow Warbler	71	14	5	5	35	15
Scarlet Tanager	2	0	0	0	2	0
Lark Sparrow	26	12	1	1	15	8
Grasshopper Sparrow	60	9	0	0	32	7
Song Sparrow	53	6	0	0	15	4
Vesper Sparrow	50	1	1	0	28	1
Clay-colored Sparrow	28	2	0	0	14	2
Brewer's Sparrow	2	1	1	1	3	2
Field Sparrow	19	1	1	1	6	2
Cassin's Sparrow	0	0	1	1	1	1
Baird's Sparrow	1	0	0	0	1	0
Lark Bunting	30	14	2	2	14	8
Chestnut-collared Longspur	19	10	0	0	10	6
White-winged Junco	4	1	0	0	3	1
Bobolink	57	10	1	1	27	8
Dickcissel	47	3	0	0	27	3
Bullock's Oriole	8	1	0	0	4	1
Baltimore Oriole	40	7	3	1	18	7
Western Meadowlark	89	39	4	4	38	27

Appendix 1B: Species of Special Concern that were never detected during summer 2008.

Horned Grebe
Tricolored Heron
Yellow-Crowned Night-Heron
Common Merganser
Sharp-Shinned Hawk
Merlin
Ruffed Grouse
Greater Prairie Chicken
Yellow Rail
King Rail
Mountain Plover
American Woodcock
Flammulated Owl
Chuck-will's-widow
Whip-Poor-Will
Lewis' Woodpecker
Three-Toed Woodpecker
Black-Backed Woodpecker
Pileated Woodpecker
Cassin's Kingbird
Pinyon Jay
American Dipper
Blue-Gray Gnatcatcher
Wood Thrush
Sage Thrasher
Cerulean Warbler
Virginia's Warbler
Henslow's Sparrow
Le Conte's Sparrow
Nelson’s Sharp-Tailed Sparr.
Sage Sparrow
McCown's Longspur
Eastern Meadowlark
Cassin's Finch