


LEGISLATIVE REFERENCE LIBRARY
QL684.M5 H47x
Henderson, Carr - A preliminary atlas of breeding bi

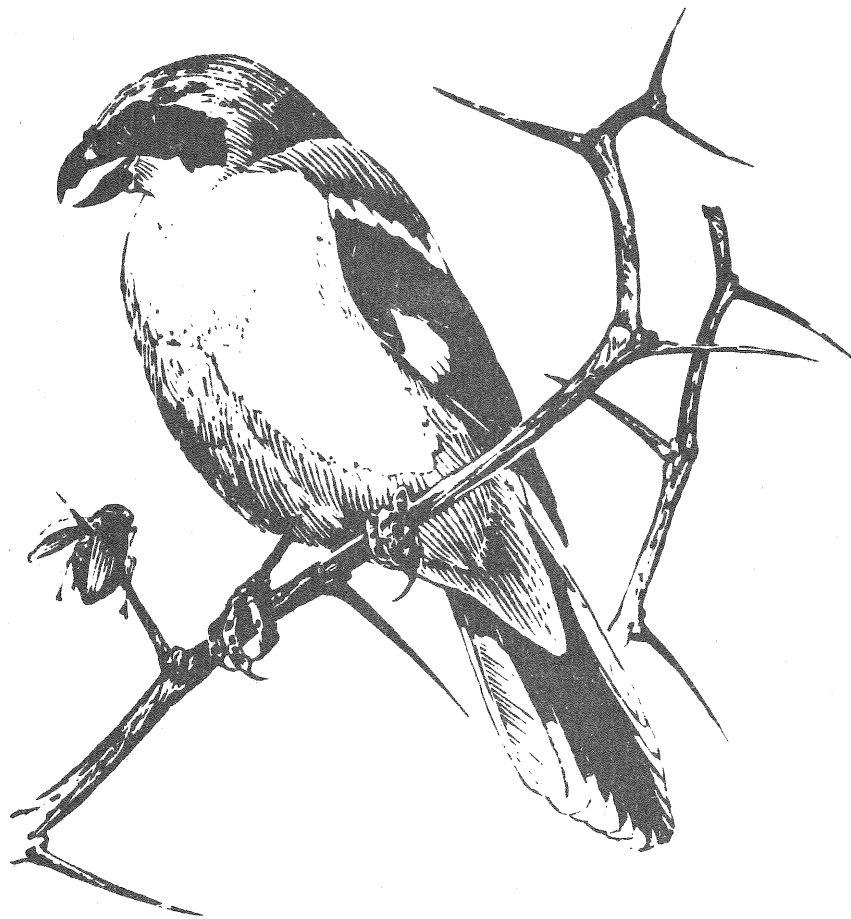


3 0307 00060 6338

840730

A Preliminary Atlas of Breeding Birds in Minnesota

(As derived from
U.S. Fish and Wildlife Service
Breeding Bird Survey Results 1967-1979)



Minnesota Department of Natural Resources

QL
684
.M5
H47x

A Preliminary Atlas of Breeding Birds in Minnesota

By Carrol L. Henderson

Nongame Wildlife Supervisor

Section of Wildlife

Minnesota Department of Natural Resources

Box 7, Centennial Building

658 Cedar St., St. Paul, MN 55155

ABSTRACT

From 1967 through 1979, the U.S. Fish and Wildlife Service has maintained 52 Breeding Bird Survey (BBS) routes in Minnesota. Most of these routes were run annually. A total of 389 routes have been run during that 13-year period. A total of 313,144 birds comprised of 208 resident breeding species were counted along 9,725 miles of routes. This data has been combined for the 13-year period by species and region to provide a preliminary atlas for the distribution and relative abundance of Minnesota's breeding birds. This atlas can be a useful reference about Minnesota's avifauna as long as the limitations of the BBS are recognized.

INTRODUCTION

One of the primary responsibilities of Minnesota's Nongame Wildlife Program is to carry out inventory projects to learn more about the distribution, abundance, and status of the state's nongame species. Special efforts are underway to study and survey species which are threatened, endangered, or of special concern. In addition to these studies, there is also a general need for a comprehensive summary of state-wide breeding bird status and distribution for more common species. Several states and some Canadian provinces have already undertaken "atlas" projects to satisfy that need. This includes Colorado, Utah, Wyoming, Ontario, New York, and others.

The need for a similar "breeding bird atlas" in Minnesota is currently being reviewed within the Nongame Wildlife Program. In the meantime, there is a significant body of related data already available from the U.S. Fish and Wildlife Service. This data has been collected by some of the best birders in Minnesota during annual Breeding Bird Surveys from 1967 through 1979.

The primary purpose of the BBS program is to determine the population trends of North American bird species. Analysis of trends is carried out by the Migratory Bird and Habitat Research Lab, U.S. Fish and Wildlife Service, at Laurel, Maryland. The results of these surveys from 1975-1979 have

earlier been reported and analyzed by Henderson (1981).

Since the initiation of the BBS program in 1966 in the mid-west, these annual surveys have served as the single most important source of population trend data for many common species of birds. Janssen (1979) and Zimmerman (1978) have both reviewed the history and techniques employed to conduct the surveys.

Danny Bystrak is in charge of the national BBS program at the Migratory Bird and Habitat Research Lab. Robert Jansen is in charge of coordinating Minnesota's 52 routes. Dr. Walter J. Breckenridge was in charge of coordinating the routes from 1967 until 1977.

This preliminary atlas analyzes the composite results of the BBS data from 1967 through 1979. The results are broken down by species and region in the Appendix to provide distribution and relative abundance maps for 208 breeding bird species. The maps are based on a 13-year total of 313,144 individuals of 208 species. The counts are based on 389 routes of 25 miles each. The total length of routes run during this 13-year period was 9,725 miles. See Table 1.

The preliminary maps will serve as a general reference for the distribution and relative abundance of Minnesota's more common birds until an atlas project is carried out.

Region	Total Miles of route	Total Birds counted
1N	730	29,261
1E	370	9,497
1S	410	13,842
2E	525	13,017
2W	1,615	45,192
2S	500	10,739
3S	520	14,299
3W	620	20,924
3N	750	17,182
4E	375	14,659
4W	900	27,752
4S	535	19,421
5	1,175	45,511
6	700	31,848
	9,725	313,144

Table 1. Summary of total miles of BBS route and total birds counted from 1967-1979 by regions.

Data were taken from copies of the summary sheets from the routes run from 1967 through 1979. The sheets plus county maps showing each route were supplied by the U.S. Fish and Wildlife Service at Laurel, Maryland. The locations of Minnesota routes are shown in Figure 1.

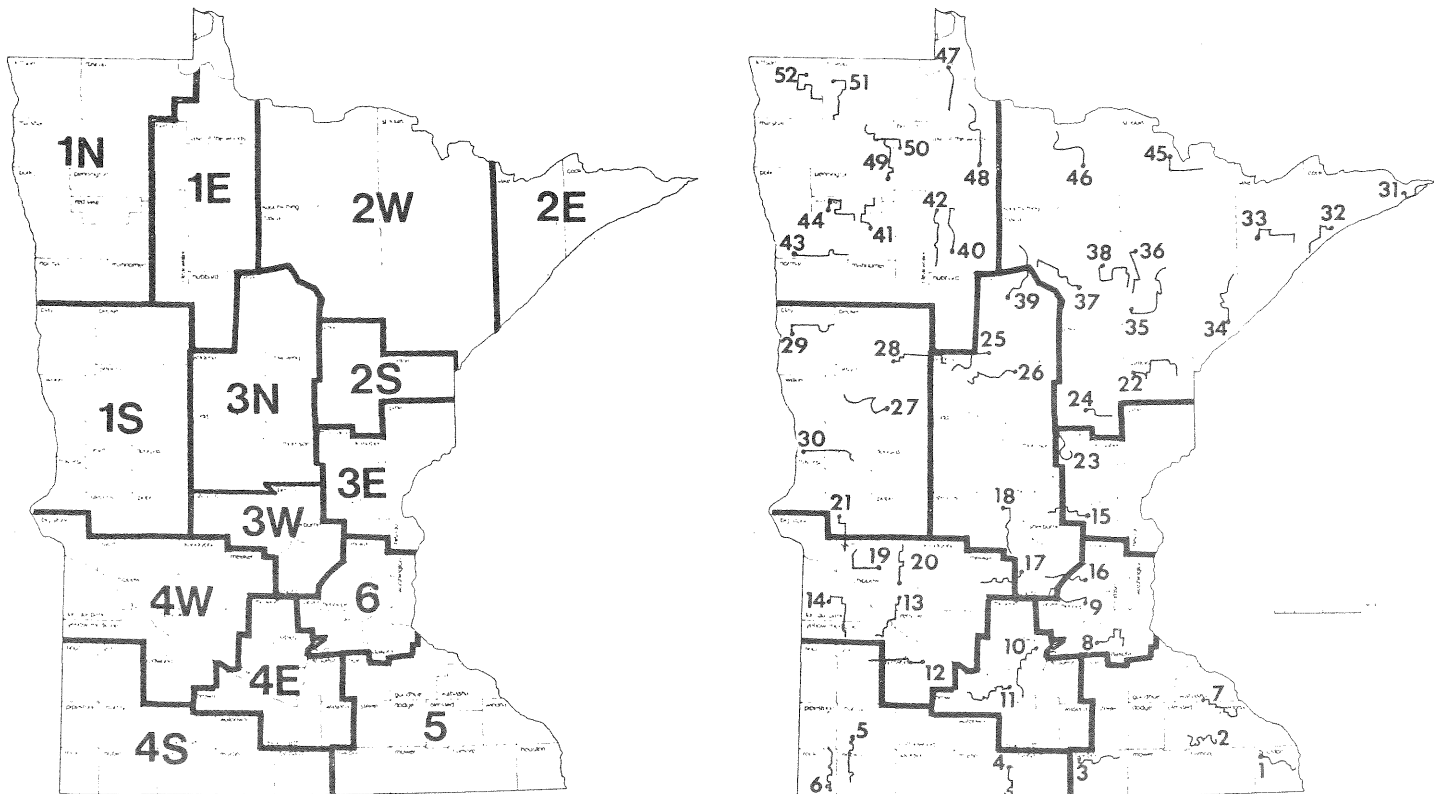
Each one degree block of latitude and longitude (about 55 miles wide, east to west, and 70 miles long) is sampled by one or more random transects, or routes. Minnesota has two routes per degree block. Starting points and compass directions have been determined at random. Each route is covered between June 1 and the first week of July. Observers begin exactly one-half hour before sunrise and make 50 stops at one-half mile intervals. They count all birds heard at each stop or seen within one-fourth mile during a 3-minute watching and listening period. One observer must do all the observing on a given route, but he may have an assistant to help with recording or driving. Unless driving conditions are very poor, most routes should be completed in 4 to 4½ hours.

The results of each route were broken down to the region where the observations occurred. Each summary sheet for a route had five subtotals, one for each 10 counting sites in each five miles. Where a route crossed a regional line, the 10-site increment where the crossing occurred was analyzed to see which region contained most of that 10-site segment. The tally for that subtotal was then recorded for the region with more than five sites of the route.

For analytical purposes the state was divided into 14 regions which correspond to the six Department of Natural Resources administrative regions and to smaller units that are considered according to major drainage basins and general vegetation type. These regions are shown in Figure A.

Bird tallies were compiled by region and species. All counts were then converted to the number of birds per 100 miles of route and these results were mapped by region. All values less than one were rounded to one. All values of exactly one-half were rounded to the next even number.

Figure A.
Regions used for analysis of breeding bird distribution.



FEDERAL BREEDING BIRD SURVEY

RESULTS AND DISCUSSION

A total of 313,144 individuals of 208 species was counted during the five-year period. Ten species accounted for 49.9 percent of the birds counted: red-winged blackbird, common grackle, house sparrow, western meadowlark, European starling, American robin, mourning dove, common yellowthroat, American crow, and cliff swallow.

There were 208 breeding species counted during the BBS counts from 1967-1979. Maps portraying the distribution and relative abundance of those species are presented on the following pages.

Relative Abundance and Distribution

These maps present both the general distribution of bird species in Minnesota and the relative abundance of individual species among the various regions. In this report the term "relative abundance" refers to the abundance of a *single* bird species in the various regions.

The BBS data were converted to "birds per 100 miles" by dividing the count for each species in each region by the number of miles driven in that region. This allows the portrayal of a map of distribution and relative abundance for each species. This approach is possible because the routes are all run uniformly.

It should be emphasized that the distribution maps portray the approximate, not the exact, range for most species. If no number is given for a certain region for a species, it can mean one or more of five things: 1) The species is absent in that region as a breeding species; 2) The species is present in low levels in that region and was not detected due to the randomness of the survey; 3) The species is present, but not detectable by this kind of survey technique; 4) The species is present, but because of specific habitat needs was missed due to the randomness of the survey, or 5) The coverage was inadequate. Either there were not enough routes or observers were not skilled enough to record some species.

Apparent Abundance of Breeding Birds

Each species of breeding bird is characterized by a different degree of visibility and audibility. This is a reflection of the species' size, activity period, coloration, nesting season phenology, and habitat use with relation to road systems. Comparison of BBS counts *among* species must be done only in a very general way and should not be confused as the exact relative abundance among species. It is actually an "apparent abundance" or detectability that is dependent on the variable visibility and audibility factors.

It should be mentioned that "flocking" also affects "apparent abundance." Reporting 500 yellowthroats means something quite different from 500 Franklin's gulls. Flocking bias and aspects are not dealt with in this report.

Species Not Effectively Counted by BBS Survey Technique

Not all bird species lend themselves equally well to being surveyed by the BBS. Among the bird species counted from 1967-1979 that are not effectively counted by BBS techniques are nocturnal birds, crepuscular birds, gallinaceous birds with early nesting seasons, very small birds with faint calls, and most of the raptors which appear to have low counts either because of early nesting seasons or low flight activity in early morning hours.

A few examples of birds which appear to fall into this category are listed in Table 2. This is not a definitive list. It is admittedly subjective, but it is included to help explain the inconsistent distribution and relative abundance levels reported for these species.

Sharp-shinned hawk	Eastern screech owl
Cooper's hawk	Great horned owl
Red-shouldered hawk	Bobwhite
Swainson's hawk	Turkey vulture
Bald eagle	Barred owl
Osprey	Great gray owl
Merlin	Northern saw-whet owl
Ducks-family	Whip-poor-will
anatidae	Common nighthawk
Yellow rail	Rubby-throated hummingbird
Ruffed grouse	Mergansers
Sharp-tailed grouse	Brown creeper
Spruce grouse	
American woodcock	

Table 2. Species suggested as not being effectively counted by BBS routes.

Species Most Effectively Counted by BBS Techniques

There are many bird species which appear to be effectively counted by BBS techniques. Among them are diurnal shorebirds (killdeer), doves, cuckoos, kingfishers, woodpeckers, and passerines which have a peak of nesting activity in June and which are characterized by conspicuous size, readily identifiable calls, and conspicuous activity patterns.

Particularly well represented by the BBS data, probably to the extent of representing a positive bias in the data, are those species adapted to utilization of roadside habitats. Such "roadside" species typically nest in roadside ditches and/or may also perch on fenceposts, fences, and power lines for territorial defense or food gathering purposes. Other birds may be particularly well represented because they eat grit along highway shoulders and gravel roads. Examples of such species are western meadowlark, vesper sparrow, rock dove, bobolink, eastern kingbird, and ring-necked pheasant.

The reason for discussing which species are effectively counted by the BBS technique and which species are not effectively counted is to caution persons to interpret this data carefully and not apply it as equally effective for all species. Recognizing this limitation, the BBS data is still some of the best information currently available about the relative abundance and distribution for many of our more common bird species.

Breeding Species Not Encountered on BBS Routes

It is of interest to know which breeding species were not counted on BBS routes. This knowledge can help in identifying priorities for the survey of rare birds which are not adequately counted by this survey technique.

Table 3 is a list of casual or regular birds known or believed to currently breed in Minnesota which were not counted on BBS routes from 1967-1979.

Species Diversity

The species diversity of Minnesota birds, both statewide and regionally, is a useful indicator for evaluating the general condition of the environment. More habitat diversity and more complex structure within habitats contributes to greater species diversity. Greater diversity is considered to be a desirable characteristic contributing to greater ecological stability (Dasmann 1968). Unfortunately, people tend to simplify environments or create monocultures (single species environments) for their own benefit. This creates a long term downward trend in species diversity. It also creates favorable habitat for extremely adaptable pest birds like starlings, house sparrows, and rock doves. These birds then become the dominant species in these simplified communities, outnumbering most other birds.

There was a significant difference in the total number of species counted in each region, varying from 87 in Region 4S of southwest Minnesota to 147 in Region 2W in northern Minnesota. Species diversity was greatest across the forested regions of northern Minnesota and least in the agricultural monocultures of southwest Minnesota. The total number of birds per 100 miles, however, was lowest in northeast Minnesota and highest in southern Minnesota and in the metropolitan area. This is generally because the northeast has greater habitat structure, but lower soil productivity. The southwest has greater soil productivity but less habitat structure.

It should be emphasized that the number of species recorded in each region is an *incomplete* list of breeding species for that region for the five reasons discussed in the section of "Relative Abundance and Distribution." Current routes in Region 4S, for example, failed to record many waterbirds which are present in that region. The totals should, therefore, be regarded as an index to species diversity rather than the total number of breeding species in the region. Figure B portrays the total number of species and number of birds per 100 miles by region.

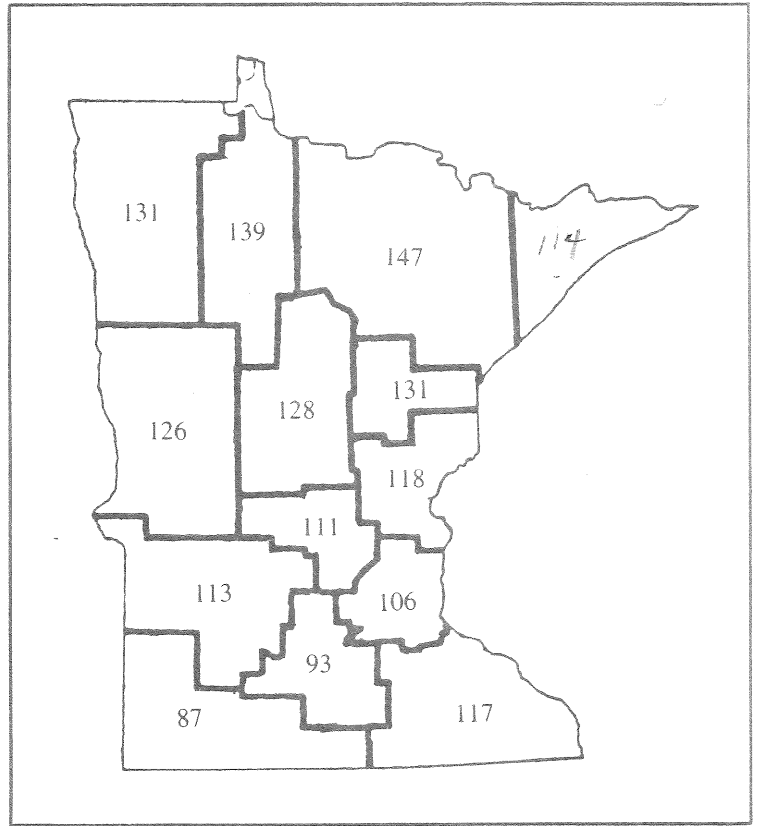
<i>Wetland Species</i>	<i>Prairie/Grassland Species</i>	<i>Northern Forest Species</i>
Horned grebe	Greater prairie chicken	Northern goshawk
Eared grebe	Burrowing owl	Northern hawk-owl
Little blue heron	Sprague's pipit	Long-eared owl
Cattle egret	Lark bunting	Boreal owl
Snowy egret	Baird's sparrow	<i>Other species</i>
Yellow-crowned night heron	Chestnut-collared longspur	Western wood pewee
King rail		<i>Southeastern forest species</i>
Piping plover		Acadian flycatcher
American avocet		Prothonotary warbler
Common gallinule		Turkey
		Carolina wren
		Louisiana water thrush

Table 3. Birds currently known or believed to breed in Minnesota, which were not counted on BBS routes from 1967-1979.

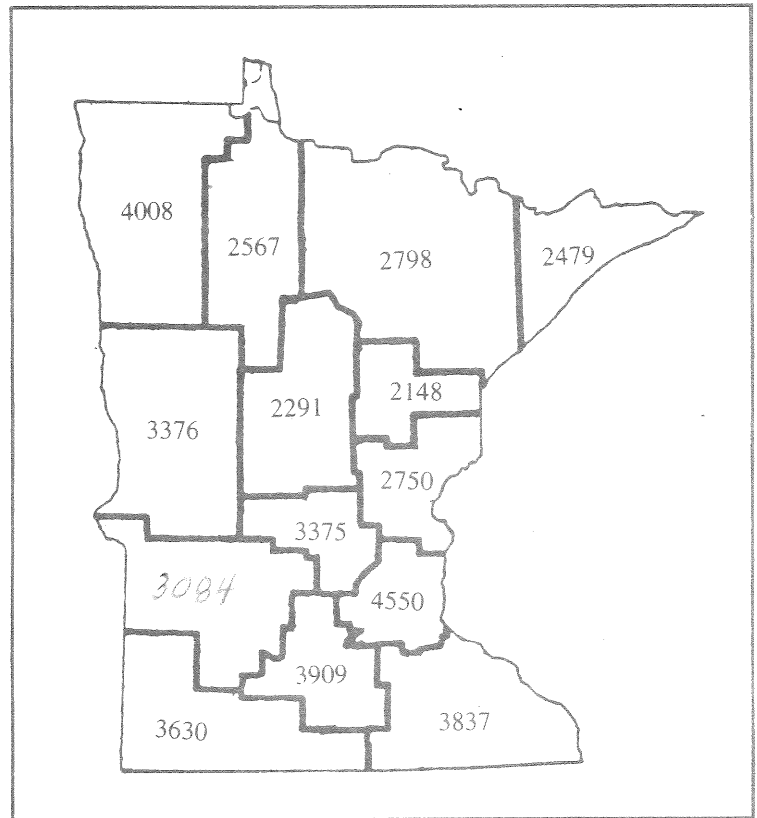
Figure B.

Number of species counted in each region and number of individuals counted per 100 miles in each region on BBS surveys, 1967 — 1979.

Total Species



Birds Per 100 miles



CONCLUSION

The U.S. Fish and Wildlife Service Breeding Bird Survey is an effective technique for assessing population trends and distribution of many species of Minnesota birds. This data can also be useful for drawing general conclusions about distribution, the relative abundance and species diversity of different regions if the limitations of the survey are recognized.

ACKNOWLEDGMENTS

Grateful appreciation is extended to Kim Eckert, Bob Janssen, Janet C. Green, Craig Faanes, and Danny Bystrak for reviewing the manuscript. Acknowledgments are also extended to Julie Reitter, Anita Manders, Dianne Vosick, and Mary Miller for assisting with the data tallying and report preparation. Cover art is by Walter J. Breckenridge. Special thanks and recognition are due to the 70 cooperators of the Minnesota Breeding Bird Survey from 1967 to 1979 who have contributed their efforts and expertise to increase our knowledge of Minnesota's breeding birds.

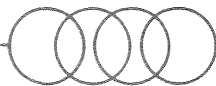
Josephine G. Blanich
A. A. Bolduc
Donald A. Bolduc
David M. Bosanko
Walter J. Breckenridge
P. E. Bremer
Charles S. Buer
Doug D. Campbell
Elizabeth M. Campbell
Marjorie M. Carr
Bruce S. Davis
Deanna K. Dawson
Kim R. Eckert
Roger Eliason
Adela A. Elwell
John P. Feehan
R. W. Ficken
Don J. Fiedler
Lee K. French
Merrill J. Frydendall
Raymond A. Glassel
Janet C. Green
Jerome J. Gresser
Lee H. Grimm
Helen S. Hatelid

Arthur S. Hawkins
Arthur S. Hawkins, Jr.
Lyle A. Herzog
Edmund A. Hibbard
Nester M. Hiemenz
Bruce A. Hitman
Pershing B. Hofslund
Harding F. Huber
Robert B. Janssen
Oscar L. Johnson
Oscar W. Johnson
Frank F. Kelley
John F. Kelley
Kenneth Krumm
Ruth D. Kuchta
Henry C. Kyllingstad
Goodman K. Larson
E. A. LeFebure
Frederick Z. Leshner
William Litkey
Mrs. S. E. Maertens
Donald G. Mahle
John E. Mathisen
J. F. Mehner
Harriet I. Micensky

Steven P. Millard
Gerald J. Niemi
James L. Norman
Richard J. Oehlenschlager
Gary L. Otnes
Harold T. Peters
Lee A. Pfannmuller
Bruce A. Porisch
L. S. Rayan
Terry L. Savaloja
John L. Schladweiler
J. A. Schliep
Thomas C. Sobolik
Shelley A. Steva
Ernest H. Strubbe
Ben L. Thoma
Sarah S. Vasse
Theodore Voelker
Richard A. Wachtler
Jane N. West

LITERATURE CITED

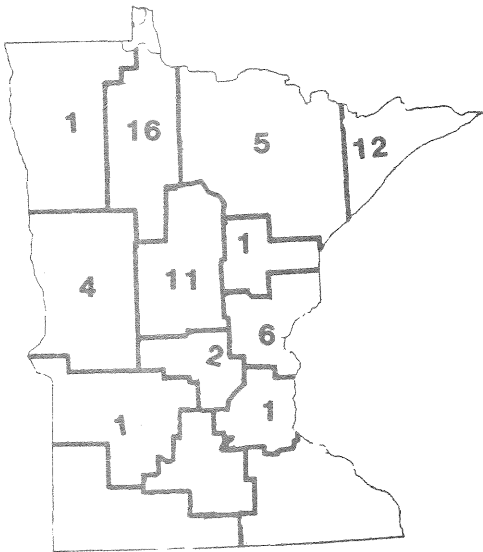
- Dasmann, Raymond F., *A Different Kind of Country*. The Macmillan Co. New York, 1968, 276 pp.
- Green, Janet C. and R. B. Janssen. *Minnesota Birds: Where, When and How Many*. UMN Press, Mpls. 1975, 217 pp.
- Henderson, C. L. *Breeding Birds in Minnesota, 1975-1979: Abundance, Distribution, and Diversity*. Loon 53(1): 11-49. 1981.
- Janssen, B. *Minnesota Breeding Bird Surveys: A Summary*. Loon 51(2); 64-70. 1979.
- Zimmerman, J. L. *Ten Year Summary of the Kansas Breeding Bird Survey: an Overview*. Kansas Ornith. Soc. Bull. 29(4): 26-31. 1978.



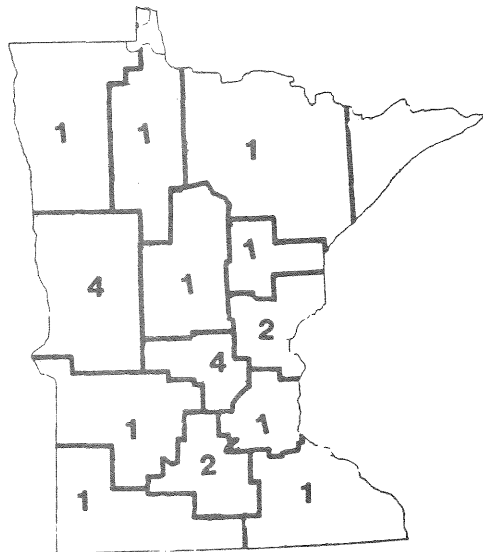
APPENDIX

Relative Abundance and Distribution of Breeding Birds in Minnesota. All numbers refer to number of birds counted per 100 miles on BBS routes. Pages 9-32.

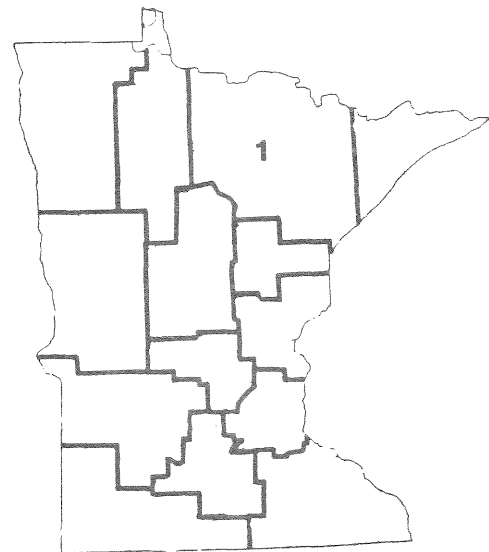
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



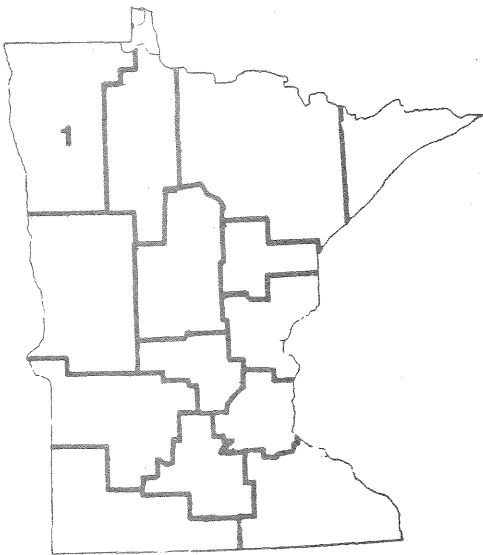
Common loon



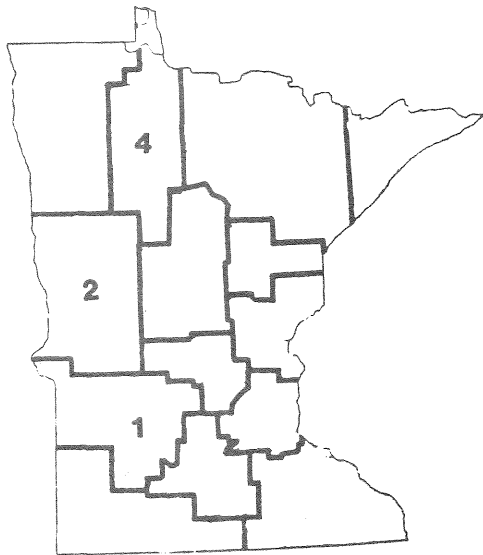
Pied-billed grebe



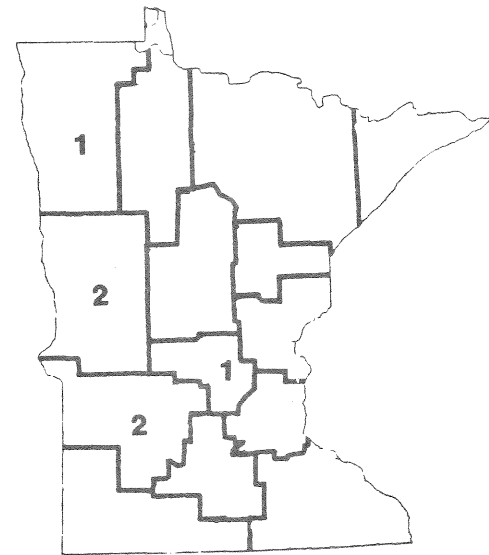
Red-necked grebe



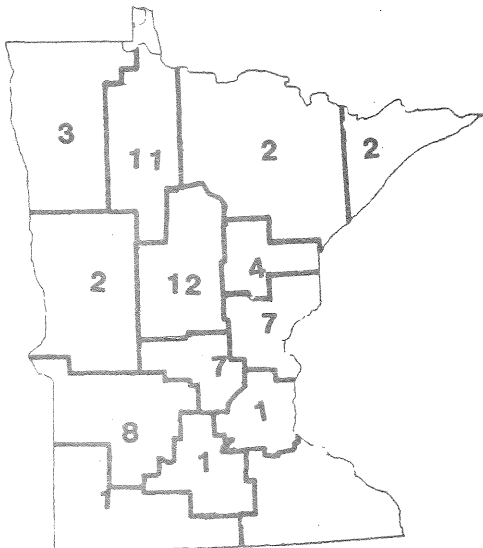
Western grebe



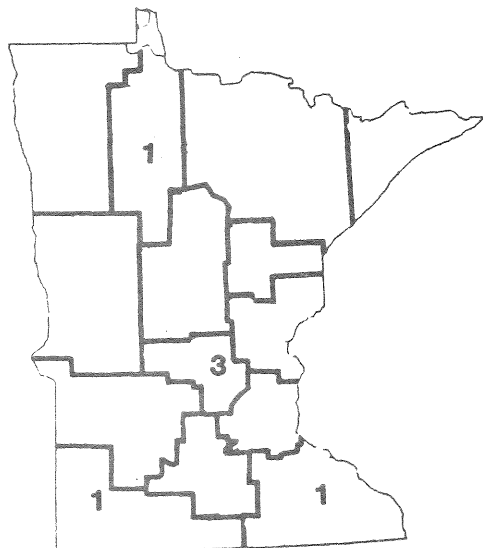
American white pelican



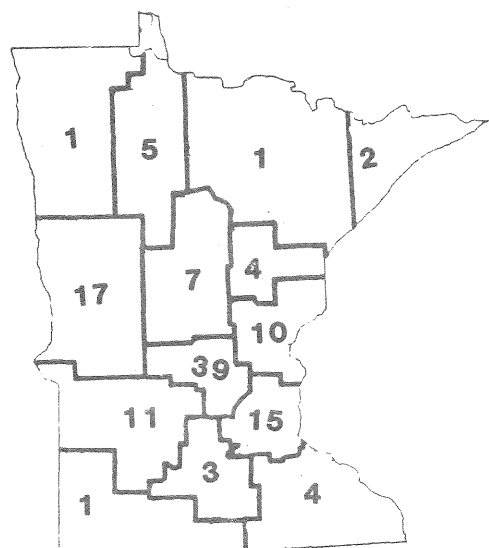
Double-crested cormorant



American bittern

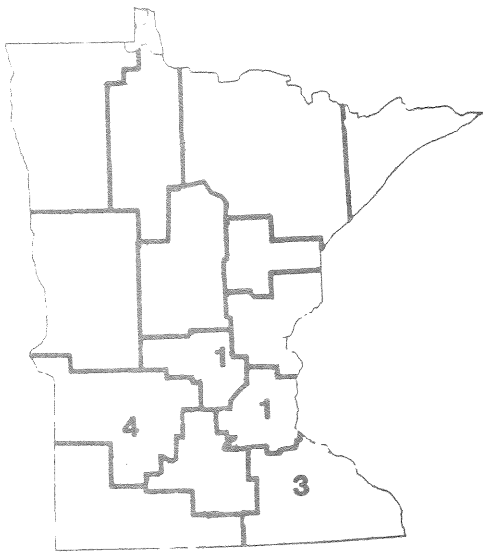


Least bittern

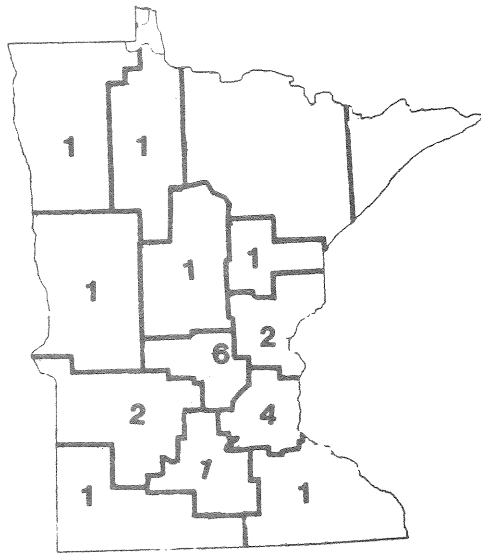


Great blue heron

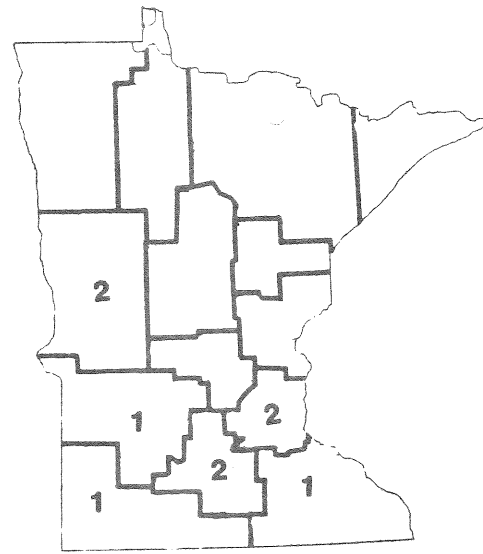
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



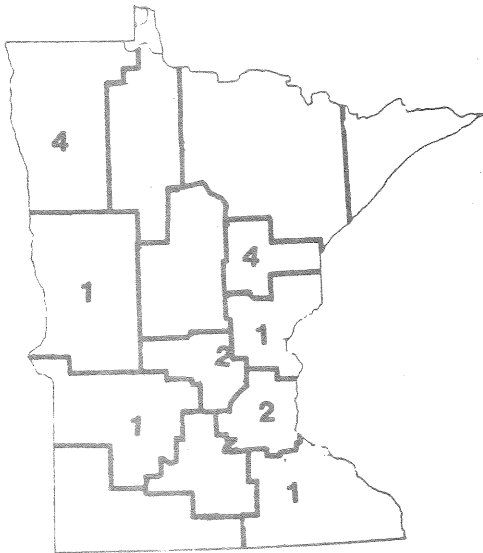
Great egret



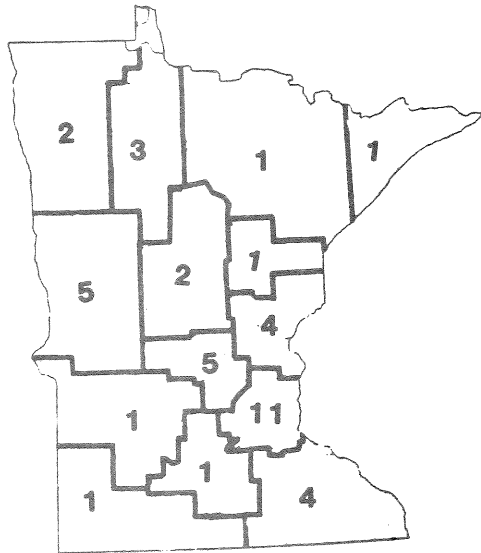
Green-backed heron



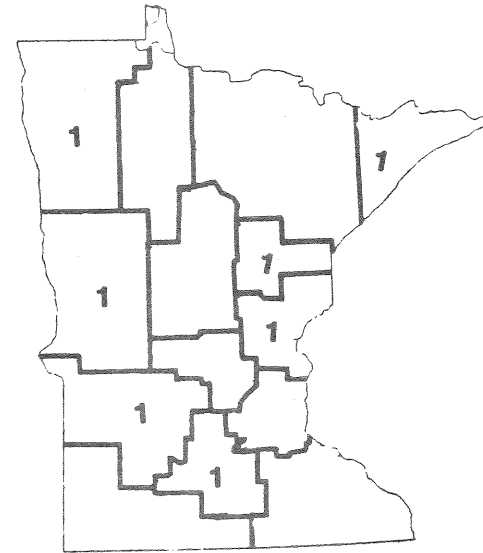
Black-crowned night heron



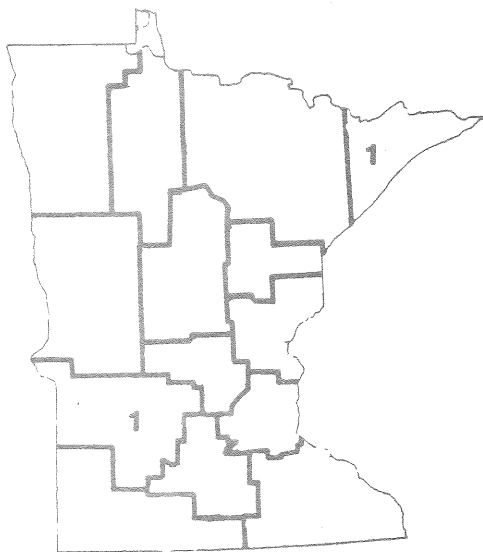
Canada goose



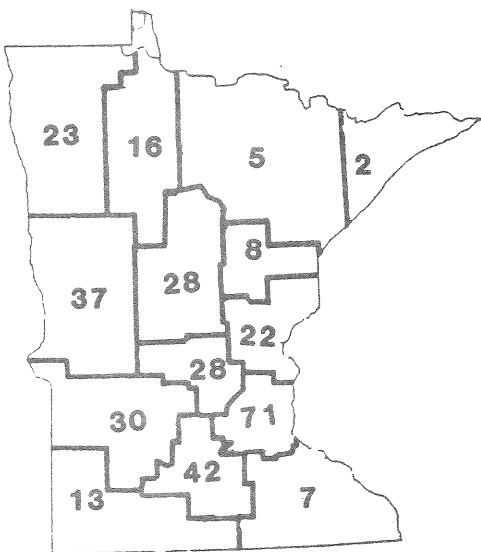
Wood duck



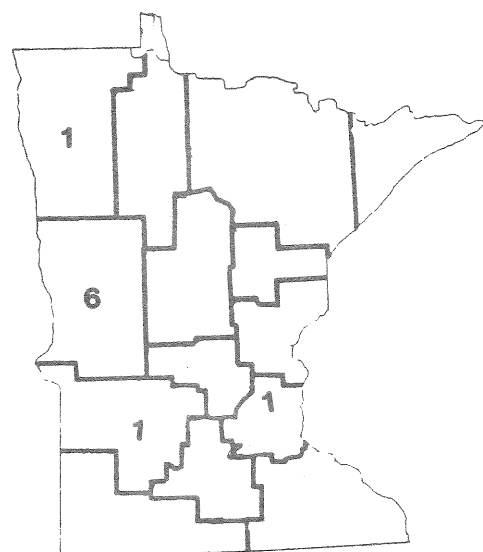
Green-winged teal



American black duck

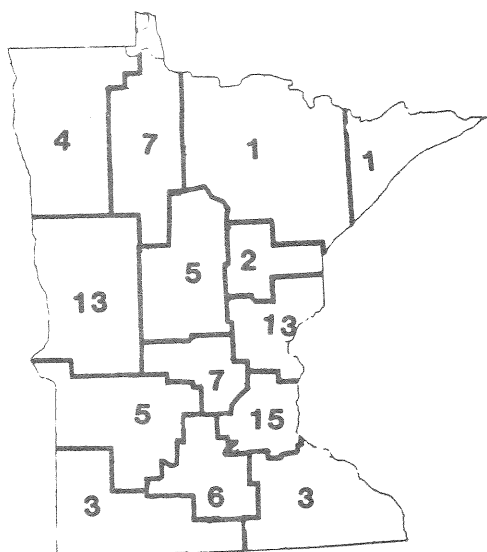


Mallard

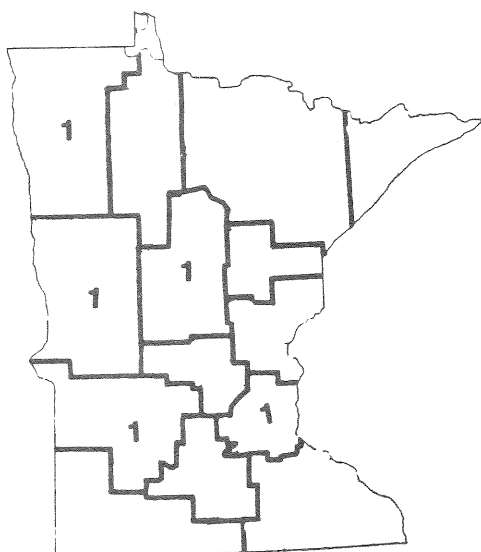


Northern pintail

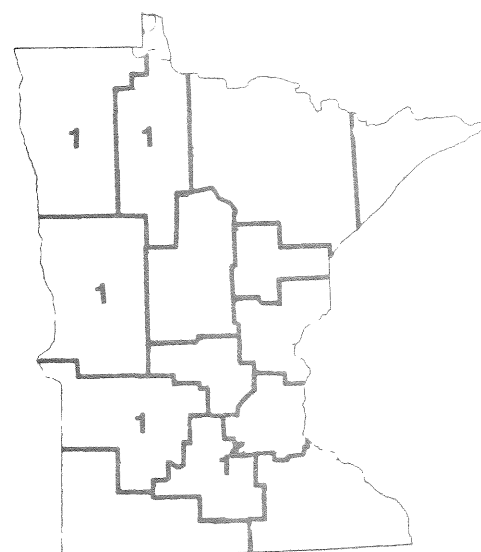
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



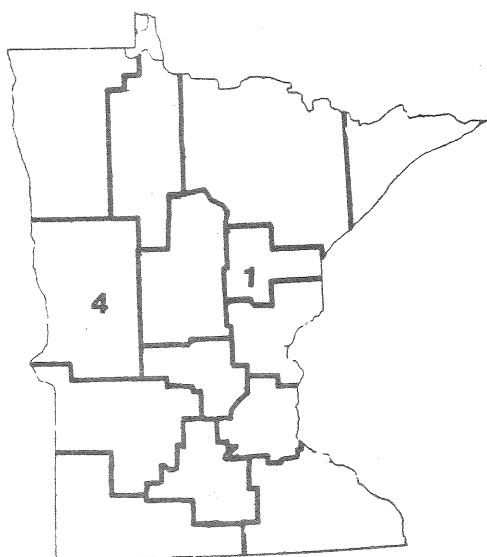
Blue-winged teal



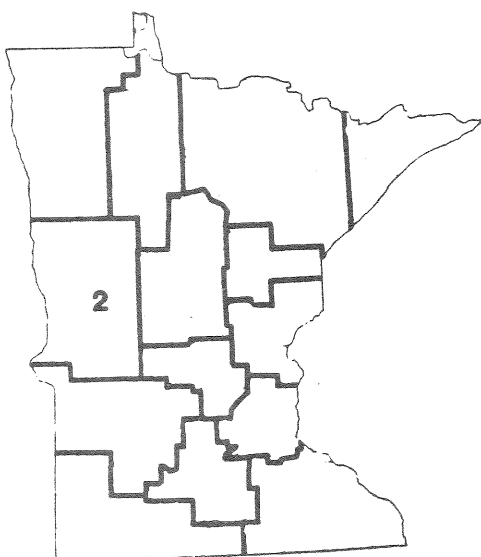
Northern shoveler



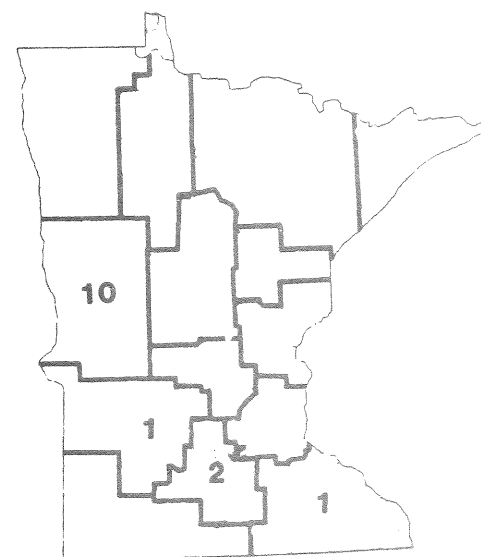
Gadwall



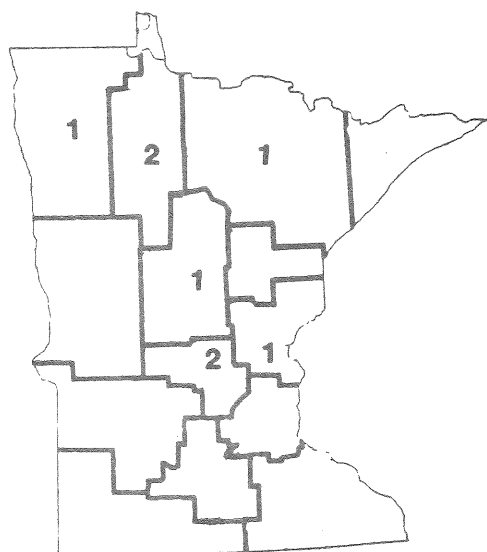
American wigeon



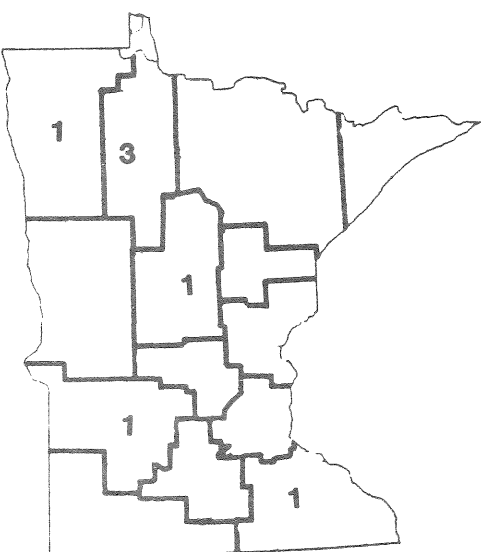
Canvasback



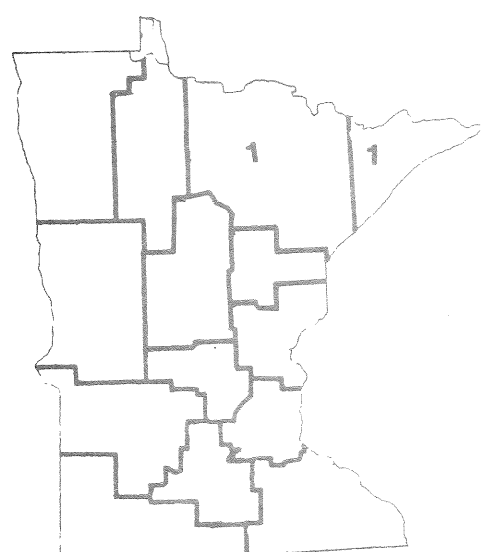
Redhead



Ring-necked duck

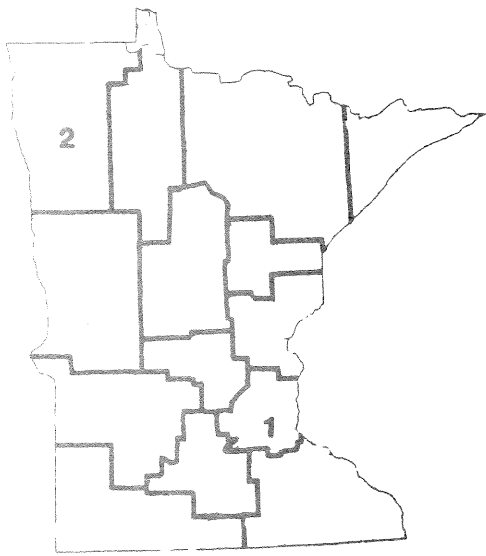


Lesser scaup

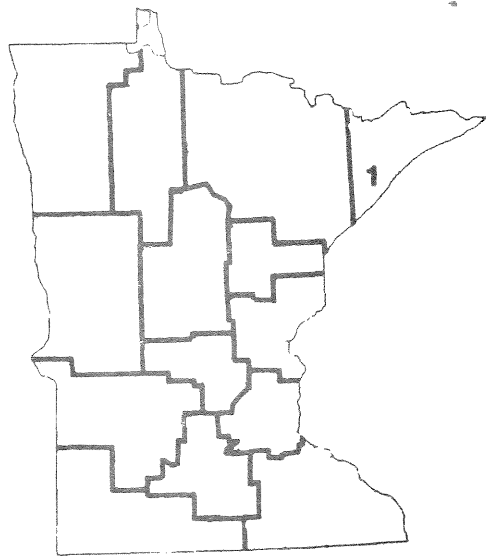


Common goldeneye

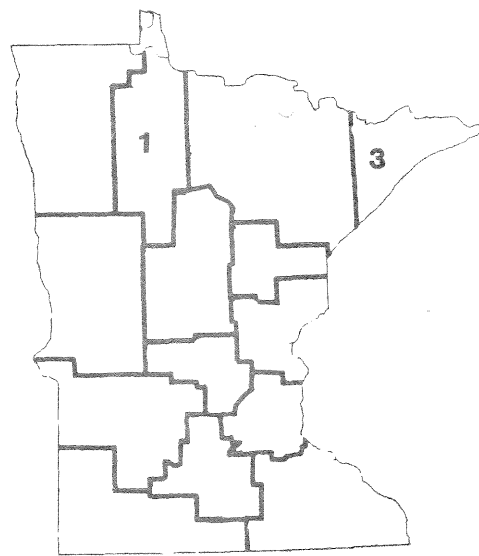
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



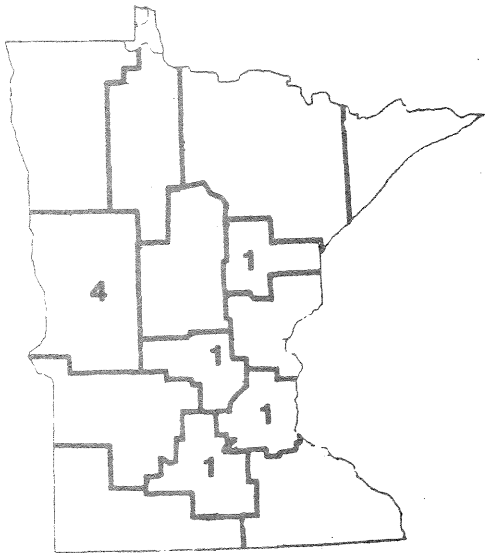
Hooded merganser



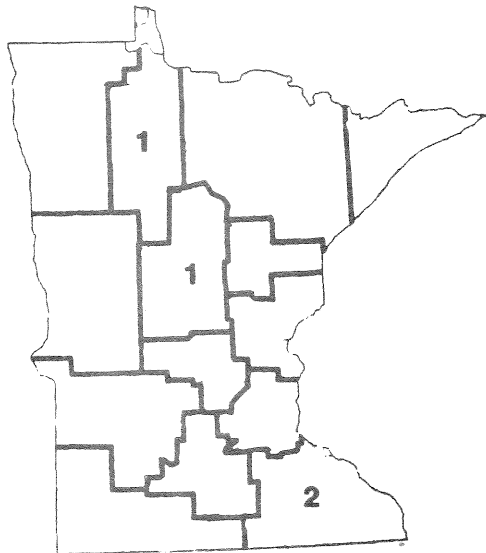
Common merganser



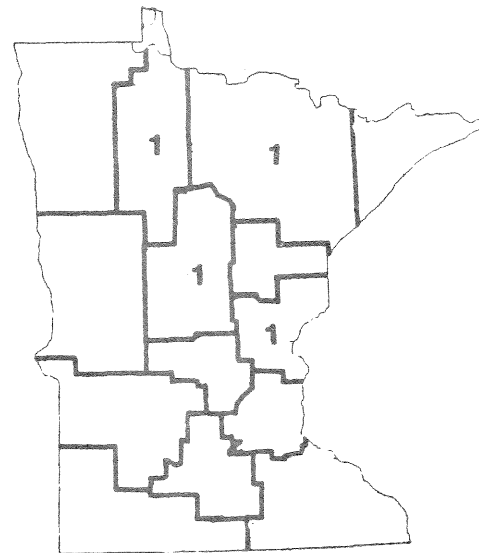
Red-breasted merganser



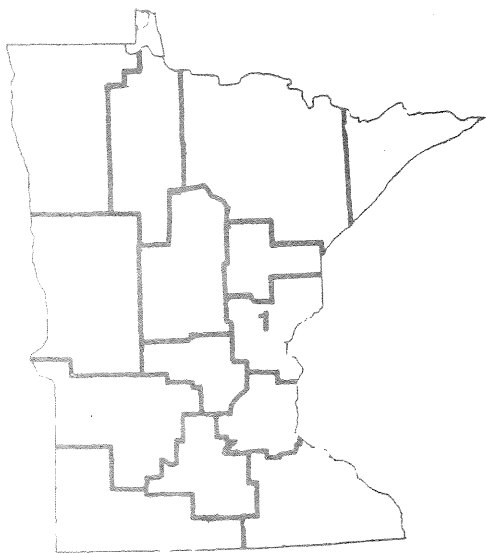
Ruddy duck



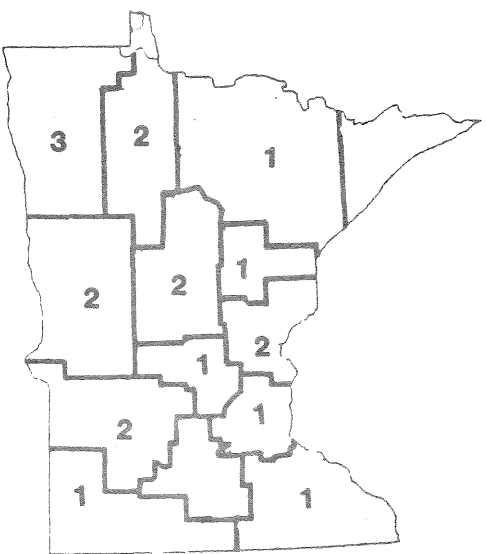
Turkey vulture



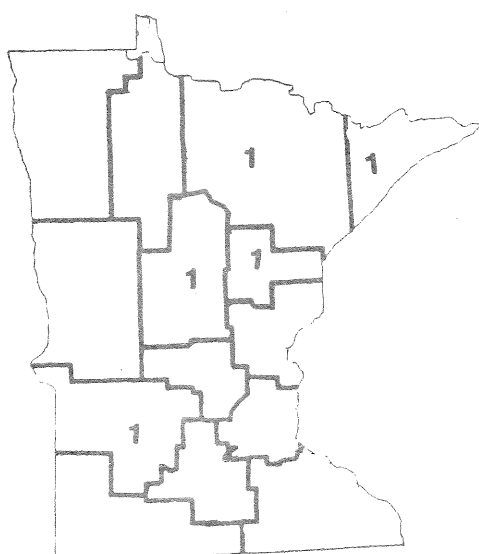
Osprey



Bald eagle

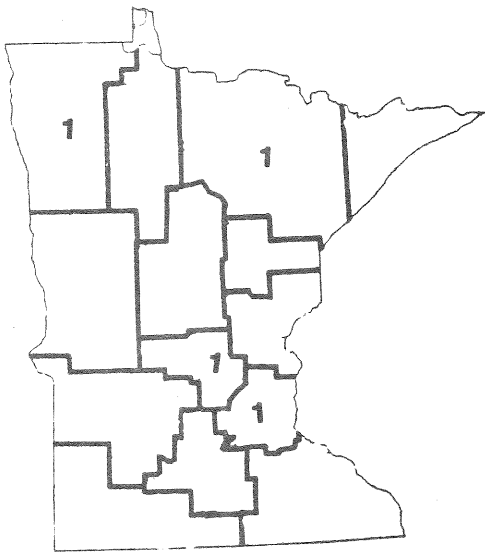


Northern harrier

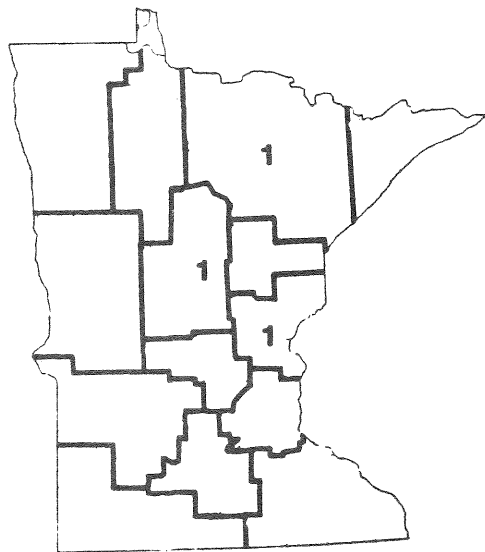


Sharp-shitned hawk

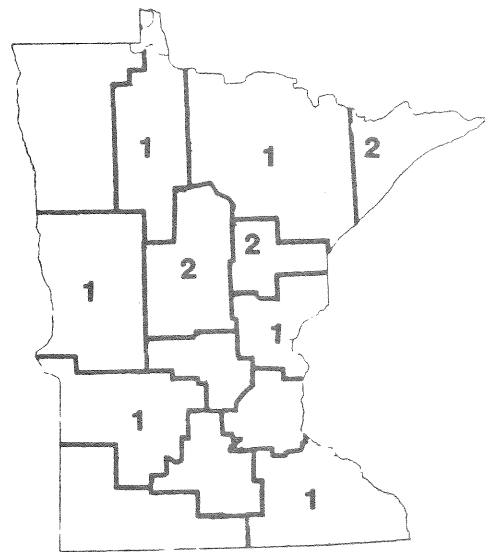
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



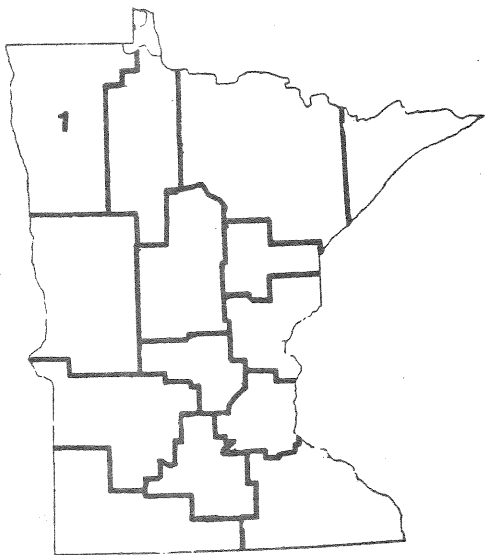
Cooper's hawk



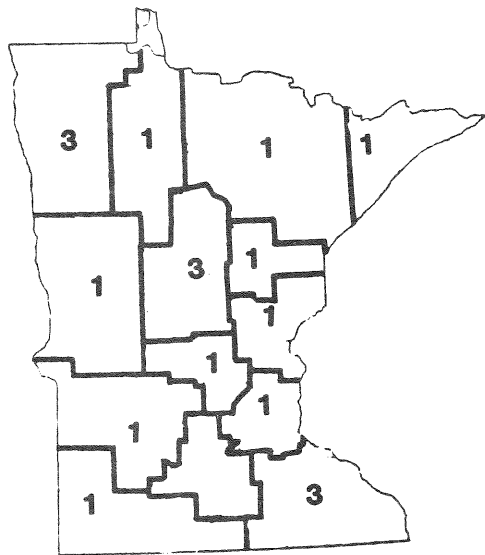
Red-shouldered hawk



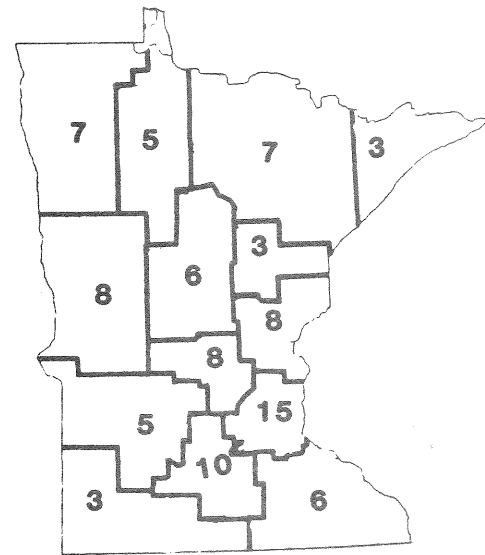
Broad-winged hawk



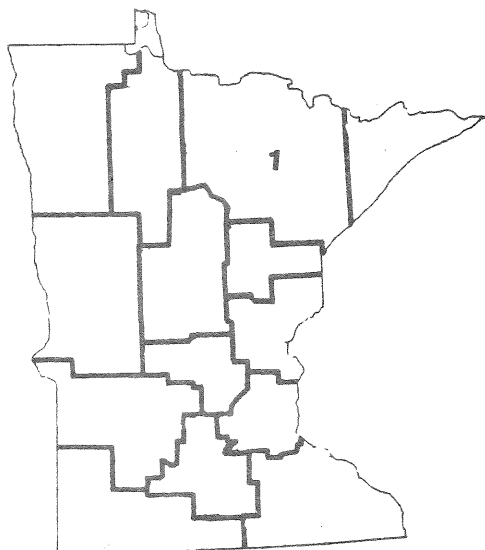
Swainson's hawk



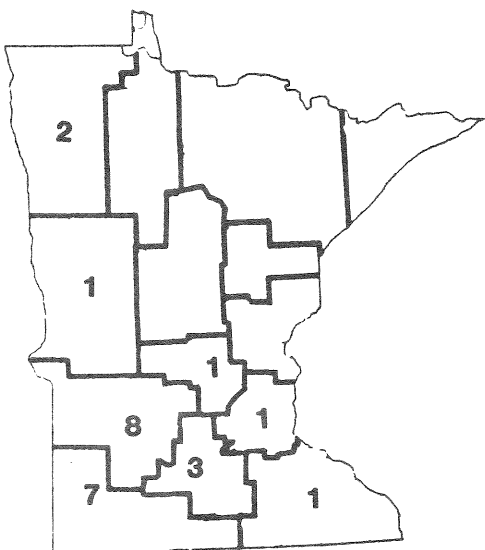
Red-tailed hawk



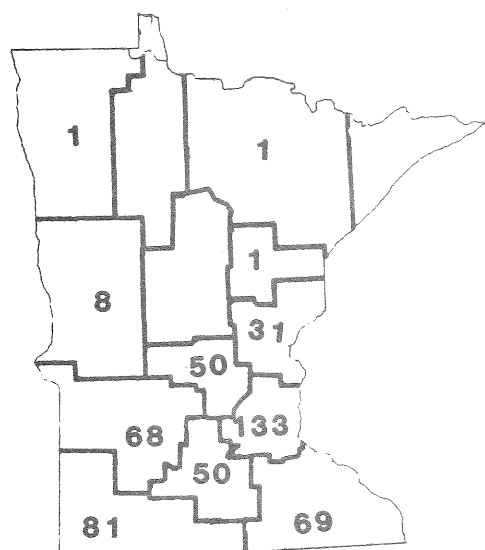
American kestrel



Merlin

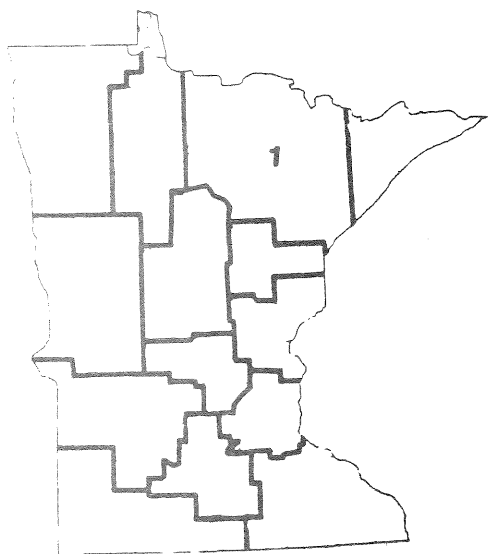


Gray partridge

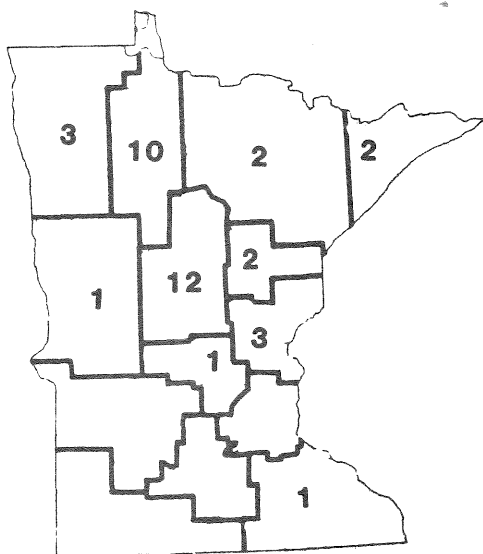


Ring-necked pheasant

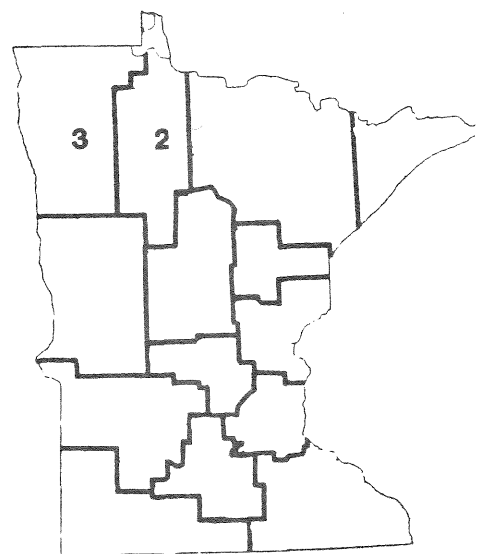
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



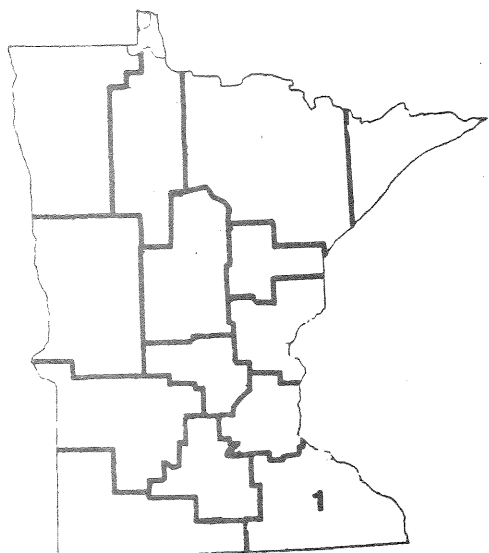
Spruce grouse



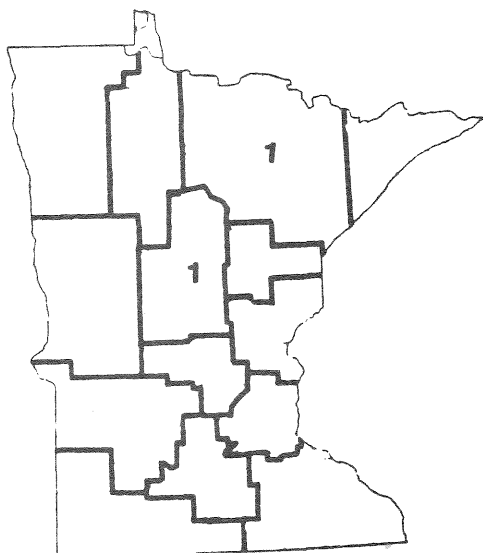
Ruffed grouse



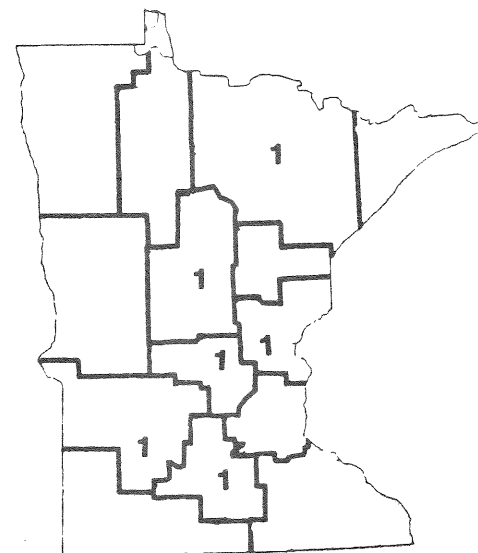
Sharp-tailed grouse



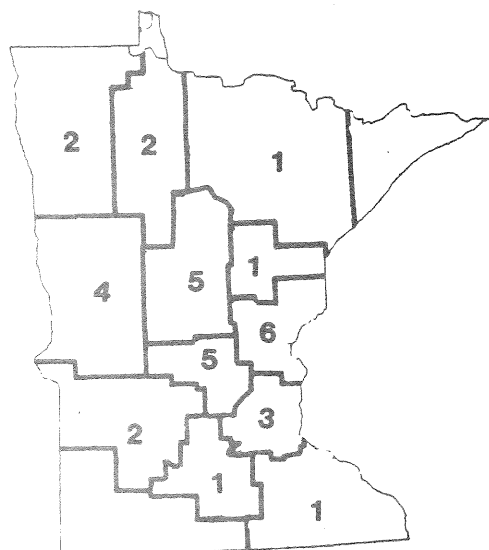
Northern bobwhite



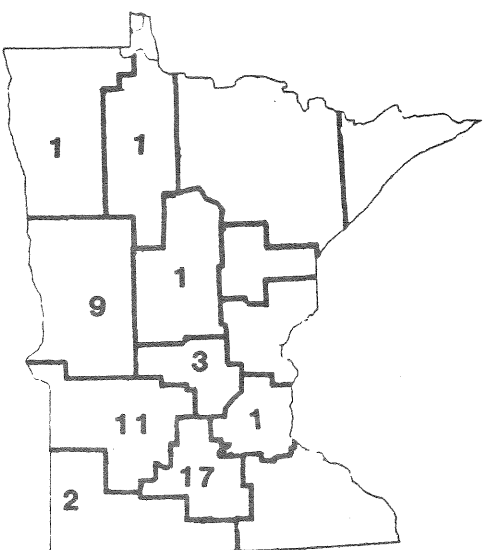
Yellow rail



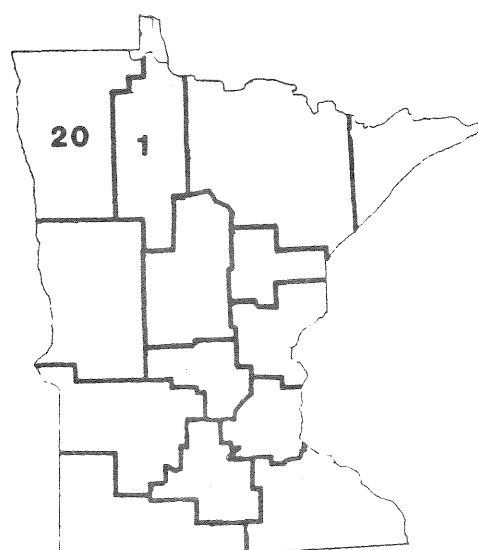
Virginia rail



Sora

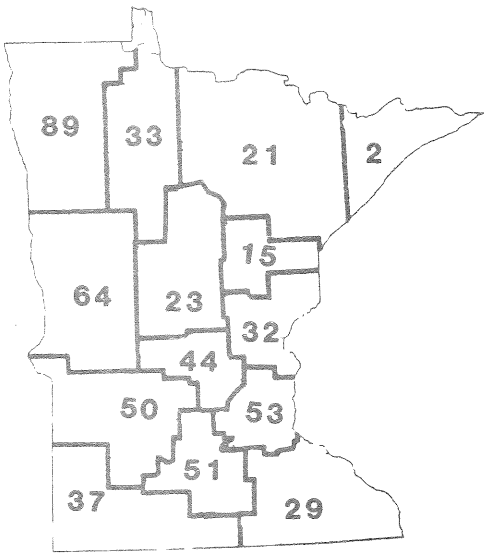


American coot

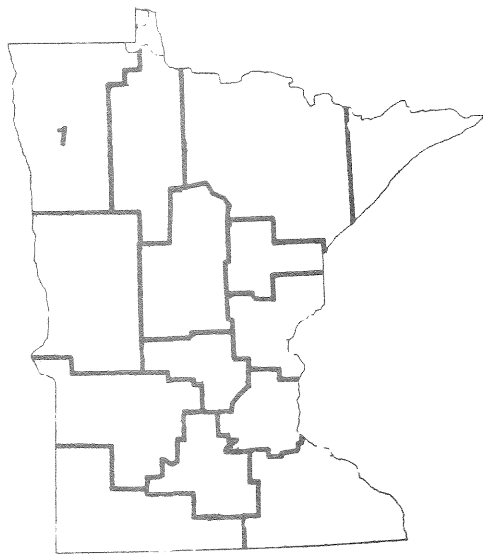


Sandhill crane

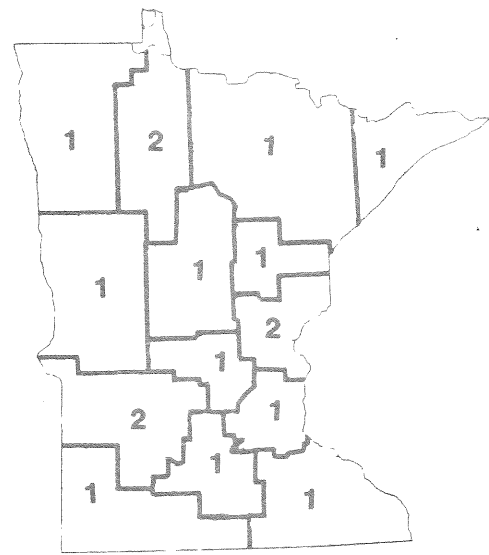
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



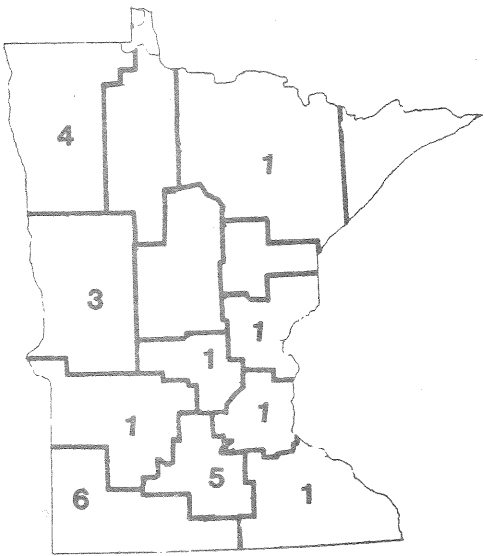
Killdeer



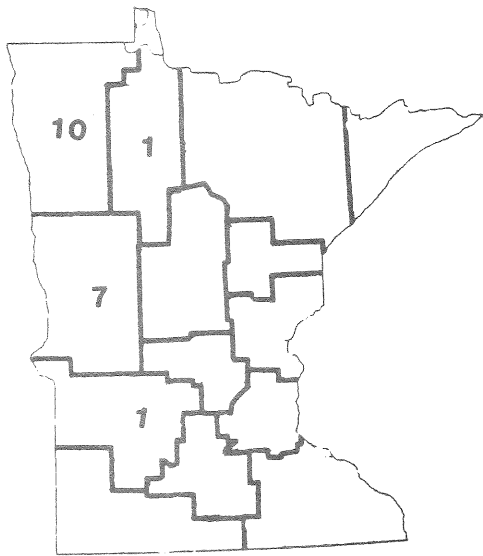
Solitary sandpiper



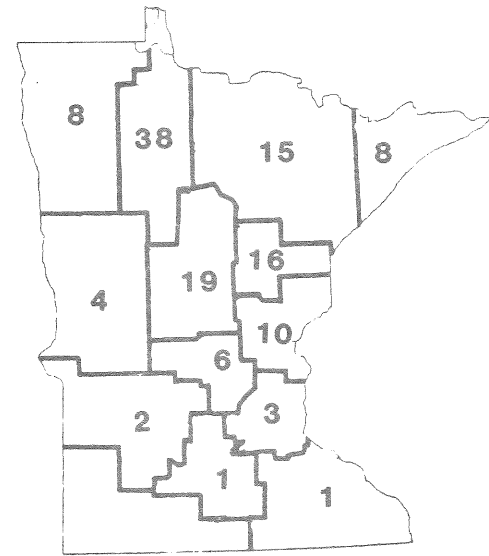
Spotted sandpiper



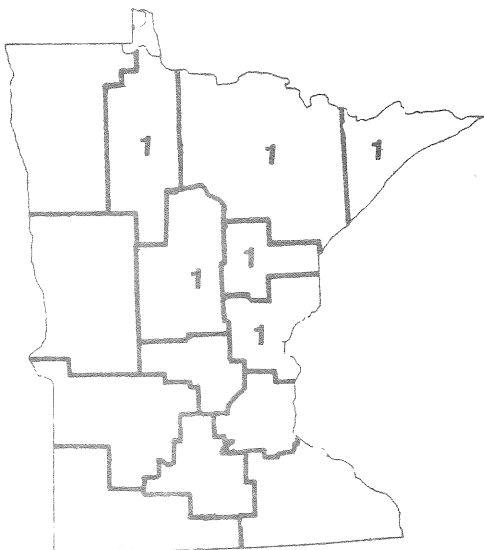
Upland sandpiper



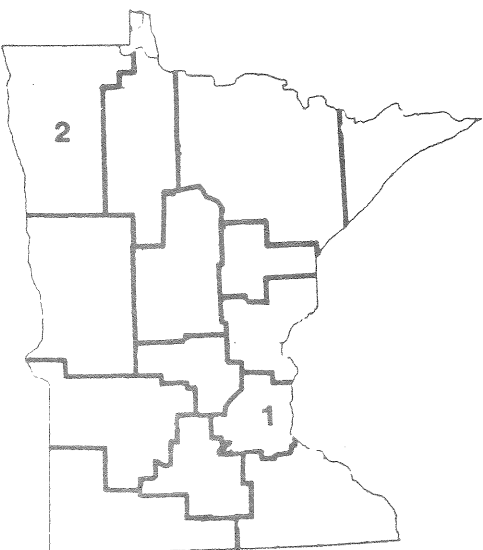
Marbled godwit



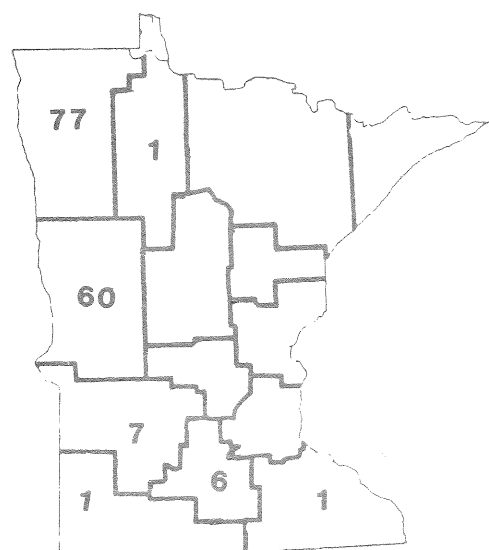
Common snipe



American woodcock

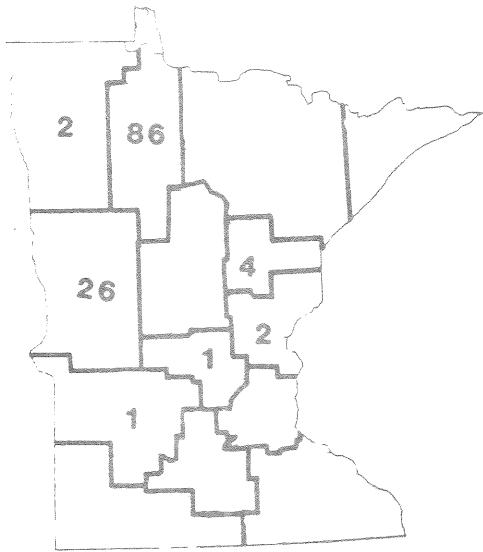


Wilson's phalarope

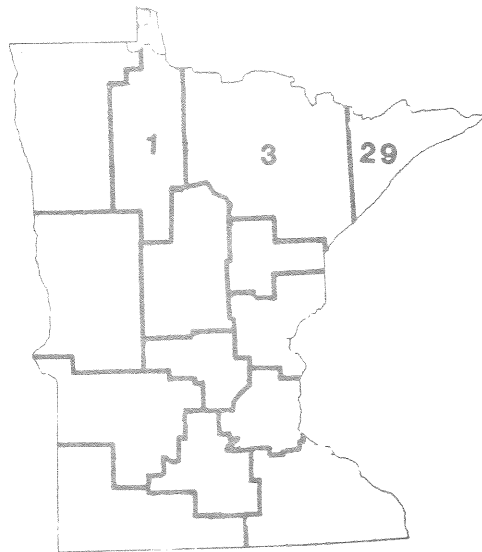


Franklin's gull

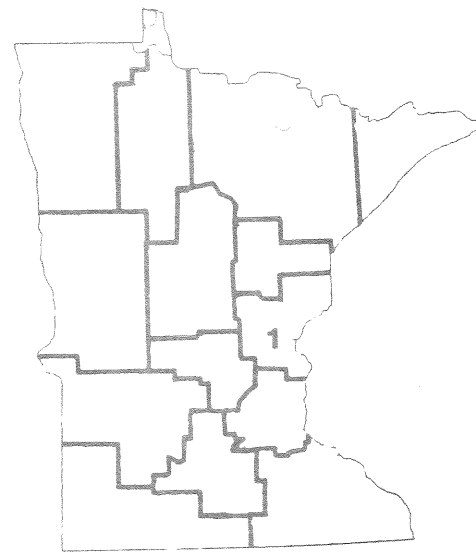
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



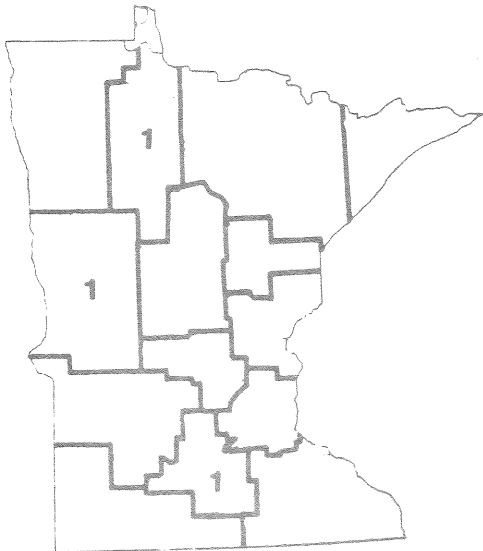
Ring-billed gull



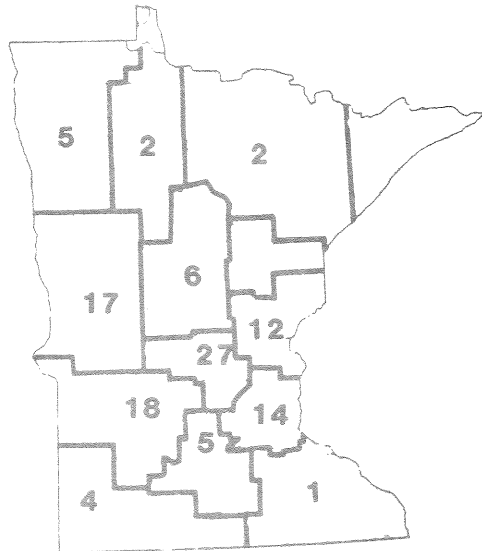
Herring gull



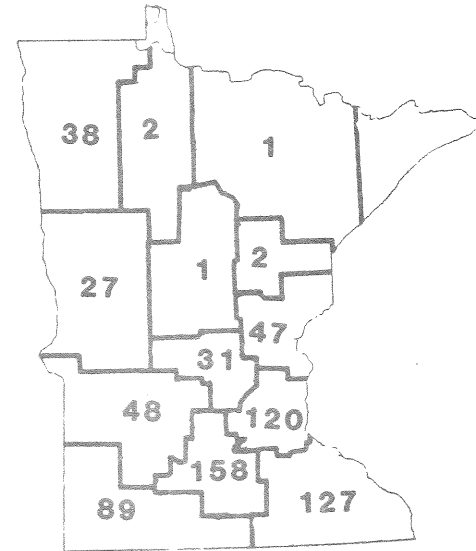
Common tern



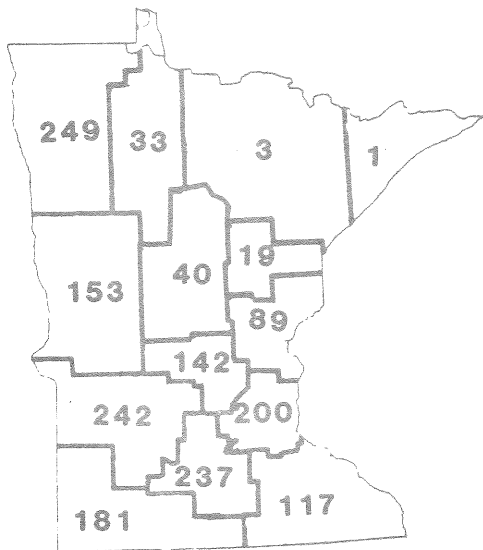
Forster's tern



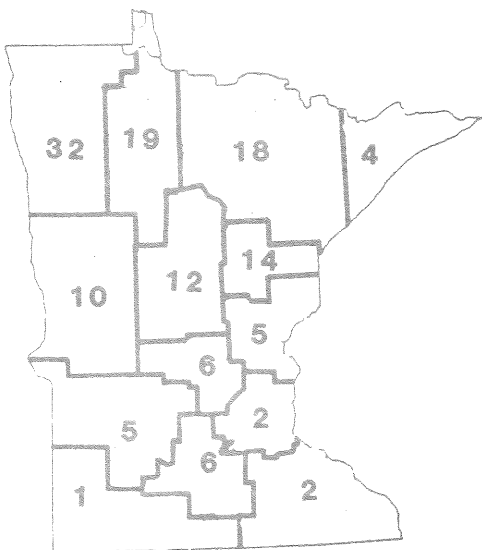
Black tern



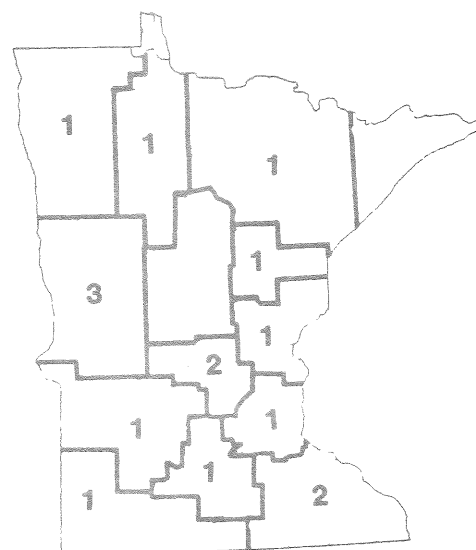
Rock dove



Mourning dove

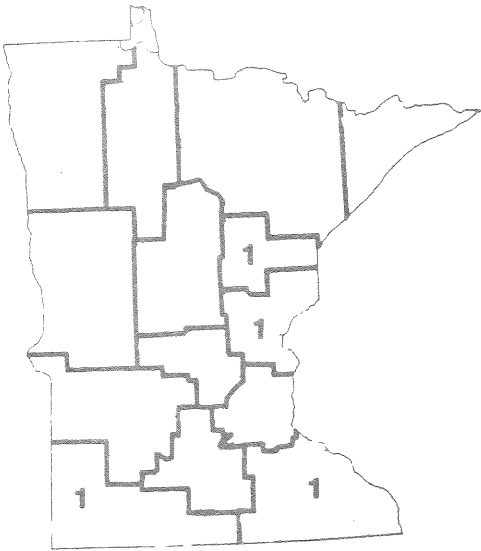


Black-billed cuckoo

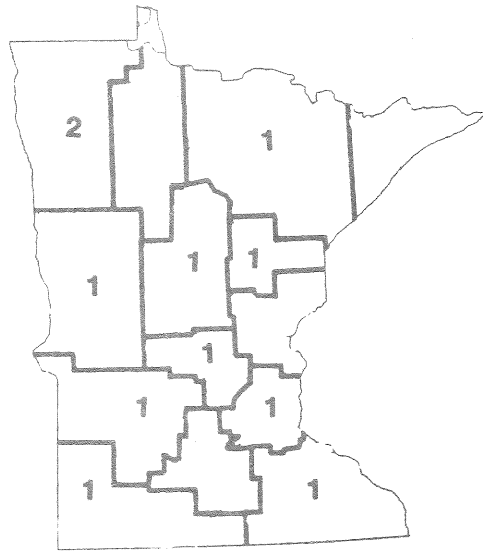


Yellow-billed cuckoo

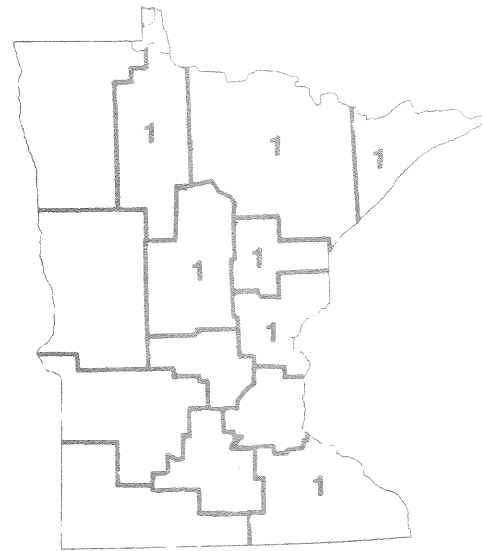
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



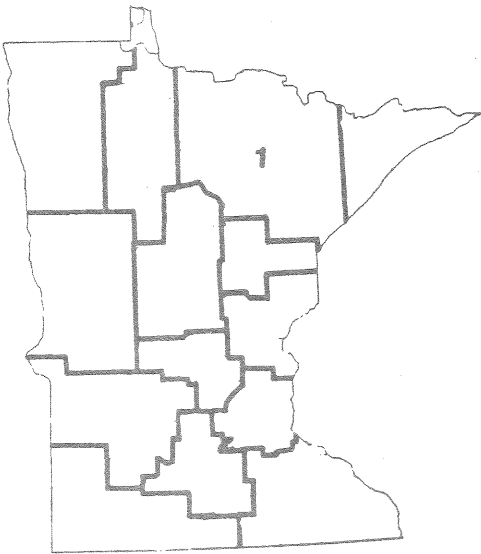
Eastern screech owl



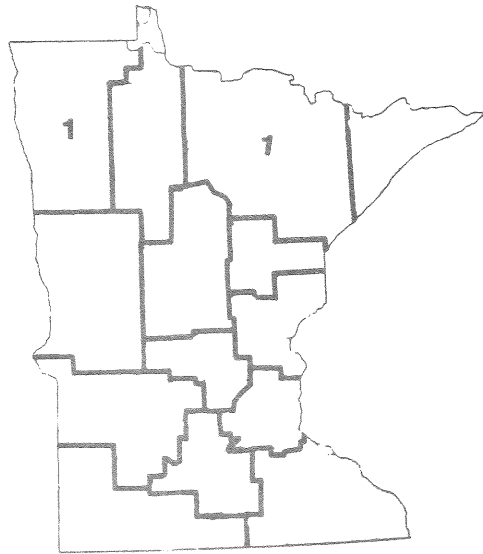
Great horned owl



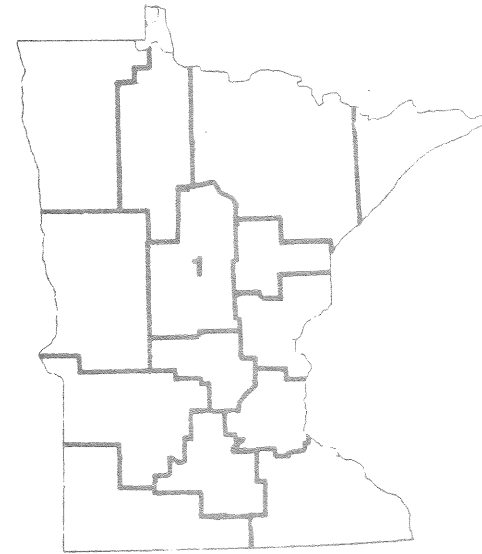
Barred owl



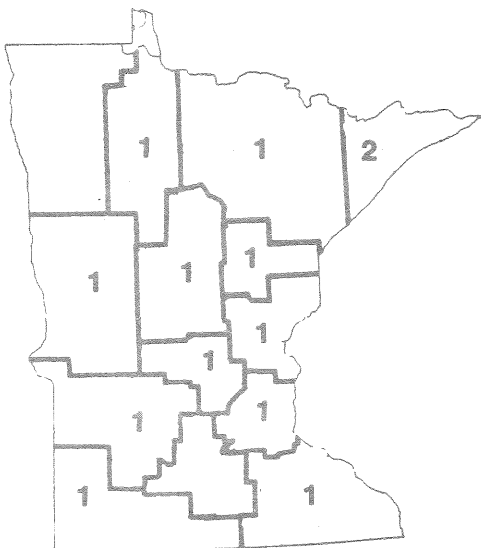
Great gray owl



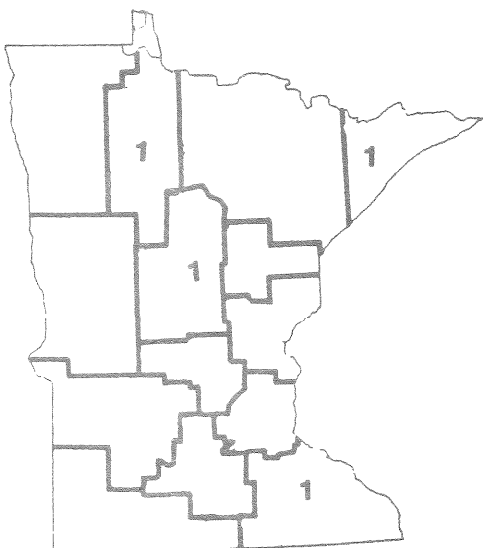
Short-eared owl



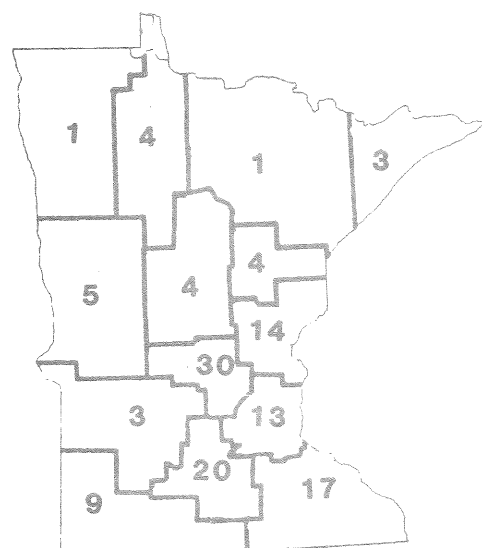
Northern saw-whet owl



Common nighthawk

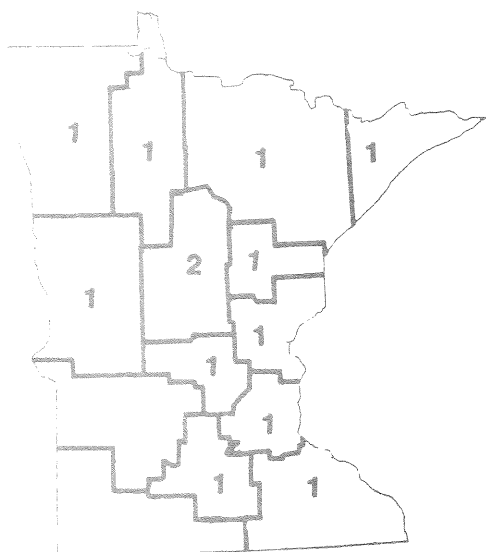


Whip-poor-will

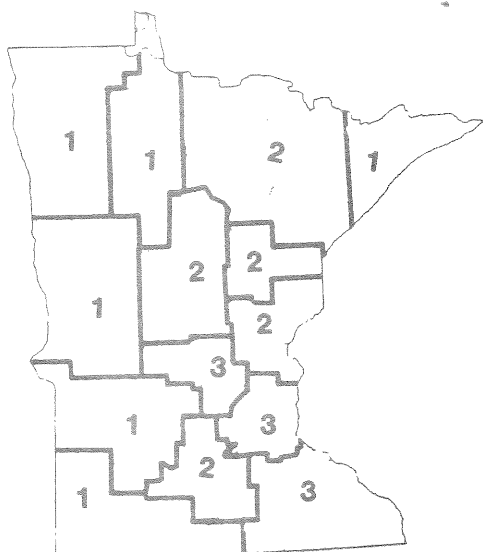


Chimney swift

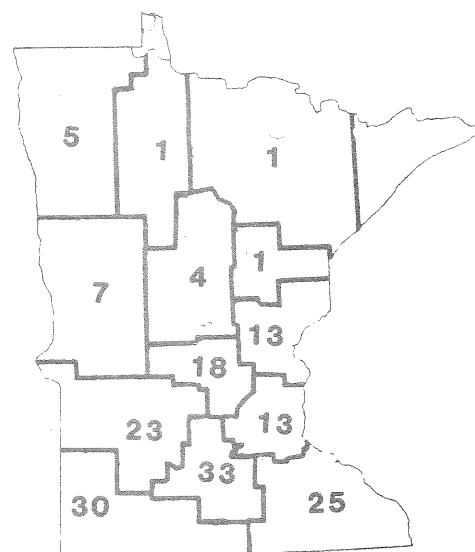
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



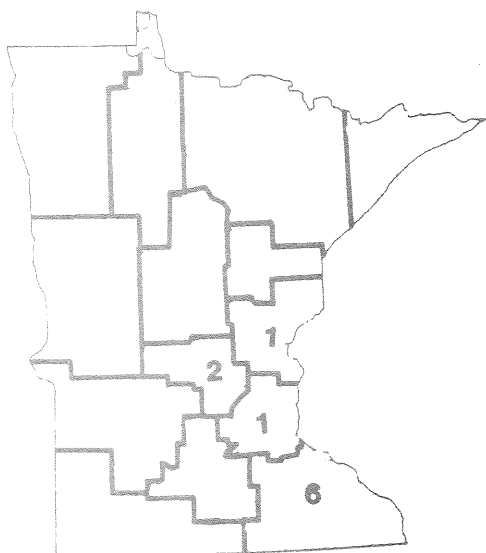
Ruby-throated hummingbird



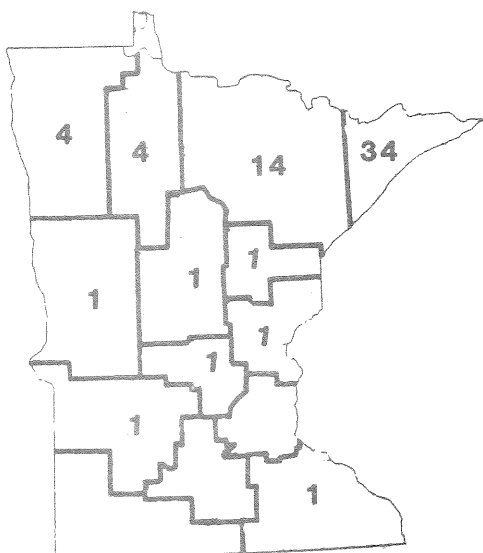
Belted kingfisher



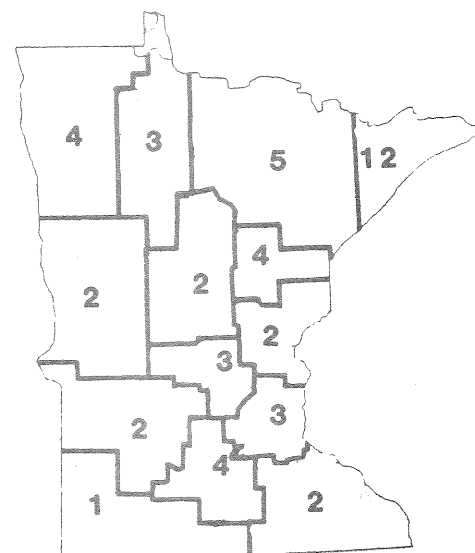
Red-headed woodpecker



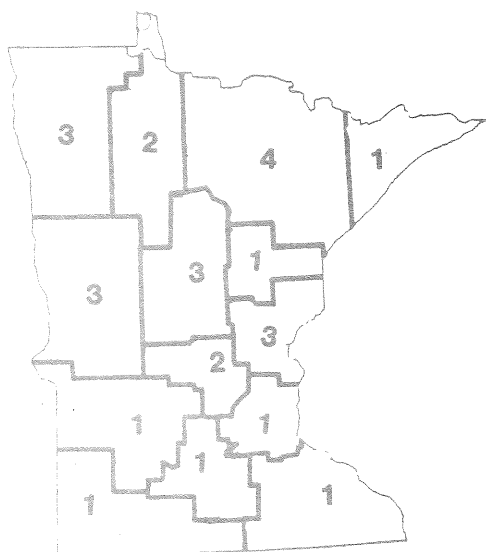
Red-bellied woodpecker



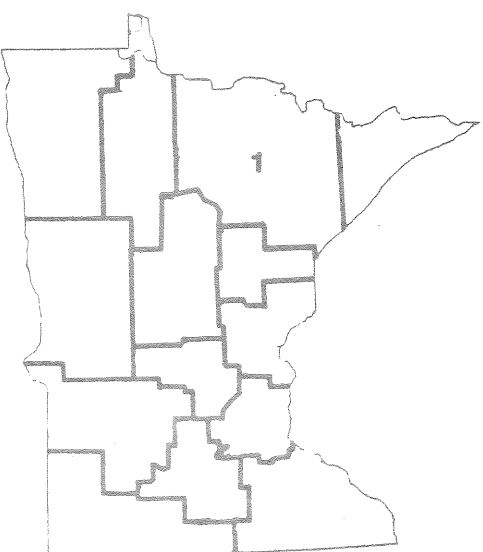
Yellow-bellied sapsucker



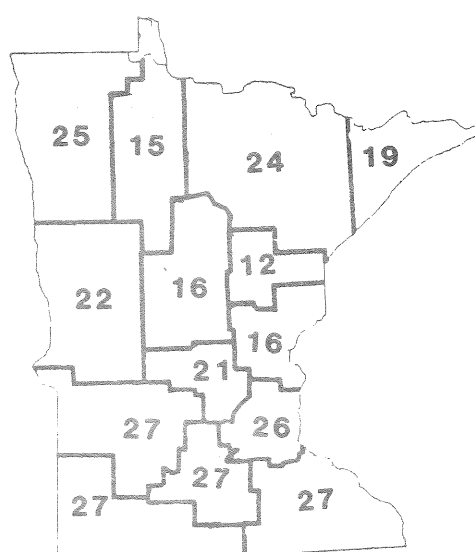
Downy woodpecker



Hairy woodpecker

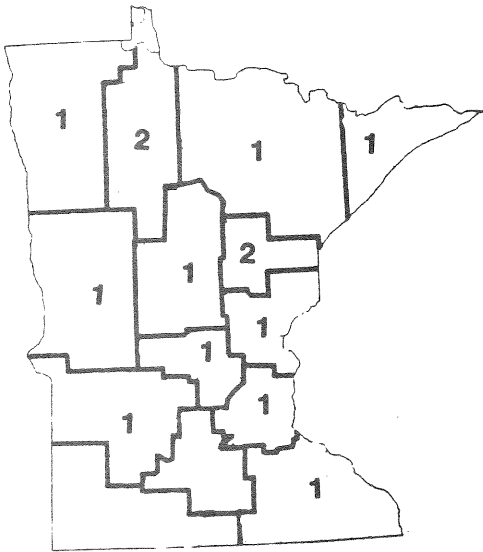


Black-backed woodpecker

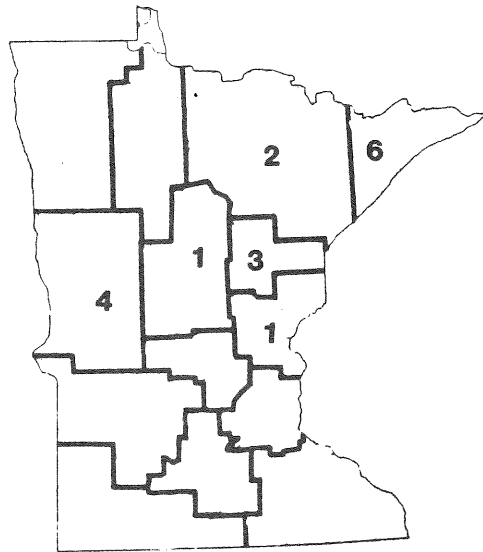


Northern flicker

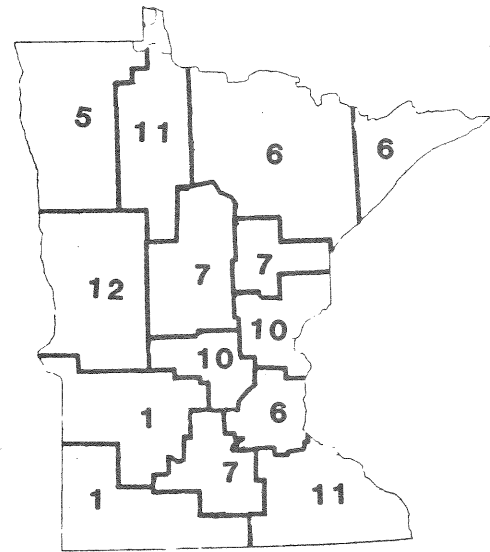
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



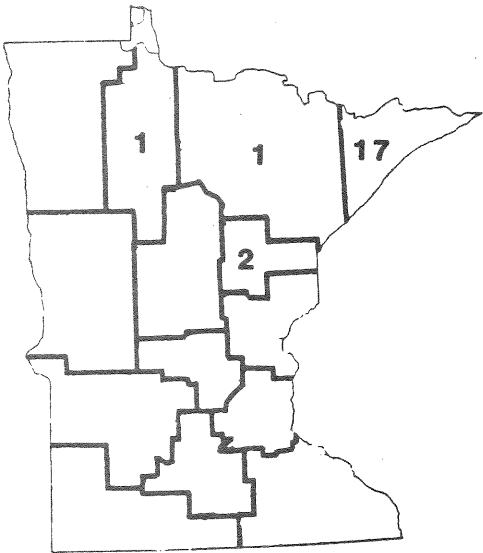
Pileated woodpecker



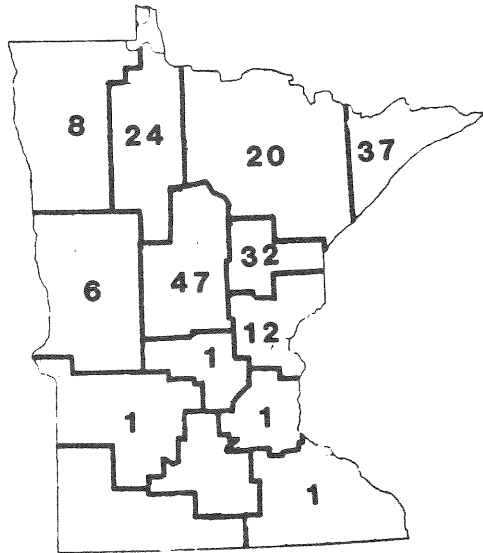
Olive-sided flycatcher



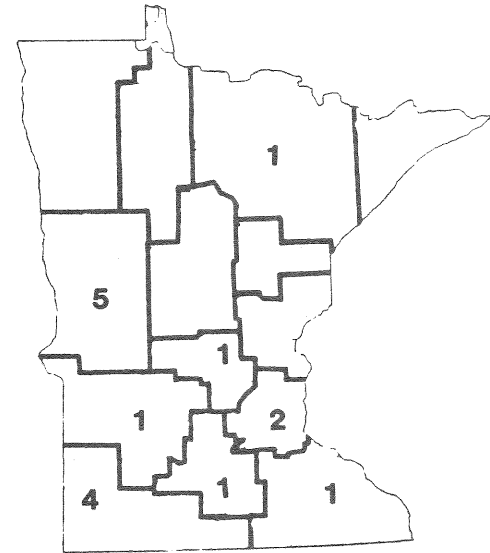
Eastern wood pewee



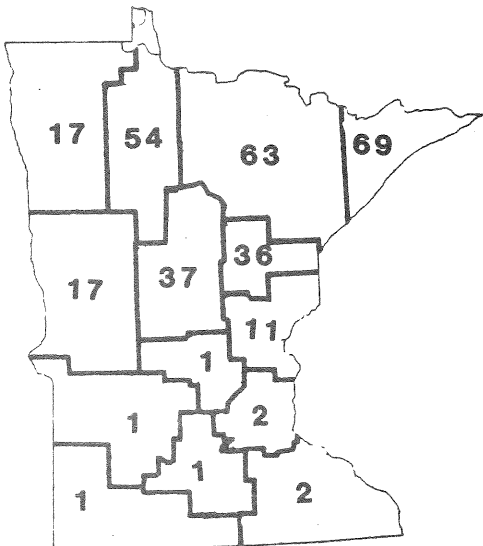
Yellow-bellied flycatcher



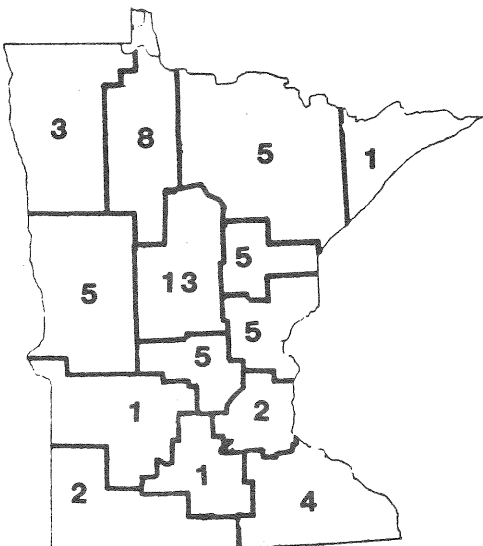
Alder flycatcher



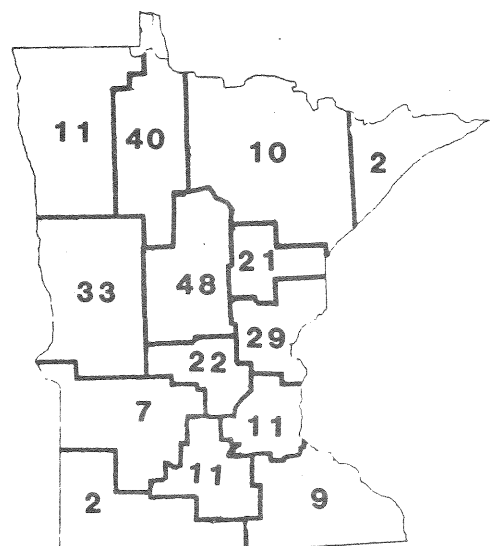
Willow flycatcher



Least flycatcher

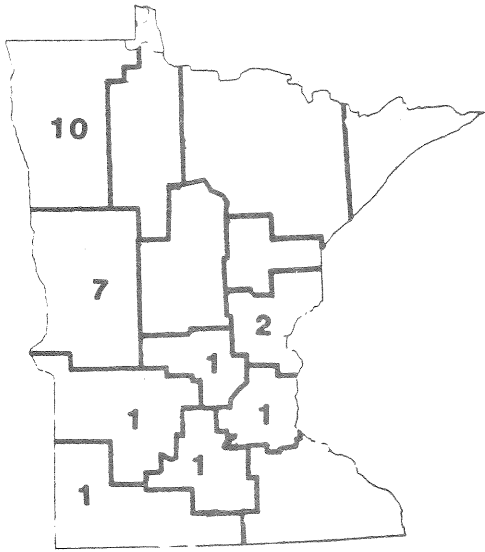


Eastern phoebe

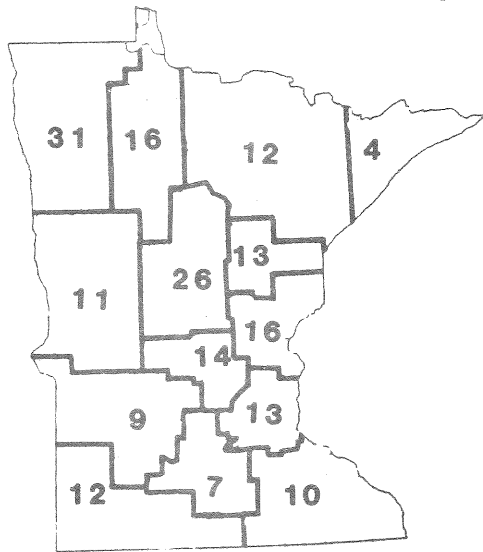


Great crested flycatcher

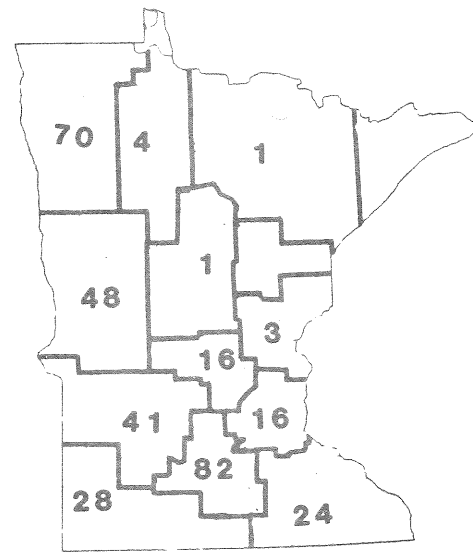
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



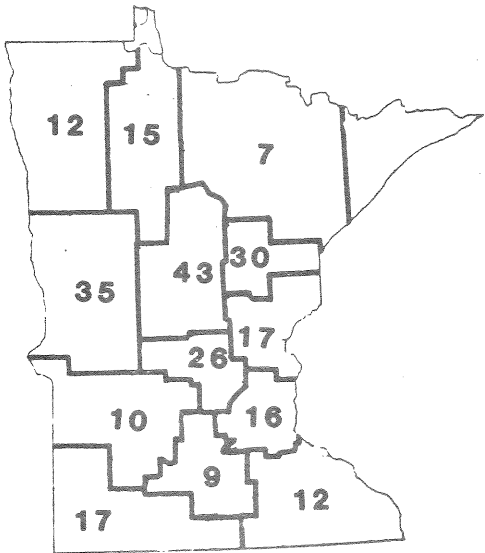
Western kingbird



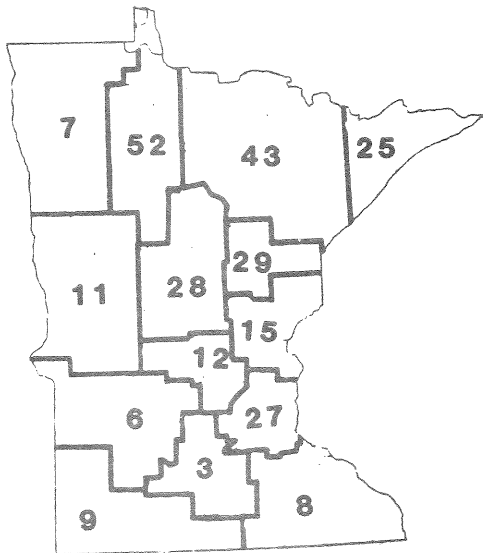
Eastern kingbird



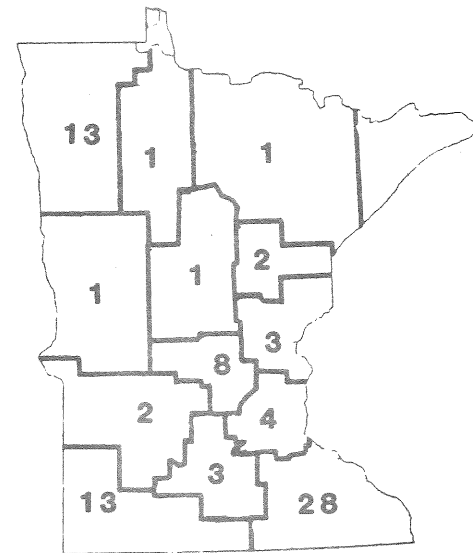
Horned lark



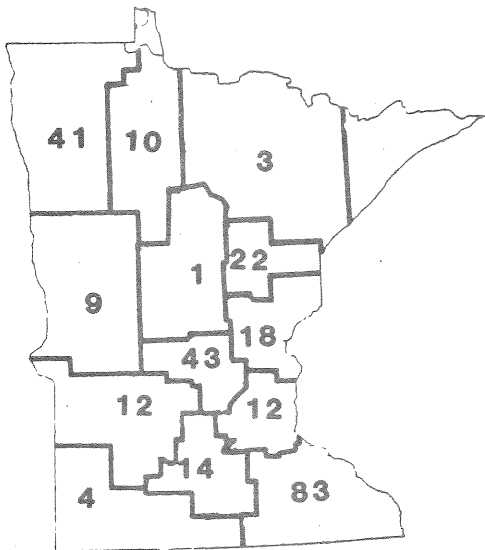
Purple martin



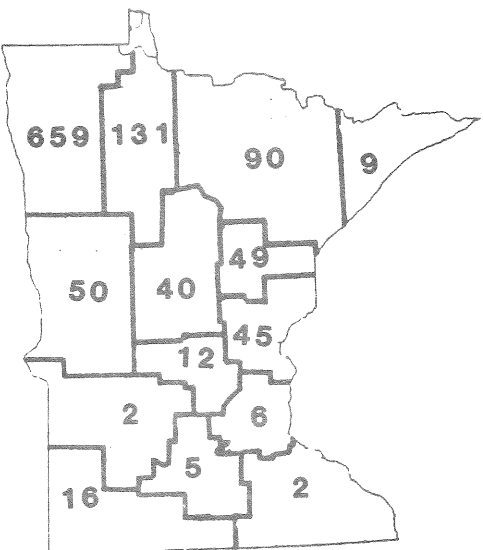
Tree swallow



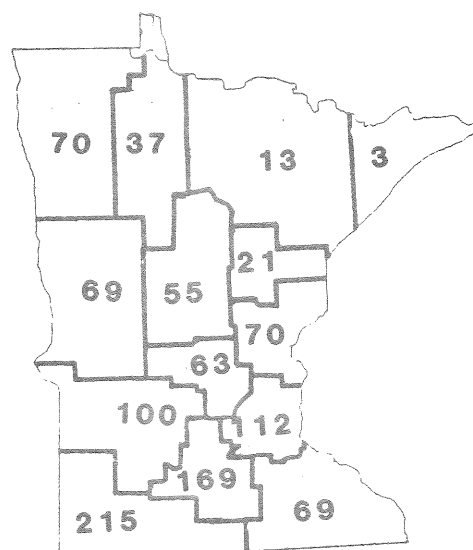
Northern rough-winged swallow



Bank swallow

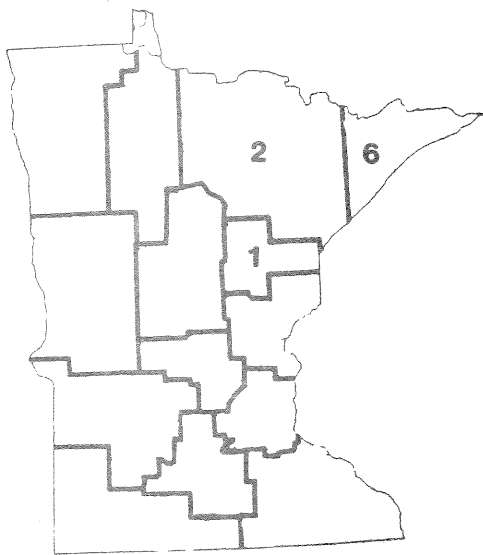


Cliff swallow

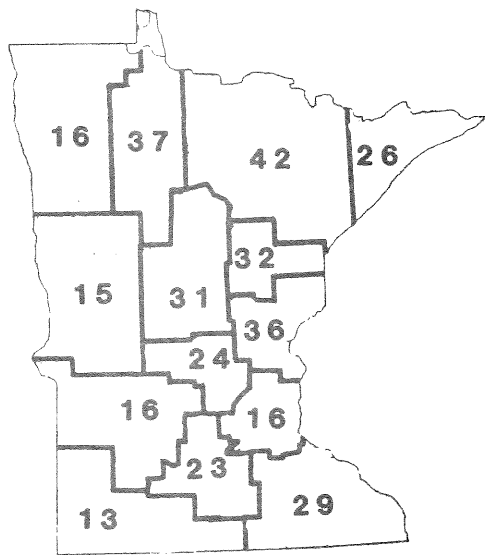


Barn swallow

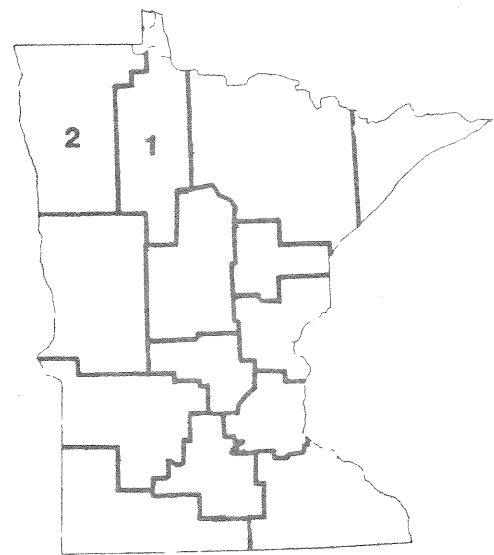
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



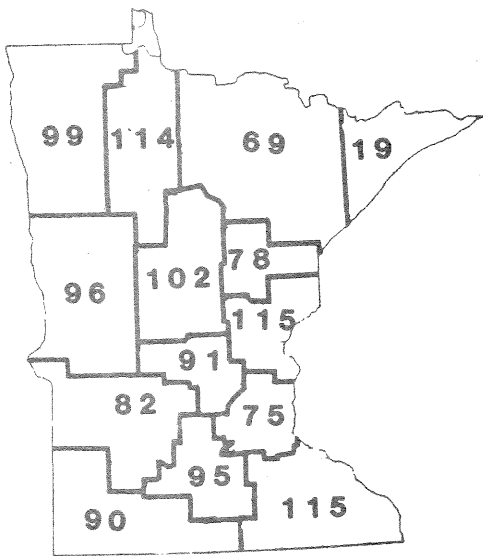
Gray jay



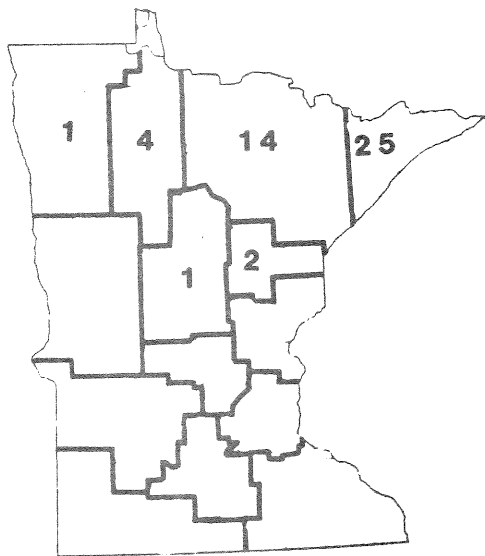
Blue jay



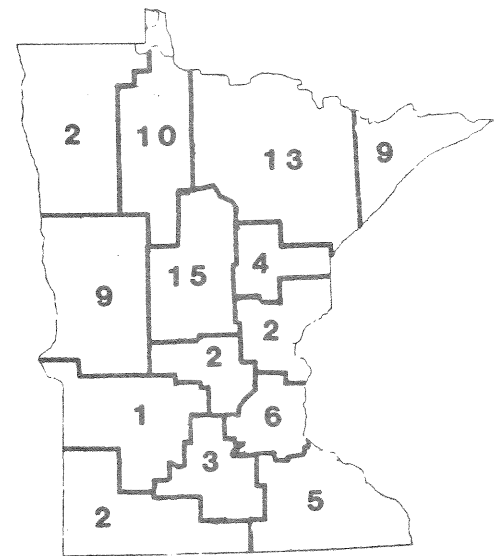
Black-billed magpie



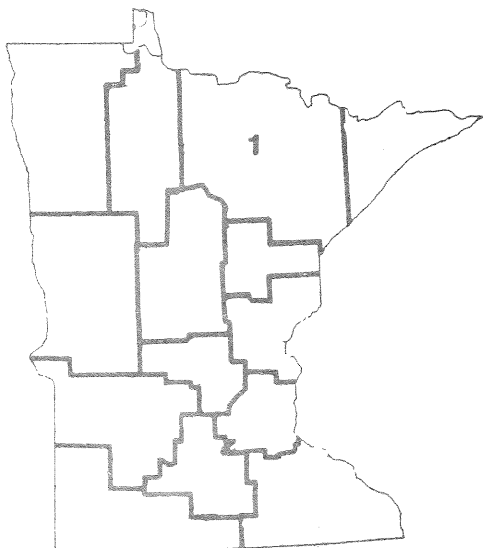
American crow



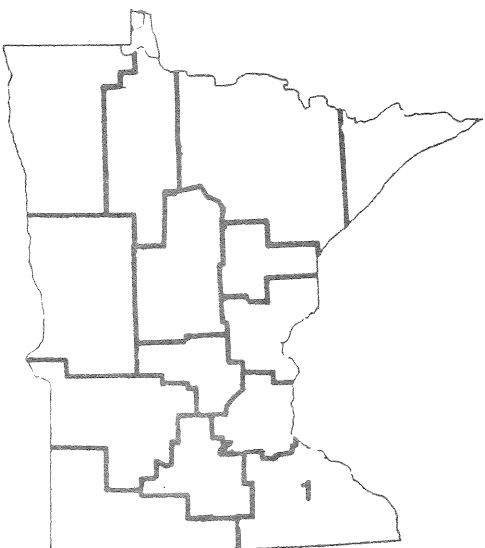
Common Raven



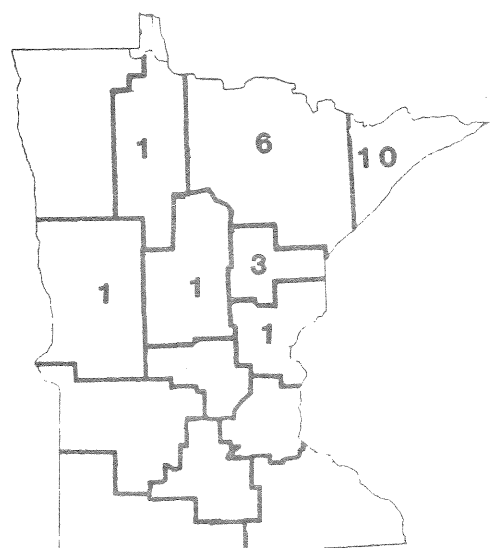
Black-capped chickadee



Boreal chickadee

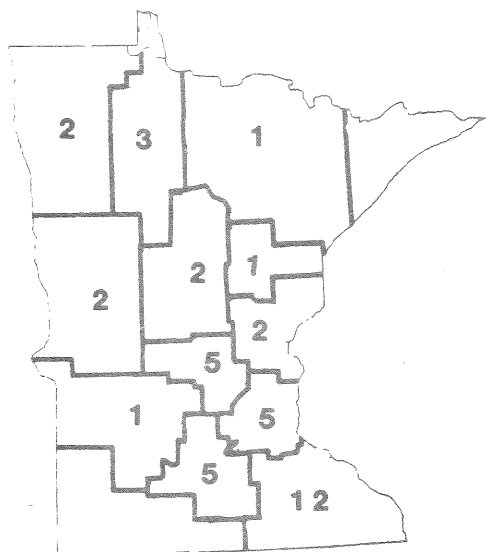


Tufted titmouse

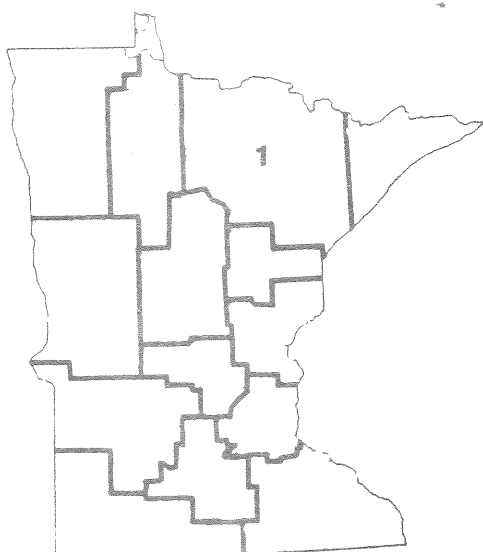


Red-breasted nuthatch

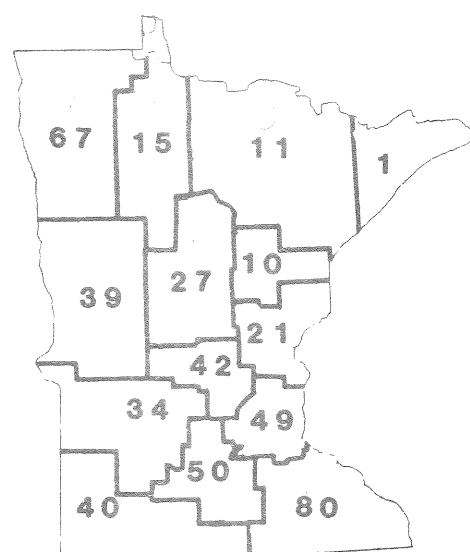
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



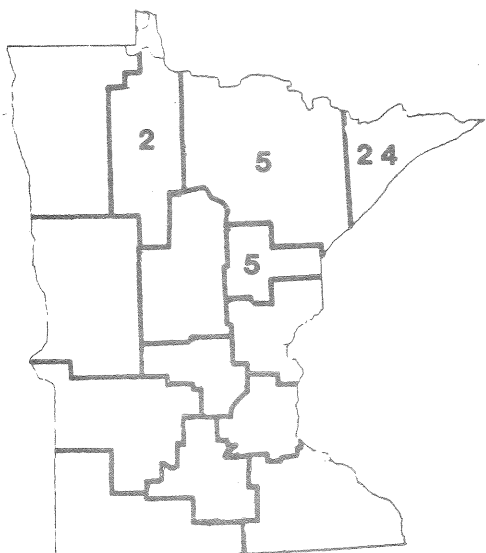
White-breasted nuthatch



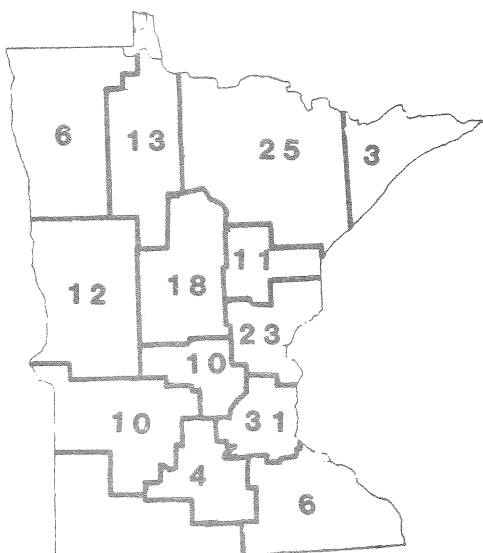
Brown creeper



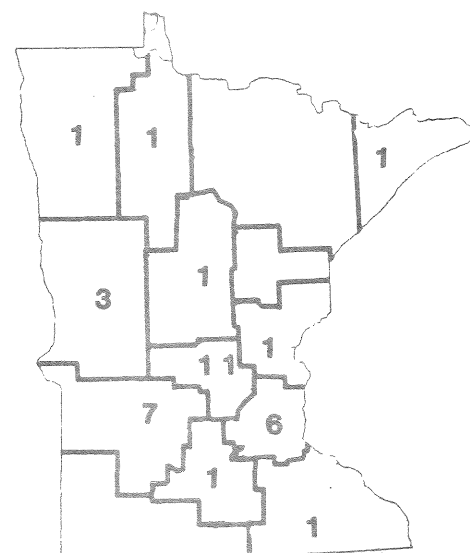
House wren



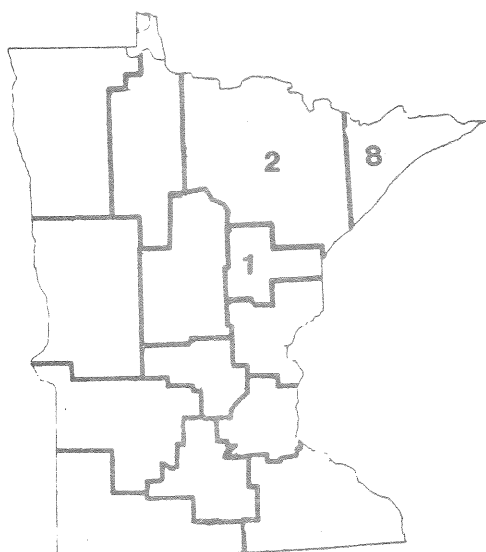
Winter wren



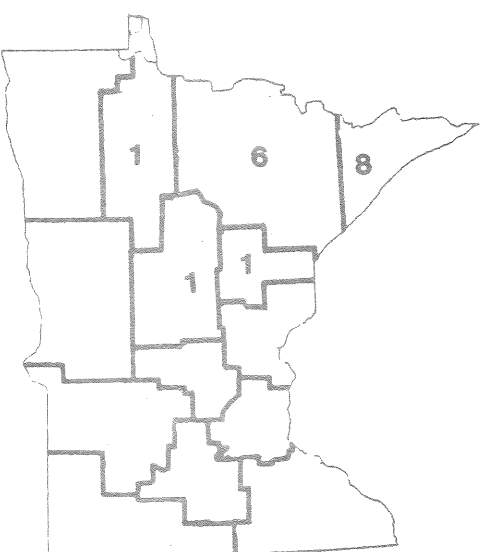
Sedge wren



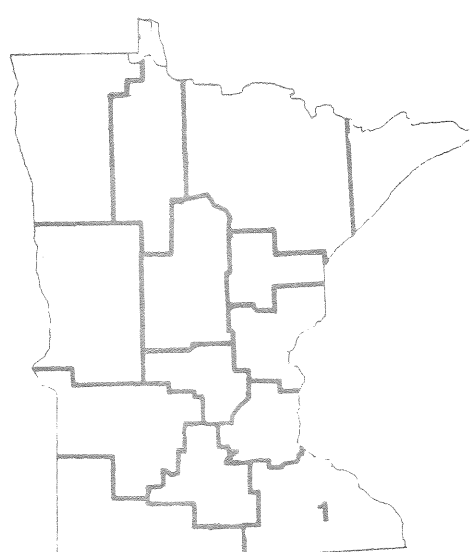
Marsh wren



Golden-crowned kinglet

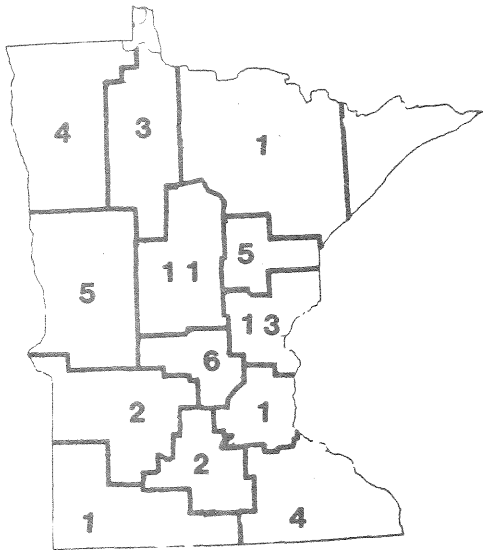


Ruby-crowned kinglet

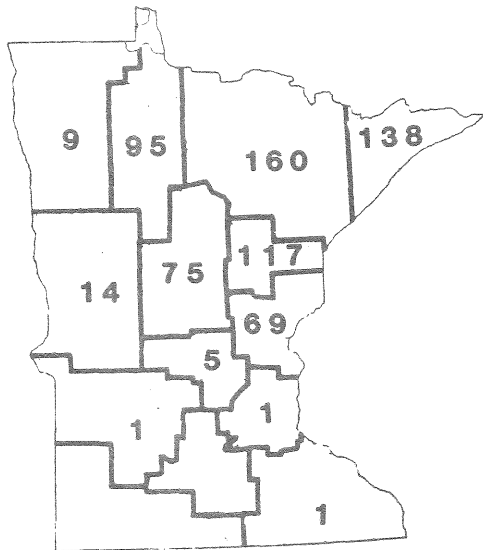


Blue-gray gnatcatcher

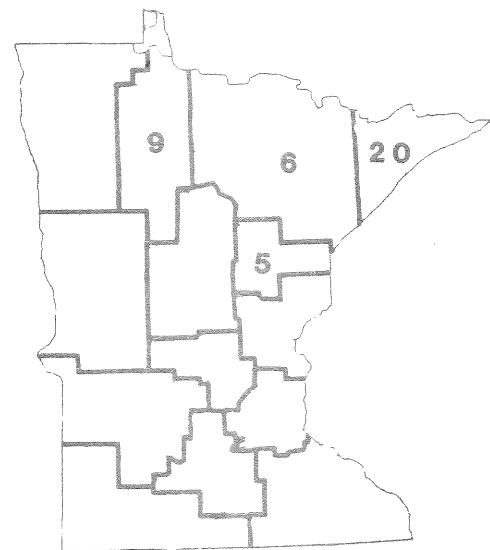
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



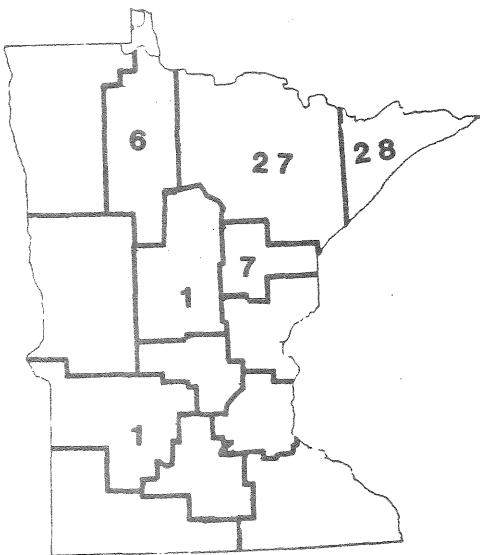
Eastern bluebird



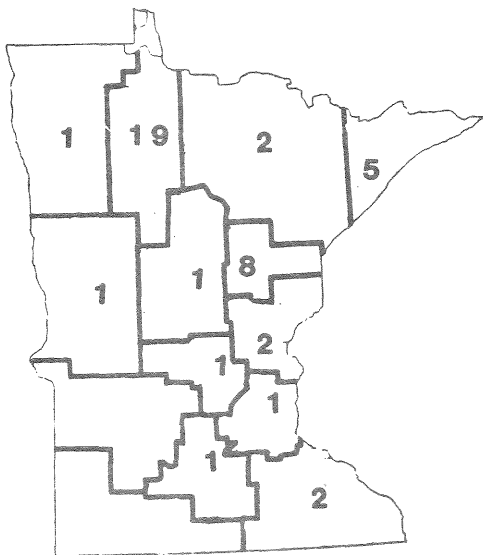
Veery



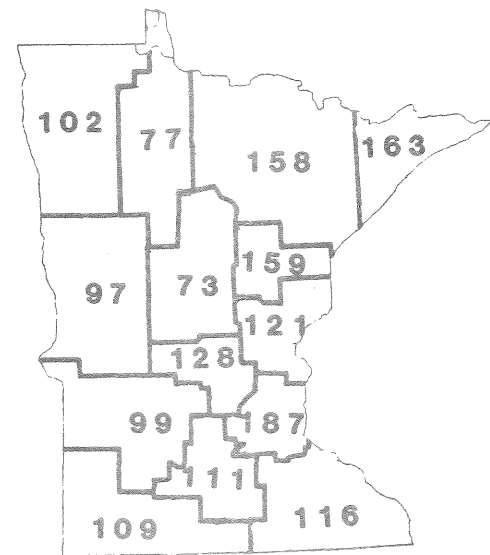
Swainson's thrush



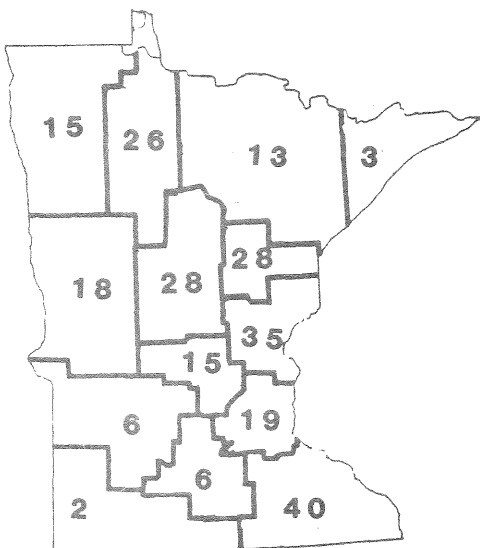
Hermit thrush



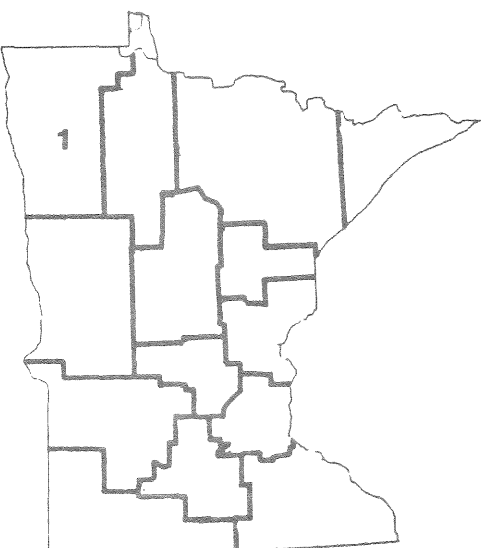
Wood thrush



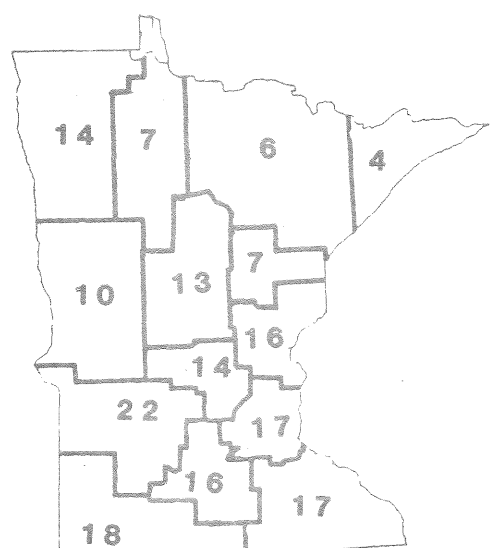
American robin



Gray catbird

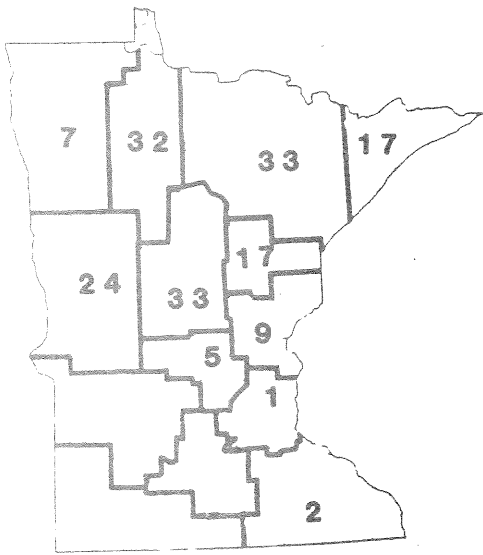


Northern mockingbird

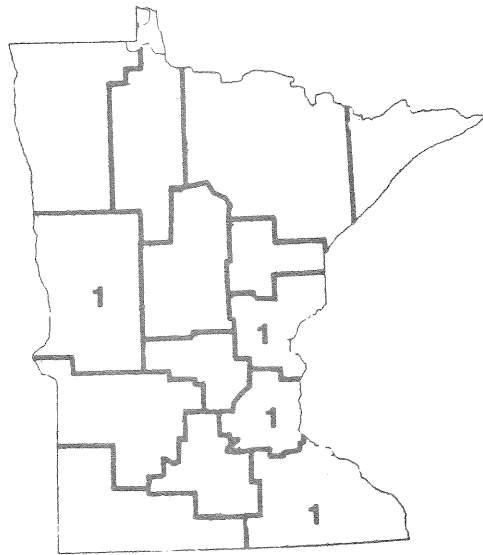


Brown thrasher

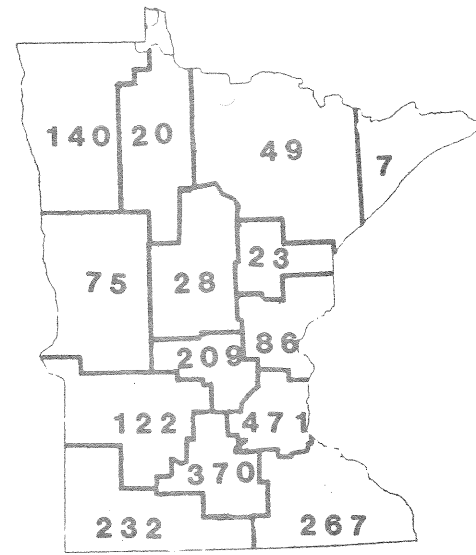
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



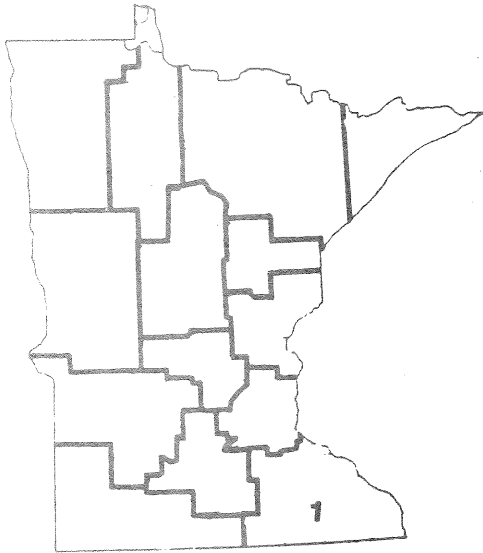
Cedar waxwing



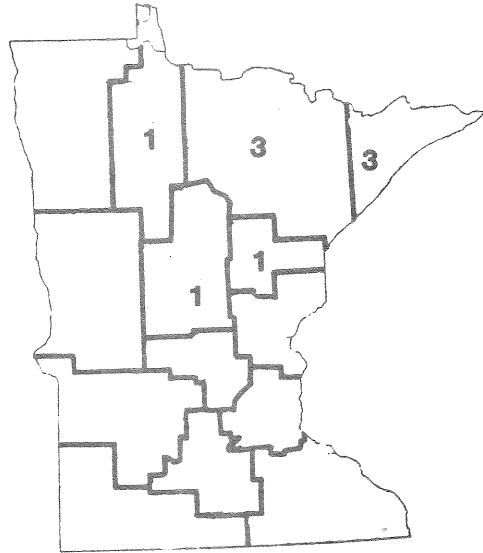
Loggerhead shrike



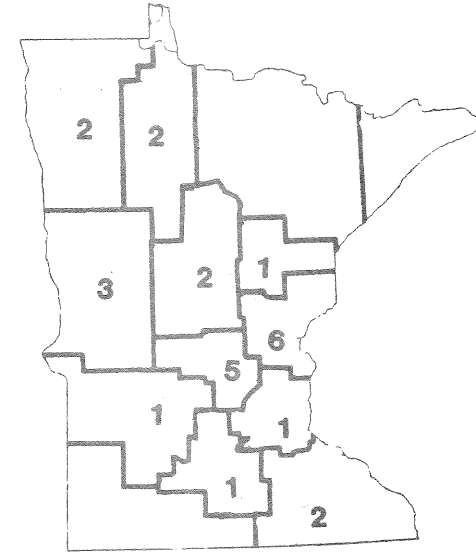
European starling



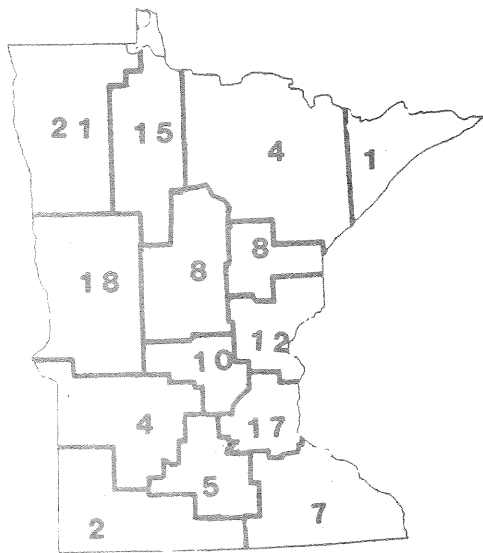
Bell's vireo



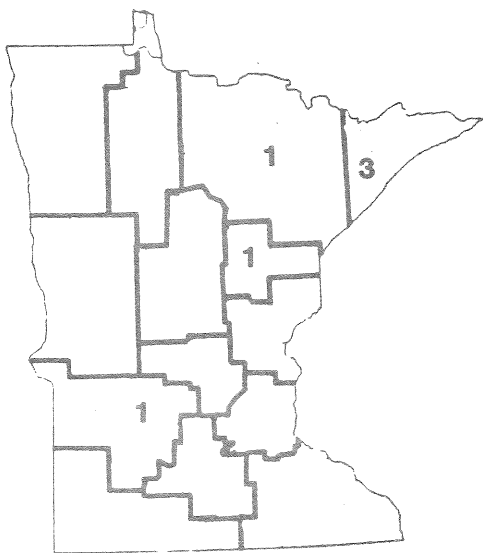
Solitary vireo



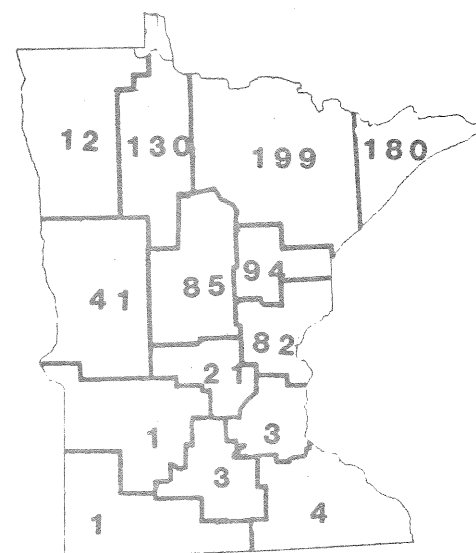
Yellow-throated vireo



Warbling vireo

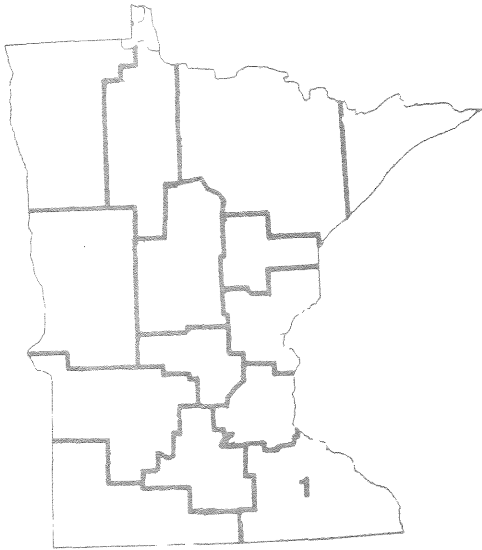


Philadelphia vireo

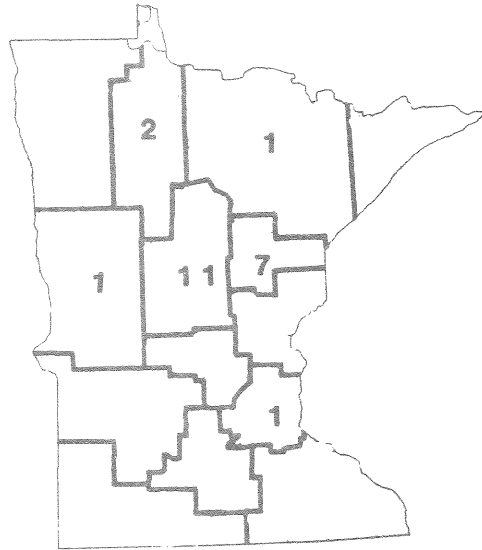


Red-eyed vireo

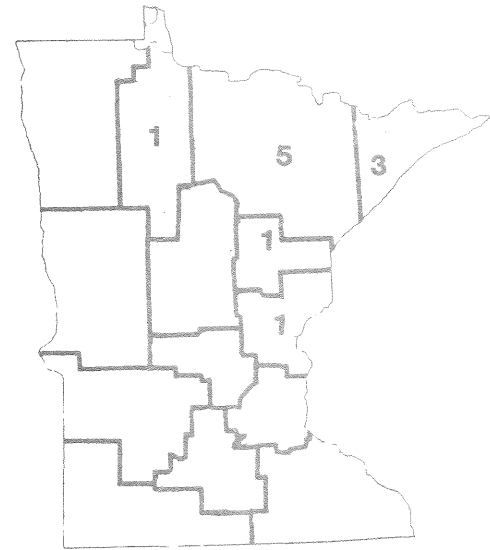
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



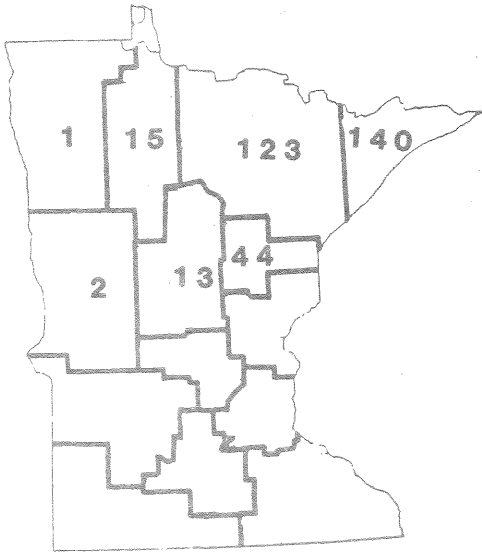
Blue-winged warbler



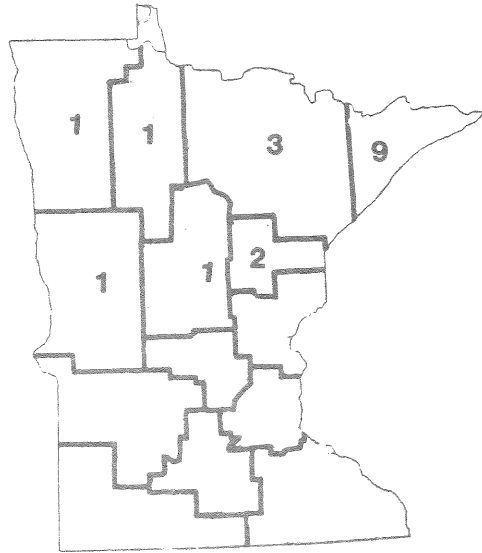
Golden-winged warbler



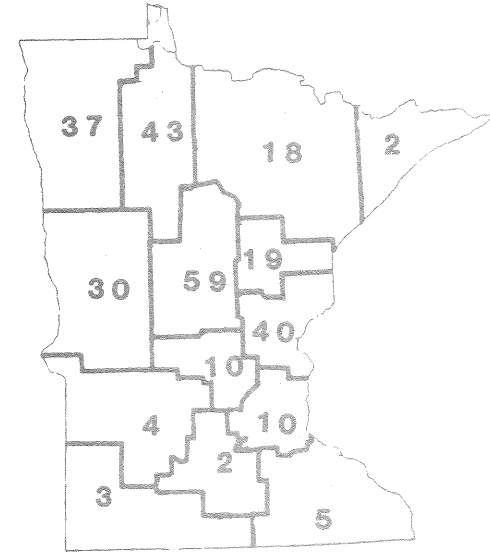
Tennessee warbler



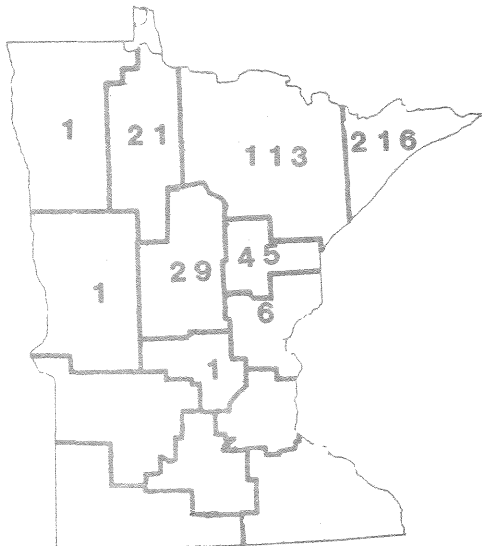
Nashville warbler



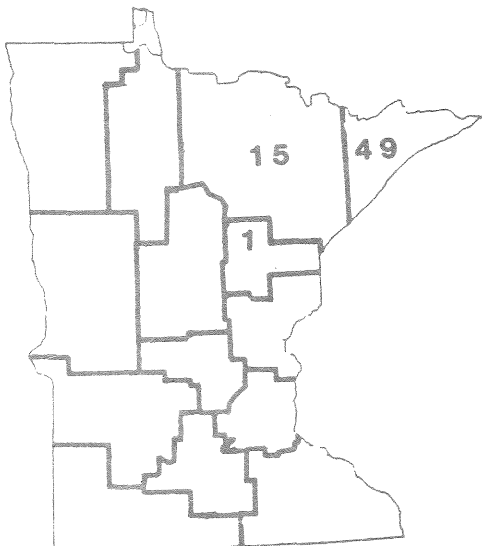
Northern parula



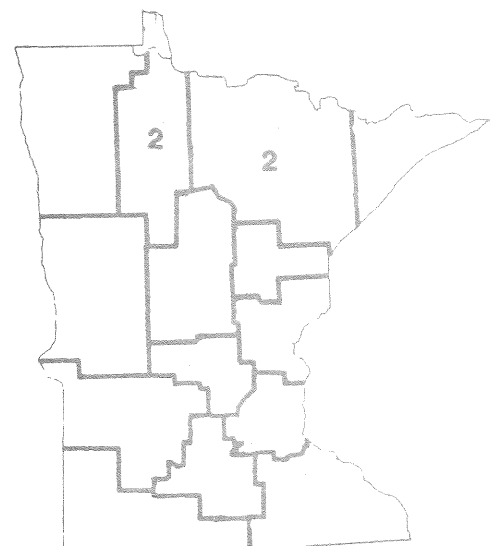
Yellow warbler



Chestnut-sided warbler

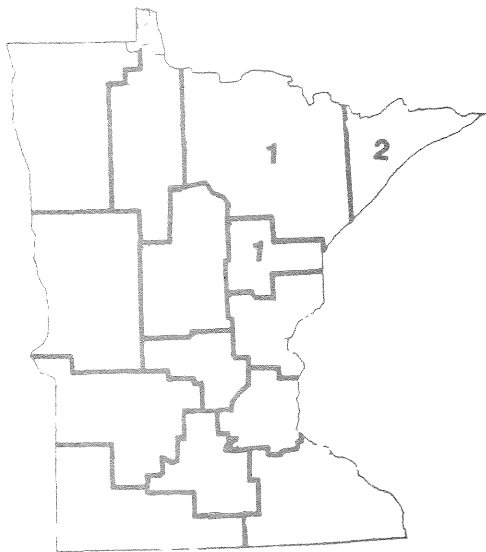


Magnolia warbler

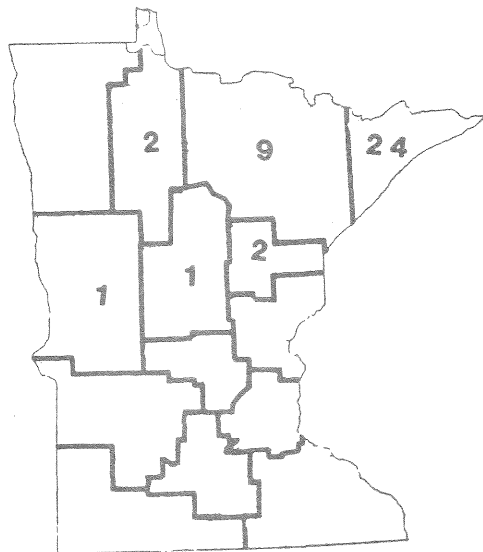


Cape May warbler

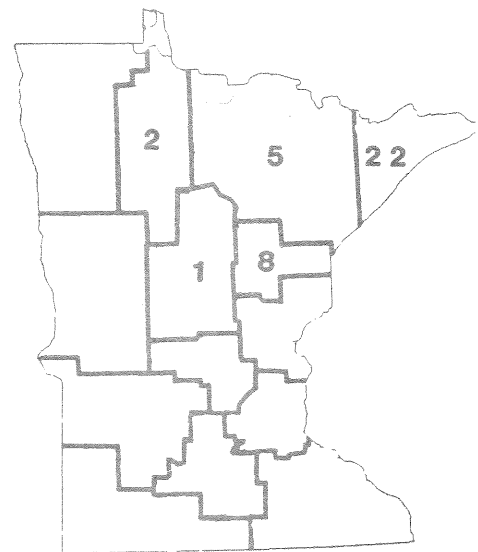
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



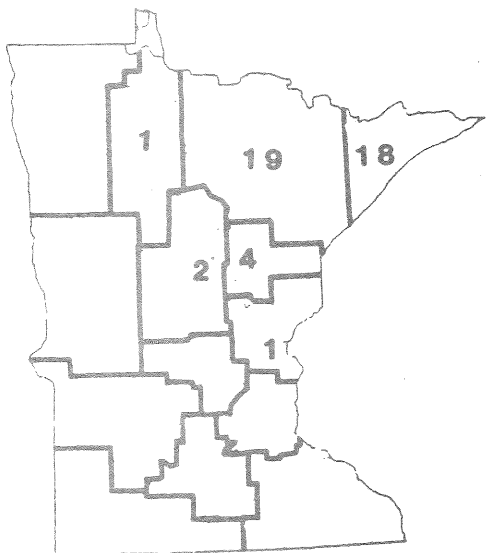
Black-throated blue warbler



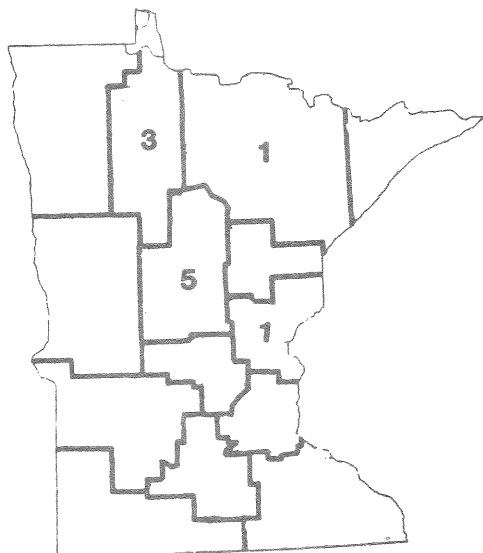
Yellow-rumped warbler



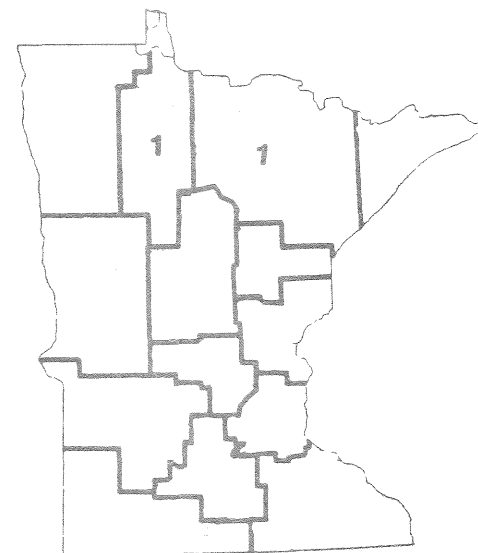
Black-throated green warbler



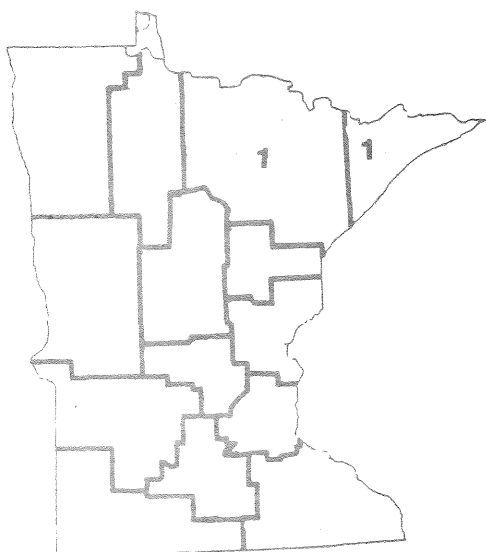
Blackburnian warbler



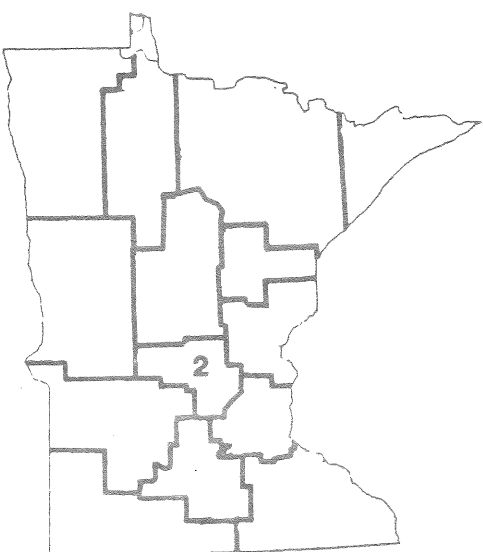
Pine warbler



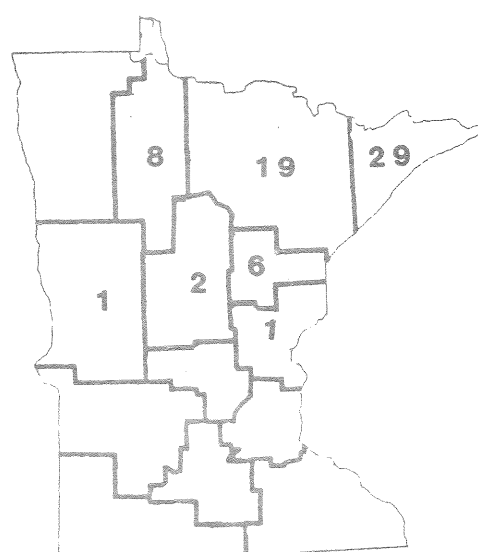
Palm warbler



Bay-breasted warbler

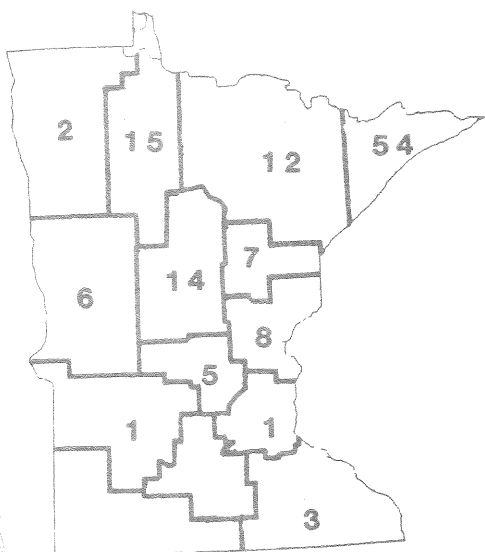


Cerulean warbler

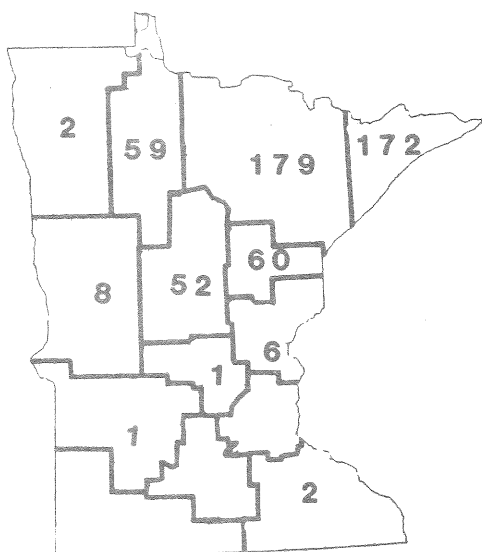


Black-and-white warbler

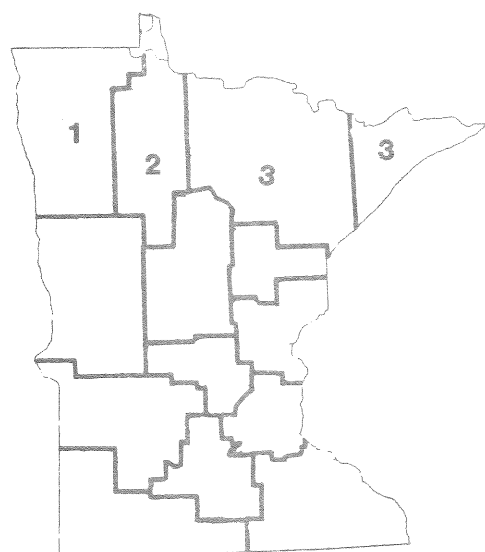
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



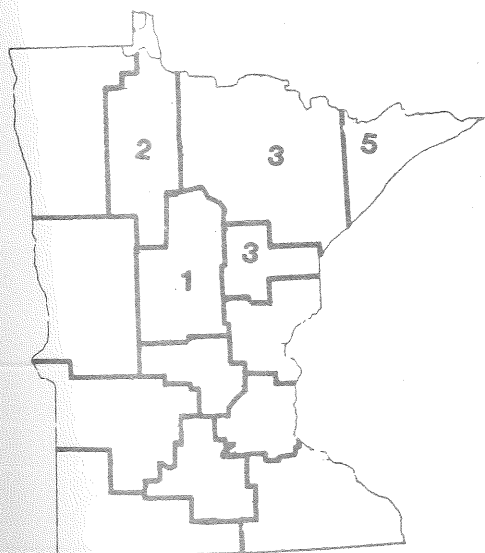
American redstart



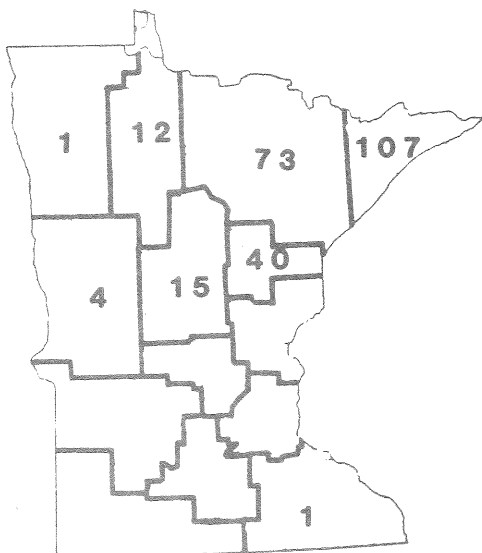
Ovenbird



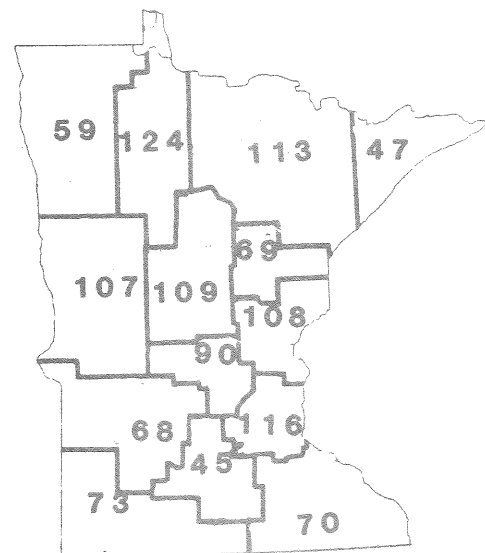
Northern water thrush



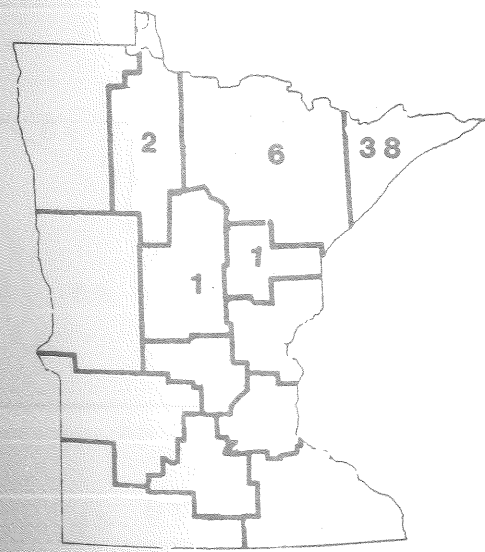
Connecticut warbler



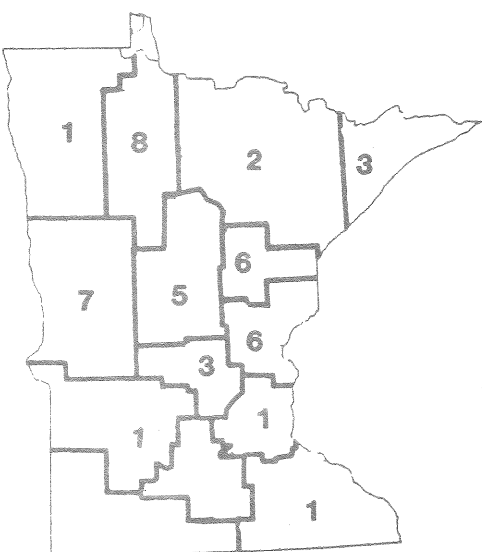
Mourning warbler



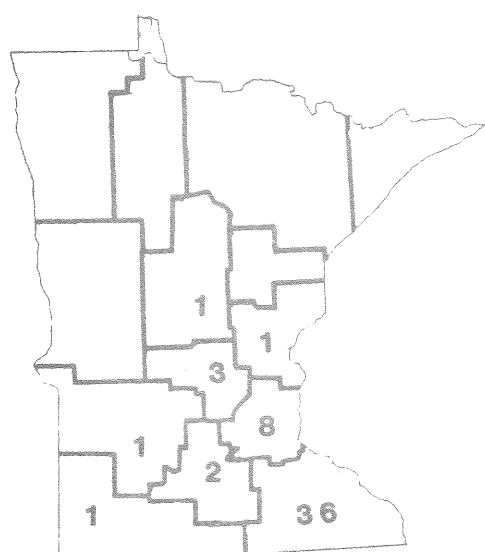
Common yellowthroat



Canada warbler

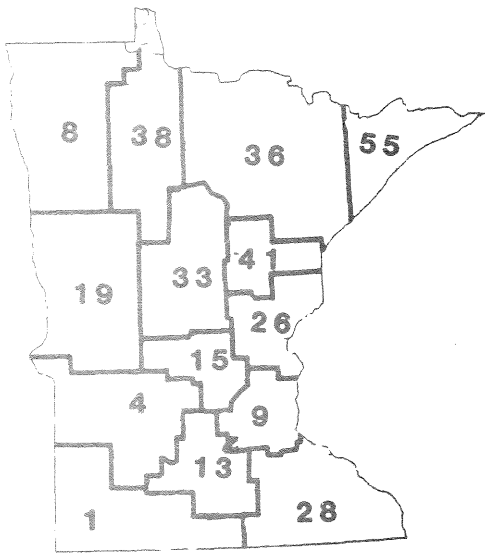


Scarlet tanager

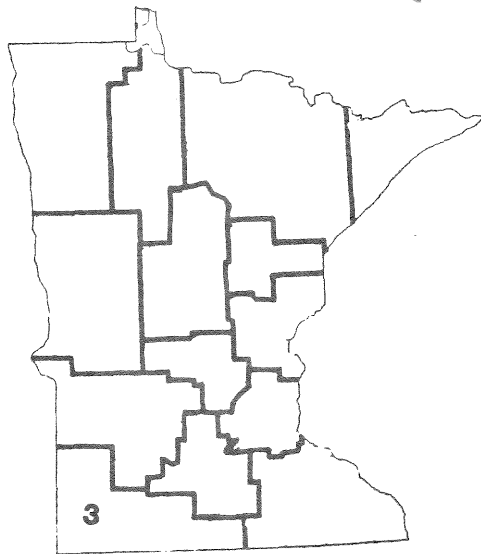


Northern cardinal

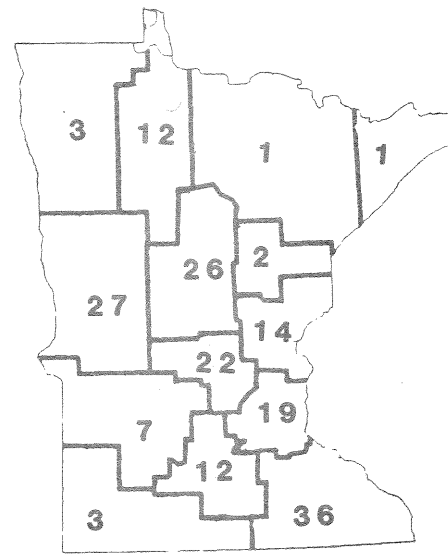
RELATIVE ABUNDANCE OF BREEDING BIRDS
ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



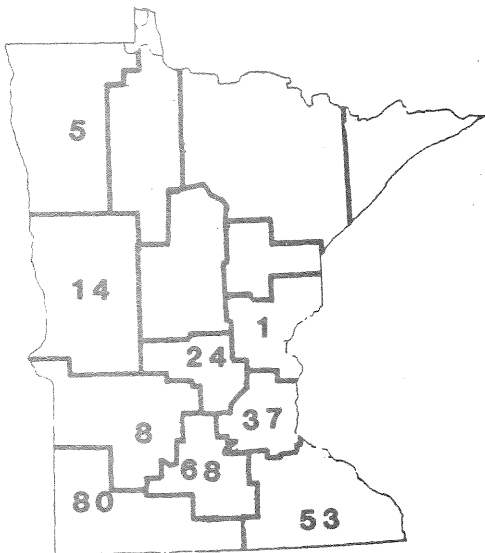
Rose-breasted grosbeak



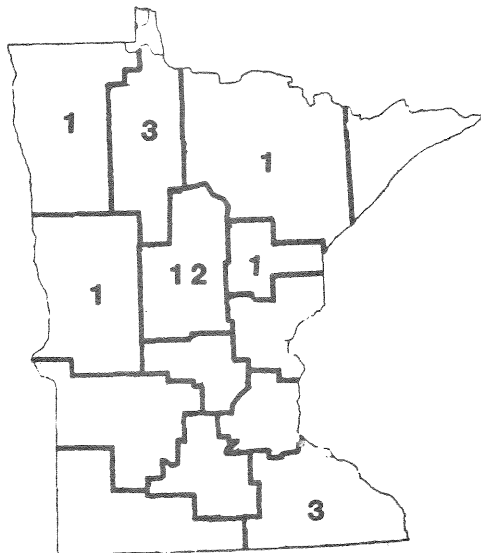
Blue grosbeak



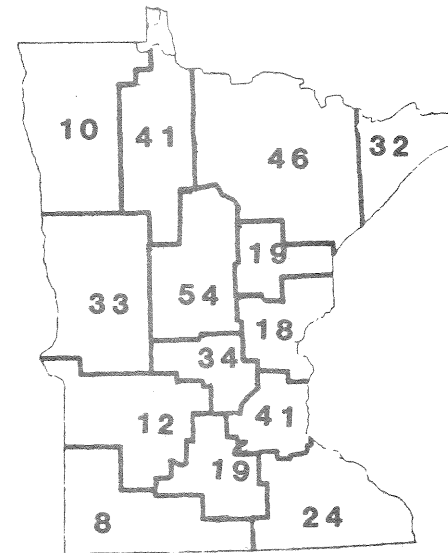
Indigo bunting



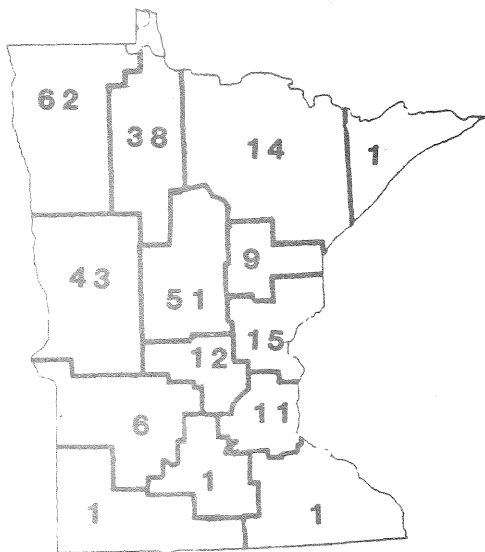
Dickcissel



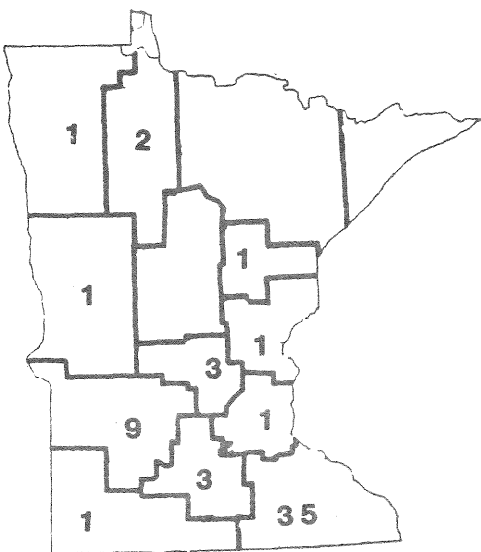
Rufous-sided towhee



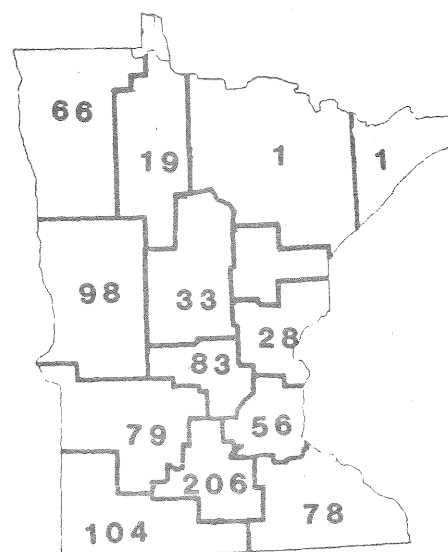
Chipping sparrow



Clay-colored sparrow

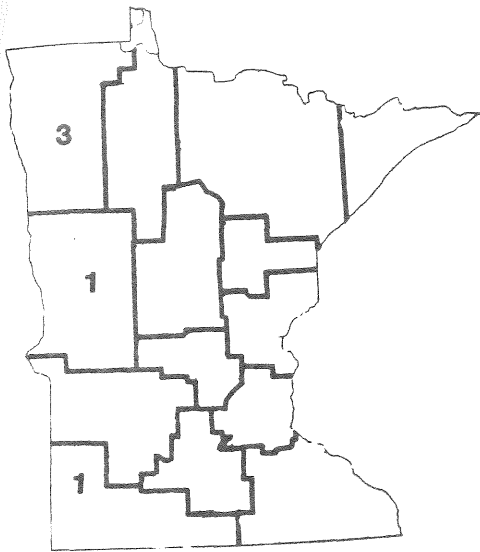


Field sparrow

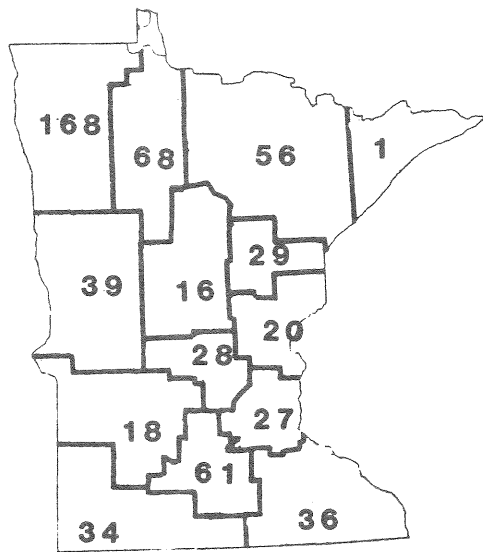


Vesper sparrow

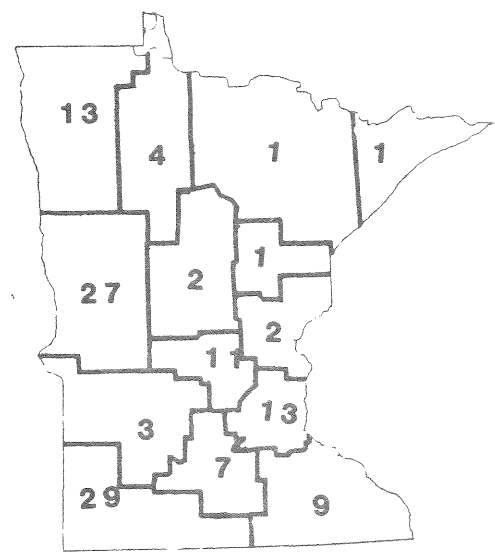
RELATIVE ABUNDANCE OF BREEDING BIRDS
ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



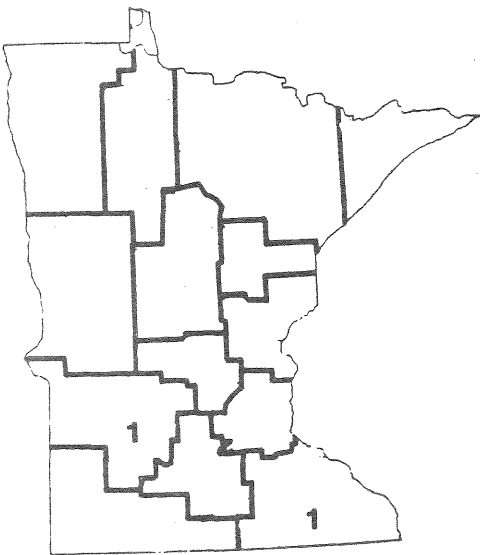
Lark sparrow



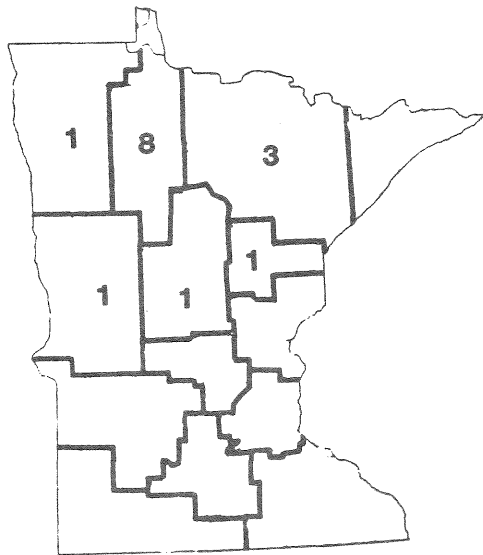
Savannah sparrow



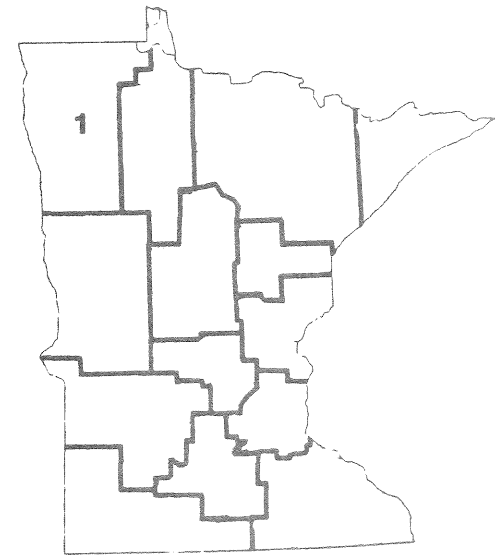
Grasshopper sparrow



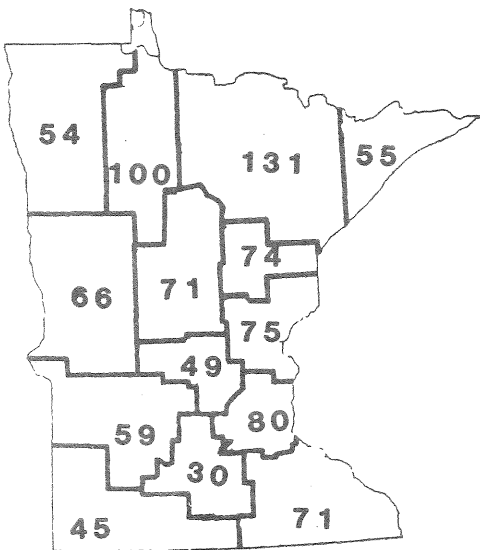
Henslow's sparrow



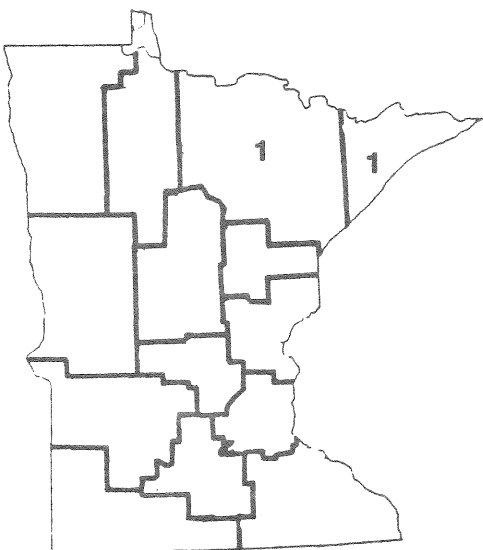
LeConte's sparrow



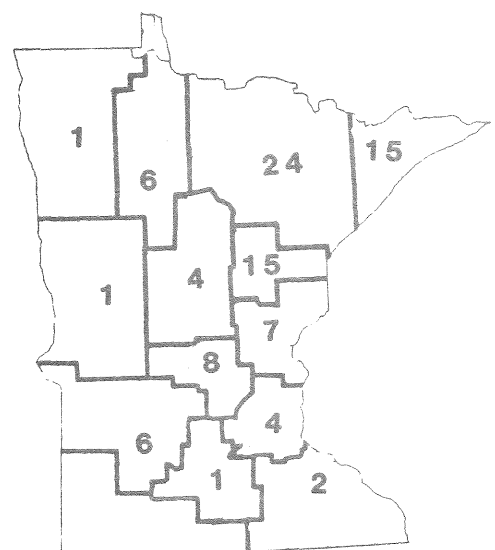
Sharp-tailed sparrow



Song sparrow

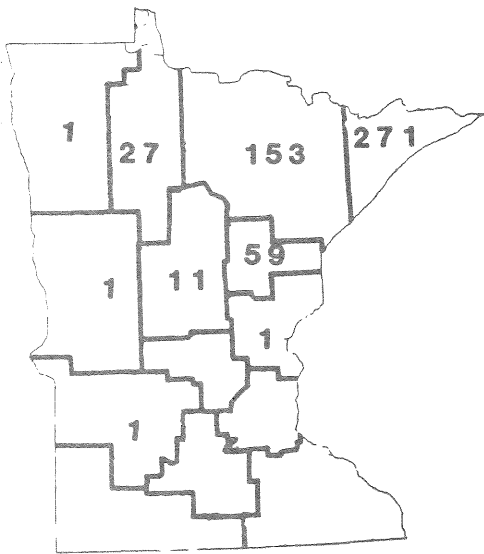


Lincoln's sparrow

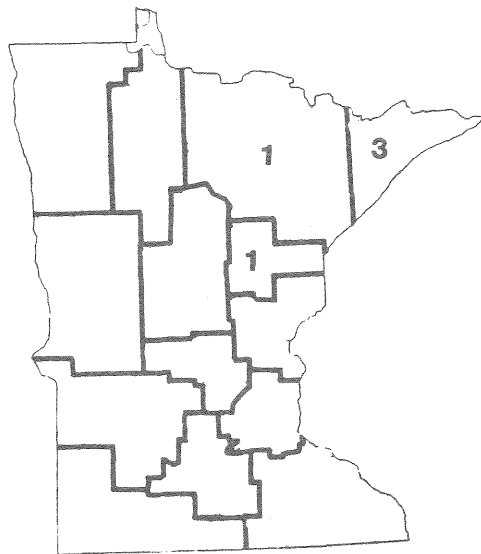


Swamp sparrow

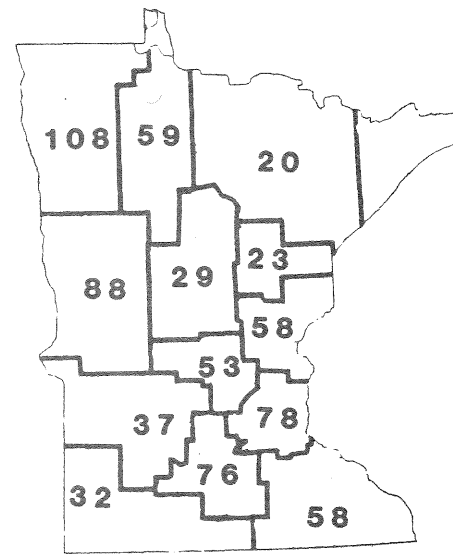
RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



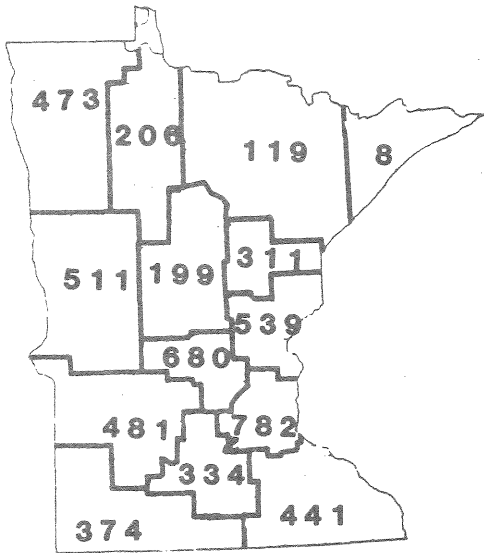
White-throated sparrow



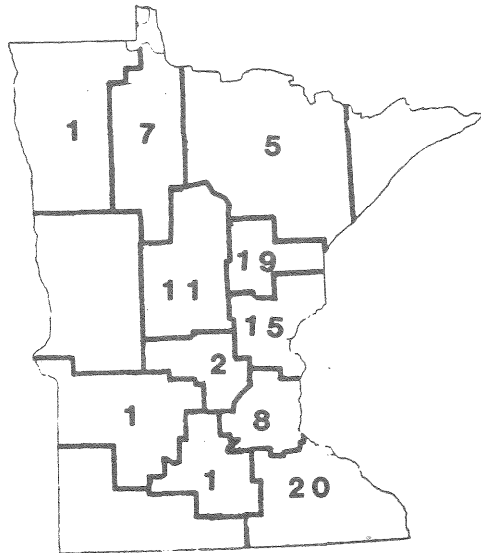
Dark-eyed junco



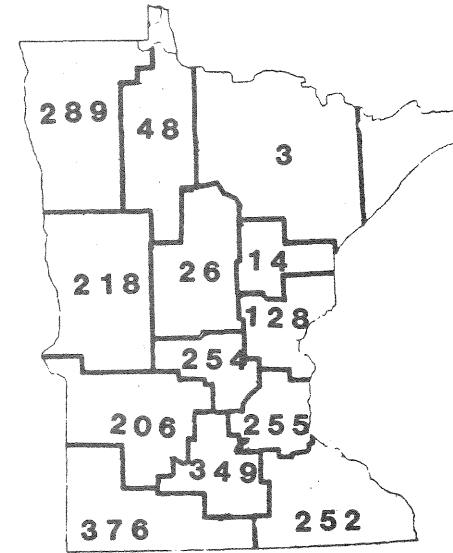
Bobolink



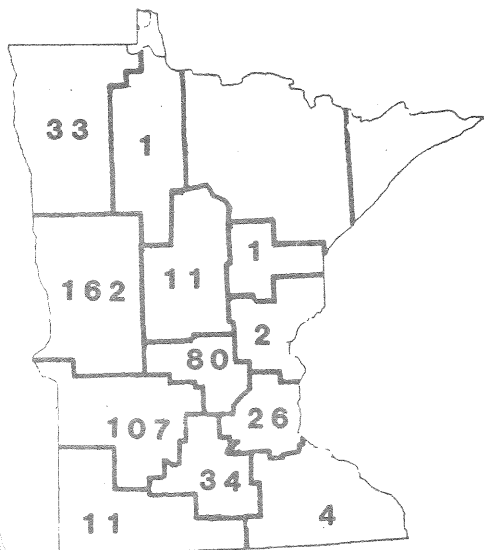
Red-winged blackbird



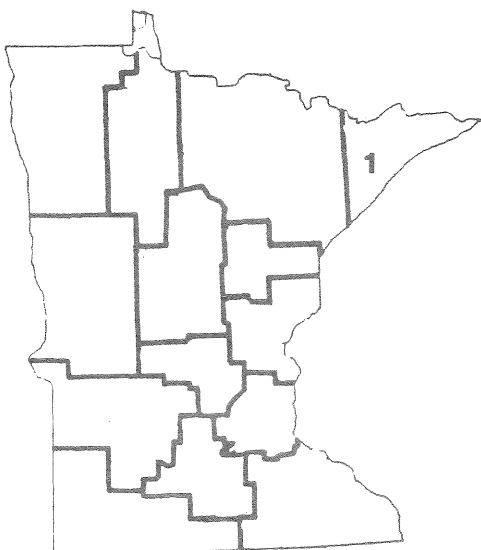
Eastern meadowlark



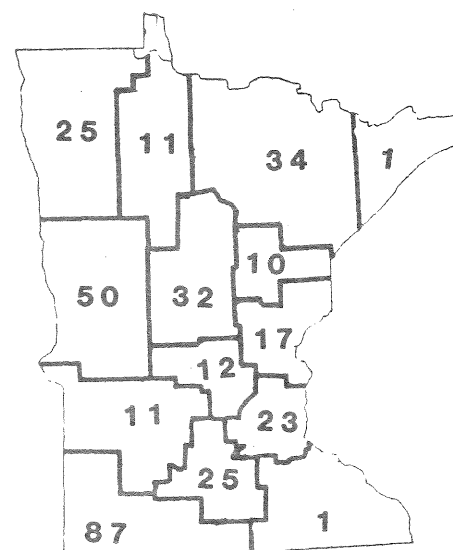
Western meadowlark



Yellow-headed blackbird

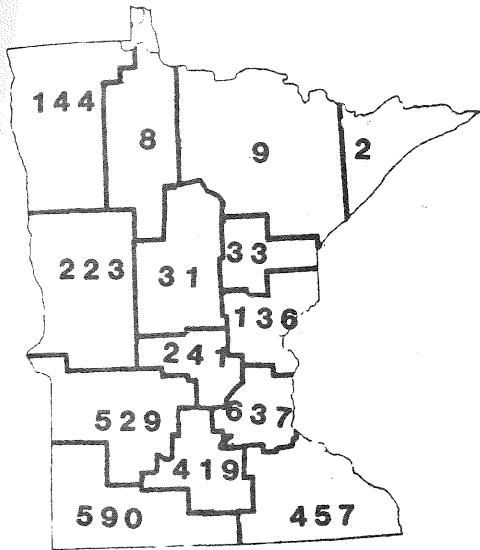


Rusty blackbird

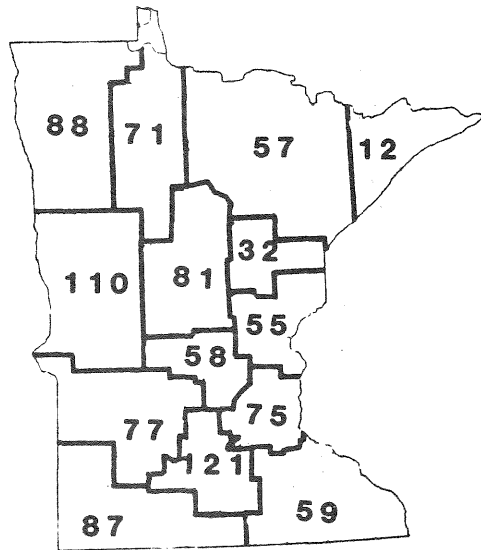


Brewer's blackbird

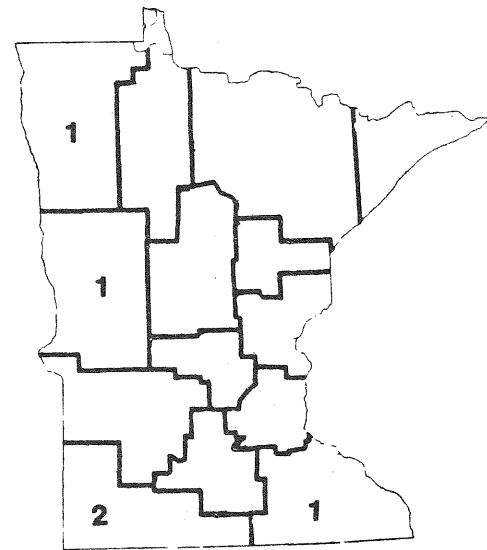
RELATIVE ABUNDANCE OF BREEDING BIRDS
ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



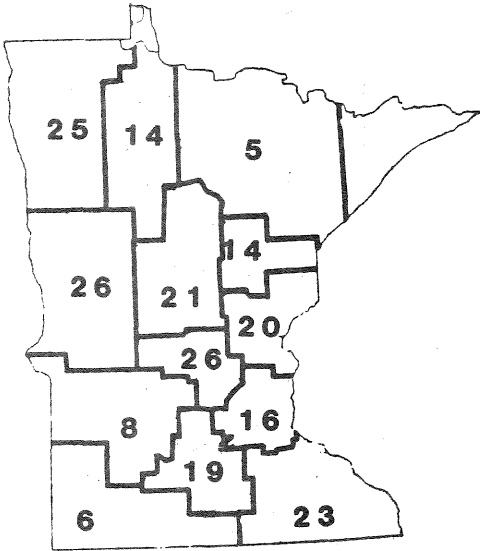
Common grackle



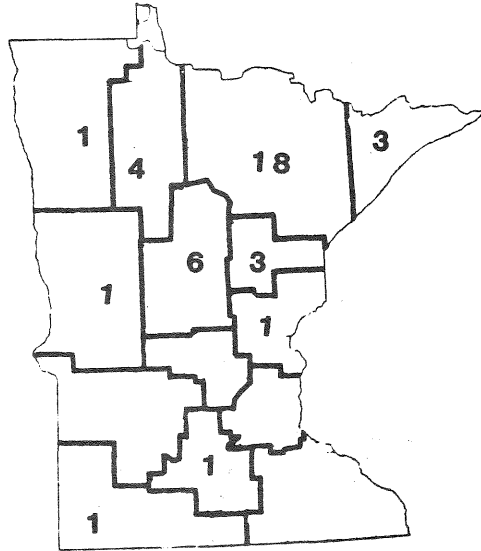
Brown-headed cowbird



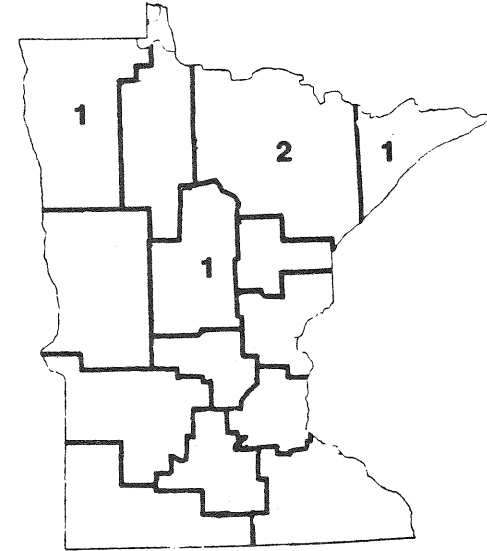
Orchard oriole



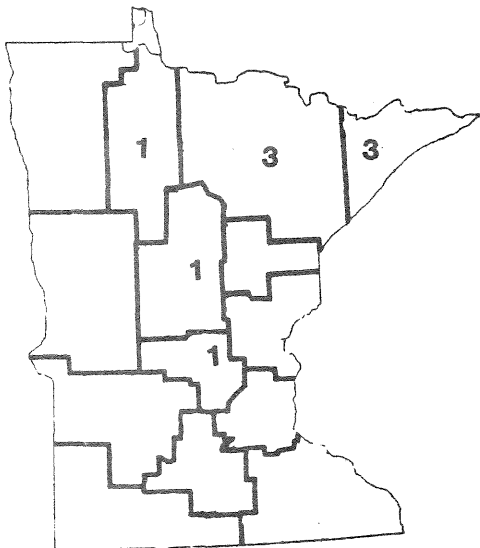
Northern oriole



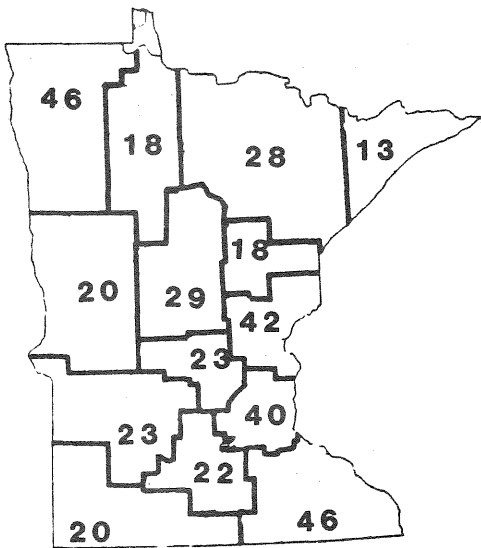
Purple finch



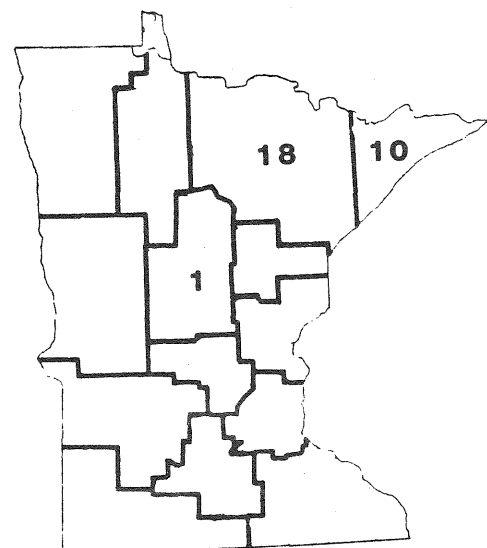
Red crossbill



Pine siskin

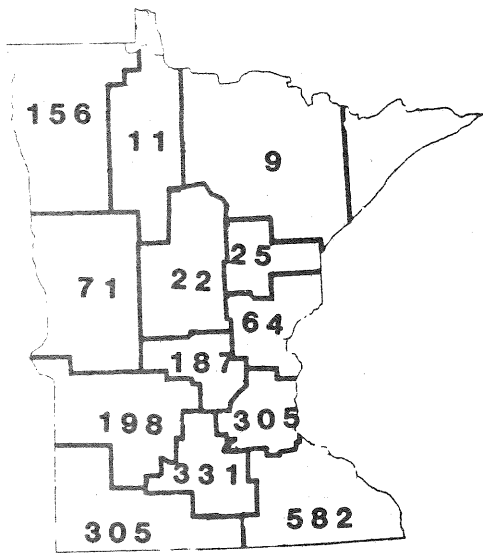


American goldfinch



Evening grosbeak

RELATIVE ABUNDANCE OF BREEDING BIRDS
 ALL FIGURES REFER TO BIRDS COUNTED/100 MILES OF ROUTE



House sparrow

