

RING-BILLED GULLS Banded IN SASKATCHEWAN, 1936-1989

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Between 1936 and 1989, 23,866 Ring-billed Gulls were banded in Saskatchewan by four banders. There were 538 recoveries or 2.3% (including a minimum of 29 encounters, see Table 2) We studied this data set to learn what it might reveal about causes of death, migration routes, speed of travel, delineation of wintering grounds, natal dispersal, and longevity.

Methods

Banders and locations of banding: A printout of Saskatchewan banding records since 1955 was received from the banding office. Pre-1955 banding totals have not been computerized for non-game species, but we obtained copies of the banding records of Fred G. Bard and William I. Lyon,⁴ as well as our own gull banding for the years 1953 and 1954.

Fred G. Bard banded 3,299 Ring-billed Gull nestlings in three gull colonies, and we banded 20,446 nestlings in nine different colonies. William I. Lyon banded 61 and Robert C. McClanahan, an estimated 60 (based on a single recovery) at one colony each (Table 1, Figure 1).

Recoveries/encounters: The banding office provided a list of all recoveries (found dead) and encounters (found alive) of Ring-billed Gulls banded in Saskatchewan, both before and after 1955. To this list we added: three band numbers sighted by telescope away from the banding site, which had been

reported to the banding office but not entered into the computer; two Ring-billed Gulls incorrectly identified as California Gulls at the time of banding; and two recoveries reported to the band finder and bander that had inadvertently dropped off the computer list. We deleted a duplicate report sent six years later by the same tourist, concerning a gull shot in Mexico. We deleted 17 gulls known to have died before they could fly from their nest island. This left 538 recoveries/encounters.

Locations of recoveries: The banding office provided only the name of the Mexican state in which the recovery took place, not the ten-minute block of latitude and longitude that was calculated for other jurisdictions in the hemisphere. This was insufficient for mapping the 138 recoveries in Mexico. Only for our own banding did we have access to the individual recovery reports sent to the bander, which listed the town nearest to the recovery site, a piece of information not entered into the main-frame computer at the banding office. Exact localities for recoveries of gulls banded by Fred Bard, William I. Lyon and R.C. McClanahan were determined individually from reports sent to banders, as a special and time-consuming favor by Mary Gustafson in the banding office. Locations of three difficult-to-find Mexican localities were provided by Mario A. Ramos and Adolfo Navarro Siguenza. One now-obsolete locality name for Texas was provided by Diana Houston. Thus, we were able

Table 1. Numbers, locations and banders of Ring-billed Gull nestlings in Saskatchewan, 1936 -1989

| | Lat-Long** | Lyon 1936 | Bard 1936-58 | McClanahan 1941 | Houston 1953-86 | Total |
|---------------------------|------------|--------------|-----------------|--------------------|--------------------|-------|
| Amisk Lake | 543-1021 | | | | 100 | 100 |
| Crane Lake | 500-1090 | | | | 46 | 46 |
| Dore Lake | 544-1070 | | | | 418 | 418 |
| Fishing Lake | 515-1033 | | | | 236 | 236 |
| Kindersley slough | 512-1091 | | | | 731 | 731 |
| Last Mtn Lake nr Penzance | 510-1051 | 61 | 147 | 60* | 3716 | 3984 |
| Last Mtn Lake nr Simpson | 512-1051 | | 3052 | | 787 | 3839 |
| Old Wives Lake | 501-1055 | | 100 | | | 100 |
| Quill Lakes | 515-1041 | | | | 160 | 160 |
| Redberry Lake | 524-1071 | | | | 14252 | 14252 |
| Total | | 61 | 3299 | 60 | 20446 | 23866 |

* = McClanahan banding total is a best estimate

** = Latitude is expressed as three digits representing degrees and minutes (543 = 54° 30') as is longitude (1021 = 102° 10')

to calculate with certainty the ten-minute block of latitude and longitude for all but two of the 138 recoveries from fifteen different Mexican states.

Contacts with band finders: For our own banding records, we attempted to contact band finders whenever their report seemed incomplete or ambiguous. These contacts resulted in the following corrections: 2 for numerical code for a Mexican state, 9 for date of recovery, 20 for "how found," 9 for condition of bird (alive or dead), 9 for recovery location, and 6 for the ten-minute block assigned to the banding location.

Results

Recovery rates: Annual recovery rates declined gradually but consistently over six decades, from 3.5% in the 1930s, to 3.4%, 2.6%, 2.3%, 1.3%, and finally 0.5% in the 1980s (Fig. 2). This gradual decline in the percentage of bands reported is explicable in part by a declining

percentage shot, coupled with a presumed decline in the "curiosity factor" among those finding the bands. However, shooting of gulls persisted in the Mexican states of Michoacan and Sinaloa until 1979 and 1980.

How found: Nearly 80% of the recoveries were accounted for by gulls found dead, shot, injured, killed on highways or by power transmission lines (Table 2). Of interest were three that were hit by airplanes in Canada: two by commercial aircraft, one at the Saskatoon and the other at the Edmonton airport, and a 9-year-old gull by a trainer jet at the Moose Jaw air training base. Two gulls died during severe storms, one in Saskatchewan and one in Montana. One was killed by a bulldozer in the city garbage dump at Beaumont, Texas and one died during a forest fire in Mexico. Another became flightless with oil-soaked feathers at four years of age near Vegreville, Alberta. No gulls were reported as killed on highways during the first half of this

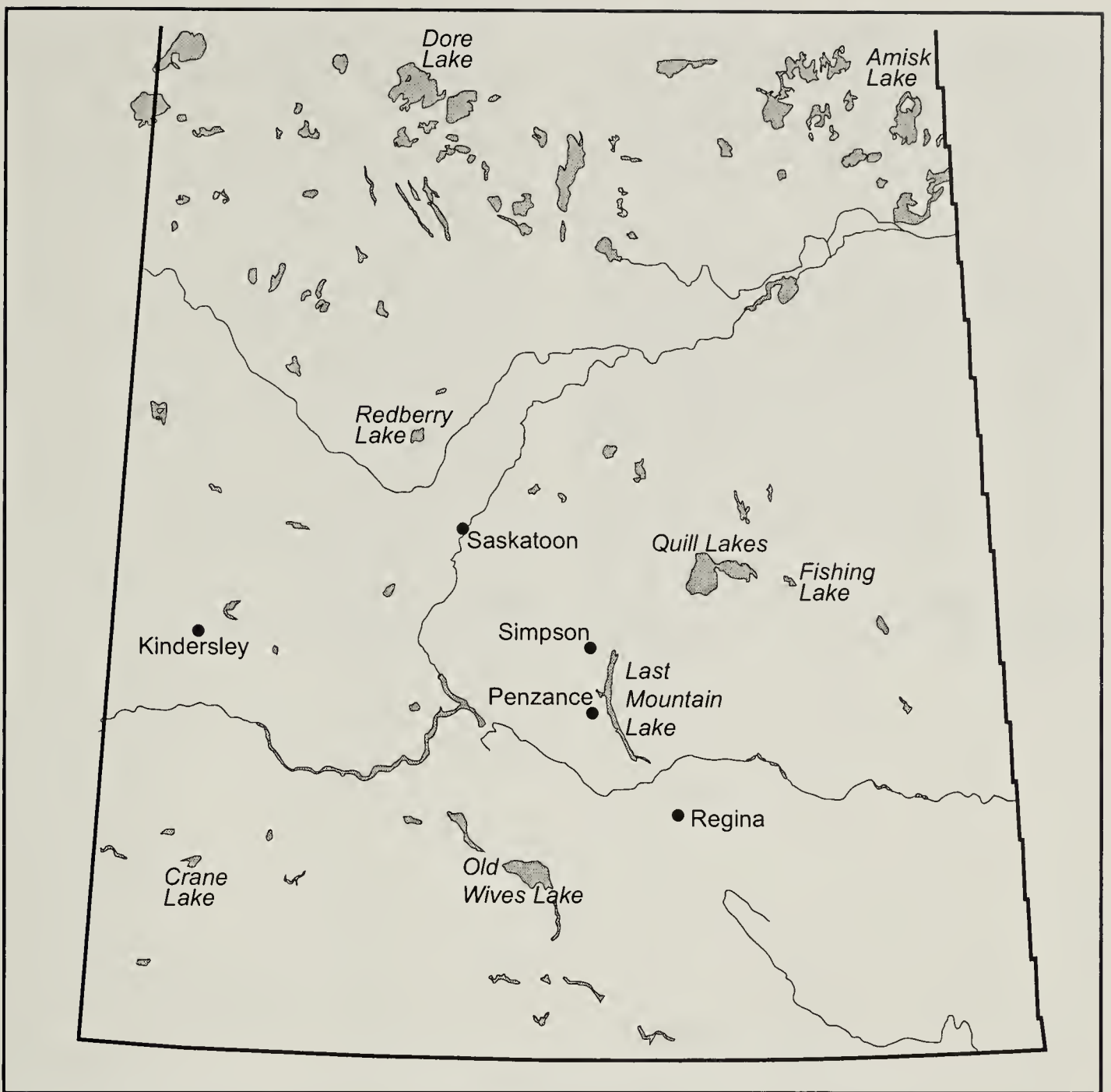


Fig. 1. Saskatchewan lakes where Ring-billed Gulls were banded.

Map by Carol Beaulieu.



Ring-billed Gull

Wayne Lynch

study; the first was in 1959, about the time rural Saskatchewan roads began to be improved and average highway speeds of farm vehicles increased.

Of special interest were the encounters of live birds, including eight trapped (usually by cannon nets) in the 1960s, and released alive by waterfowl biologists: two at Snipe Lake, SK, both in 1968, and one at Coronation, AB in 1960. The others were at Upper Souris National Wildlife Refuge (NWR) near Foxholme, ND in 1962; Tennessee NWR, Tennessee, in 1968, and three in Colorado, at Timnath Reservoir in 1963, Fort Collins in 1966 and Mosca in 1968.

Where and when found: Recoveries came mainly from Saskatchewan (187), four other provinces (41), 29 American states (173), and 15 Mexican states (137) (Table 3). The main wintering areas were Texas (43), Sonora (48) and Sinaloa (29), followed by Jalisco (11), Chihuahua (10) and Michoacan (9). However, one gull went on to Veracruz and 13 gulls wandered inland into four other Mexican states (Durango, Guanajuato, San Luis Potosi and Zacatecas), all beyond the mapped usual winter range.⁹ Those from the Pacific and Gulf of Mexico coasts of Mexico delineated the extent of the usual "wintering grounds."

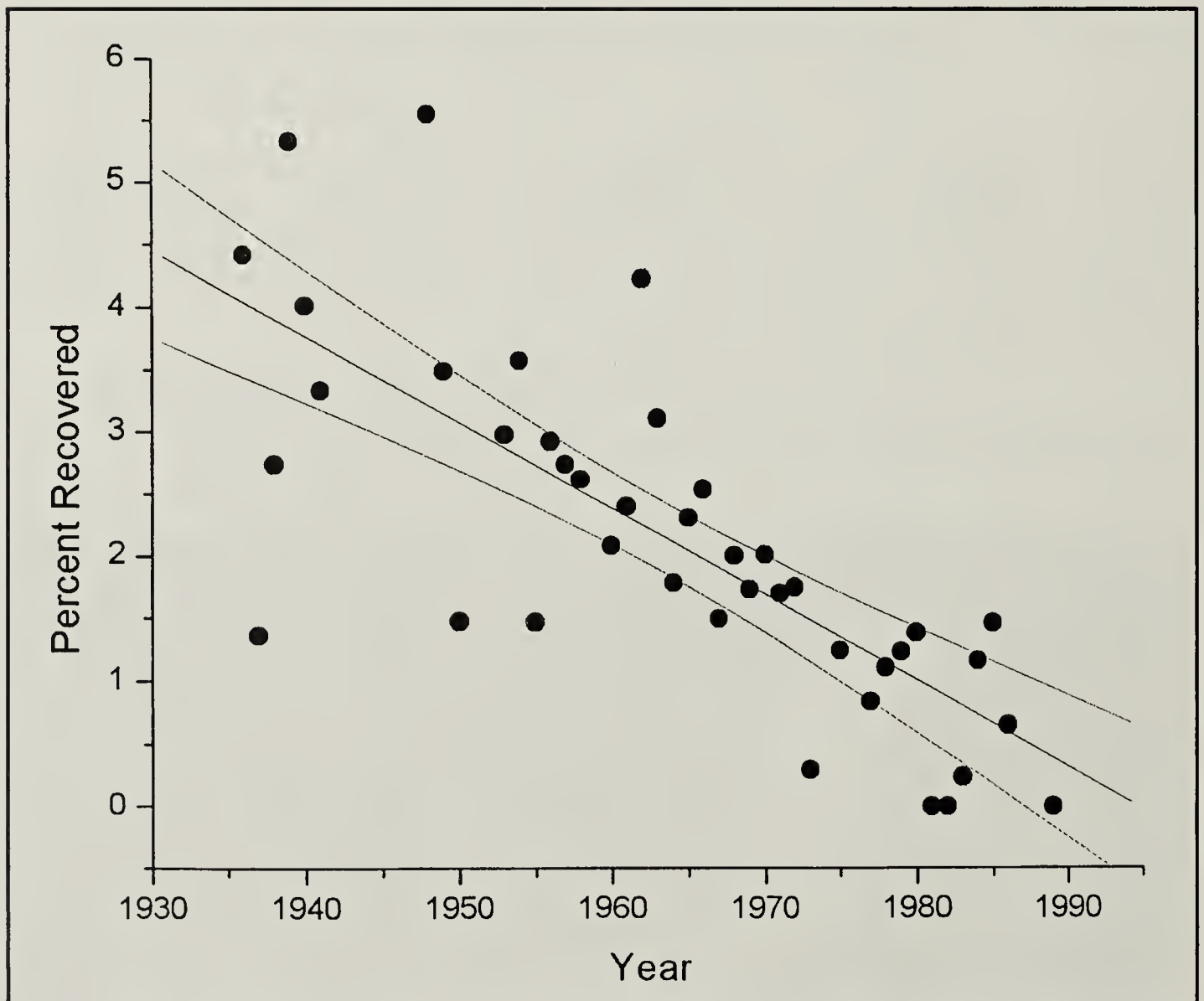


Fig. 2. Declining annual rates of percent recoveries of Ring-billed Gulls banded in Saskatchewan, 1936 - 1989. Each dot represents the percent recovered in that year. Years with fewer than 50 gulls banded (1932, 32; 1976, 15; 1987, 14) were excluded from the calculations. The regression line and 95% confidence intervals are shown. $r^2 = 0.35$; $p = 0.00003$.

The month with the fewest recoveries (12) with an exact date was April. The highest numbers were in July (46), August (48) and October (43). Numbers of inexact dates followed a similar monthly pattern (Table 4).

Monthly maps of recovery locations of Ring-billed Gulls banded in Saskatchewan show the progress of migration (Figs. 3-14, at end of article).

Exact dates are shown as circles and inexact dates with a "+" sign. The only unequivocally unacceptable date concerns a gull found dead at St. Benedict, Saskatchewan, reported in a letter dated 5 February (Fig. 4). The September map (Fig. 11) shows four early migrants: a bird, hatched that year, that reached Stillwater, OK, on 29 September; a 2-year-old bird in Tijuana, Baja California, on 28 September; an

Table 2.
Recoveries and encounters of 538 Ring-billed Gulls banded in Saskatchewan

| How found | Where Found | | | Total | Including know alive |
|----------------------|-------------|--------|--------|-------|-------------------------|
| | USA | Canada | Mexico | | |
| Found dead | 87 | 114 | 14 | 215 | |
| Shot | 36 | 21 | 86 | 143 | 1 |
| Injured | 18 | 19 | 6 | 43 | 6 |
| In trap | | 4 | 2 | 6 | 1 |
| By raptor | 1 | 3 | 1 | 5 | |
| Band mortality | 1 | | | 1 | |
| By cat | 1 | 1 | | 2 | |
| Hit wire, power line | 4 | 3 | 1 | 8 | |
| By car, on highway | 5 | 14 | 1 | 20 | |
| By weather | 1 | 1 | | 2 | |
| Diseased | 3 | 7 | 2 | 12 | |
| Underbuilding | | 1 | | 1 | |
| By oil | | 1 | | 1 | 1 |
| Poisoned | | 1 | | 1 | |
| By fish line | 3 | 2 | 2 | 7 | 2 |
| Caught by hand | | 5 | 5 | 10 | 3 |
| By misc animal | | 1 | | 1 | |
| By fire | | | 1 | 1 | |
| By aircraft | | 3 | | 3 | |
| By machine | | 1 | | 1 | |
| "Band obtained" | 1 | 2 | 5 | 8 | |
| Skeleton | 1 | 5 | | 6 | |
| Read by telescope | | 7 | | 7 | 7 |
| Scientific specimen | | 1 | | 1 | |
| Trapped, released | 5 | 3 | | 8 | 8 |
| Miscellaneous | 2 | | | 2 | |
| Band only | 4 | 8 | 11 | 23 | |
| | 173 | 228 | 137 | 538 | 29 |

Table 3.**Number of Ring-billed Gull recoveries in:****CANADA**

| | | |
|------------------|----|-----|
| Alberta | AB | 29 |
| British Columbia | BC | 2 |
| Manitoba | MB | 9 |
| Ontario | ON | 1 |
| Saskatchewan | SK | 187 |
| | | 228 |

USA

| | | |
|----------------|----|-----|
| Alabama | AL | 1 |
| Arizona | AZ | 1 |
| California | CA | 11 |
| Colorado | CO | 16 |
| Florida | FL | 2 |
| Idaho | ID | 5 |
| Illinois | IL | 2 |
| Iowa | IA | 4 |
| Kansas | KS | 5 |
| Louisiana | LA | 5 |
| Maryland | MD | 1 |
| Michigan | MI | 1 |
| Minnesota | MN | 9 |
| Mississippi | MS | 2 |
| Missouri | MO | 1 |
| Montana | MT | 7 |
| Nebraska | NE | 7 |
| New York | NY | 1 |
| North Dakota | ND | 14 |
| Ohio | OH | 1 |
| Oklahoma | OK | 15 |
| South Carolina | SC | 1 |
| South Dakota | SD | 9 |
| Tennessee | TN | 1 |
| Texas | TX | 43 |
| Utah | UT | 4 |
| Washington | WA | 1 |
| Wisconsin | WI | 1 |
| Wyoming | WY | 2 |
| | | 173 |

MEXICO

| | | |
|------------------|-----|-----|
| Baja California | BCF | 5 |
| Chihuahua | CHH | 10 |
| Coahuila | COA | 2 |
| Durango* | DGO | 3 |
| Guanajuato* | GTO | 7 |
| Jalisco | JAL | 11 |
| Michoacan | MIC | 9 |
| Nayarit | NAR | 2 |
| Nuevo Leon | NL | 1 |
| San Luis Potosi* | SLP | 1 |
| Sinaloa | SIN | 29 |
| Sonora | SON | 48 |
| Tamaulipas | TAM | 6 |
| Vera Cruz* | VER | 1 |
| Zacatecas* | ZAC | 2 |
| | | 137 |
| Total | | 538 |

* indicates state outside expected winter range

11-year-old at Cueramaro, Guanajoto, on 28 September; and a 1-year-old at Huatabampo, Sonora, letter dated 30 September.

Some gulls, presumably non-breeding individuals, wander widely when one year old, exemplified by two in Nebraska on 12 and 14 July and one at Tonawanda, NY on 1 August (Figs. 9 & 10). In August, a 7-year-old gull wandered 1060 km northwest of its natal colony to Fort Vermilion, Alberta, a little north of the known colonies mapped by Semenchuk.¹⁰

Speed of travel: Although two Ring-billed Gull nestlings were recovered a mere four days after they were banded, at Hafford village and at Arelee, at distances of 20 and 60 km from their natal island in Redberry Lake, we doubt

that many nestlings left the lake until at least ten days after banding, the figure chosen for column 2 in Table 5. This table shows distances traveled by selected nestlings in their first southward migration between 8 July and 30 October. These gulls migrated more slowly than most bird species, averaging only 10 to 35 km per day (Table 5).

Natal dispersal: Greenwood defined natal dispersal as the direction and distance from the birth location to the first breeding location,² but we have modified this to include the first encounter of a bird at that breeding location. We have data on 18 instances of natal dispersal by Ring-billed Gulls banded in Saskatchewan. These 18 birds bred at 13 different gull colonies at distances of 35 - 260 km within

Table 4.
Month and season of recovery of Ring-billed Gulls banded in Saskatchewan

| Month | Exact Date | Inexact | Total |
|-----------|------------|---------|-------|
| Jan. | 24 | 11 | 35 |
| Feb. | 23 | 13 | 36 |
| Mar. | 27 | 16 | 43 |
| Apr. | 12 | 6 | 18 |
| May | 24 | 12 | 36 |
| June | 20 | 10 | 30 |
| July | 46 | 11 | 57 |
| Aug. | 48 | 15 | 63 |
| Sep. | 32 | 11 | 43 |
| Oct. | 43 | 30 | 73 |
| Nov. | 37 | 11 | 48 |
| Dec. | 30 | 10 | 40 |
| Spring | | 5 | 5 |
| Summer | | 3 | 3 |
| Fall | | 2 | 2 |
| Hunting | | 2 | 2 |
| Winter | | 1 | 1 |
| Uncertain | | 3 | 3 |
| Totals | 366 | 172 | 538 |

Table 5.
Indicators of speed of travel of Ring-billed Gulls during first southward migration

| Date Banded | Est. Date left lake* | Gull Colony | Lat-long** | Date Recovered | Location | State/ Province | Lat-Long** | Distance (km) | Days Elapsed | Km/day |
|-------------|----------------------|--------------|------------|----------------|---------------|-----------------|------------|---------------|--------------|--------|
| Jun 28/72 | Jul 8 | Red berry | 524-1071 | Jul 16/72 | Prince Albert | SK | 531-1054 | 115 | 8 | 14 |
| Jul 7/79 | Jul 17 | Redberry | 524-1071 | Aug 28/79 | Edmonton | AB | 533-1133 | 430 | 42 | 10 |
| Jul 4/36 | Jul 14 | LML Simpson | 512-1051 | Sep 29/36 | Stillwater | OK | 360-0971 | 1820 | 77 | 24 |
| Jun 29/71 | Jul 9 | Redberry | 524-1071 | Oct 6/71 | Hooper | UT | 410-1120 | 1345 | 89 | 15 |
| Jun 30/38 | Jul 10 | LML Simpson | 512-1051 | Oct 15/38 | Paxton | NE | 410-1012 | 1185 | 97 | 12 |
| Jul 4/56 | Jul 14 | LML Penzance | 510-1051 | Oct 29/56 | EIPalmito | DUR | 253-1045 | 2835 | 107 | 26 |
| Jul 7/79 | Jul 17 | Redberry | 524-1071 | Oct 30/79 | La Angostura | MIC | 201-1022 | 3640 | 105 | 35 |

LML - Last Mountain Lake

DUR - Durango

MIC - Michoacan

* = estimated date of leaving colony is 10 days after banding

** = Latitude is expressed as 3 digits representing degrees and minutes (524 = 52° 40') as is longitude (1071 = 107° 10')

Table 6.
Natal dispersal from five Saskatchewan Ring-billed Gull Colonies

| Lake where banded | Date banded | Where recovered | Lat-long** | Age* (yrs) | Distance (km) | Date found | How Found |
|--------------------------------|-------------|----------------------------|------------|------------|---------------|------------|-----------|
| Redberry L (524-1071) | Jun27/63 | Last Mtn L, Penzance SK | 510-1051 | 5 | 230 | May26/68 | injured |
| " | Jun20/64 | Reed Lake, Morse SK | 502-1070 | 2 | 260 | Jul30/66 | injured |
| " | Jun27/63 | Beaverhills L, AB | 532-1122 | 1 | 355 | May20/64 | sci spec |
| " | Jun27/63 | Upper Souris NWR, ND | 482-1013 | 5 | 625 | Jul15/68 | dead |
| " | Jul10/76 | Banks L, WA | 473-1191 | 20 | 1030 | Jun8/96 | dead |
| " | Jul6/75 | Leslie Spit, Toronto, ON | 433-0792 | 3 | 2285 | May6/78 | telescope |
| Last Mtn L Simpson (512-1051) | Jun21/49 | Last Mtn L, Penzance SK | 510-1051 | 5 | 35 | Jul19/54 | disease |
| " | Jul1/38 | Liberty, nr Last Mtn L, SK | 510-1052 | 4 | 40 | May23/42 | dead |
| " | Jul12/49 | Old Wives L, SK | 500-1054 | 5 | 155 | May10/54 | in trap |
| " | Jul8/48 | Krydor, nr Redberry L, SK | 524-1070 | 3 | 195 | May15/51 | injured |
| " | Jun24/40 | Medicine L NWR, MT | 482-1042 | 2 | 340 | Jul7/42 | rainstorm |
| " | Jun21/49 | Beaverhills L, AB | 532-1124 | 5 | 375 | Jun17/54 | dead |
| " | Jun30/61 | Garrison Reservoir, ND | 473-1012 | 7 | 510 | Jul11/68 | dead |
| Last Mtn L Penzance (510-1051) | Jul4/56 | Last Mtn L, Simpson SK | 512-1051 | 6 | 35 | June24/62 | dead |
| " | Jun21/49 | Reed L, Morse SK | 502-1070 | 4 | 150 | June14/53 | dead |
| " | Jul4/56 | Chase L NWR, ND | 470-0992 | 9 | 615 | June5/65 | dead |
| Quill L (515-1041) | Jul29/56 | Fishing L, SK | 515-1033 | 5 | 45 | Jun4/61 | dead |
| Fishing L (515-1041) | Jun28/63 | Cymric nr Last Mtn L, SK | 511-1050 | 6 | 125 | Jun/69 | injured |
| MEAN DISTANCE | | | | | | | 411 km |

* = Age is in terms of breeding years, hence May is included with June and July

** = Latitude is expressed as 3 digits representing degrees and minutes (510=51° 00') as is longitude (1051 = 105° 10')

Table 7 .
Natal Fidelity. Returns to any Saskatchewan gull breeding site

| Lake where banded | Date banded | Where recovered | Prov/ State | Lat-long** | Age* (yrs) | Distance (km) | Date found | How Found |
|-----------------------------|-------------|------------------------|-------------|------------|------------|---------------|------------|--------------|
| Red berry L (524-1071) | Jun30/58 | Red berry L | SK | 524-1071 | 2 | 0 | Jun27/60 | freshly dead |
| " | Jun23/60 | Redberry L | SK | 524-1071 | 3 | 0 | Jul28/63 | dead |
| " | Jul1/65 | Redberry L | SK | 524-1071 | 7 | 0 | Jun28/72 | fresh dead |
| " | Jul3/70 | Redberry L | SK | 524-1071 | 10 | 0 | Jul15/80 | band thin |
| " | Jun29/71 | Redberry L | SK | 524-1071 | 9 | 0 | Jul5/80 | band v thin |
| " | Jul5/80 | Redberry L | SK | 524-1071 | 1 | 0 | Jun14/81 | dead |
| " | Jun25/61 | N Borden nr Redberry L | SK | 523-1071 | 4 | 20 | Jn21/65 | dead |
| " | Jul3/70 | Blaine L nr Redberry L | SK | 525-1070 | 5 | 20 | May21/75 | injured |
| LastMtnLSimpson (512-1051) | Jun30/38 | Venn nr Last Mtn L | SK | 513-1051 | 4 | 20 | Jul1/42 | disease |
| | Jun23/40 | Govan nr Last Mtn L | SK | 511-1050 | 2 | 20 | Jun12/42 | dead |
| LastMtnLPenzance (510-1051) | Jul16/55 | Last Mtn L Penzance | SK | 512-1051 | 1 | 0 | Jul4/56 | dead |

MEAN DISTANCE

7.3 km

* = Age is in terms of breeding years, hence May is included with June and July

** = Latitude is expressed as 3 digits representing degrees and minutes (524 = 52° 40') as is longitude (1071 = 107° 10')

Saskatchewan; 355 and 375 km to Alberta; 510 and 630 km to North Dakota; 1030 km west to Banks Lake, Washington, and 2285 km east to Leslie Spit in the Toronto harbor, Ontario (Table 6).

Natal fidelity: There were only 11 instances of natal fidelity, i.e., gulls that returned during the breeding season to, or immediately adjacent to, their colony of origin when of breeding age (Table 7). When only one year of age, a year before breeding age, two gulls unexpectedly returned to their natal sites, one at Redberry Lake and another at Last Mountain Lake. Six gulls returned to their colony of origin, presumably to breed: Redberry Lake when 2 years old, 7 years old (freshly dead), 9 years old (band number deciphered by chemical etching), and 10 years old (band worn thin), and Last Mountain Lake when 2 and 4 years old. Four other gulls died within a ten-minute block of latitude and longitude adjacent to known nesting areas, and were presumably breeding birds on food-gathering errands when killed (Table 7).

Longevity: Three Saskatchewan gulls were reported at ages 17, 18, and 20; the oldest gull was found freshly dead, thin and emaciated, on a small gull and tern island colony in Banks Lake, Washington. The official longevity record for this species is 27 years, 3 months.⁶ "Calculation of mortality rates" is "confounded by wear and loss of aluminum bands",⁹ hence gull longevity may be appreciably greater than banding records indicate.

Discussion

An earlier study from Lakes Michigan and Huron, by Frederick E. Ludwig,⁷ showed a slightly higher recovery rate of 2.7% from 18,259 Ring-billed Gulls

banded, 1926-1941. J. P. Ludwig later showed that 9.5% of the leg band can be lost each year, which greatly diminishes the value of longevity calculations for Ring-billed Gulls.⁸

Twelve of Ludwig's 483 gulls (2.5%) had been killed on highways, compared to 4% in our study, all in the latter half. In the northern United States, highway deaths began in the 1930s, two decades earlier than in Saskatchewan. Since Ludwig's recoveries were mainly from areas that already had paved highways, traffic speed was no doubt higher two decades earlier than in Saskatchewan. In Ludwig's study, 9.9% of recoveries were birds that were reported as shot, compared to 27% in our study.

The most unexpected result from Saskatchewan banding was the prevalence of distant natal dispersal, with 18 such records at up to 1030 km west and 2285 km east, and an average natal dispersal distance of 411 km (Table 6). On 6 May 1978, a band placed on a nestling at Redberry Lake on 6 July 1975 was read with binoculars at Leslie Spit; the adult was on three eggs, two of which hatched (Hans Blokpoel, in litt., 10 October 1978). That colony began in 1973, when all ten nests failed, and increased to 10,000 nests in 1976.¹ Especially within new colonies, such as that at Leslie Spit in the Toronto Harbor, Ring-billed Gulls regularly begin nesting when only two years old.

Ring-billed Gulls found breeding at distant colonies (18) outnumbered those that returned to the colony of their origin (11), in spite of the fact that there were more opportunities for banders to find freshly dead birds at colonies that were visited each year. Thus the natal fidelity rate of 11/29 (38%) was

less than the natal dispersal rate of 18/29 (62%).

Striking differences in direction of migration and age of first breeding are evident between Ring-billed and California Gulls. Nestling California Gulls begin to leave their nesting colony in early July, move more quickly in the first month after learning to fly, travel west or even west-north-west to the Pacific coast to mingle at Vancouver with California Gulls raised in Alberta, North Dakota, Montana, Wyoming, Idaho, Washington, Oregon and California.^{3,5} It is rare for Saskatchewan California Gulls to visit any inland state other than North Dakota. After three years of summering in British Columbia, California Gulls return east to their colony of origin to breed before they are four years old, whereas Ring-billed Gulls disperse more widely to other colonies, occasionally return when one year old, and often breed at two years.

Acknowledgments

Details concerning exact localities in Mexico were provided by Mary Gustafson and one in Texas by Diana Houston. Mario A. Ramos explained the location of Nácori Chico, Sonora and Adolfo Navarro Siguenza did the same for Atanasia and two communities named Providencia. Helpful comments

were provided by an anonymous reviewer.

1. BLOKPOEL, H. and P. M. FETTEROLF. 1978. Colonization by gulls and terns of the Eastern Headland, Toronto Outer Harbor. *Bird-Banding* 49:59-65.
2. GREENWOOD, P.J. 1980. Mating systems, philopatry and dispersal in birds and mammals. *Animal Behavior* 28:1140-1162.
3. HOUSTON, C.S. 1963. R. F. Oldaker, the man who reads gull bands with a telescope. *Blue Jay* 21:53-57.
4. HOUSTON, C. S. 1968. Saskatchewan Bird Banders #11. William I. Lyon and H. E. McArthur. *Blue Jay* 26:185-187.
5. HOUSTON, C. S. 1977. Movements of Saskatchewan-banded California Gulls. *Bird-Banding* 48:158-161.
6. KLIMKIEWICZ, M.K. 2006. Longevity records of North American birds. Version 2006.1. Patuxent Wildlife Research Center. Bird Banding Laboratory. Laurel, MD. [Http://www.pwrc.usgs.gov/bbl/homepage/longvrec.htm](http://www.pwrc.usgs.gov/bbl/homepage/longvrec.htm)
7. LUDWIG, F.E. 1943. Ring-billed Gulls of the Great Lakes. *Wilson Bull.* 55:234-244.
8. LUDWIG, J.P. 1967. Band loss - its effect on banding data and apparent survivorship in the Ring-billed Gull population of the Great Lakes. *Bird-Banding* 38:309-323.
9. RYDER, J.P. 1993. Ring-billed Gull, *Larus delawarensis*. Birds of North America No. 33.
10. SEMENCHUK, G. 1992. The Atlas of Breeding Birds of Alberta. Federation of Alberta Naturalists, Edmonton.

Figs. 3-14, (on the following pages)

Recovery locations of Ring-billed Gulls banded in Saskatchewan, 1936-1986, shown by month the bird was found. • = exact dates. + = inexact dates. Maps by Kathy M. Meeres

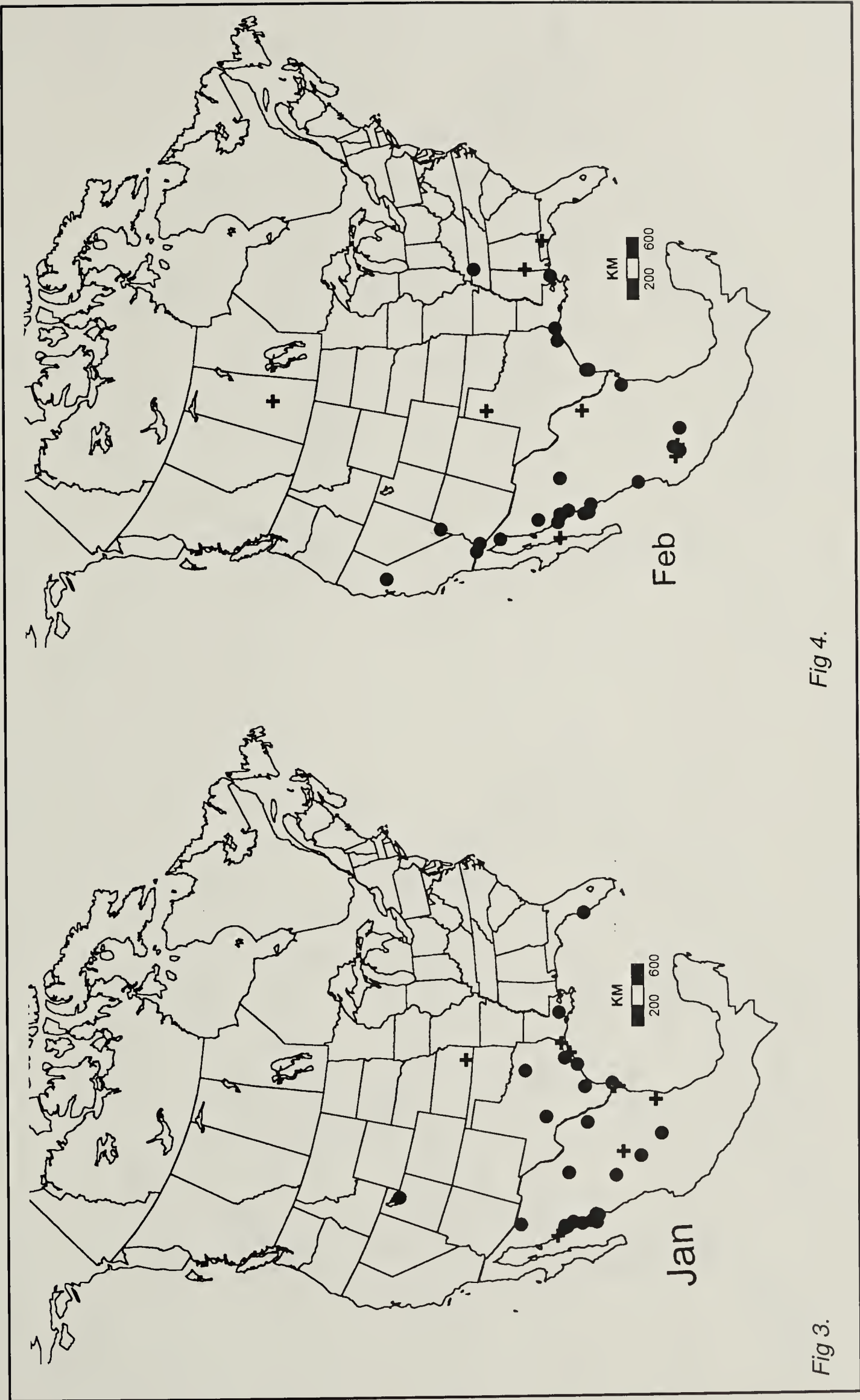


Fig 4.

Fig 3.



Fig 5.

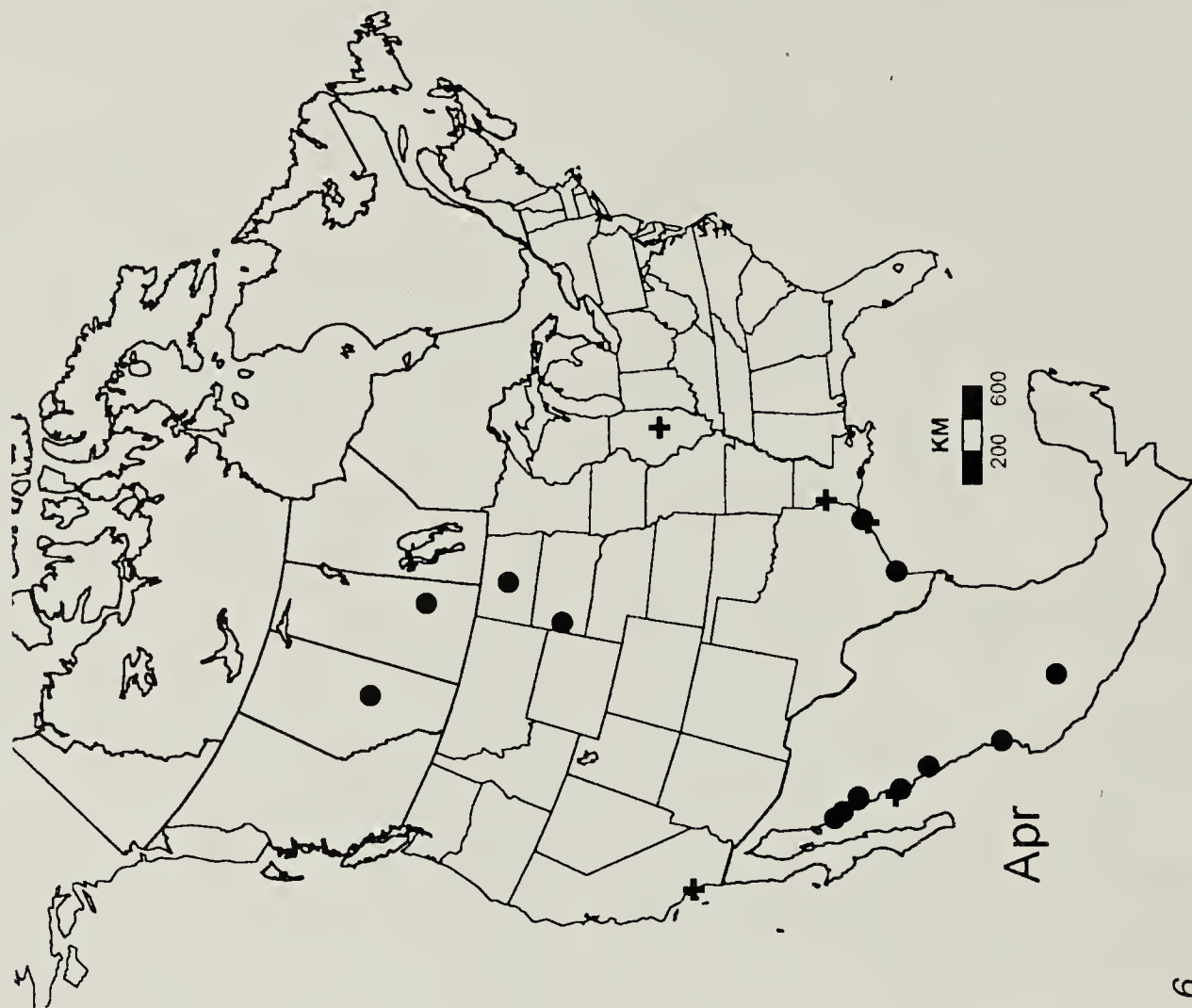


Fig 6.



Fig 7.



Fig 8.

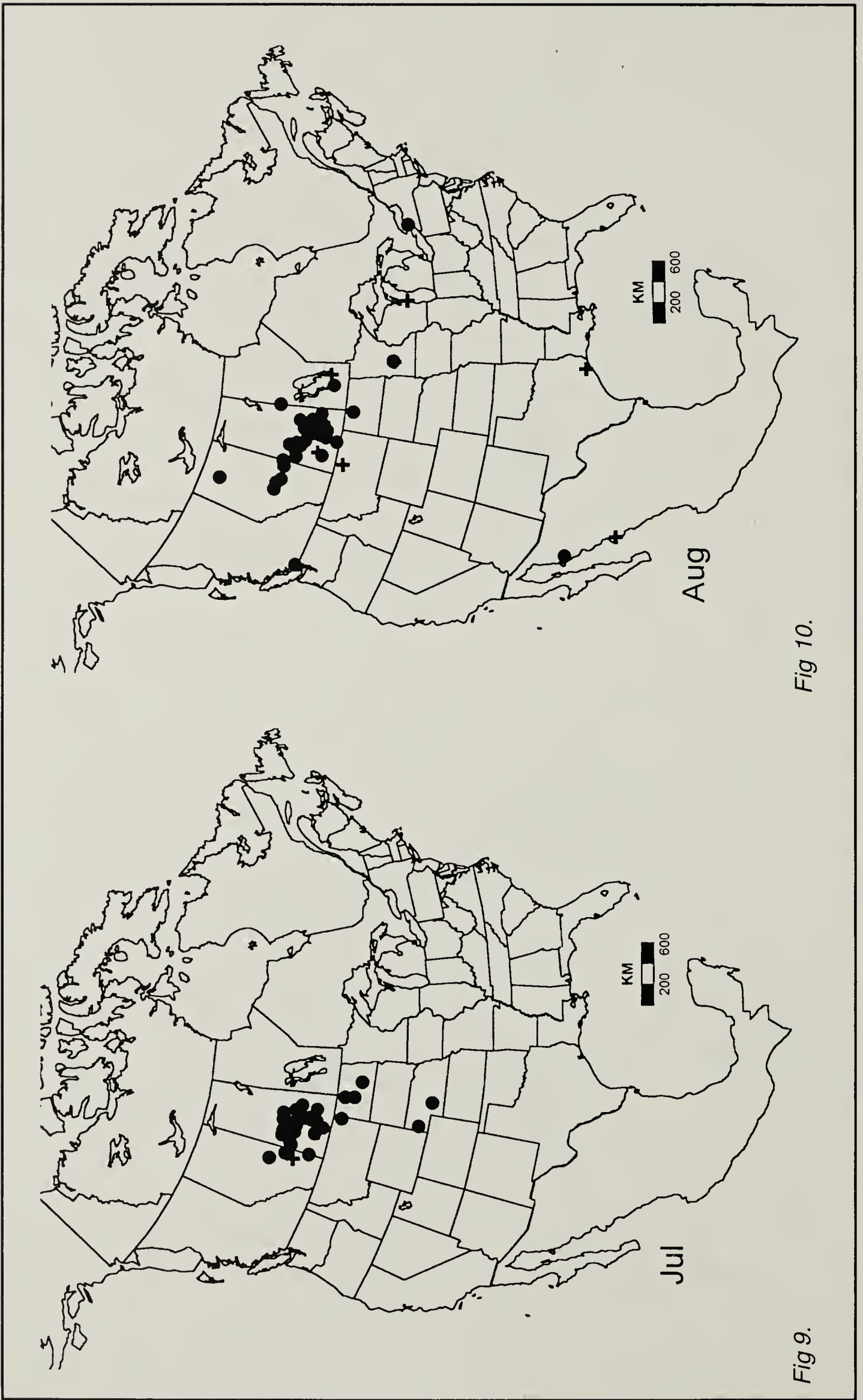


Fig 10.

Fig 9.



Fig 12.

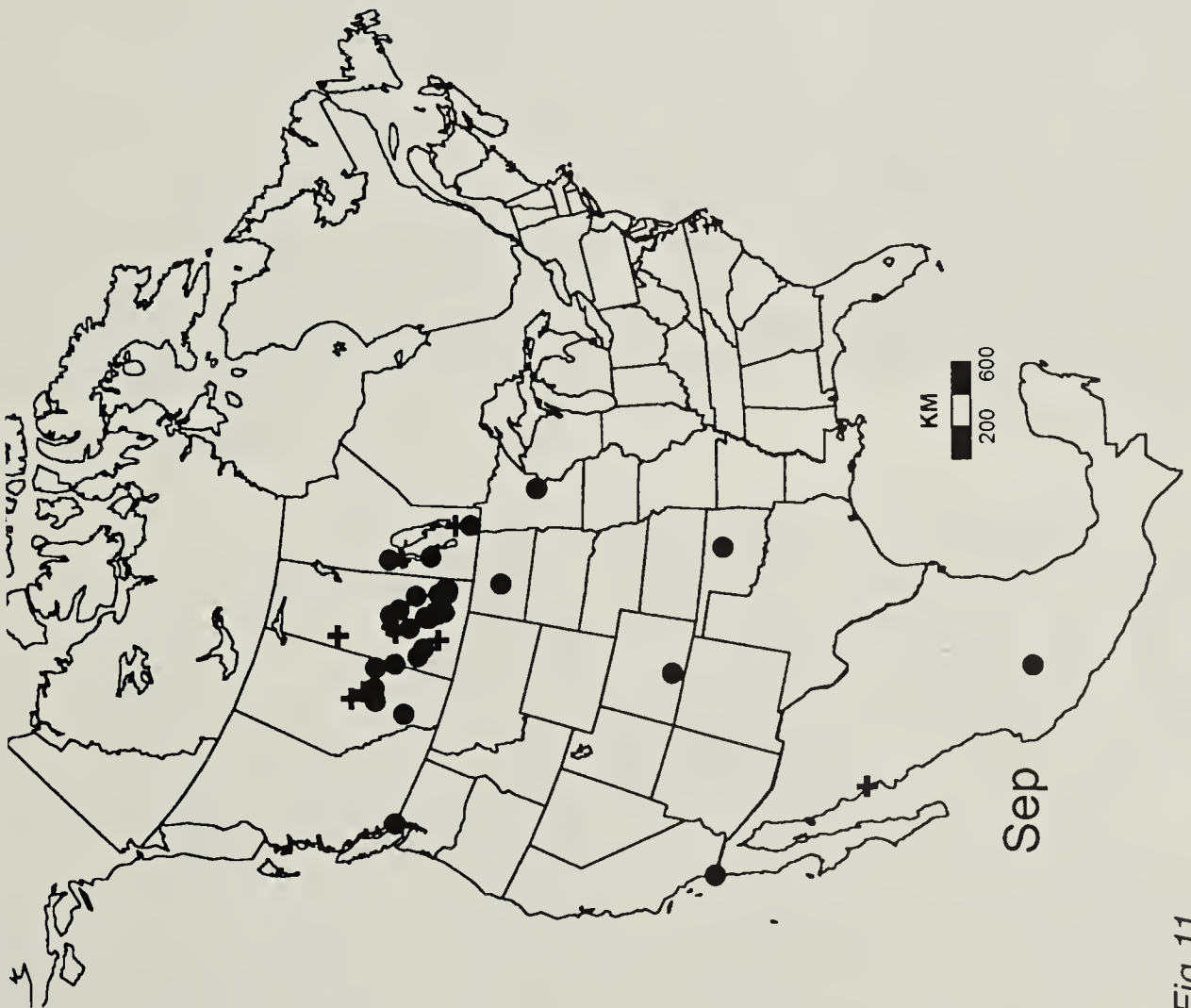


Fig 11.

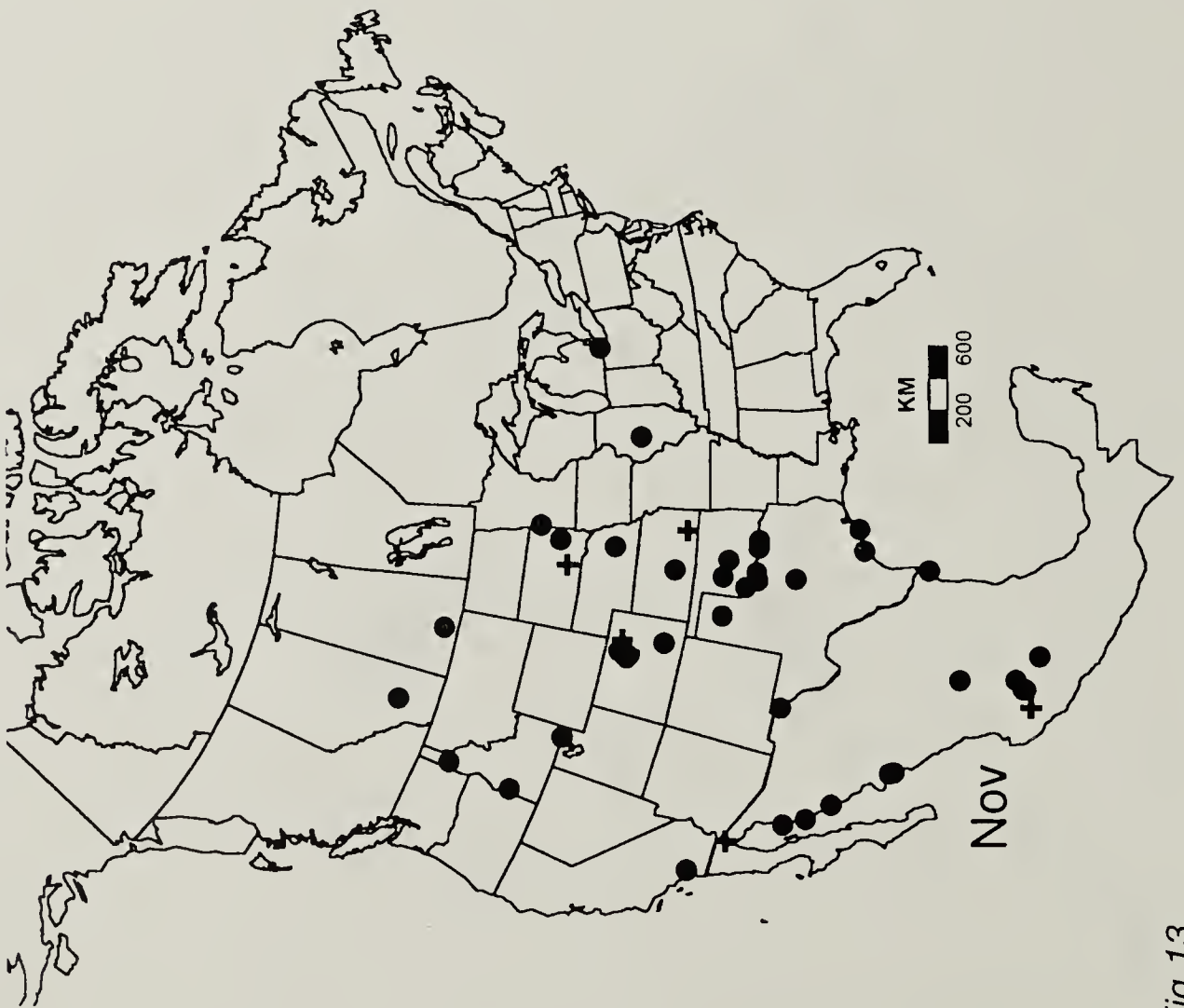


Fig 13.

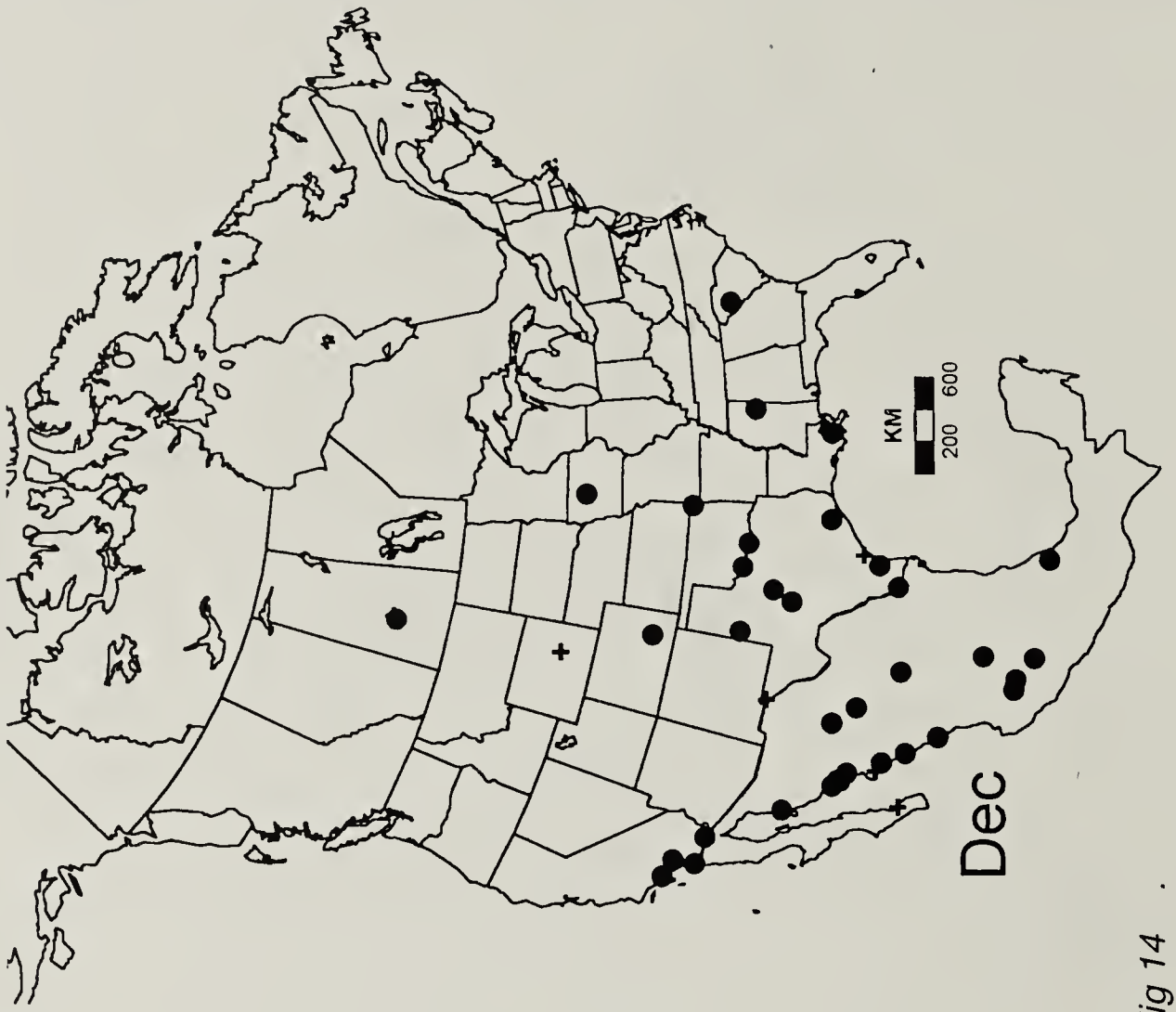


Fig 14 .