1988 AND 1989 SURVEY TO DETERMINE THE STATUS AND DISTRIBUTION OF THE BOREAL OWL IN COOK COUNTY, MINNESOTA

A FINAL PROJECT REPORT
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PRESENTED BY:

William H. Lane
574 Continental Dr.
New Brighton, MN. 55112

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ABSTRACT

During 1988 and 1989, I conducted nocturnal surveys in Lake and Cook Counties of northern Minnesota to determine the number and locations of singing male boreal owls. Male boreal owls were identified at 37 locations in 1988, and 52 locations in 1989. Sites with male owls were revisited following completion of the evenings' surveys and foot surveys conducted to determine utilization of potential nesting cavities. Four cavities were located in 1988; 13 in 1989. All cavities occurred in mature-growth aspen. Two nest sites were documented in 1988 and three in 1989. Cavity tree parameters and cavity site habitat data were ascertained and are included in this report.

INTRODUCTION

Because of its elusive nature and relative isolation little is known about the population dynamics and habitat requirements of the boreal owl (Aegolius funereus) in Minnesota. The first documented nesting of the owl in the state, as well as in the forty-eight contiguous United States occurred in 1978 (Eckert, Savaloja 1979). Additional Minnesota nest sites have been documented in recent years (Eckert 1979; Matthiae 1982; Duncan, Lane 1987; S. Wilson 1988, 1989 pers. comm.; auth.1988,1989, pers. obs.) The boreal owl is considered a regular, but rare winter visitor in the state (Janssen 1987) and records exist for several large winter-time invasions into Minnesota (Eckert 1978,1982). The boreal owl is not presently a listed endangered or threatened species in Minnesota (MN Department of Natural Resources 1984) and little is known about the habitat utilized by the owl in the state. This study was undertaken to determine the distribution and status of the boreal owl in Cook County, Minnesota.

METHODS AND MATERIALS

The study was conducted in Lake and Cook County (Fig.1) along five routes I established in 1987. Surveys were run along county and private logging roads, maintained for access during the winter months. Survey routes are described as follows (see Fig.2):

Crooked Lake Route: Cook County 1 (4.2 miles west of Schroeder) to Lake County 8; west to Lake County 7; east to Cook County 3 and to junction with Cook County 2. Route length: 38.9 miles.

Sawbill Route: Cook County 2 (3.1 miles north of Tofte) to Sawbill Lake; U.S.F.S. #165 east to junction with Cook County 4. Route length: 40.5 miles.

Caribou Route: Cook County 4 (4.9 miles north of Lutsen) to junction with U.S.F.S. #153; east to Cook County 27; south to Cook County 8. Route length: 26.2 miles.

Gunflint Route: Gunflint Trail from Trail's End parking lot south to U.S.F.S. #140. Route length: 44.8 miles.

Arrowhead Route: Cook County 16 (4.5 miles north of Hovland) to McFarland Lake; U.S.F.S. #313 east to U.S.F.S. #1386, south to U.S.F.S. #309; west to Cook County 12 (Gunflint Trail). Route length: 39.9 miles.

During both 1988 and 1989, each of the five survey routes

was driven four times. Surveys were initiated on 26 March 1988 and completed on 15 May 1988. In 1989, surveys were initiated on 23 March and completed on 10 May 1989. Surveys consisted of three minute listening stations and .5 mile intervals for the length of the route. Surveys were initiated at least ½hour after sunset and conducted until individual routes were completed or daylight occurred. At each station, investigators listened for the vocalizations of male boreal owls (Bondrup-Nielsen 1978) as well as other northern forest owl species. Owls were identified according to species and initial location estimated by a combination of compass bearing, triangulation from subsequent listening posts, and loudness estimates (faint, barely perceptible, moderate, loud). Surveys were not conducted in winds exceeding 15 m.p.h., or moderate to heavy precipitation.

Upon completion of the evenings' surveys, stations with singing boreal owls were revisited and foot surveys initiated to ascertain perch trees and/or potential nesting cavities. When located, individual trees were demarcated using foresters ribbon and locations plotted on United States Forest Service (USFS) maps. Locations with singing boreal owls were monitored throughout the survey period to determine changes in singing behavior, a potential indicator of pairbond formation (Bondrup-Nielsen 1984).Cavity sites from both 1988 and 1989 were revisited, and cavity tree parameters obtained (Table 1). Approximations to location (using maps and aerial photography) were made and existing USFS silviculture data (Appendix 1) obtained for individual cavity sites (Table 2).

1988 RESULTS

A total of 695.7 miles, involving 122.3 hours, was surveyed. Singing male boreal owls were identified at 37 locations; four in Lake County and 33 in Cook County (Fig.3). The greatest number of boreal owls (including repeat individuals) occurred on 15 April 1988 (12 owls heard) along the Gunflint route (Fig.4). Temperatures ranged from -3 degrees F. on 29 March 1988 to 53 degrees F. on 2 May 1988..Trees used for singing perches were identified at ten locations. Male owls were observed in potential nesting cavities at three locations.

All initial singing perches were located in the crowns of mature-growth conifers (jack pine, white pine, or balsam fir). All cavities were located in over-mature trembling aspen (Populus tremuloides). One cavity, located at T61N, R4W, Sec. 6, NW¼, SE¼, resulted in pairbond formation and hatching of young, with juvenile vocalizations first heard on 14 May 1988. An additional nest site was documented at T64N, R2E, Sec. 19, SE¼, NW¼ on 4 May 1988. This nest

occurred along the Arrowhead survey route but in an area where no male owls had been heard during previous censusing, indicating pairbond formation prior to survey initiation. Surveys results for all owl species are represented in Table 3.

1989 RESULTS

A total of 760.8 miles, involving 162.2 hours and including 16 miles on cross country skis, was surveyed. Singing male boreal owls were identified at 52 locations, six in Lake County and 46 in Cook County (Fig.5).The greatest number of owls heard during one evening occurred on 26 March 1989 (12), along the Gunflint Route and numbers of singing owls remained consistent through mid-April (Fig.6).Temperatures during the survey ranged from 14 F. on 23 March 1989, to 50 F. on 16 April 1989. At 16 sites, singing-perch trees were located and demarcated using foresters' ribbon and plotted on USFS maps. Male boreal owls were observed in potential nesting cavities at thirteen locations.

All initial singing perches were located in the crowns of mature-growth conifers (jack pine, white pine, or balsam fir). A male owl was observed in the same cavity utilized in 1988 (Cav.#3,Table 1&2;Figs.3,5). All cavities were located in over-mature trembling aspen. Female boreal owls were observed and/or heard on six territories. Three sites resulted in nest initiation (male observed making food deliveries to cavity). One nest site, located at T66N, R4W, Sec.32,NW¼,SE¼, was inspected for cavity contents and a dead boreal owl was removed. Age was estimated to be 2½ weeks. No prey items were found in the cavity. Survey results for all owl species are represented in Table 3.

DISCUSSION

This study presents the first significant evidence of an indigenous population of the boreal owl in Minnesota.This conclusion is supported by results from a concurrent study undertaken in Lake and St. Louis counties (S.Wilson, MN.DNR pers.comm.).

Although a significant winter die-off of boreal owls was recorded during 1989 it did not affect the objective of this study. Whether or not the dead owls were part of an invasive migration or representative of a resident population remains unclear. It does, however, indicate the need for additional studies to address the area of population dynamics of the boreal owl in Minnesota.

Habitats utilized by the owl appear to be influenced by the presence of mature-growth aspen. Aspen was a consistent resource present at all cavity sites, and was present at all sites where boreal owls were located during investigative foot surveys. In both 1988 and 1989, several areas (Figs.3&5) have supported singing male owls. But, given the limited duration of this study it remains uncertain whether these areas are of significance to the biology of the owl.

Cavity sites consisted of mature, mixed growth (deciduous and conifer) forests, with the aspen component comprising a majority of the supercanopy. This forest-type was also immediately adjacent to the boreal owl located in an aspen cavity on the edge of a clear cut (fig.5, table 1 Cav.10). Existing federal habitat recommendations for the boreal owl (Russ USFS,pers.comm.) call for the maintenance of 200 acre tracts of mature growth spruce/fir timber-types. While this forest type may be an important element of the overall habitat utilized by the boreal owl (foraging, roosting), its use for nesting purposes is not suggested by my findings. Attempts to locate roosting owls at several nest sites proved unsuccessful. The habitats utilized by the boreal owl for roosting and foraging must be identified if the species is to receive management consideration.

An increase of aspen harvests is projected during the 1990's in northern Minnesota (T. Nicholls, D. Dexter USFS; J. Hane MN.DNR pers.comms.). This fact, along with findings from my study, make it increasingly important to identify the habitats associated with the boreal owl. Only with further study will the habitat requirements of the owl be understood.

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LOCATION OF STUDY

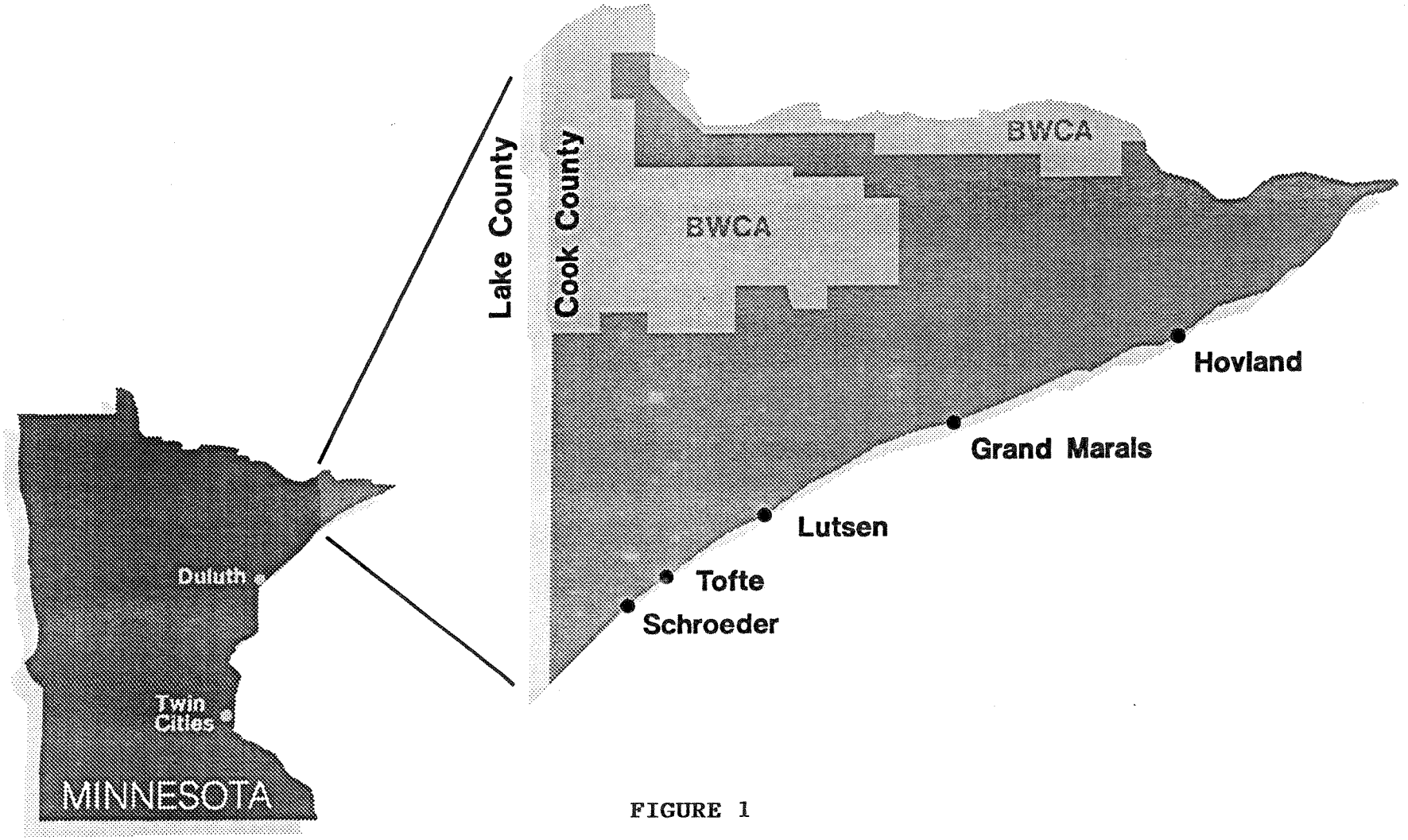
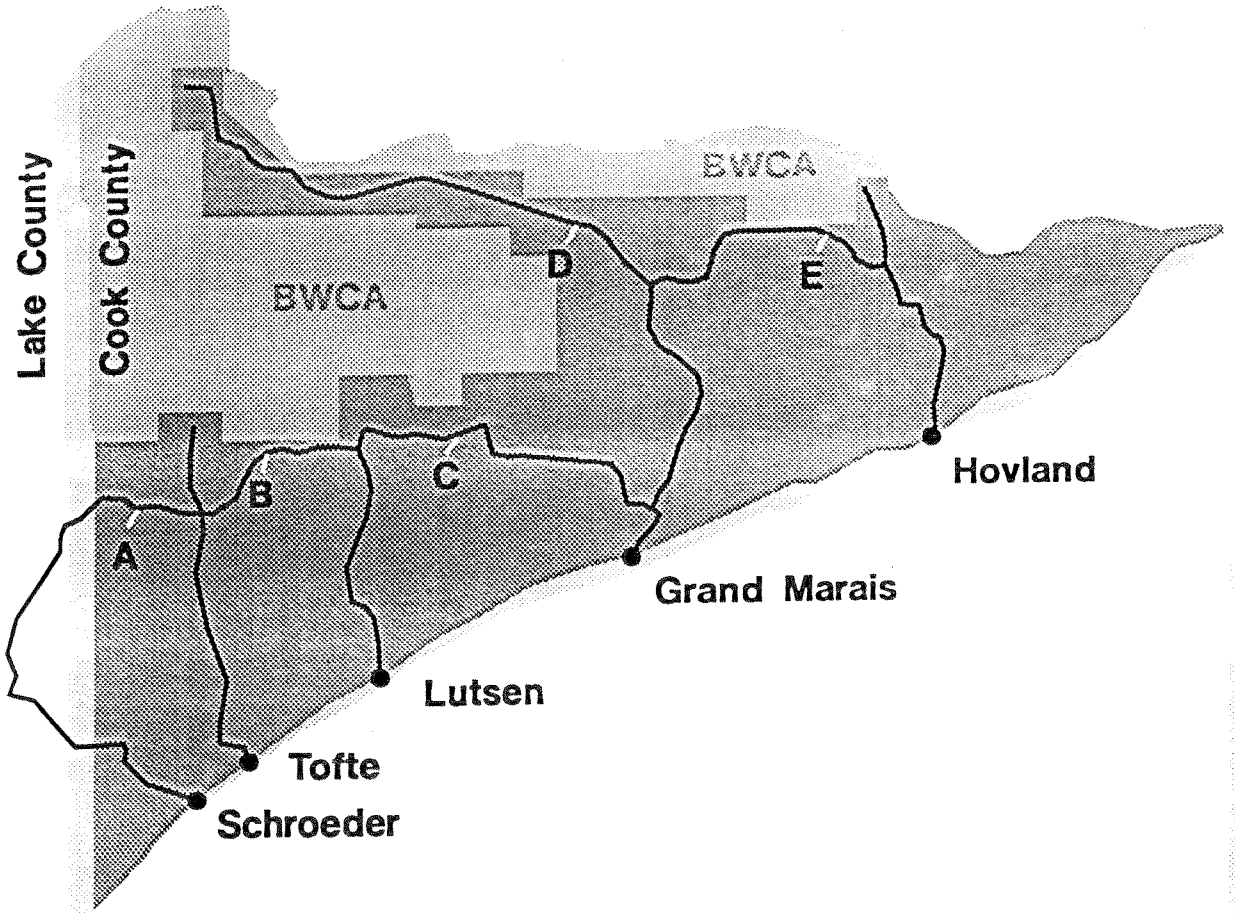


FIGURE 1

SURVEY ROUTE LOCATIONS



Routes Driven

A: Crooked Lake Route
B: Sawbill Route
C: Caribou Route
D: Gunflint Route
E: Arrowhead Route

FIGURE 2

TABLE 1: SILVICULTURE SPECIFICATIONS* FOR 1989 CAVITY SITES**

CAVITY #	LEGAL DESCRIPTION	ACRES	TIMBER TYPE	DENSITY	BASAL AREA	STAND CONDITION	AVE. D.B.H.
1	T66N,R4W,Sec.32,NW¼SE¼***	195	Jack Pine	Poletimber+70	110	Mature	8"
2	T64N,R1W,Sec.14,NW¼SE¼	8	Asp-WhSp-BaF	Poletimber+70	100	High Risk	8"
3	T65N,R4W,Sec.8,SW¼NE¼	60	Jack Pine	Poletimber+70	150	Mature	--
4	T63N,R4E,Sec.18,SW¼NE¼***	Stand data not available					
5	T64N,R3E,Sec.20,NE¼SW¼	22	Quak.Aspen	Poletimber+70	90	Mature	9"
6	T62N,R1W,Sec.3,NW¼SE¼	--	Asp-WhSp-BaF	Poletimber+70	100	High Risk	8"
7	T62N,R2W,Sec.11,SW¼SE¼	7	Asp-WhSp-BaF	Poletimber+70	80	Low Quality	5"
8	T62N,R3W,Sec.21,SE¼NW¼***	--	Asp-WhSp-BaF	Sawtimber40-69	100	Mature	12"
9	T61N,R4W,Sec.8,NE¼NW¼	45	Black Spruce	Poletimber+70	120	Mature	6"
10	T61N,R4W,Sec.7,SE¼SE¼	Cavity occurred in clear cut					
11	T62N,R6W,Sec.36,NW¼SE¼	--	BaF-Asp-PaB	Sawtimber+70	110	Mature	10"
12	T61N,R6W,Sec.11,SW¼NW¼	11	Asp-WhSp-BaF	Sawtimber+70	120	Mature	14"
13	T61N,R6W,Sec.33,NE¼NW¼	36	Quak.Aspen	Sawtimber+70	90	HighRisk	14"

* Based upon R-9 Silviculture Handbook, U.S.F.S., 1983.
** See Fig. 5 for cavity tree locations.
*** Nest sites.
Asp-WhSp-BaF: Aspen-White Spruce-Balsam Fir.
BaF-Asp-PaB: Balsam Fir-Aspen-Paper Birch.

1989 CAVITY TREE** PARAMETERS

CAVITY #	LEGAL DESCRIPTION	TREE TYPE	TREE HEIGHT	CAVITY HEIGHT	D.B.H.	CAVITY ASPECT
1	T66N,R4W,Sec.32,NW¼SE¼***	Aspen	81 ft.	30 ft.	14.1"	NNE 4
2	T64N,R1W,Sec.14,NW¼SE¼	Aspen	78'	41'	16.4"	ENE 84
3	T65N,R4W,Sec.8,SW¼NE¼	Aspen	87'	27'(31'32')	13.9"	SSW 192
4	T63N,R4E,Sec.18,SW¼NE¼***	Aspen	82'	36'	16.8"	---
5	T64N,R3E,Sec.20,NE¼SW¼	Aspen	76'	22'	18.1"	ESE 120
6	T62N,R1W,Sec.3,NW¼SE¼	Aspen	51'	21'	11.6"	S 176
7	T62N,R2W,Sec.11,SW¼SE¼	Aspen	71'	21'(31')	16.5"	ESE 166
8	T62N,R3W,Sec.21,SE¼NW¼***	Aspen	63'	41'(46')	17.3"	NNE 12
9	T61N,R4W,Sec.8,NE¼NW¼	Aspen	47'	27'	11.9"	ESE 116
10	T61N,R4W,Sec.7,SE¼SE¼	Aspen	43'	31'(42')	15.9"	ESE 136
11	T62N,R6W,Sec.36,NW¼SE¼	Aspen	82'	39'(35')	15.7"	WSW 230
12	T61N,R6W,Sec.11,SW¼NW¼	Aspen	75'	23'(28'31')	14.5"	SW 228
13	T61N,R6W,Sec.33,NE¼NW¼	Aspen	48'	34'(32'39')	18.4"	SSE 170

** See Fig. 5 for cavity tree locations.
-- Cavity heights in parenthesis are additional cavities not utilized by singing owls.
*** Nest sites.

TABLE 2: SILVICULTURE SPECIFICATIONS* FOR 1988 CAVITY SITES**

CAVITY #	LEGAL DESCRIPTION	ACRES	TIMBER TYPE	DENSITY	BASAL AREA	STAND CONDITION	AVE. D.B.H.
1	T64N,R2E,Sec.19,SE¼NW¼***	6	Asp-WhSp-BaF	Poletimber+70	120	Mature	10"
2	T62N,R3W,Sec.15,NE¼SW¼	11	Quak.Aspen	Sawtimber+70	---	High Risk	13"
3	T65N,R4W,Sec.8,SW¼NE¼	60	Jack Pine	Poletimber+70	150	Mature	--
4	T61N,R4W,Sec.6,NW¼SE¼***	Private land-stand data not available					

* Based upon R-9 Silviculture Handbook, U.S.F.S., 1983.
** See Fig.3 for cavity tree locations.
*** Nest sites.
Asp-WhSp-BaF: Aspen-White Spruce-Balsam Fir.

1988 CAVITY TREE PARAMETERS**

CAVITY #	LEGAL DESCRIPTION	TREE TYPE	TREE HEIGHT	CAVITY HEIGHT	D.B.H.	CAVITY ASPECT
1	T64N,R2E,Sec.19,SE¼NW¼***	Aspen	72 ft.	48 ft.	15"	ESE 18
2	T62N,R3W,Sec.15,NE¼SW¼	Aspen	68'	31'(38')	17.4"	WNW 284
3	T65N,R4W,Sec.8,SW¼NE¼	Aspen	87'	27'(31'32')	13.9"	SSW 192
4	T61N,R4W,Sec.6,NW¼SE¼***	Aspen	76'	43'	17.9"	NNE 8

** See Fig.3 for cavity tree locations.
-- Cavity heights in parenthesis are additional cavities not utilized by singing owls.
*** Nest sites.

1988 BOREAL OWL LOCATIONS

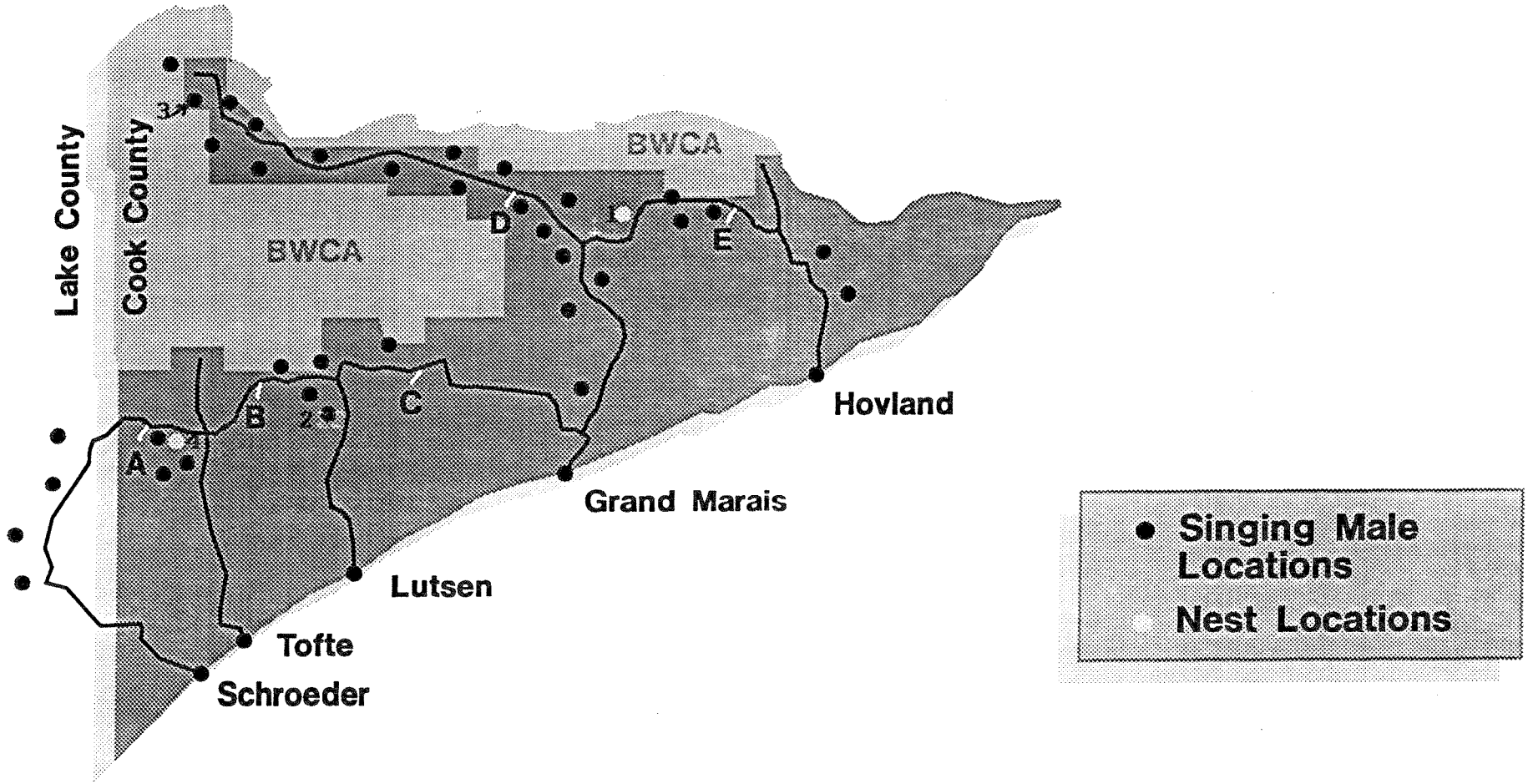


FIGURE 3

1988 SURVEY RESULTS

NUMBER OF VOCALIZING BOREAL OWLS BY ROUTE AND DATE SURVEYED

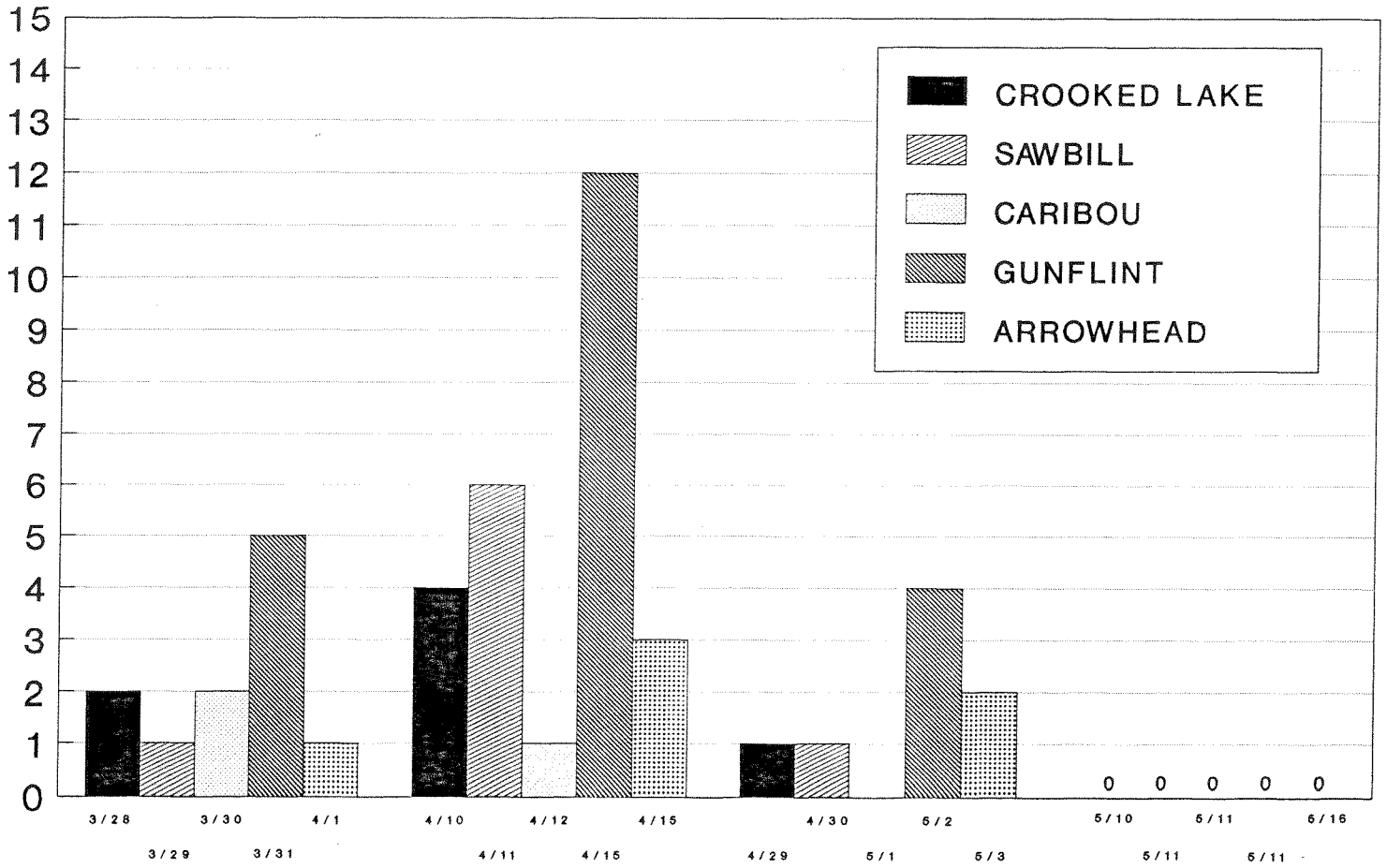


FIGURE 4

1989 BOREAL OWL LOCATIONS

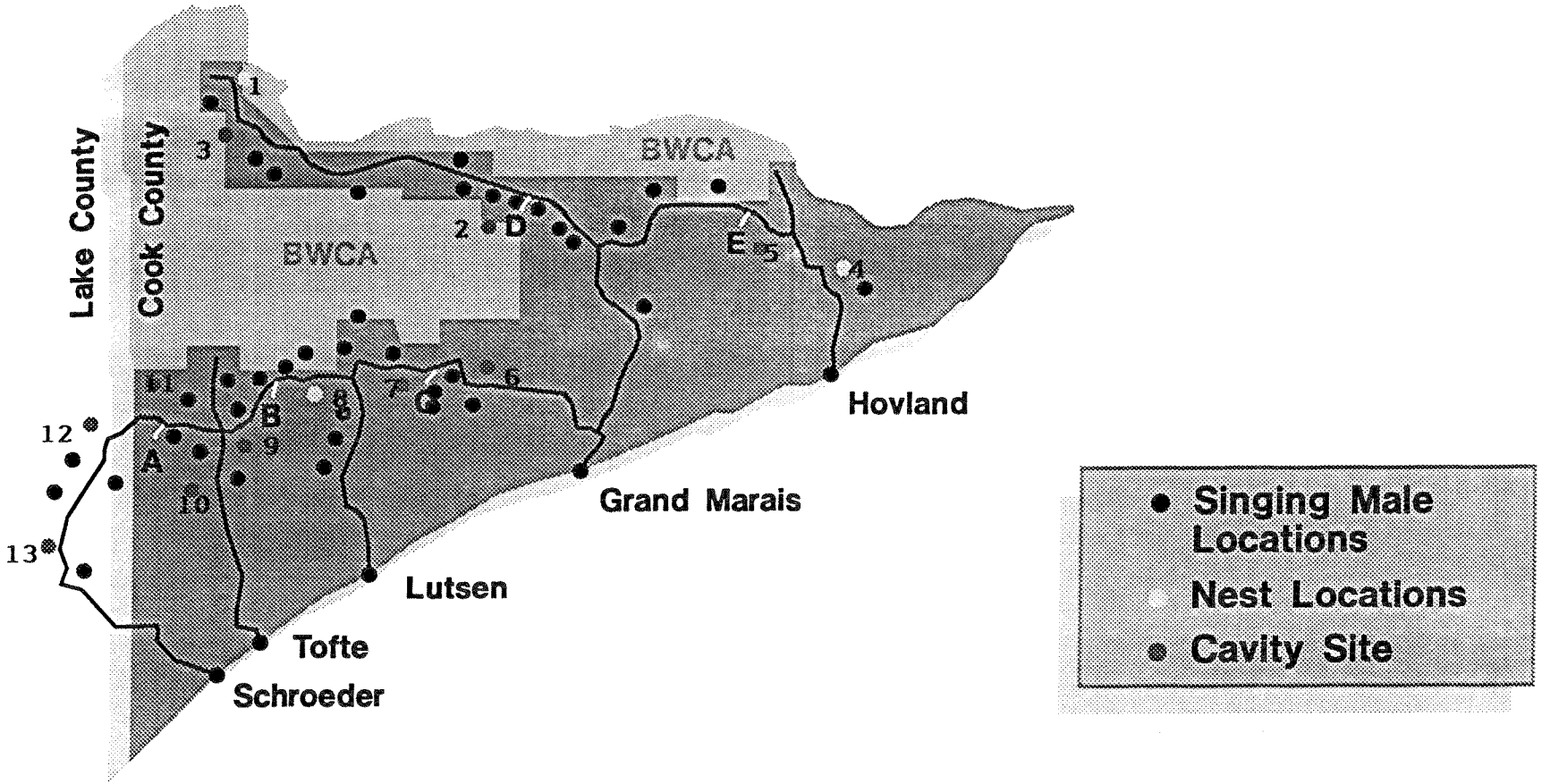


FIGURE 5

1989 SURVEY RESULTS

NUMBER OF VOCALIZING BOREAL OWLS BY ROUTE AND DATE SURVEYED

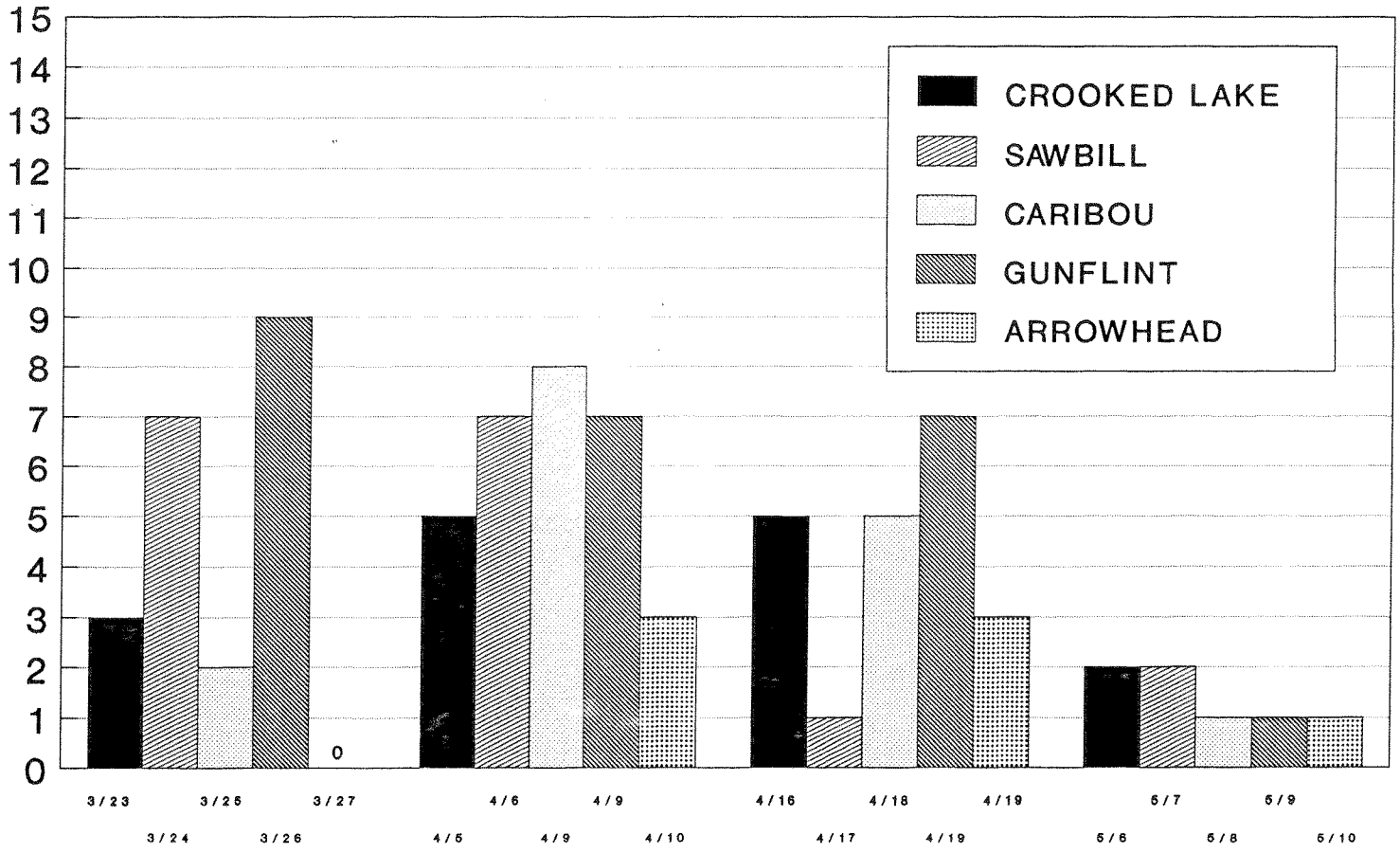


FIGURE 6

TABLE 3: SPECIES AND NUMBERS OF OWLS ENCOUNTERED

SPECIES	1988 TOTALS	1989 TOTALS
Boreal owl (*Aegolius funereus*)	37	52
Northern saw-whet owl (*Aegolius acadicus*)	69	55
Barred owl (*Strix varia*)	24	27
Great-horned owl (*Bubo virginianus*)	15	7
Long-eared owl (*Asio otus*)	2	1
Great gray owl (*Strix nebulosa*)	1	5

ADDENDUM: GUIDELINES FOR SILVICULTURE DATA

Existing compartment and stand silviculture sheets were used where possible. A minimum of five sample locations per stand was utilized, with numbers and observations derived representative of the featured stand.

Timber Type: Type refers only to the commercial forest tree species on the area evaluation plot. It does not refer to ground cover vegetation.

Jack Pine: Forests where a majority of the stocking is in jack pine or where jack pine and other pine species comprise a plurality of the total stocking and jack pine is the dominant pine. Common associated species are white pine, red pine, aspen, paper birch, black spruce, balsam fir, and tamarack.

White Pine: Forests where a majority of the stocking is in white pine or where white pine and other pine species comprise a plurality of the total stocking and white pine is the dominant pine. Common associated species are red pine, jack pine, aspen, paper birch, white spruce, and balsam fir.

Balsam Fir, Aspen, Paper Birch: Forests where a majority of the stocking is in balsam fir or where the spruce-fir component of the stand comprises a plurality of the total stocking and balsam fir is the dominant conifer. This type is common in late successional aspen-birch communities when the hardwood supercanopy yields site dominance or in pure conifer mixtures. Common associated species are white spruce, black spruce, white pine, red pine, jack pine, and white cedar.

Black Spruce: Forests where a majority of the stocking is in black spruce. This type can occur on both upland and lowland sites. Common associated species are jack pine, aspen,paper birch, balsam fir, white cedar, and tamarack.

Quaking Aspen: Forests where a majority of stocking is quaking aspen and where the spruce-fir component of the featured stand does not exceed 23% or where quaking aspen comprises a plurality of stocking in a mixed type. Common associated species are paper birch, white pine, red pine, jack pine, balsam fir, white spruce, black spruce, and red maple.

Aspen-White Spruce-Balsam Fir: Forests where a majority of stocking is quaking aspen and where the spruce-fir component of the featured stand exceeds 25%, All listed species need not occur to record this type. Common associated species are paper birch and black spruce.

Addendum cont.:

Density:

Poletimber; Poor (16%-39% stocked)
Poletimber; Medium (40%-69% stocked)
Poletimber; Well (over 70% stocked)
Sawtimber; Poor (16%-39% stocked)
Sawtimber; Medium (40%-69% stocked)
Sawtimber: Well (over 70% stocked)

Basal Area: an estimate of the square footage per one acre area if all trees greater than one inch in diameter are cut at D.B.H.

Stand Condition: Stand condition is based on species, age, size, quality, and stocking of trees making up the stand to be featured in management.

High Risk: Those stands which will not survive for ten years or will have a net volume loss before the next cutting period.

Low Quality: Stands with less than 40 ft.2 of desirable, acceptable, and mature growing stock.

Mature: Any stand within five years of rotation age, and any stand over rotation age that is not high risk or low quality.