

## FINAL REPORT

### Avian Studies--Proposed GMP Wind Turbine Project Searsburg and Readsboro, Vermont, Summer 1994

Submitted by

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5 August 1994

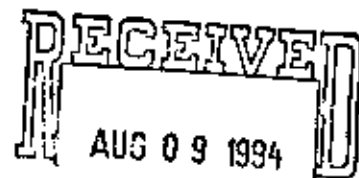
The Green Mountain Power Corporation has requested a permit from the U.S. Forest Service to operate a wind-powered electrical generating facility on lands administered by the Green Mountain National Forest. An EIS will be prepared for the project, and one of the issues to be addressed in the EIS will be the effects of the proposed project on avian species. As part of that assessment, it is desirable to acquire baseline information on selected species in the vicinity of the areas that might be developed for wind turbines.

Personnel of the Green Mountain National Forest have indicated that baseline studies should address the possible existence of nesting goshawks in the study region and document the diversity of songbirds in the area. We report on the completion of appropriate surveys to satisfy these objectives, and we do so in general accordance with guidelines entitled "Avian Study Requirements" supplied by Vermont Environmental Research Associates, Inc. (VERA).

#### Study Procedures

##### Goshawk and Other Raptors

Transects were established across two ridges where turbines are proposed to be located. In preparation for field surveys, we mapped the study area with a Geographic Information System (GIS) and established a pattern of transects that most closely crossed the ridges perpendicular to the proposed service roads and turbine sites, but remained parallel and spaced 250 meters apart (Figure 1.). About 8.8 km (5.5 mi) of these transects fell on terrain that was too steep to walk, so the region where these transects were located was visited from more accessible points. The total length of transects surveyed was 48.4 km (30 mi).



Because transects for goshawk surveys were visited only once, they were not surveyed and marked. Instead, we used a compass and measuring tape to locate the point on each transect that was closest to the proposed access road on top of the ridges and placed a temporary marker at those points. This allowed field observers to adjust their bearings if necessary each time they crossed the ridges.

Survey points along these transects were used to play tape recordings of goshawk alarm calls. Field biologists stopped every 300 meters to broadcast goshawk calls. The two field biologists who conducted these surveys walked transects in different portions of the study area to avoid interference with each other. Although this survey technique was designed specifically for goshawks during the nesting season, field workers were asked to record any other raptorial birds observed in the study area and note the location of any nests for other raptor species.

### Songbirds

We interpreted "songbirds" to mean the complex of true songbirds and other forest-dwelling species that occupy the region during the breeding season. Most of these species set up distinct territories where they nest, and exclude other members of the same species from these territories. This system of territoriality allows field surveys that produce reasonably precise estimates of abundance. We established the following procedures for the songbird surveys:

1. As illustrated on the enclosed map (Figure 2), songbird survey points were located on a zig-zag pattern where every other point was offset 100 meters from the center line of the proposed service road down the two major ridges in the study region. Census points were spaced 250 meters apart. Points were not permanently marked, but a precise locations were determined so that they might be relocated in the future (Table 1).
2. The census technique involved a careful determination of the numbers and species of birds singing at each point, and required that field observers be trained in the identification of birds by sight and sound. Thus, data collected at each point were a listing of birds, by species and number, during a 5-minute census period, with a determination of which birds were within a 50-meter radius and which were beyond that distance. Counts taken within the fixed-radius plot were used to calculate density, whereas records of birds observed beyond the 50-meter plot boundary were useful for expressing relative abundance.

## Results and Discussion

### Habitat and Topography

Elevations at points selected for songbird surveys ranged from 777 m to 924 m, with an average of 852 m. The two ridges comprising the study area were quite different, however.

The western ridge was characterized by gentle slopes with a maximum elevation of about 870 m. A mature northern hardwood forest of American beech, yellow birch, and sugar maple was the dominant cover type. Two recent clearcuts added diversity to the vegetation. The eastern ridge exceeded 920 m in elevation, was much steeper, and was dominated by a mixture of red spruce-balsam fir, paper birch, and northern hardwoods.

Of the 35 survey points established for songbirds, 17 fell in mixed spruce-fir and paper birch-northern hardwoods; 13 points were in mature northern hardwoods; 2 points were in 3- to 4-year-old clearcuts; and the remaining 3 points were near edges or in shrubby or young forest stands.

### Goshawks and Other Raptors

No goshawks were seen or heard during any of 16 person/days on the site, including the 4 days when observers walked transects and played recordings of the goshawk's alarm call. The only raptorial bird detected in the study region was a Red-tailed Hawk, which was seen flying over the area. These results should be viewed with caution, however, because a similar survey technique was used in the White Mountains of New Hampshire in 1993 and 1994. Eighteen goshawk nests were located in 1993, but only 3 were found in 1994 despite a comparable degree of effort in the same areas that were surveyed in 1993. New Hampshire field workers speculated that the severe winter of 1993-94 may have caused high mortality among goshawks. Despite this caveat, there was nothing about the habitat in the study area that suggested a particularly unique nesting site for Northern Goshawks.

### Songbirds and Other Species

Thirty-eight species of birds were detected on the songbird survey points (Table 2). None of these species is endangered, threatened, or especially rare. However, the presence of a Gray-cheeked Thrush (the race is known as Bicknell's Thrush), detected on two occasions on the same survey plot, is noteworthy. This is a species that is characteristically found in Vermont only on some of the state's highest mountains and ridges, usually in dense coniferous habitat above 915 m (3000 ft). Census Plot 6, where the species was heard, was an appropriate habitat type and near the 915-meter elevation mark.

The diversity of songbirds and the relative abundance of the 38 species detected by point counts is about what should be expected for a study area with the mix of habitat types described above in a mid- to high-elevation zone in the Green Mountains. Several species were present because of the openings created by recent clearcuts (e.g., Common Yellowthroat, Chestnut-sided Warbler, Brown-headed Cowbird, Cedar Waxwing), but even more species were characteristic of an expansive tract of northern forest (e.g., Ovenbird, Black-throated Blue Warbler, Black-throated Green Warbler, Blackpoll Warbler, Swainson's Thrush). The habitat found in this study region and the birds detected in this area are quite common and predictable for the Green Mountain physiographic region.

### Personnel

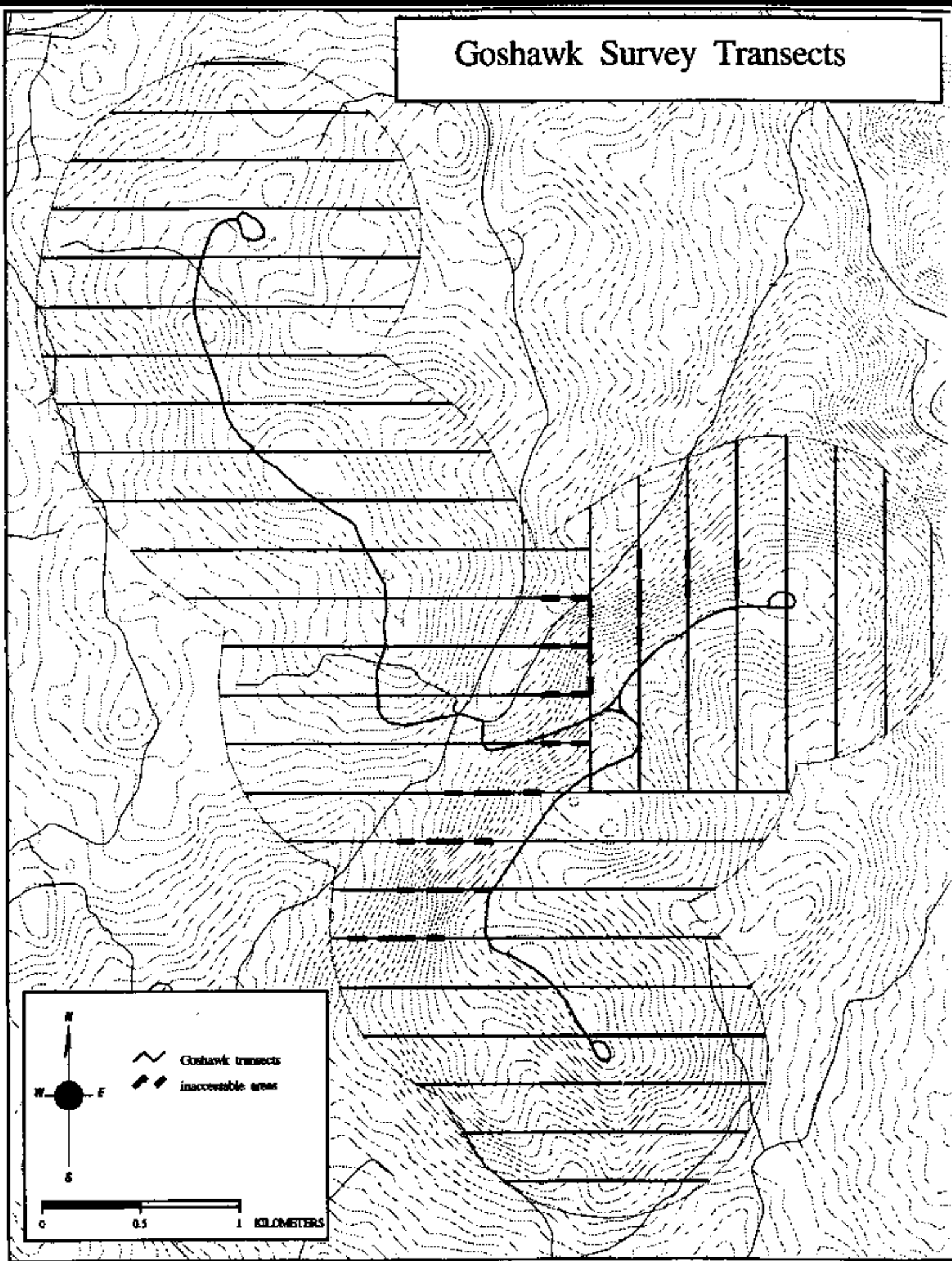
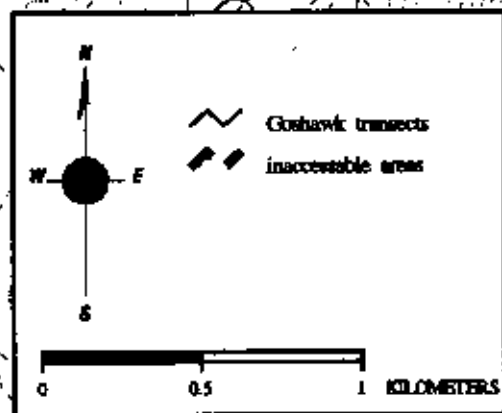
The principal contractor for this project was David E. Capen, an Associate Professor of Wildlife Biology at the University of Vermont. Dr. Capen has degrees in Forestry, Wildlife Management, and Wildlife Science. His expertise is in avian ecology, wildlife habitat, field sampling and study design. He is a Certified Wildlife Biologist. The principal field biologist was Daniel R. Coker, who has an undergraduate degree in Biology and an M.S. degree in Wildlife and Fisheries Biology. Mr. Coker is an accomplished field ornithologist and has complementary skills in GIS and GPS technology. Kristi Wilkins provided field assistance for transect layout and goshawk surveys. Ms. Wilkins is working toward an M.S. degree in Wildlife and Fisheries Biology. Caitlin Boyd assisted Mr. Coker with surveys for goshawks. Ms. Boyd has a B.A. degree with a minor in Wildlife Biology and is a competent field ornithologist.

### Figure Legends

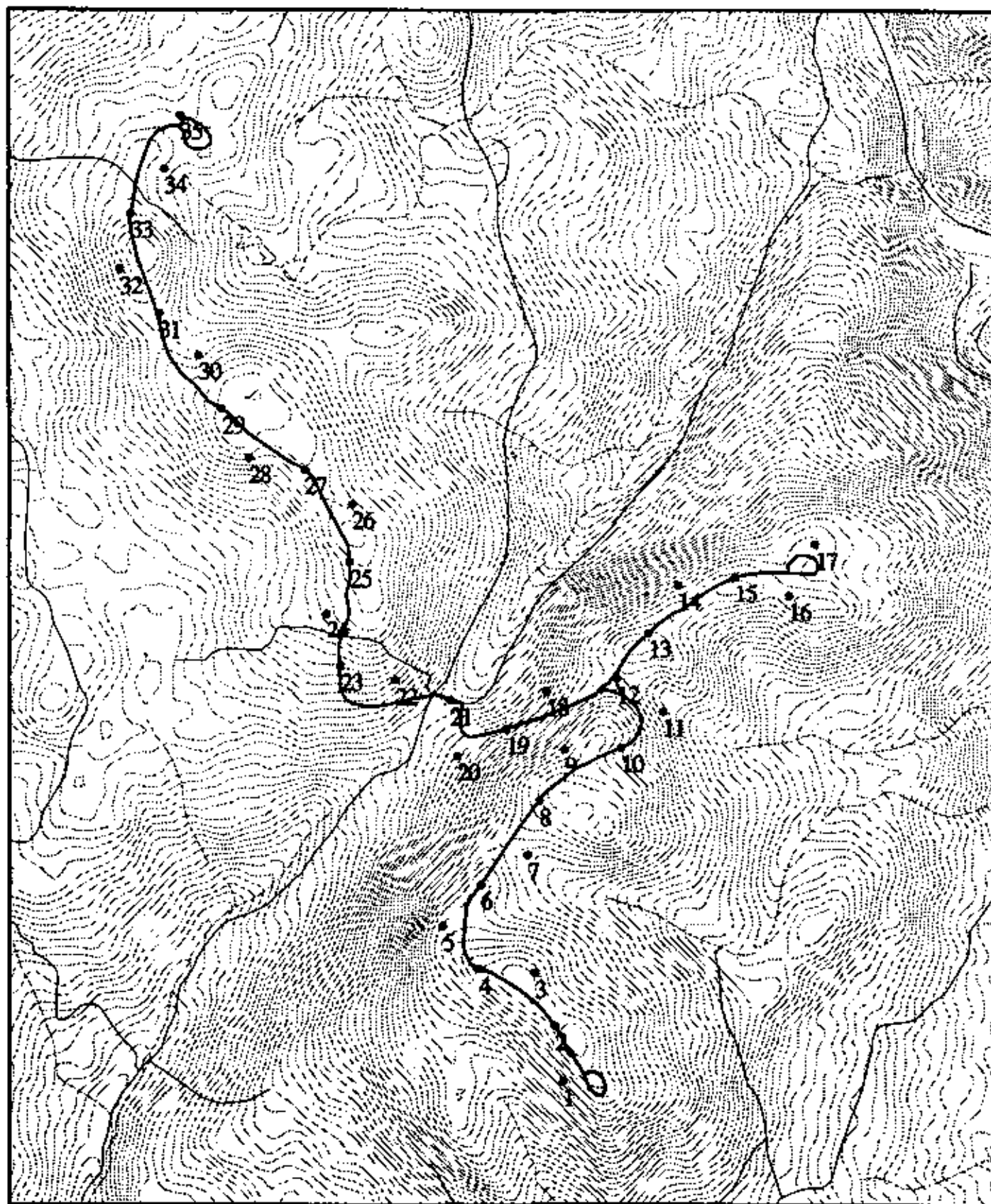
**Figure 1.** Locations of transects surveyed for Northern Goshawks, GMP study, summer 1994.

**Figure 2.** Locations of survey points for songbirds, GMP study, summer 1994.

# Goshawk Survey Transects



# Songbird Survey Points showing line of proposed action



0 0.5 1 KILOMETERS

Table 1. Location of 35 survey points for songbirds, GMP study, summer 1994.		
Survey Point	Longitude-W	Latitude-N
1	72.967834	42.844986
2	72.968292	42.847218
3	72.969429	42.848319
4	72.972488	42.848483
5	72.974503	42.851186
6	72.972420	42.852882
7	72.969884	42.854095
8	72.969223	42.856247
9	72.967850	42.858315
10	72.964775	42.858408
11	72.962509	42.859856
12	72.965004	42.861183
13	72.963303	42.863037
14	72.961708	42.864983
15	72.958828	42.865314
16	72.955673	42.864582
17	72.954282	42.866642
18	72.968895	42.860672
19	72.971054	42.859142
20	72.973755	42.858036
21	72.974182	42.860287
22	72.977188	42.861057
23	72.980179	42.861614
24	72.980985	42.863743
25	72.979729	42.865822
26	72.979599	42.868118
27	72.982208	42.869507
28	72.985237	42.869953
29	72.986732	42.871895
30	72.988014	42.874089
31	72.990135	42.875748
32	72.992249	42.877495
33	72.991699	42.879749
34	72.989908	42.881561
35	72.989067	42.883713

Table 3. Relative abundance and density estimates for birds detected on 35 survey points, GMP study, summer 1994.						
Species Code	On Plot Visit 1	On Plot Visit 2	Density No./ha*	Off Plot Visit 1	Off Plot Visit 2	Total Count
REVI	14	9	0.510	22	11	56
OVEN	16	11	0.582	16	13	56
SCJU	14	19	0.892	14	3	50
BTBW	14	10	0.510	10	11	45
WTSP	13	9	0.473	6	10	38
SWTH	6	9	0.328	6	14	35
BTNW	6	5	0.218	9	4	24
YRWA	10	9	0.364	4	1	24
MAWA	10	9	0.364	2	2	23
CAWA	11	4	0.400	3	1	19
CSWA	5	5	0.182	4	2	18
BLPW	6	10	0.364	0	0	16
HETH	1	3	0.109	4	3	11
WIWR	0	0	0.000	2	8	10
COYE	1	3	0.109	1	4	9
BAWW	3	3	0.109	3	0	9
AMRE	5	3	0.182	1	0	9
BLBW	3	4	0.148	1	0	8
CEDW	5	2	0.182	0	0	7
MOWA	1	3	0.109	1	1	6
BCCH	1	3	0.109	1	0	5
AMCR	0	0	0.000	3	2	5
RBGR	3	1	0.109	1	0	5
PUFI	3	0	0.109	1	1	5
RBNU	2	1	0.073	0	1	4
SOVI	2	2	0.073	0	0	4
GCKI	2	2	0.073	0	0	4
YBSA	1	2	0.073	0	0	3
AMRO	0	0	0.000	2	0	2
GCTH	1	1	0.036	0	0	2
UIWO	0	0	0.000	1	0	1
BLJA	0	1	0.036	0	0	1
BAOR	0	1	0.036	0	0	1
BHCO	0	1	0.036	0	0	1
EAWP	0	1	0.036	0	0	1
RUGR	0	0	0.000	1	0	1
CHSW	0	1	0.036	0	0	1
SCTA	0	0	0.000	1	0	1

\*Calculated from the highest count for Visit 1 or Visit 2.

## Appendix A. Birds detected on 35 point-count sites, GMP study, summer 1994

Plot No.	Date	Time	< 50m	Birds Detected
1	06/16/94	615	Y	OVEN SWTH BLPW CAWA WTSP
1	06/16/94	615	N	BTNW OVEN SCJU SWTH REVI YRWA CAWA
1	06/30/94	636	Y	HETH CAWA MAWA BLPW
1	06/30/94	636	N	HETH
2	06/16/94	633	Y	SOVI HETH OVEN-2 SCJU
2	06/16/94	633	N	BTBW SCJU REVI HETH
2	06/30/94	652	Y	YRWA OVEN SCJU
2	06/30/94	652	N	
3	06/16/94	645	Y	SCJU AMRE SWTH REVI BTNW BWWA
3	06/16/94	645	N	BTBW SCJU WIWR
3	06/30/94	705	Y	SWTH-2 CAWA
3	06/30/94	705	N	BTBW WIWR WTSP REVI
4	06/16/94	659	Y	WTSP CAWA MAWA
4	06/16/94	659	N	SCJU MAWA HETH
4	06/30/94	723	Y	WTSP SCJU
4	06/30/94	723	N	SWTH
5	06/16/94	711	Y	CAWA-2 BTBW RBGB
5	06/16/94	711	N	
5	06/30/94	741	Y	BAWW
5	06/30/94	741	N	
6	06/16/94	730	Y	WTSP YRWA CAWA BLPW PUFU AMRE GCTH
6	06/16/94	730	N	HETH
6	06/30/94	705	Y	SWTH BLPW CAWA MAWA SCJU YRWA GCTH
6	06/30/94	758	N	WTSP SWTH MAWA CAWA YRWA
7	06/16/94	743	Y	MAWA YRWA REVI WTSP SCJU
7	06/16/94	743	N	BTNW WIWR OVEN BTBW
7	06/30/94	816	Y	OVEN BTBW SWTH WTSP YRWA
7	06/30/94	816	N	WIWR SCJU SWTH
8	06/16/94	756	Y	MAWA-2 SCJU WTSP BLPW YRWA CEDW
8	06/16/94	756	N	WTSP
9	06/16/94	814	Y	SCJU BTBW BLPW AMRE CAWA WTSP
9	06/16/94	814	N	SWTH SCJU WTSP SCTA
9	06/30/94	833	Y	SWTH WTSP SCJU BLPW-2 YRWA BCCH
9	06/30/94	833	N	REVI PUFU
10	06/16/94	826	Y	MAWA CAWA PUFU
10	06/16/94	826	N	OVEN YRWA SCJU
10	06/30/94	847	Y	MAWA SCJU SOVI WTSP
10	06/30/94	847	N	WTSP SWTH
11	06/16/94	838	Y	CAWA YRWA OVEN MAWA BLBW
11	06/16/94	838	N	CAWA
11	06/30/94	900	Y	MAWA SCJU-2 BAWW BLJA WTSP
11	06/30/94	900	N	SWTH OVEN MAWA
12	06/16/94	849	Y	WTSP BLPW
12	06/16/94	849	N	SCJU
12	06/30/94	913	Y	SWTH YRWA WTSP BLPW
12	06/30/94	913	N	SWTH-2 WTSP OVEN WIWR
13	06/16/94	902	Y	SCJU-2 CAWA WTSP BLPW
13	06/16/94	902	N	

13	06/30/94	927	Y	BLPW-3 MAWA SCJU BTBW YRWA
13	06/30/94	927	N	SWTH WTSP
14	06/16/94	915	Y	WTSP SCJU BAWW YRWA RBNU
14	06/16/94	915	N	REVI SCJU
14	06/30/94	939	Y	CAWA SCJU BLPW WTSP BTBW
14	06/30/94	939	N	SWTH-2 WIWR
15	06/16/94	927	Y	SWTH BTBW WTSP
15	06/16/94	927	N	SCJU
15	06/30/94	957	Y	SWTH BLPW SCJU OVEN YRWA MAWA
15	06/30/94	957	N	WTSP SCJU
16	06/16/94	937	Y	SCJU-2 YRWA CAWA BTBW-2
16	06/16/94	937	N	SCJU
16	06/30/94	1009	Y	BLBW OVEN BAWW SCJU MAWA BCCH
16	06/30/94	1009	N	SCJU BTNW
17	06/16/94	955	Y	OVEN-2 REVI BTBW YRWA BTNW
17	06/16/94	955	N	REVI
17	06/30/94	1019	Y	BTNW REVI CHSW
17	06/30/94	1019	N	WIWR
18	06/09/94	513	Y	BTNW REVI BTBW
18	06/09/94	513	N	OVEN-2 SWTH WTSP AMRO-2 BTBW REVI-2
18	07/01/94	615	Y	REVI BAOR BTBW
18	07/01/94	615	N	BTBW OVEN SWTH REVI
19	06/09/94	524	Y	OVEN BTNW REVI BTBW
19	06/09/94	524	N	REVI SWTH AMCR-2 UNWO REVI
19	07/01/94	632	Y	BTBW
19	07/01/94	632	N	BTBW REVI
20	06/09/94	538	Y	REVI BTBW SWTH OVEN
20	06/09/94	538	N	WTSP SCJU REVI BTNW OVEN -2 AMCR HETH MAWA
20	07/01/94	645	Y	SOVI OVEN REVI BTBW
20	07/01/94	645	N	RBNU BTBW REVI OVEN
21	06/09/94	552	Y	WTSP COYE CSWA REVI GCKI PUF1
21	06/09/94	552	N	CSWA BTNW OVEN
21	07/01/94	658	Y	CSWA-2 BHCO WTSP COYE BLBW REVI
21	07/01/94	658	N	CSWA REVI WTSP
22	06/09/94	604	Y	BTBW YRWA GCKI BLBW OVEN RBNU MAWA
22	06/09/94	604	N	REVI-2 OVEN BTNW YRWA BCCH WTSP
22	07/01/94	710	Y	BLBW OVEN GCKI EWPE WTSP
22	07/01/94	710	N	REVI OVEN WIWR
23	06/09/94	616	Y	YRWA-2 MAWA-2 BLBW SOVI SCJU
23	06/09/94	616	N	SWTH BLBW RUGR
23	07/01/94	721	Y	MAWA-2 RBNU YRWA BLBW GCKI
23	07/01/94	721	N	BTBW SWTH-2 BTNW WIWR
24	06/09/94	627	Y	OVEN
24	06/09/94	627	N	BTNW OVEN REVI-2 PUF1
24	07/01/94	732	Y	OVEN
24	07/01/94	732	N	OVEN
25	06/09/94	640	Y	SCJU SWTH
25	06/09/94	640	N	OVEN
25	07/01/94	744	Y	BTBW SCJU-2
25	07/01/94	744	N	AMCR SWTH OVEN
26	06/09/94	652	Y	SCJU BTBW REVI RBGR
26	06/09/94	652	N	BTNW

26	07/01/94	755	Y	BTNW BTBW SWTH SCJU
26	07/01/94	755	N	HETH OVEN
27	06/09/94	705	Y	OVEN
27	06/09/94	705	N	OVEN-2 REVI-2 BTNW YRWA
27	07/01/94	808	Y	REVI BTNW OVEN HETH BTBW
27	07/01/94	808	N	BTBW REVI
28	06/09/94	718	Y	RBGR REVI-3 OVEN BTBW BCCH SWTH AMRE
28	06/09/94	718	N	OVEN BTBW
28	07/01/94	823	Y	REVI-2 HETH AMRE
28	07/01/94	823	N	AMCR
29	06/09/94	732	Y	CAWA CSWA-2 MOWA AMRE
29	06/09/94	732	N	REVI BTBW-2 SCJU CSWA AMRE
29	07/01/94	837	Y	MOWA-2 CSWA-2 SCJU COYE
29	07/01/94	837	N	OVEN COYE BTBW WTSP
30	06/09/94	743	Y	
30	06/09/94	743	N	CSWA OVEN BTBW
30	07/01/94	849	Y	YRWA BCCH
30	07/01/94	849	N	BTBW OVEN HETH
31	06/09/94	754	Y	REVI OVEN BTNW YBSA BAWW BTBW
31	06/09/94	754	N	REVI
31	07/01/94	900	Y	BTNW REVI OVEN YBSA
31	07/01/94	900	N	REVI OVEN
32	06/09/94	809	Y	OVEN-2
32	06/09/94	809	N	BTNW REVI-2
32	07/01/94	911	Y	BTNW BTBW REVI SCJU OVEN
32	07/01/94	911	N	OVEN WTSP
33	06/09/94	821	Y	OVEN BTNW
33	06/09/94	821	N	BTNW
33	07/01/94	925	Y	YBSA
33	07/01/94	925	N	REVI BTNW BTBW OVEN
34	06/09/94	835	Y	WTSP REVI CEDW-4 SCJU
34	06/09/94	835	N	BTBW REVI-2 BAWW-2 RBGR CAWA SWTH-2 COYE SCJU WTSP
34	07/01/94	933	Y	CSWA WTSP RBGR SWTH AMRE CEDW-2 SCJU-2
34	07/01/94	938	N	CSWA COYE-2 BTBW WTSP
35	06/09/94	852	Y	AMRE BTBW WTSP REVI CSWA-2
35	06/09/94	852	N	REVI OVEN MOWA CSWA BAWW SCJU
35	07/01/94	957	Y	SCJU AMRE COYE OVEN MOWA
35	07/01/94	957	N	BTBW REVI WIWR BTNW MOWA