

COPY

A PROGRESS REPORT:

LANDBIRD BREEDING AND FALL MIGRATION
AT MOTHER GOOSE LAKE
ALASKA PENINSULA NATIONAL WILDLIFE REFUGE, ALASKA
JUNE-SEPTEMBER 1996

84
34
JAN
135
1996



By:

Donna A. Dewhurst
Linda A. Wells
Heather Moore

Key Words: Alaska Peninsula, bird banding, chickadees, MAPS, migration, mist-nets, Mother Goose Lake, neotropical migratory birds, passerines, point counts, redpolls, sparrows, swallows, thrushes, warblers

U. S. Fish & Wildlife Service
Alaska Peninsula/Becharof National Wildlife Refuge Complex
P.O. Box 277
King Salmon, Alaska 99613

December 1996

TABLE OF CONTENTS

LIST OF TABLES, FIGURES AND APPENDICES.....	ii
ABSTRACT.....	1
INTRODUCTION.....	1
Background.....	1
Objectives and Goals.....	1
STUDY AREA.....	2
METHODS.....	4
Weather.....	4
MAPS Banding.....	4
Color Banding.....	5
Point Counts.....	5
Fall Migration Banding.....	5
Nest Searching.....	7
Avian Sightings.....	7
Vegetation Surveys.....	7
Data Analysis.....	7
RESULTS.....	7
Weather.....	7
MAPS.....	7
Capture Success.....	7
Productivity.....	11
Site Switching.....	11
Returns.....	11
Point Counts.....	11
Habitat.....	11
Nest Searching.....	11
Off-Road Point Counts.....	17
Migration Banding.....	17
Returns.....	17
Mortality.....	17
Avian Sightings.....	20
DISCUSSION.....	20
Landbird Abundance.....	20
Species composition.....	20
Breeding densities.....	20
Productivity and Recruitment.....	20
Survivorship and Site Fidelity.....	20
Habitat Use.....	21
Breeding Season.....	21
Fall Migration.....	21
RECOMMENDATIONS.....	21
ACKNOWLEDGMENTS.....	22
LITERATURE CITED.....	23
APPENDICES.....	25

ARLIS

Alaska Resources
Library & Information Services
Anchorage, Alaska

3 3755 000 87486 7

LIST OF TABLES, FIGURES AND APPENDICES

Tables

1. Weather data collected at Mother Goose Lake, Alaska Peninsula, June-September 1994-1996.....	8
2. Totals of birds banded during mist netting operations at Mother Goose Lake, Alaska Peninsula, June-September 1996.....	9
3. Summary of individual mist net efficiencies during banding operations at Mother Goose Lake, Alaska Peninsula, 1996.....	10
4. Capture rates of birds banded at Mother Goose Lake during MAPS June-August, 1994-1996.....	12
5. Frequency of species occurrence during MAPS point counts at Mother Goose Lake, Alaska Peninsula June-July 1996.....	13
6. Vegetation data collected during the summer of 1996 from mist net sites at the Lake MAPS site, Mother Goose Lake, Alaska.....	14
7. Vegetation data collected during the summer of 1996 from mist net sites at the Cranberry Hill MAPS site, Mother Goose Lake, Alaska.....	15
8. Observations made of landbird nests found incidentally in the vicinity of the mist net arrays at Mother Goose Lake, Alaska Peninsula, June-July 1996.....	16
9. Frequency of species occurrence during off-road point counts at Mother Goose Lake, Alaska Peninsula, June-July 1996.....	18

Figures

1. Location of Mother Goose Lake, relative to King Salmon and the Alaska Peninsula/Becharof National Wildlife Refuge Complex.....	3
2. Location of off-road point count routes at Mother Goose Lake, Alaska Peninsula, June-July 1996.....	6
2. Migration capture rates of landbirds caught at Mother Goose Lake, Alaska Peninsula, 1994-1996.....	19

Appendices

I. Capture histories of 20 adult landbirds switching sites during 1996 MAPS banding, Mother Goose Lake, Alaska.....	27
II. Capture histories of 14 landbirds originally banded as adults during MAPS in 1994 or 1995 and returning to a different MAPS site during 1996.....	27

ABSTRACT

For the third consecutive year, landbirds were studied at Mother Goose Lake on the Alaska Peninsula/Becharof NWRC. The status of breeding and migrating landbirds was examined using constant-effort mist netting, with results contributing to the Monitoring Avian Productivity and Survivorship (MAPS) Program and statewide migration monitoring efforts. Color banding was initiated this year on AHY (after hatching-year) birds captured during MAPS. A total of 3849 landbirds of 25 species were banded during the breeding season and fall migration. Breeding and fall migration densities of Wilson's warblers (*Wilsonia pusilla*) continue to be the highest among the landbird species captured at Mother Goose Lake in 1996. Due to increases in several species other than Wilson's warblers, fall migration topped previous banding totals by 519 birds. The peak of fall migration was on 13 August with 371 birds banded in 78 net hrs (475.6 birds captured/100 net hrs). Despite these high migration capture rates, area productivity appeared to decline during 1996, likely paralleling a similar decline in Wilson's warbler productivity. Thirty-seven birds returned to Mother Goose Lake from 1994, while 89 birds returned from 1995. Ninety-four percent of all returns were originally banded as AHY birds.

INTRODUCTION

Background

The establishment of long-term monitoring of landbirds is an effort to identify and understand factors affecting their populations. Long-term monitoring efforts, primarily on the east coast, have shown that many of our migrant landbirds have experienced a steady decline over the last 25 years (Robbins et al. 1989, Sauer and Droege 1989, Hagan et al. 1989). In Alaska, poor accessibility has prevented long-term monitoring of landbird populations throughout most of the state. The Mother Goose Lake Field Station was established in 1994 to contribute to the overall understanding of landbird populations as well as observe local populations of landbirds in a remote setting away from human effects. The field station is a cooperative effort between the U.S. Fish and Wildlife Service (FWS) and Earthwatch. Efforts in the first year involved 2 Monitoring Avian Productivity and Survivorship (MAPS) stations, off-road point counts, nest searching, and migration banding. In its third year, it now includes 3 MAPS stations and an increase in staff size. MAPS is a network of constant effort mist netting projects established in 1989 by the Institute for Bird Populations (DeSante and Burton 1994). It is a continental project targeting Neotropical landbird breeding populations in North America. Originally developed by the British Trust for Ornithology (BTO) in 1986, the MAPS project has seen exponential growth throughout the country and is rapidly approaching the goal of 20 stations in each region. In 1996, Alaska and the Yukon maintained 25 MAPS stations in the combined region.

Few studies involving landbird banding have been conducted previously on the Alaska Peninsula (Bailey 1974a, Bailey 1974b, Dewhurst et al. 1995, Savage et al. 1988). This lack of data emphasizes the importance of collecting baseline information for future comparisons.

Objectives and goals

The MAPS program was established to: (1) determine annual changes and, ultimately, longer-term trends in population and demographic parameters of the target species in each region; (2) relate these trends to readily-measured environmental co-variables such as climatic factors, habitat type, and management practice; and (3) refine current population models and develop new ones. These are the goals of the overall MAPS program, but do not address the objectives of individual MAPS contributors.

Objectives of landbird monitoring on the Alaska Peninsula/Becharof National Wildlife Refuge Complex were developed to meet the goals of individual MAPS stations, to provide baseline data of local bird species, and to contribute to the regional goals of Boreal Partners in Flight (BPIF) (DeSante et al. 1993 and Handel 1994). These objectives include:

- 1) determine relative abundance and breeding status of landbird species on the Alaska Peninsula;
- 2) examine post-fledging productivity and recruitment into the local landbird population;
- 3) examine adult landbird survivorship and breeding site fidelity; and
- 4) document local habitat use by landbird species both during breeding and migration.

These objectives establish a framework for all landbird monitoring on the Refuge Complex. Mother Goose Lake Field Station contributes to these overall goals by establishing and maintaining 3 MAPS stations and conducting fall migration banding consistent with statewide efforts (Fadely et al. 1995).

STUDY AREA

Mother Goose Lake is located on the Alaska Peninsula in southwestern Alaska (Fig 1). Located at 57-11 N and 157-15 W, the Mother Goose Lake watershed is unique to the Peninsula due to a large stand of black cottonwoods (*Populus balsiforma*) surrounding the lake. This lucustrine woodland is surrounded by millions of hectares of treeless tundra which comprises most of the peninsula. Local tundra is dominated by non-vasculars (lichens, mosses), grasses and ericaceous plants. A complete list of vascular flora for the area is currently available at the Refuge Headquarters in King Salmon, with a non-vascular list in the development stage. The Mother Goose Lake area is dominated by an open deciduous woodland of black cottonwoods in the lowlands, with the major lake drainages bordered by large tracts of wet meadows. Going upslope from the lake, the cottonwoods are interspersed with willow (*Salix* spp.) and alder (*Alnus crispa*) thickets and a variety of meadow types (wet, dwarf shrub, grassy and tall forb) (Kessel 1979). Dwarf shrub mat dominates the surrounded mountain plateaus and seasonally exposed slopes.

The locations of all banding sites at Mother Goose Lake were repeated from 1994 and 1995 (Dewhurst et al. 1995, Eskelin and Dewhurst 1996). Also, the addition of Cranberry Hill MAPS site created a banding site 1.2 km (3/4 mi) W of the Lake MAPS site. Individual MAPS site habitat descriptions are as follows:

Lake Site.-- The Lake MAPS site is the heart of the Mother Goose Lake Field Station. Located on the lakeshore at the southeast corner of Mother Goose Lake, this site is typical of the moist cottonwood riparian areas of this watershed. A small stream ("Horsetail Creek") bisects the site creating extensive riparian habitat throughout most of the area. The canopy is exclusively black cottonwood with small stands of willow, alder and highbush cranberry (*Viburnum edule*) forming a shrub sub-layer. The understory is generally lush and dominated by moist-soil species like ferns (*Aspidiaceae*, *Athyriaceae*), horsetails (*Equisetum* spp.), rushes (*Juncus* spp.), monkshood (*Aconitum delphinifolium*), and wild geranium (*Geranium erianthum*). The woodland is bordered to the south by a dwarf shrub meadow characterized by crowberry (*Empetrum nigrum*), Labrador tea (*Ledum palustre*) and lowbush cranberry (*Vaccinium vitis-idaea*).

Mountain Site.-- The mountain site is located approximately 0.8 km (0.5 mi) S of the Lake site. Elevation at this site is approximately 76 m (250 ft). This is roughly the elevational limit of black cottonwood in the area with only scattered stands at this site. Much of the site does not have an

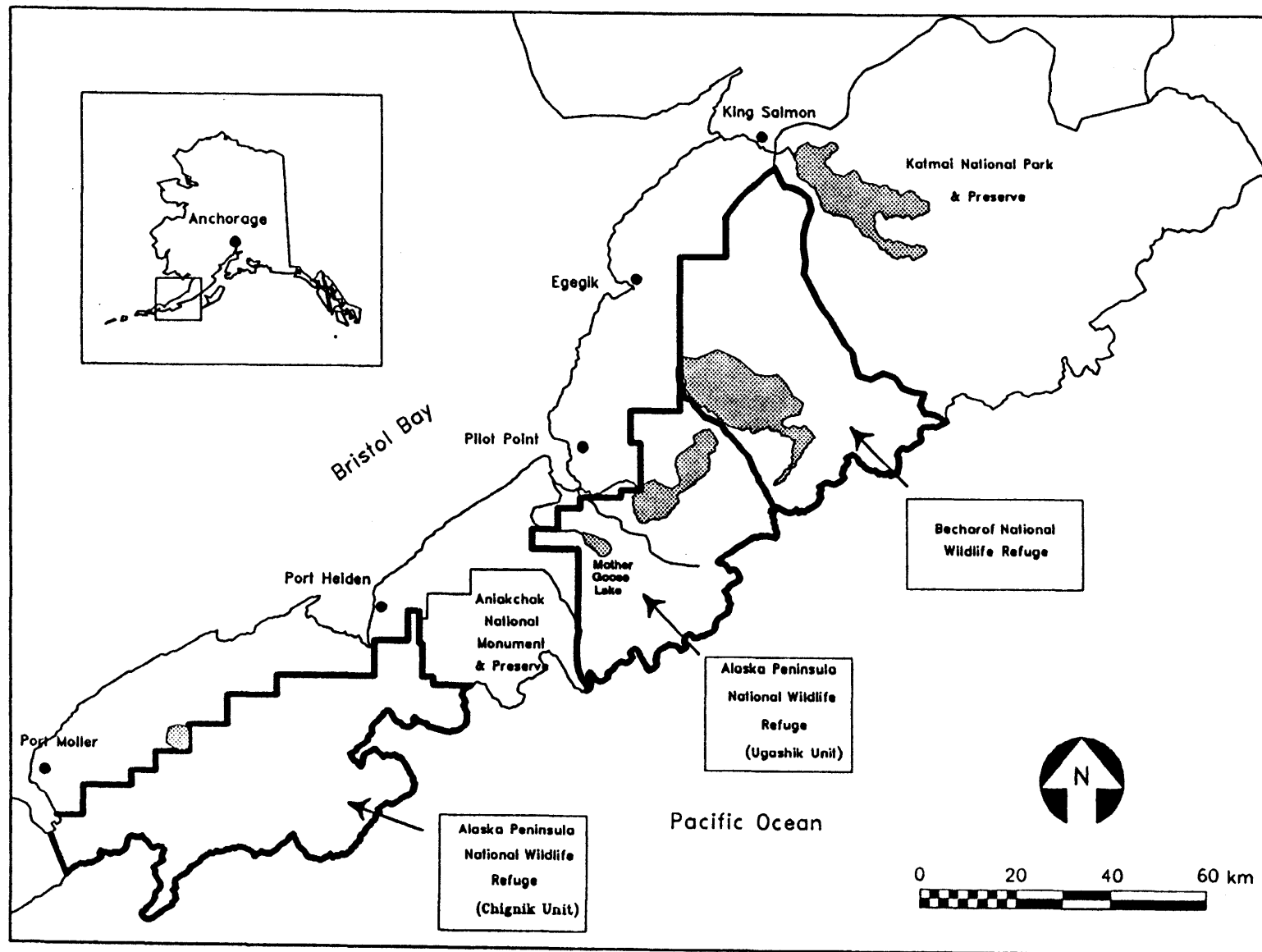


Fig. 1. Location of Mother Goose Lake, relative to King Salmon and the Alaska Peninsula/Becharof National Wildlife Refuge Complex.

upper canopy level. Thick, brushy tracts of willow and alder form a shrub canopy layer. These shrubs are associated with the constantly changing run-off streams draining into Horsetail Creek, which also bisects the site. Understory areas are characterized by lush beds of ferns and grasses (Gramineae). Seasonal snow melt creates tall forb meadows in the spring which dry and become dominated by cow parsnip (*Heracleum lanatum*), wild celery (*Angelica lucida*) and fireweed (*Epilobium angustifolium*).

Cranberry Hill.-- Located about 0.8 km (0.5 mi) W of the Lake site and 0.2 km (0.1 mi) from the lakeshore, this upland site is at about 45-60 m (150-200 ft) in elevation. Canopy cover is characterized by black cottonwood, but is much more open than the Lake site. Willow and alder thickets are prevalent throughout the site with alder dominating near the lake. Highbush cranberry is found extensively on the site. The understory groundcover is dominated by drier species like fireweed, Jacob's ladder (*Polemonium acutiflorum*) and various grasses (*Festuca rubra*, *Calamagrostis canadensis*, *Poa* spp.) This hill site is bordered to the east and west by steep-walled stream canyons and to the south by a wet sedge meadow.

METHODS

Weather

Weather data was collected daily at approximately 0800 hrs. During fall migration, weather was collected before and after the banding session. Measurements of ceiling height, wind speed and direction, barometric pressure, current precipitation, visibility, minimum and maximum temperature over past 24 hours, and total rainfall over last 24 hours were recorded. Also, a determination was made regarding the possibility of banding at that time. Feasibility criteria followed guidelines established by Ralph et al. (1992). Banding feasibility was recorded even if banding was not scheduled for that day.

MAPS Banding

Constant-effort mist netting and banding was conducted using the MAPS banding protocol established by DeSante and Burton (1994). All 3 MAPS sites were operated from Period 5 (10-19 June) through Period 10 (30 July-8 August). The MAPS mist netting and banding was discontinued in early August to begin migration banding at the Lake site (Fadely et al. 1995). Captures were recorded to the nearest 30 min rather than 10 min intervals recommended by DeSante and Burton (1994). During busy times, captures were only recorded to the nearest hour. Also, starting time was again moved to 45 min after sunrise due to bear safety concerns (Dewhurst et al. 1995).

Consistent with previous years, banding at the Lake site was split into 2 days due to staff limitations and large numbers of birds in the later periods. Nets 1-5 were operated first followed by nets 6-10 on the next bandable day. To standardize effort, site order was followed throughout the season and in most cases attempts were made to operate each site in the same 1/3 of each MAPS period. The respective order established was: Lake site, Mountain site, and Cranberry Hill.

To be consistent with 1994-1995 banding methods, special measurements were taken on *Catharus thrushes*, alder flycatchers (*Empidonax alnorum*), Wilson's warblers (*Wilsonia pusilla*) and pine grosbeaks (*Pinicola enucleator*) (Waddington 1992, Dewhurst et al. 1995, Eskelin and Dewhurst 1996). In 1996, BPIF changed the format of Alaska bird banding forms to incorporate several new measurements of interest for regional subspecies classification. The keel measurement was eliminated while additions included: color of eye rings, auriculars and rectrices; flight feather contrast in the coverts; and base color and wash or streaking in the body or undertail coverts. These new measurements were species specific with a detailed guide produced by BPIF

(Colleen Handel, U. S. Geological Survey, Anchorage, Alas.). Boreal Partners in Flight also provided a guide with wing and tail diagrams to help banders provide more detailed descriptions of primary and rectrices feather shape and wear for Alaska species.

Age classifications [After Second Year (ASY) and Second Year (SY)] of banded birds were made based on rectrices shape, wear (Pyle et al. 1991) and extremes in crown code (mostly ASY males). These age classifications were only made on an experimental basis. All ASY and SY birds were reported to the banding lab as After Hatching Year (AHY) birds.

Color Banding.-- Color banding was initiated in 1996 in response to low bird return rates during MAPS. Using color band resightings would provide a means to increase the observed return rate without relying solely on recaptures. Color banding would also provide a means to study the site switching of individual birds during MAPS. All newly caught (no returning birds) AHY birds were color banded during MAPS with a few exceptions. Tree and bank swallows (*Tachycineta thalassina* and *Riparia riparia*) were not color banded due to poor visibility of leg bands. Downy woodpeckers (*Picoides pubescens*) were not color banded due to their shorter tarsi. High MAPS capture rates forced us to limit the color banding of some species. These included: Wilson's warblers--every 10th bird was color banded; and orange-crowned warblers (*Vermivora celata*) and common redpolls (*Carduelis flammea*)--every 2nd bird was color banded. Solid colors were used for all but band size 2, which utilized split-colors. The right leg was given a metal (FWS/USGS) band over the plastic station color band (red - Lake, blue - Mountain, yellow - Cranberry Hill). The left leg was given 2 stacked, plastic color bands with combinations that were randomly selected. Data on color banded birds was cross-referenced on both the standard banding forms and in a special color banding notebook with the color combination order pre-printed.

Point Counts

Point counts were conducted at each MAPS site during the first 3 banding periods (DeSante and Burton 1994). In all cases the observer remained the same for each site during all repetitions. Point count habitat data was not collected in 1996 due to a misinterpretation of the MAPS guidelines. All other point count methods followed MAPS guidelines established by DeSante and Burton (1994).

Off-road point counts were again initiated in the Mother Goose Lake watershed. Previously established routes from 1994 were deemed not replicatable due to marking problems (Dewhurst et al. 1995, Eskelin and Dewhurst 1996). Five new routes were established in 1996 (Fig. 2). New route marking methods included staking each point center with a 1.2 m (4 ft) piece of rebarr with fluorescent orange survey flagging wrapped and taped to the stake. Written descriptions of direction and distance were still recorded for each route as well as habitat data taken at each point. The Lakeshore route (points at mean high water) could not be marked with rebarr stakes due to assumed problems with lake ice in the winter.

Fall Migration Banding

During fall migration the Lake MAPS site was operated daily as weather permitted, with the addition of 3 nets (Eskelin and Dewhurst 1996). All banding paralleled the 1994-1995 efforts at Mother Goose Lake. All aspects of the measuring and banding process followed the previously described MAPS/BPIF methods and were recorded on the same banding data forms. During periods of high banding volumes, data was prioritized to only include: date; time; net #; species; sex & age (including how sexed and aged); wing and tail length; and weight.

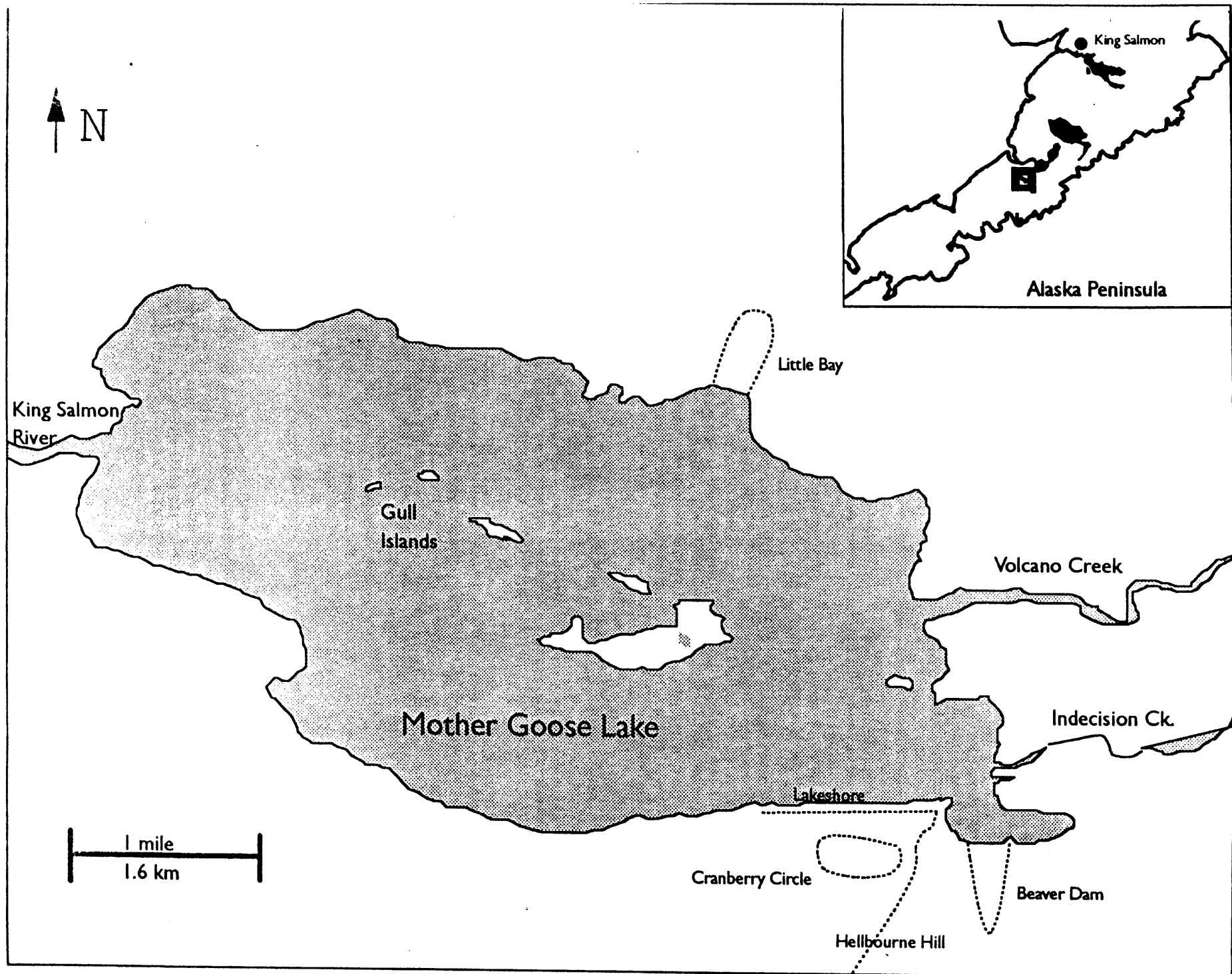


Figure 2. Location of off-road point count routes at Mother Goose Lake, Alaska Peninsula, June-July 1996.

Nest Searching

During 1996, nest searching was only conducted incidentally to other duties. Agitated behavior and carrying nesting materials or food prompted observers to search for nests and once discovered, nests were re-visited every 3-5 days to collect information on eggs and young. All nests discovered were documented on standardized forms and maintained in a nest notebook.

Avian Sightings

Miscellaneous landbird sightings were compiled on forms created by the Refuge Complex (Appendix II). All observations included date, species, quantity, habitat classification (Kessel 1979), observer, behavior, breeding status, and notes on age and sex of individuals. All information is currently being stored in a computerized database (Lotus Approach) used by FWS and the National Park Service.

Vegetation Surveys

New vegetation data was collected around each mist net at the Lake and Mountain MAPS sites. Four 1-m squares were described for each net, the centers being located 4 m towards the center of the net and 4 m perpendicular to the net lane. Estimates were made of canopy density, number of woody stems in the area, highest, lowest and average height of woody vegetation, diameter at breast height (dbh) of select trees, estimated percentage of vascular and non-vascular ground cover, height of vascular cover, and all vascular species present in order of dominance. Habitat classifications were assigned to each net according to Kessel (1979). In addition, local weekly blooming phenologies and a general inventory of area vascular species has been maintained annually since 1994.

Data Analysis

Individual species capture rate values were adjusted for the Mountain (1994-1995) and Cranberry Hill (1995) MAPS sites due to MAPS Period 11 (August 9-18) not being run in 1996. To account for this difference, the banding totals and effort for that period were subtracted from the 1995 totals and capture rates were recalculated for comparative analysis.

RESULTS

Weather

The total rainfall for Mother Goose Lake from 6 June to 18 September 1996 was 261.9 mm [(10.5 in)(Table 1)]. Comparing with the past 2 years, Mother Goose Lake in 1996 had a relatively wet month of June (+34 mm rain) and dry month of July (-49 mm rain). The monthly mean temperatures were remarkably consistent between 1994 and 1996. In addition, there was no noteworthy difference in the percentage of bandable days from 1994 through 1996; however August did had 15% more bandable days in 1996, which may have benefited fall migration banding.

MAPS

Capture Success.-- Mist netting at the 3 MAPS sites produced 1428 total captures (912 banded) of 19 species, during 1183 net hrs (Table 2). Capture rates at MAPS sites ranged from 113.0 birds/100 net hrs at the Cranberry Hill to 162.8 at the Lake (Table 3). A comparison with last year's capture rates shows an decrease of 15-23 birds/100 net hrs at all of the MAPS sites. Numbers of birds escaping before banding decreased in 1996, likely due to more training and closer supervision given to Earthwatch volunteers maintaining the mist nets. The composition of escaping birds demonstrated with no obvious differences in species or abundance from previous years. The recapture rate during MAPS was 33.9% (484 birds), with Wilson's warblers accounting for almost half of these recaptures (225 birds). The highest individual species

Table 1. Weather data collected at Mother Goose Lake, Alaska Peninsula, June-September 1994-1996.

1994*					
Month	Rainfall		Temperature (F)		% Bandable days
	% days	mm	Mean high	Mean low	
June	42	17.7	64	43	64
July	68	78	64	47	68
August	44	52.7	69	49	48
TOTAL	53	147.7	66	48	59
1995					
Month	Rainfall		Temperature (F)		% Bandable days
	% days	mm	Mean high	Mean low	
June	50	18.1	64	43	69
July	55	74.2	66	47	61
August	65	105.9	61	47	45
September	76	81.5	60	48	57
TOTAL	60	279.7	63	45	58
1996					
Month	Rainfall		Temperature (F)		% Bandable days
	% days	mm	Mean high	Mean low	
June	59	52.2	56	41	63
July	42	27.2	65	46	65
August	73	110.9	60	45	60
September	61	71.6	57	37	67
TOTAL	59	261.9	60	42	63

* Weather data only collected June-August 1994.

Table 2. Totals of birds banded during mist netting operations at Mother Goose Lake, Alaska Peninsula
June-September 1996.

SPECIES	MAPS STATIONS								FALL MIGRATION			TOTALS			TOTALS ALL AGES
	LAKE SITE			MTNS SITE			CRAN SITE								
	AHY	HY	UNK	AHY	HY	UNK	AHY	HY	AHY	HY	UNK	AHY	HY	UNK	
Downy Woodpecker							1		1		1	2		1	3
Alder Flycatcher	3			2						7		5	7		12
Tree Swallow	2			2			2			2		6	2		8
Bank Swallow				2								2			2
Black-capped Chickadee	2	14		3	6			3		70	1	5	93	1	99
American Dipper									1			1			1
Golden-crowned Kinglet										1			1		1
Ruby-crowned Kinglet										1			1		1
Gray-cheeked Thrush	9			7	2		6		2	22	1	24	24	1	49
Hermit Thrush	7	19		18	24		11	7	8	190		44	240		284
American Robin	4			1		1	1			3		6	3	1	10
American Pipit										1			1		1
Northern Shrike									1	5		1	5		6
Orange-crowned Warbler	19	12		5	9		15	12	18	105	1	57	138	1	196
Yellow Warbler	12	9		17	11		3	1	19	334		51	355		406
Wilson's Warbler	74	114		62	101		61	57	45	1267	3	242	1539	3	1784
Unidentified Warbler					3			3		1			7		7
American Tree Sparrow					1				9	196		9	197		206
Savannah Sparrow	1	5		1	3		2		9	231		13	239		252
Fox Sparrow	5	7		3	4		5	2	2	48	2	15	61	2	78
Golden-crowned Sparrow	13	8	1	11	8		5	2	12	44		41	62	1	104
Gambel's White-crowned Sparrow	9								8	26	1	17	26	1	44
Slate-colored Junco										1			1		1
Lapland Longspur		1											1		1
Pine Grosbeak	2			4					5	6		11	6		17
Common Redpoll	13	6		17	3		11		73	149	4	114	158	4	276
TOTALS	175	195	1	155	175	1	123	87	213	2710	14	667	3157	15	3849

Table 3. Summary of individual mist net efficiencies during banding operations at Mother Goose Lake, Alaska Peninsula, 1996. Capture rates expressed as birds/100 net hrs.

MAPS Mountain Site														
Net #	1	2	3	4	5	6	7	8	9	10	11	12	13	Total
Total Birds	47	92	51	27	31	60	85	36	24	41				500
Net hrs	35	35	35	35	35	35	35	35	35	35				350
Capture rate	134	261	145	77	88	170	242	102	68	117				142
MAPS Lake Site														
Total Birds	79	36	42	40	31	61	59	59	45	112				573
Net hrs	34	34	34	34	36	36	36	36	36	35				351
Capture rate	229	104	122	116	90	169	164	164	125	316				163
MAPS Cranberry Hill														
Total Birds	37	24	25	46	26	29	23	51	54	39				547
Net hrs	31	31	32	31	32	32	32	31	32	30				314
Capture rate	148	109	106	141	121	109	128	170	180	147				136
Fall Migration														
Total Birds	434	227	149	123	157	191	209	168	160	400	285	536	517	3599
Net hrs	173	175	176	176	178	180	181	177	183	181	186	176	152	2172
Capture rate	251	130	85	70	88	106	116	94	88	220	154	304	341	166

recapture rate during MAPS was for gray-cheeked thrushes (*Catharus minimus*, 63.1% recapture rate), followed by golden-crowned sparrows (*Zonotrichia atricapilla*, 47.4%) and hermit thrushes (*Catharus guttatus*, 43.5%).

Productivity.-- As in 1995, juvenile (HY) capture rates differed between the MAPS sites in 1996, with Cranberry Hill consistently having the lowest productivity of the 3 sites (Table 4). Overall landbird productivity based on HY capture rates declined at all 3 sites in 1996. A declining trend was apparent since 1994 for capture rates of HY Wilson's warblers at the Lake MAPS site (Table 4), possibly representing declining productivity at that site. A decrease in HY Wilson's warblers was also noted at the Mountain site for 1996, but not at Cranberry Hill. In contrast, the capture rates of HY orange-crowned warblers has been steadily increasing over the same period for all 3 sites. Yellow warblers (*Dendroica petechia*) also demonstrated increases in HY birds caught at all 3 sites in 1996.

Site Switching.--Twenty of the AHY birds captured during MAPS were later recaptured at a different MAPS site (Appendix I). No obvious species or gender-related trends were apparent, nor were any movement patterns detected. These MAPS sites were approximately .5-.75 miles apart, which perhaps was too close for this primarily cottonwood habitat in Alaska. More emphasis on searching for and resighting color-banded birds may yield insight into this switching phenomenon.

Returns.-- As expected with the 3rd year of a MAPS project, the number of returning birds increased with 37 (1.1%) from 1994 and 89 (2.3%) from 1995, consisting of 16 species. Of the returning birds, 2 were originally banded during incidental netting and 9 from fall migration, and when subtracted from totals yielded an overall MAPS return rate of 4.4% from both years. An analysis of only AHY birds banded during MAPS 1994/1995 and recovered during MAPS 1996 revealed a 9.3% return rate. Only 8 (6.3%) of the returning birds were originally banded and aged as HY birds.

Fourteen of the returning birds were recovered in different MAPS sites from which they were originally banded (Appendix II). No species or gender-related trends were apparent, nor were distinct movement patterns detected. It appears that these birds were loyal to the general area, but were not loyal to a specific MAPS site. Thus, having a cluster (3) of MAPS stations in an area did yield a higher return rate than would have a single MAPS station.

Point Counts.-- Consistent with previous years' data, information on landbirds from point counts generally paralleled banding data. Species relative abundance at all 3 MAPS sites was comparable between banding and point counts (Table 5). One exception was the detection of Gambel's white-crowned sparrows at all 3 sites during 1996 point counts, yet they were captured only at the Lake MAPS site. Comparing species annual trends between point counts and banding data, demonstrated no overall pattern of increases or decreases. Yet in one instance, MAPS capture rates and numbers banded of Wilson's warblers did decrease noticeably in 1996, while point counts demonstrated no decrease in abundances detected.

Habitat.-- New vegetative sampling was conducted at the Lake and Cranberry Hill MAPS mist net sites in 1996 (Tables 6 and 7). While both sites are primarily deciduous forest made up solely of black cottonwoods, the quantitative comparison between the sites demonstrated that Cranberry Hill had larger trees with less canopy density than the Lake site. Understory vascular flora were dominated by horsetails at the Lake site and grasses and ferns at Cranberry Hill, confirming the Lake site to have a wetter understory.

Nest Searching

Incidental nest searching yielded 22 landbird nests, including 8 of Wilson's warblers (Table 8). With the exception of cavity nesters (chickadees and swallows) and common redpolls, most of the nests discovered were on the ground. The northern harrier (*Circus cyaneus*) nest was a relatively small

Table 4. Capture rates of birds banded at Mother Goose Lake during MAPS, June-August, 1994-1996. All capture rates expressed as birds/100 net hours.

	1994		1995		1996		1994		1995		'1996		1995		1996	
	Lake Site						Mountain Site						Cranberry Hill Site			
Species	AHY	HY	AHY	HY	AHY	HY	AHY	HY	AHY	HY	AHY	HY	AHY	HY	AHY	HY
Alder Flycatcher	0.56	0.28	0.56		0.85		1.39	0.28	1.67	0.56	0.85					
Black-capped Chickadee	1.12	0.84	0.83		0.57	3.98	1.67	0.56	1.39	1.67	0.57	3.98	0.58			0.96
Gray-cheeked Thrush	6.15	1.40	7.22	0.56	2.56		2.50	2.22	0.56	0.28	2.56		4.06	0.87	1.91	
Hermit Thrush	8.38	3.63	6.39	8.06	1.99	5.40	5.28	3.89	5.00	6.94	1.99	5.40	4.93	0.58	3.50	2.23
American Robin		0.28	2.22	0.83	1.14					0.28	1.14			0.29	0.32	
Orange-crowned Warbler	5.31	1.40	13.89	1.67	5.40	3.41	4.44	3.06	5.28	3.33	5.40	3.41	4.64	1.16	4.78	3.82
Yellow Warbler	5.31	1.96	6.11	0.83	3.41	2.56	7.22	3.06	3.89	1.94	3.41	2.56	2.03		0.96	0.32
Wilson's Warbler	38.27	65.08	48.33	45.83	21.02	32.39	18.61	40.56	21.11	48.33	21.02	32.39	29.86	17.97	19.43	18.15
American Tree Sparrow	0.56	0.56	0.28											0.29		
Savannah Sparrow	0.28	1.40	0.28	0.56	0.28	1.42	2.78	4.72	1.11	3.33	0.28	1.42		0.87	0.64	
Fox Sparrow	0.84	3.07	0.28	0.56	1.42	1.99	1.11	2.50	0.56	2.78	1.42	1.99	0.87	4.93	1.59	0.64
White-crowned Sparrow	1.40		2.22	0.83	2.56		0.28	0.28	0.56		2.56		4.64	1.45		
Golden-crowned Sparrow	6.98	2.79	7.22	1.94	3.69	2.27	3.06	3.89	1.39	1.67	3.69	2.27	0.29	0.29	1.59	6.64
Pine Grosbeak	0.84		1.67	0.28	0.57		0.28	0.56	0.83		0.57		0.29			
Common Redpoll	6.70	0.28	5.00	0.83	3.69	1.70	6.11	0.83	3.61	0.83	3.69	1.70	2.61	0.29	3.50	
TOTALS	67.88	81.84	54.22	76.39	49.72	55.40	55.28	65.00	47.22	72.50	49.72	55.40	55.94	30.14	39.17	27.71

Table 5. Frequency of species occurrence during MAPS point counts at Mother Goose Lake, Alaska Peninsula June-July 1996. Frequency equals number of points at which a species was recorded divided by total number of points/route. Number in parentheses is the total number of individuals detected/replicate.

Species	Lake Site			Mountain Site			Cranberry Hill		
	13 June	21 June	03 July	14 June	23 June	06 July	19 June	29 June	07 July
Common Loon	(1) 0.11					(1) 0.11			
Tundra Swan		(2) 0.11							
Greater Scaup			(1) 0.11						(2) 0.13
Sandhill Crane	(2) 0.11	(2) 0.33	(4) 0.88	(9) 0.33	(2) 0.22	(9) 0.55		(2) 0.13	(2) 0.25
Greater Yellowlegs	(1) 0.11	(1) 0.11	(2) 0.22						
Common Snipe	(1) 0.11	(3) 0.44	(1) 0.33	(2) 0.22	(1) 0.11	(2) 0.22			(1) 0.25
Mew Gull			(1) 0.11						
Glaucous-winged Gull					(5) 0.11				
Downy Woodpecker									(1) 0.13
Alder Flycatcher				(1) 0.11	(9) 0.77	(5) 0.77		(3) 0.38	(1) 0.25
Tree Swallow	(10) 0.44	(16) 0.77	(26) 0.88	(7) 0.44	(6) 0.44	(8) 0.55	(6) 0.38	(3) 0.38	(12) 0.75
Bank Swallow	(4) 0.22	(1) 0.11			(2) 0.11				
Common Raven	(1) 0.11		(1) 0.11	(5) 0.33	(1) 0.11	(1) 0.11			(1) 0.13
Black-capped Chickadee	(1) 0.11	(1) 0.11	(1) 0.11	(2) 0.22	(2) 0.22	(1) 0.11		(1) 0.13	
Gray-cheeked Thrush	(15) 0.88	(5) 0.44	(4) 0.44	(8) 0.66	(13) 0.66	(7) 0.33	(5) 0.50	(4) 0.50	(8) 0.63
Hermit Thrush	(3) 0.33	(10) 1.0	(12) 0.88	(34) 1.0	(24) 1.0	(21) 0.88	(5) 0.38	(19) 1.0	(23) 1.0
American Robin	(13) 0.88	(16) 0.88	(11) 0.66	(3) 0.33	(7) 0.55	(3) 0.22	(4) 0.50	(7) 0.75	(4) 0.50
Orange-crowned Warbler	(8) 0.55	(13) 0.88	(4) 0.44	(11) 0.77	(9) 0.77	(10) 0.66	(7) 0.63	(6) 0.63	(6) 0.75
Yellow Warbler	(25) 1.0	(12) 1.0	(5) 0.55	(5) 0.44	(17) 1.0	(5) 0.44	(3) 0.25	(5) 0.5	(4) 0.38
Wilson's Warbler	(32) 1.0	(33) 1.0	(30) 1.0	(28) 1.0	(40) 1.0	(18) 0.88	(23) 1.0	(23) 1.0	(14) 1.0
Savannah Sparrow	(2) 0.11	(2) 0.22	(2) 0.11	(1) 0.11	(2) 0.22	(2) 0.22	(1) 0.13	(1) 0.13	(1) 0.13
Fox Sparrow	(4) 0.44	(2) 0.22	(2) 0.22	(11) 1.0	(4) 0.22	(6) 0.66		(4) 0.50	
Golden-crowned Sparrow	(12) 0.77	(8) 0.88	(19) 1.0	(6) 0.44	(8) 0.66	(5) 0.44	(9) 0.88	(13) 0.88	(6) 0.50
White-crowned Sparrow	(3) 0.33	(1) 0.22	(2) 0.22	(8) 0.66	(3) 0.22		(2) 0.25	(2) 2.5	(1) 0.13
Pine Grosbeak	(1) 0.11		(2) 0.22	(5) 0.44	(13) 1.0	(5) 0.33	(1) 0.13		
Common Redpoll	(33) 0.88	(27) 0.88	(34) 0.88	(51) 1.0	(18) 0.55	(43) 1.0	(10) 0.75	(11) 0.88	(20) 0.75
Number of points	9	9	9	9	9	9	8	8	8

Table 6. Vegetation data collected during the summer of 1996 from mist net sites at the Lake MAPS site, Mother Goose Lake, Alaska. Values are expressed as means, while canopy density and woody vegetation height have the range printed above the mean. Shaded nets are migration nets only, and values were not used for calculating site-wide means.

Net	Canopy density	DBH tree	# Woody Stems	Woody Veg. Height	Vascular Cover Ht.	3 dominant vascular taxa	Habitat type [Kessel 1979]
1	80 to 86% 83%	8.6cm	2.3	0.8 to 2.2m 1.5 m	0.8 m	Equisetum arvense, Epilobium augustifolium, Aspidaceae	Deciduous Forest
2	5 to 31% 17%	4.5cm	0.5	1.7 to 4.5m 3.1 m	1.0 m	Aspidaceae, Gramineae, Epilobium augustifolium	Deciduous Forest
3	14 to 62% 30%	4.7cm	1.8	0.7 to 1.8 1.2 m	0.8 m	Gramineae, Achillea borealis, Equisetum arvense	Deciduous Forest
4	7 to 23% 14%	none	2.8	0.8 to 2m 1.6 m	1.1 m	Gramineae, Equisetum arvense, Geranium erianthum	Medium Shrub Thicket
5	28 to 32% 29%	7.9cm	0.5	1.5 to 1.6m 1.6 m	0.8 m	Equisetum arvense, Angelica lucida, Epilobium augustifolium	Deciduous Forest
6	27 to 45% 35%	6.9cm	0.5	all 2.2 2.2	0.9 m	Epilobium augustifolium, Achillea borealis, Galium boreale	Deciduous Forest
7	35 to 81% 51%	9.1cm	1.3	1.0 to 2.4m 1.4 m	0.7 m	Achillea borealis, Aspidaceae, Equisetum arvense	Deciduous Forest
8	15 to 83% 42%	7.9cm	0.0	none	0.6 m	Gramineae, Equisetum arvense, Epilobium augustifolium	Deciduous Forest
9	12 to 30% 22%	8.7cm	1.8	1.1 to 2.3m 1.6 m	1.0 m	Equisetum arvense, Gramineae, Achillea borealis	Deciduous Forest
10	51 to 96% 64%	5.8cm	2.0	0.6 to 1.4m 0.9 m	1.0 m	Equisetum arvense, Potentilla sp., Iris setosa	Deciduous Forest
11	18 to 71% 45%	8.1cm	2.0	0.8 to 2.3m 1.6 m	0.8 m	Equisetum arvense, Gramineae, Polemonium acutiflorum	Deciduous Forest
12	81 to 90% 86%	5.5cm	4.3	0.5 to 1.5m 1.0 m	0.9 m	Achillea borealis, Angelica lucida, Gramineae	edge-Lacustrine Shoreline Deciduous Forest
13	all 96% 96%	5.3cm	1.3	0.1 to 1.3m 0.7 m	0.7 m	Gramineae, Achillea borealis, Geranium erianthum	edge-Lacustrine Shoreline Medium Shrub Thicket
All Nets	22 to 83% 39.00%	7.1 cm	1.4	0.9 to 4.5m 1.5 m	0.9 m	Equisetum arvense, Gramineae, Epilobium augustifolium	

Table 7. Vegetation data collected during the summer of 1996 from mist net sites at the Cranberry Hill MAPS Site, Mother Goose Lake, Alaska. Values are expressed as means, while canopy density and woody vegetation height have the range printed above the mean.

Net	Canopy density	DBH tree	# Woody Stems	Woody Veg. Height	Vascular Cover Ht.	3 dominant vascular taxa	Habitat type [Kessel 1979]
1	4 to 25% 13%	8.9cm	3.3	0.7 to 2.1m 1.3 m	0.7 m	Gramineae, Epilobium augustifolium Sanguisorba stipulata	Deciduous Forest
2	3 to 24% 10%	10.7cm	0.5	0.9 to 1.0m 1.0 m	1.1 m	Gramineae, Equisetum arvense, Epilobium augustifolium	Deciduous Forest
3	20 to 69% 38%	7.5cm	2.5	0.8 to 2.1m 1.5 m	1.1 m	Gramineae, Epilobium augustifolium Solidago multiradiata	Deciduous Forest
4	23 to 37% 31%	6.2cm	1.5	0.5 to 2.0m 1.3 m	0.8 m	Gramineae, Epilobium augustifolium Solidago multiradiata	edge-Wet Grass Meadow Deciduous Forest
5	4 to 39% 22%	9.6cm	1.8	0.8 to 2.3m 1.5 m	1.0 m	Gramineae, Epilobium augustifolium Equisetum arvense	Deciduous Forest
6	10 to 49% 28%	12.1cm	1.3	1.3 to 2.6m 2.0 m	1.2 m	Aspidaceae, Epilobium augustifolium, Gramineae	Deciduous Forest
7	17 to 21% 20%	13.6cm	0.8	1.2 to 1.6m 1.3 m	1.4 m	Gramineae, Geranium erianthum, Aspidaceae	Deciduous Forest
8	21 to 51% 34%	5.5cm	3.5	0.9 to 3.0m 1.8 m	0.7 m	Achillea borealis, Aspidaceae, Geranium erianthum	Deciduous Forest
9	13 to 23% 18%	12.2cm	1.0	0.8 to 2.3m 1.7 m	0.8 m	Aspidaceae, Epilobium augustifolium, Equisetum arvense	Deciduous Forest
10	8 to 40% 24%	9.3cm	4.3	0.7 to 1.6m 1.2 m	0.8 m	Epilobium augustifolium, Gramineae Achillea borealis	Deciduous Forest
All Nets	10 to 38% 24%	9.6cm	2.1	1.0 to 2.0m 1.5 m	1.0 m	Gramineae, Epilobium augustifolium Aspidaceae	

Table 8. Observations made of landbird nests found incidentally in the vicinity of the mist net arrays at Mother Goose Lake, Alaska Peninsula, June-July 1996.

Species	# Nests Found	# Eggs Observed	# Young Observed	Hatching Dates	Nest Type
Northern Harrier	1	5	5	2 July	Ground
Tree Swallow	4	Unknown	3-4	Unknown	Cavities
Black-capped Chickadee	1	Unknown	Unknown	Unknown	Cavity
Hermit Thrush	1	4	3	23 June	Ground
Orange-crowned Warbler	1	4	2	5 July	Ground
Wilson's Warbler	8	5-6	4-6	26 June-5 July	Ground
Savannah Sparrow	1	3	Unknown	Unknown	Ground
Golden-crowned Sparrow	3	3-4	2-4	Unknown	Ground
Gambel's White-crowned Sparrow	1	Unknown	4	Unknown	Ground
Common Redpoll	1	Unknown	4	Unknown	Cottonwood

indentation in the tundra, lined with willow twigs on the side of a hill. The Wilson's warbler nests were generally small, woven cups of grass, well concealed with mosses and overhanging taller grasses or willow stems. All of the nests were initially discovered by seeing adult birds flushing from the site. Detailed nest record information is on file at the Alaska Peninsula/Becharof National Wildlife Refuge Complex Headquarters.

Off-Road Point Counts

Off-road point counts were conducted in the Mother Goose Lake watershed from 18 June to 4 July, establishing 5 new routes (Table 9). No new landbird species were encountered during the point counts. Wilson's warblers were the dominant species, supporting mist netting results. Northern shrikes (*Lanius excubitor*) were documented only on the Little Bay transect, reaffirming their general absence during the breeding season at the MAPS sites, but presence during migration.

Migration Banding

Migration banding was conducted on 35 days between 7 August and 19 September 1996, with 3599 total captures. The overall capture rate during this period was 165.7 birds/100 net hrs (Table 3), closely paralleling 1995 capture rates. The peak day of fall migration was 13 August with a daily capture rate of 475.6 birds/100 net hrs (371 birds banded in 78 net hours) (Fig. 3). Overall, 2,937 were banded during migration, which was 517 more than 1995. Surprisingly, Wilson's warblers only accounted for 3% of the difference. Most of the 1996 increase was comprised of Savannah sparrows (*Passerculus sandwichensis*, 30%), yellow warblers (29%) and common redpolls (16%) with smaller increases also for black-capped chickadees (*Parus atricapillus*) and tree (*Spizella arborea*), fox (*Passerella iliaca*) and white-crowned (*Zonotrichia leucophrys*) sparrows. The pattern of captures rates over the migration period has remained very consistent from 1994 through 1996 (Fig. 3). Peak timing of capture rates of individual species was also consistent with that of previous years. The recapture rate during migration was 15.6% (562 birds) with Wilson's warblers again accounting for almost half of the recaptures (225 birds). The highest individual species recapture rate during migration was for black-capped chickadees (40.8% recapture rate), followed by golden-crowned sparrows (32.9%).

Species composition during the 1996 migration banding had only one new species - American dipper (*Cinclus mexicanus*). Species captured in previous years, but not in 1996 were black-billed magpie (*Pica pica*), belted kingfisher (*Ceryle alcyon*), northern waterthrush (*Seiurus noveboracensis*) and hoary redpoll (*Carduelis hornemanni*).

Returns.-- Only 3 returning birds were recovered during 1996 fall migration, all of which were originally banded during MAPS. Nine birds originally banded during either 1994 or 1995 fall migration were recovered during this year's MAPS banding.

Mortality

The mortality rate of birds captured during normal mist netting operations at Mother Goose Lake from June-September 1995 was 0.5%, which represented a 72% reduction from 1995. Of this mortality, half was caused by predators; 50% northern shrikes and 50% by short-tailed weasels (*Mustela erminea*). Not included in this calculation was one unfortunate incident in which 2 MAPS nets were left open overnight at the Mountain site on 15 June. As a result 9 banded and 7 unbanded birds were found dead in the nets the next day, along with numerous birds we were able to release. The one positive note from the incident was the capture (and release) of an adult northern saw-whet owl (*Aegolius acadicus*) - a species previously unknown to be present and/or possibly breeding in the area. The reduction in mortalities during the standard netting operations in 1996 was likely due to more intense "net picking" training and supervision given to the Earthwatch volunteers.

Table 9. Frequency of species occurrence during off-road point counts at Mother Goose Lake, Alaska Peninsula June-July 1996. Frequency equals number of points at which a species was recorded divided by points per route. Number in parentheses is the total number of individuals detected.

Species	Lakeshore	Beaver Dam	Hallbourne Hill	Cranberry Circle	Little Bay
	18 June	25 June	22 June	02 July	04 July
Common Loon	(1) 0.09				
Tundra Swan		(1) 0.10			
Greater Scaup	(7) 0.09	(2) 0.20			(1) 0.10
Black Scoter	(2) 0.09				
Common Merganser				(1) 0.08	
Red-breasted Merganser	(2) 0.09		(1) 0.14		
Northern Harrier				(1) 0.08	
Sandhill Crane	(1) 0.09	(7) 0.30	(2) 0.57	(2) 0.08	
Common Snipe	(1) 0.09			(1) 0.08	(1) 0.10
Mew Gull	(1) 0.09				
Glaucous-winged Gull		(1) 0.10	(1) 0.14		
Arctic Tern	(2) 0.09				
Downy Woodpecker				(1) 0.08	(1) 0.20
Alder Flycatcher		(8) 0.50	(3) 0.28	(7) 0.50	(3) 0.30
Tree Swallow	(19) 0.72	(23) 0.30	(1) 0.14	(9) 0.42	(11) 0.40
Bank Swallow	(1) 0.09	(2) 0.10			
Common Raven		(1) 0.20			
Black-capped Chickadee	(1) 0.09	(1) 0.10			
Gray-cheeked Thrush	(3) 0.27	(7) 0.40	(1) 0.14	(8) 0.42	(4) 0.30
Hermit Thrush	(7) 0.45	(14) 0.70	(8) 0.43	(33) 1.00	(39) 1.00
American Robin	(1) 0.09	(9) 0.70	(5) 0.57	(3) 0.17	(5) 0.50
Northern Shrike					(2) 0.10
Orange-crowned Warbler	(4) 0.27	(16) 0.80	(7) 0.71	(15) 0.83	(1) 0.10
Yellow Warbler	(17) 0.72	(20) 0.80	(4) 0.28	(5) 0.42	(4) 0.10
Wilson's Warbler	(22) 1.00	(29) 1.00	(34) 1.00	(20) 0.75	(24) 1.00
Savannah Sparrow		(4) 0.30	(5) 0.57	(5) 0.33	
Fox Sparrow	(8) 0.72	(12) 0.60	(1) 0.14	(9) 0.42	(4) 0.30
Golden-crowned Sparrow	(6) 0.54	(10) 0.60	(5) 0.71	(2) 0.17	(13) 0.80
White-crowned Sparrow		(4) 0.30		(5) 0.25	
Pine Grosbeak		(1) 0.10	(1) 0.14	(2) 0.17	
Common Redpoll	(6) 0.54	(8) 0.30	(13) 0.85	(29) 0.83	(1) 0.10
Number of points sampled	11	10	7	12	10

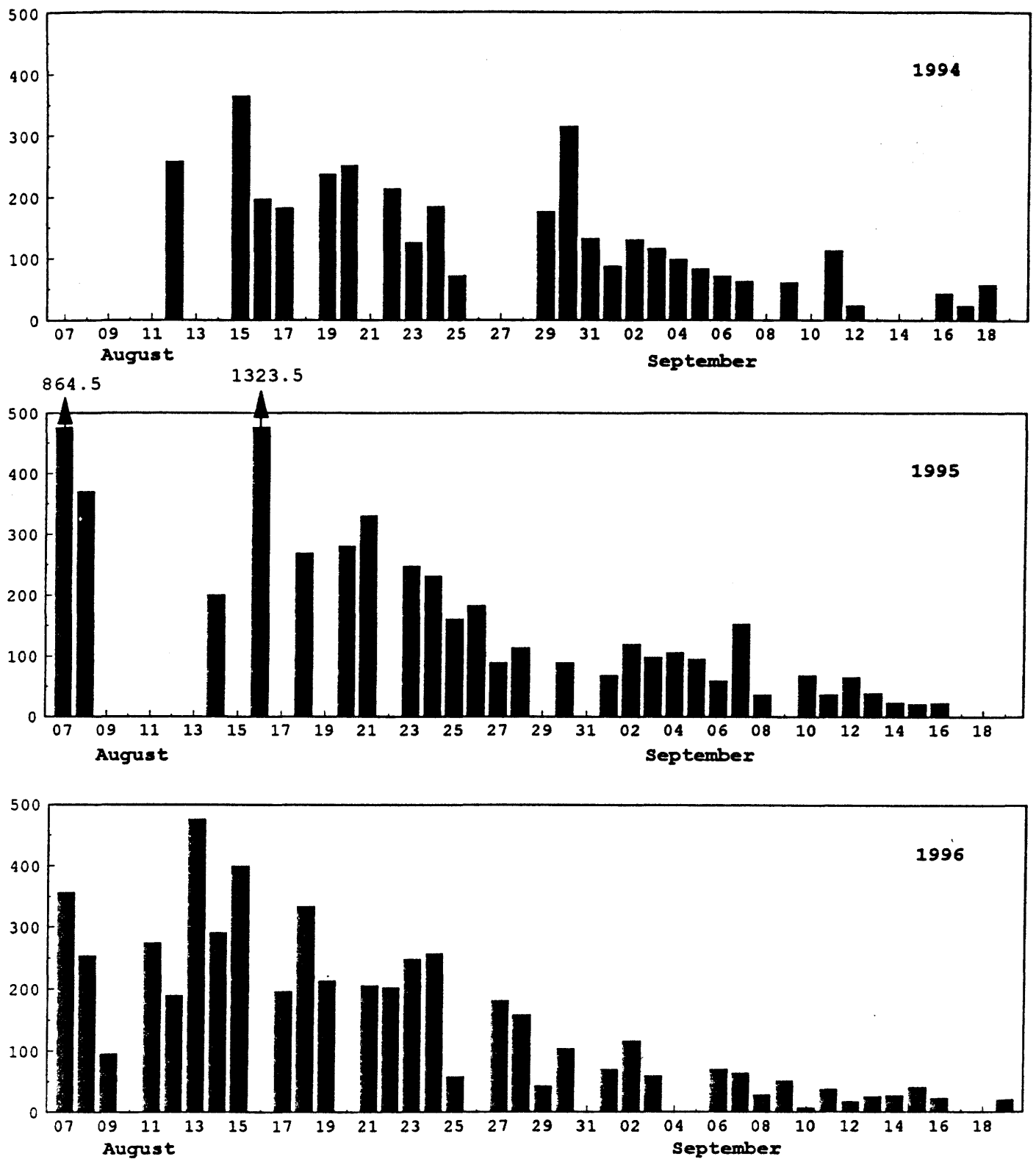


Fig. 3. Migration capture rates of landbirds caught at Mother Goose Lake, Alaska Peninsula, 1994-1996. All values expressed as birds/100 net hours.

Avian Sightings

Species composition of incidental sightings of neotropical landbirds paralleled 1994 and 1995 results. New landbird species documented at Mother Goose Lake in 1996 included: American dipper, northern saw-whet owl, hairy woodpecker (*Picoides villosus*) and Swainson's thrush (*Catharus ustulatus*).

DISCUSSION

Landbird Abundance

Species composition.-- The composition of landbird species at the mist netting sites and localized camp area was well documented through the combined use of MAPS point counts, avian sightings and mist netting. The five new off-road point count routes established in 1996 were a good start in setting up further sampling in other parts of the Mother Goose Lake watershed. A more complete picture of the watershed would be established if an additional 5 off-road point count routes could be added in 1997, while maintaining the original 5 routes from 1996.

Breeding densities.-- Breeding adult landbird capture rates were very similar in 1996 to the earlier results from 1994 and 1995 with some slight variation as would be expected between years (Dewhurst et al. 1995, Eskelin and Dewhurst 1996). The decision to eliminate MAPS Period 11 (9 August-14 August) for the different sites during different years, benefits migration data, but has complicated any direct comparisons of breeding densities during MAPS. Now that this MAPS period has been completely eliminated from the program at Mother Goose Lake, future comparisons will enable long term monitoring of species trends in breeding densities. Mother Goose Lake MAPS stations again recorded the highest apparent densities of breeding Wilson's warblers in the state, making this the best indicator species of overall change for the area.

Productivity and Recruitment

Monitoring capture rates of HY birds during MAPS has yielded some possibly significant trends over time. However, monitoring over a longer period (5-10 years) would be necessary to statistically test their true significance. In addition, comparing these trends over the Alaska/Yukon region and over the entire MAPS range would determine whether these were only local or more widely based trends.

Recruitment into the breeding population, based on 1996 return rates of HY birds banded in previous years, was low. Yet very little regional literature is currently available to provide a broader perspective on our results. Dispersal upon returning to the Mother Goose Lake watershed may account for part of the lower rate (based on MAPS recaptures). Yet unlike in 1995 (Eskelin and Dewhurst 1996), only 14% of the returning HY birds were recaptured at a different site than originally banded, demonstrating annual fluctuations in juvenile dispersal. But keeping the low sample size involved (8 birds in 1996) in perspective makes it difficult to draw any strong conclusions about post-fledging dispersal or recruitment trends at this time.

Survivorship and Site Fidelity

Being the third year of the project, the Institute for Bird populations will be starting analysis of Mother Goose Lake survivorship data relative to their nationwide program. Understanding how our MAPS sites fit into the much larger data pool will lend much insight toward interpreting what appears to be low return rates. In addition, the initiation of color banding AHY birds during MAPS in 1996, should increase our understanding of how to interpret data on returning birds that was based solely on mist netting results by providing another means of documenting returning birds (via visual observations) for comparison. Efforts to resight color banded AHY birds in 1997 and future

years would be expected to only increase our estimate of adult survivorship. However, as long as the future results are segregated by methods used (resightings versus mist net recaptures), comparisons with 1995/1996 data will still be possible.

Paralleling 1995 results, 12% of the birds returning in 1996 were documented outside of their original MAPS banding site. This supports the theory that site fidelity and actual adult survival rates may be higher than banding data from one station suggests. The question of how to differentiate spring and fall migrants from true lack of breeding site fidelity remains to be solved. Systematic searching for color banded returning birds both at and away from the mist netting arrays would likely provide more answers on site fidelity.

Habitat use

Breeding Season.-- New vegetation sampling techniques at MAPS mist net sites yielded a quantitative means to compare both within and between the net arrays. These were completed only at the Lake and Cranberry Hill sites in 1996, and still need to be completed at the Mountain site in 1997. Sampling at the net sites should then be supplemented with similar sampling at random points within each array to relate the net sites with the overall habitat composition. Once this vegetation sampling is complete, patterns of capture rates segregated by HY and AHY birds could be examined relative to the vegetation parameters and geographic location of MAPS net to map adult versus juvenile feeding/foraging areas within each array.

Fall Migration.-- An examination of fall migration capture rates by net over the past 3 years indicated the possible importance of geographical location versus vegetation type (Eskelin and Dewhurst 1996). By quantifying the vegetation types at each net sites, we can better examine this observed pattern. Every year, the lakeshore nets (1, 10, 11, 12, 13) have had the higher capture rates during migration. Nets 12 and 13 are located in unique edge habitat; however, nets 1 and 10 are in the more ubiquitous cottonwood forest habitat. The geographical location of nets 1 and 10 seem to be the only factor setting them apart from nets 2-3, 5-9, which consistently have had poorer success rates, lending further support to the importance of geography when selecting migration sites.

RECOMMENDATIONS

1. Efforts to quantify habitat and vegetation should be continued with emphasis on the annual MAPS surveys, continuing the new habitat sampling at the net sites (Mountain site) and at random sites throughout all 3 net arrays.
2. Color banding should be reorganized to emphasize only one MAPS site (Lake) with more effort put into resightings. All AHY birds of the following species should be color banded: black-capped chickadees; hermit and gray-cheeked thrushes; orange-crowned, yellow and Wilson's warblers; golden-crowned and white-crowned sparrows; pine grosbeaks; and common redpolls. The same station color (Lake site - Red) should be maintained for a second year, alternating the order with the metal band to provide more combinations.
3. More emphasis should be placed on completing the establishment of 10 off-road point count routes in the Mother Goose Lake watershed and replicating them annually.
4. The high incidence of AHY bird site switching between the Mother Goose Lake MAPS sites may indicate that they were spaced too closely for cottonwood habitat in Alaska. The separation between MAPS sites was .5-.75 miles, which should be used as a minimum guideline for placing of any future MAPS sites in similar habitat types.

ACKNOWLEDGMENTS

A project the size of Mother Goose Lake wouldn't have been possible without the efforts of numerous people working as a team. Biological Technicians Randy Moore and Linda Wells were the field camp coordinators and primary bird banders. Wildlife Biologists Donna Dewhurst and Heather Moore, and Biological Interns J. D. Semones and Ingrid Harrauld acted as assistant banders and were responsible for all the logistics and training of the Earthwatch teams. Earthwatch recruited and coordinated 7 teams of EarthCorp volunteers who contributed through individual funding for the project and by assisting in numerous aspects of the field work. This year's participants included: Emily Erler, Naoka Iwata, Clair Varian, Marilyn Wilson, Lee Miller, George Thorton, Hermann and Beate Schmid, Tracey Donaldson, Micheal Trebolt, Becky Pierce, Tim Alexander, Nadene Donner, Vicki Powers, Alix Goelet, Sandie Page, Janet Keck, Joyce Damore, Nanette Roydon, Don Chorzempa, Peter Stewart, Sieglinde Reynolds, Michael Deville and Eleanor Hung. Additional field assistance was provided by Emily Loomis, Terry Moore and Ann Loyd. Special thanks again to Carol Cherin, Earthwatch '94 for donating time and materials to make 2nd year's supply (another 60+) of colorful bird bags and for her continuing eagerness to help. Much gratitude to Dan Gibson, Assistant Curator - University of Alaska Museum, for curation and storage of collected bird specimens and his continuing encouragement for bird studies on the Alaska Peninsula.

Funding for this project was provided jointly by the U.S. Fish & Wildlife Service and Earthwatch through a Challenge Cost Share Agreement. Support from the staff of the Refuge Complex also greatly contributed in sustaining the project through its third year. Special thanks to Refuge Manager Ronald E. Hood and Administrative Technician Laura Shawback. Also thanks to C-Air, Branch River Air and Refuge Pilot Bill Smoke for many safe trips to and from King Salmon.

LITERATURE CITED

- Bailey, E.P. 1974a. Passerine diversity, relative abundance, and migration at Cold Bay, Alaska. *Bird-Banding* 45:145-151.
- . 1974b. Winter banding of passerines on the Alaska Peninsula. *Bird-Banding* 45:307-314.
- Dewhurst, D. A., T. E. Eskelin, and J. A. Melton. 1995. Passerine breeding and fall migration monitoring at Mother Goose Lake, Alaska Peninsula National Wildlife Refuge, Alaska June-September 1994. U.S. Fish and Wild. Serv., King Salmon, Alas., (Unpubl). 46pp.
- DeSante, D. F. and K. M. Burton. 1993. The Monitoring Avian Productivity and Survivorship (MAPS) Program: Overview and progress. Pages 208-222 in D. M. Finch and P. W. Stangel, eds. Status and management of Neotropical migratory birds. U. S. Forest Serv. Gen. Tech. Rep. RM-229.
- and ———. 1994. 1994 MAPS Manual: Instructions for the establishment and operation of stations as part of the Monitoring Avian Productivity and Survivorship Program. The Institute for Bird Populations, Point Reyes Station, CA., (Unpubl). 55 pp.
- Eskelin, T. D. and D. A. Dewhurst. 1996. Landbird breeding and fall migration at Mother Goose Lake, Alaska peninsula National Wildlife Refuge, Alaska, June-September 1995. U.S. Fish & Wildl. Serv., King Salmon, Alas., (Unpubl). 35pp.
- Fadely, J., B. Andres, T. Pogson, K. Sowl, C. Sterne and A. Morkill. 1995. Boreal Partners in Flight working group - 1994 annual report. Anchorage, Alas., (Unpubl). 42pp.
- Hagan, John III, T. L. Lloyd-Evans, J. L. Atwood, and S. Wood. 1989. Longterm changes in migratory landbirds in the northeastern United States: Evidence from migration capture data. Pages 115-130 in J. M. Hagan and D. W. Johnston, eds. Ecology and conservation of Neotropical migrant landbirds.
- Handel, C. M. (compiler) 1994. Alaska Partners in Flight Neotropical Migratory Bird Conservation Program: 1994 Action Plan. National Biological Service, Anchorage, Alas., (Unpubl). 13 pp.
- Kessel, B. 1979. Avian habitat classification for Alaska. *Murrelet* 60:86-94.
- Pyle, P., S. N. G. Howell, R. P. Yunick, and D. F. DeSante. 1987. Identification Guide to North American passerines. Slate Creek Press, Bolins, Calif., 278pp.
- Ralph, C. J., G. R. Guepel, T. E. Martin, and D. F. DeSante. 1992. Field Methods for monitoring landbirds. U.S. Forest Serv., Arcata, Calif., (Unpubl) 56pp.
- Robbins, C. S., J. R. Sauer, R. Greenberg, and S. Droege. 1989. Population declines in North American birds that migrate to the Neotropics. *Proceedings from the National Academy of Sciences* 86: 7658-7662.
- Sauer, J. R., and S. Droege. 1989. Geographic patterns in population trends of Neotropical migrants in North America. Pages 26-42 in J. M. Hagan and D. W. Johnston, eds. Ecology and conservation of Neotropical migrant landbirds.

- Savage, S., J. F. Payne, J. Bolling, N. Corona, T. Hanks, P. Johnson, C. Pumphrey. 1988. Ugashik Narrows public use field camp, Alaska Peninsula National Wildlife Refuge, 15 June - 22 September 1988. U.S. Fish & Wildl. Serv., King Salmon, Alas., (Unpubl) 4pp.
- Waddington, M. K. 1992. Aging and Sexing techniques for Wilson's warblers. Colorado Bird Observatory, Colorado Springs, CO., (Unpubl). 1pp.

APPENDICES

Appendix I. Capture histories of 20 adult landbirds switching sites during 1996 MAPS banding, Mother Goose Lake, Alaska.

Species	Sex	Original Capture Site	Date	Other Captures	Date(s)
WIWA	F	LAKE	07/14	CRAN	08/03
WIWA	F	CRAN	06/20	MTNS	07/25
WIWA	F	CRAN	06/20	MTNS	08/02
WIWA	F	LAKE	06/22	MTNS	06/23
OCWA	F	LAKE	07/03	CRAN	07/26
BCCH	F	CRAN	06/28	LAKE	07/13
				CRAN	08/03
BCCH	F	LAKE	06/12	CRAN	06/20
				LAKE	06/21
YWAR	M	LAKE	06/13	CRAN	07/07
WIWA	M	LAKE	06/21	CRAN	06/28
WIWA	M	CRAN	06/28	LAKE	07/02
WIWA	M	LAKE	06/22	CRAN	06/28
TRES	M	MTNS	06/23	CRAN	07/07
PIGR	M	LAKE	06/13	MTNS	06/23
GCSP	M	CRAN	06/19	LAKE	06/21
GCSP	M	LAKE	06/12	MTNS	07/15
GWCS	M	LAKE	06/22	CRAN	07/07
GWCS	M	LAKE	07/03	CRAN	07/07
GCTH	M	CRAN	06/28	MTNS	07/04
GCTH	M	LAKE	06/13	CRAN	06/28
GCTH	M	CRAN	06/28	MTNS	07/04

Appendix II. Capture histories of 14 landbirds originally banded as adults during MAPS in 1994 or 1995, and returning to a different MAPS site during 1996.

Species	Sex	Original Capture Site	Date	Site Returned To	Date
GCTH	F	LAKE	06/16/05	MTNS	07/04/96
YWAR	F	MTNS	06/13/94	CRAN	07/07/96
OCWA	F	MTNS	07/07/95	LAKE	06/22/96
WIWA	F	LAKE	06/10/94	CRAN	06/20/96
WIWA	F	CRAN	07/08/95	LAKE	07/30/96
FOSP	F	CRAN	07/18/95	MTNS	06/23/96
CORE	F	LAKE	07/30/94	MTNS	07/25/96
DOWO	U	LAKE	07/03/95	MTNS	07/04/96
GCTH	M	MTNS	07/15/95	CRAN	07/07/96
YWAR	M	LAKE	07/21/95	CRAN	07/16/96
YWAR	M	LAKE	06/23/95	MTNS	07/15/96
OCWA	M	LAKE	07/22/94	CRAN	06/19/96
WIWA	M	LAKE	07/03/95	CRAN	06/19/96
WIWA	M	CRAN	07/08/95	LAKE	06/21/96