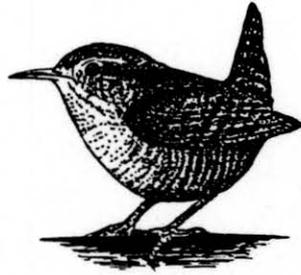


COPY

**AVIAN FALL MIGRATION AT YANTARNI SOUND,
ALASKA PENINSULA NATIONAL WILDLIFE REFUGE, ALASKA
AUGUST-SEPTEMBER 1995**



By:

Heather Moore

Key Words: Alaska Peninsula, bird banding, chickadees, migration, mist-nets, Yantarni Sound, neotropical migratory birds, passerines, redpolls, sparrows, thrushes, warblers

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

January 1996

ABSTRACT

Constant-effort landbird mist netting was conducted at Yantarni Sound between 12 August and 14 September 1995. The project was an opportunistic effort to document fall migration and collect baseline avian data from the Pacific side of the Aleutian Mountain Range, Alaska Peninsula. Mist netting yielded 1,440 total landbirds of 20 species captured in 1,321 net hours. Mist netting was surprisingly successful for an area with characteristically unfavorable weather conditions. Capture rates were highest on 12 August, with 240 birds/100 net hrs and gradually declined to 36.7 birds/100 net hrs on 13 September. The timing of passerine fall migration was relatively consistent with that recorded by other stations on the Alaska Peninsula, while species composition and relative abundance varied. Additional bird observations during migration documented 70 species of both land and waterbirds in the Yantarni Sound area.

INTRODUCTION

The "Partners in Flight" Neotropical Bird Conservation Program is an international effort conceived by the National Fish and Wildlife Foundation in response to recently documented declines in landbirds, especially those that winter in Mexico, Central and South America and the West Indies. One-half of the avian species that breed in North America are neotropical migrants that spend as much as 9 months on the wintering grounds (Rappole et al. 1983). The abundance, distribution and ecology of landbird migrants on the wintering grounds is poorly understood. This creates a critical problem in view of the rapid destruction currently taking place in the neotropics (Rappole et al. 1983). A Memorandum of Agreement has been signed by 11 Federal agencies and a number of non-governmental agencies to work together for the conservation of neotropical birds (Western Working Group 1992).

In 1995, the Alaska Peninsula/Becharof National Wildlife Refuge Complex (Complex) conducted constant-effort landbird mist netting at Yantarni Sound between 12 August and 14 September. Site selection was based on logistical support from the King Salmon Fishery Resource Office (KSFRO), which was conducting a coho salmon inventory of area streams, and proximity to Yantarni airstrip.

Research objectives of avian monitoring at Yantarni Sound were to:

- 1) collect baseline data on presence and relative abundance of migratory bird species on the Pacific side of the Aleutian Mountains, Alaska Peninsula during fall migration, targeting neotropical migratory landbirds;
- 2) determine the feasibility of mist netting at a location with known high winds;
- 3) document use of coastal habitats by migratory and resident landbirds; and,
- 4) collect information on migration phenology of landbirds using the study area.

Very little work has been done prior to this time on migratory landbirds on the Alaska Peninsula. In the early 1970's, Bailey (1974a) conducted three summers of constant effort mist netting at Cold Bay, which provides the only historical background banding data. Bailey (1974b) also conducted winter banding of passerines during the same period. Small-scale mist netting operations were conducted by Complex staff at the King Salmon office compound during the summers of 1984-1986 [U.S. Fish & Wildlife Service (FWS) files,

King Salmon, Alas.] and at Ugashik Narrows during the summer of 1988 (Savage et al. 1988). In 1994, the Complex initiated two Monitoring Avian Productivity and Survivorship (MAPS) stations during the breeding season and also conducted constant effort fall migration monitoring at Mother Goose Lake (Dewhurst et al. 1995). Efforts were expanded in 1995 to include a third MAPS station at Mother Goose Lake, a breeding and migration study at Becharof Lake, and the Yantarni Sound migration project.

Miscellaneous avian observation data from the Alaska Peninsula is available from unpublished annotated bird lists kept on file by the various land management agencies. Lists that would be most pertinent to the Yantarni area include Meyer (1987), and Starr and Starr (1988). A cooperative computerized bird database is being used by the Fish and Wildlife Service and National Park Service to consolidate and organize all miscellaneous avian sightings reported to those agencies. Most useful passerine observations would be from the Complex's oil spill related monitoring camps along the Becharof National Wildlife Refuge (NWR) coastline during 1989-1992 (FWS Refuge Files, King Salmon, Alas.) and Wilk and Wilk's (1989) faunal inventory including the Herendeen Bay, Meshik River and Dog Salmon River. Published observations are limited to Narver's (1969) three summers of incidental observations from the Chignik River drainage and Gill et al.'s (1981) four-year study of the Port Moller-Herendeen Bay area. Osgood (1904) and Murie and Scheffer (1959) provided the oldest historical data on landbird observations made along the Alaska Peninsula.

These sources provided only a limited amount of information on fall use by landbirds of the Pacific Coast. The monitoring efforts along the Becharof NWR coast were the most comprehensive, but focused on seabirds. Landbirds were only incidentally documented. The 1995 Yantarni efforts were the first to focus on landbird populations on the Pacific side of the Aleutian Mountain Range.

STUDY AREA

The Alaska Peninsula splits Bristol Bay in the north and west from the Pacific Ocean in the south and east. This rugged peninsula juts out in a southwesterly crescent beginning at the 59th parallel of latitude and running 650 km (400 mi) to about the 54th parallel. The volcanic Aleutian Mountain Range forms the backbone along the Pacific Coast. The Yantarni camp was placed at the inland end of a gravel landing strip, 10 km (6 mi) northeast of Yantarni Bay, for protection from the strong easterly winds characteristic of the area. This straight section of coastline northeast of Yantarni Bay and southwest of Nakalilok Bay is referred to as Yantarni Sound. Banding operations were conducted around camp, 2 km (1.2 mi) from the Pacific Ocean (Fig. 1).

The Pacific coast of the Alaska Peninsula is characterized by polar maritime climate with moderate temperatures, protracted cloud cover, frequent precipitation and high winds. Between 12-31 August, 61 mm (2.4 in) of rainfall was measured at Yantarni, while in the same time period between September 1 and 18 (close of camp), 143 mm (5.6 in) accumulated. Temperatures ranged from 1° C (33° F) on 2 September to 30° C (86° F) on 24 August.

Vegetation in the Yantarni area underwent substantial disturbance during an oil-drilling effort concluded by Chevron in 1981 (FWS files, King Salmon, Alas.). Historically, a wet meadow covered most of the airstrip area and some of the banding site. The airstrip area and route to the drilling site northwest of camp were filled in with gravel and revegetated with alder (*Alnus crispa*) upon termination of the project. Current area vegetation appears largely uniform, with a dense alder thicket extending across the whole banding site down to the tidal area. Tiny sparser and older patches remain in some areas. Southwest of the banding site is a remnant wet meadow, and immediately

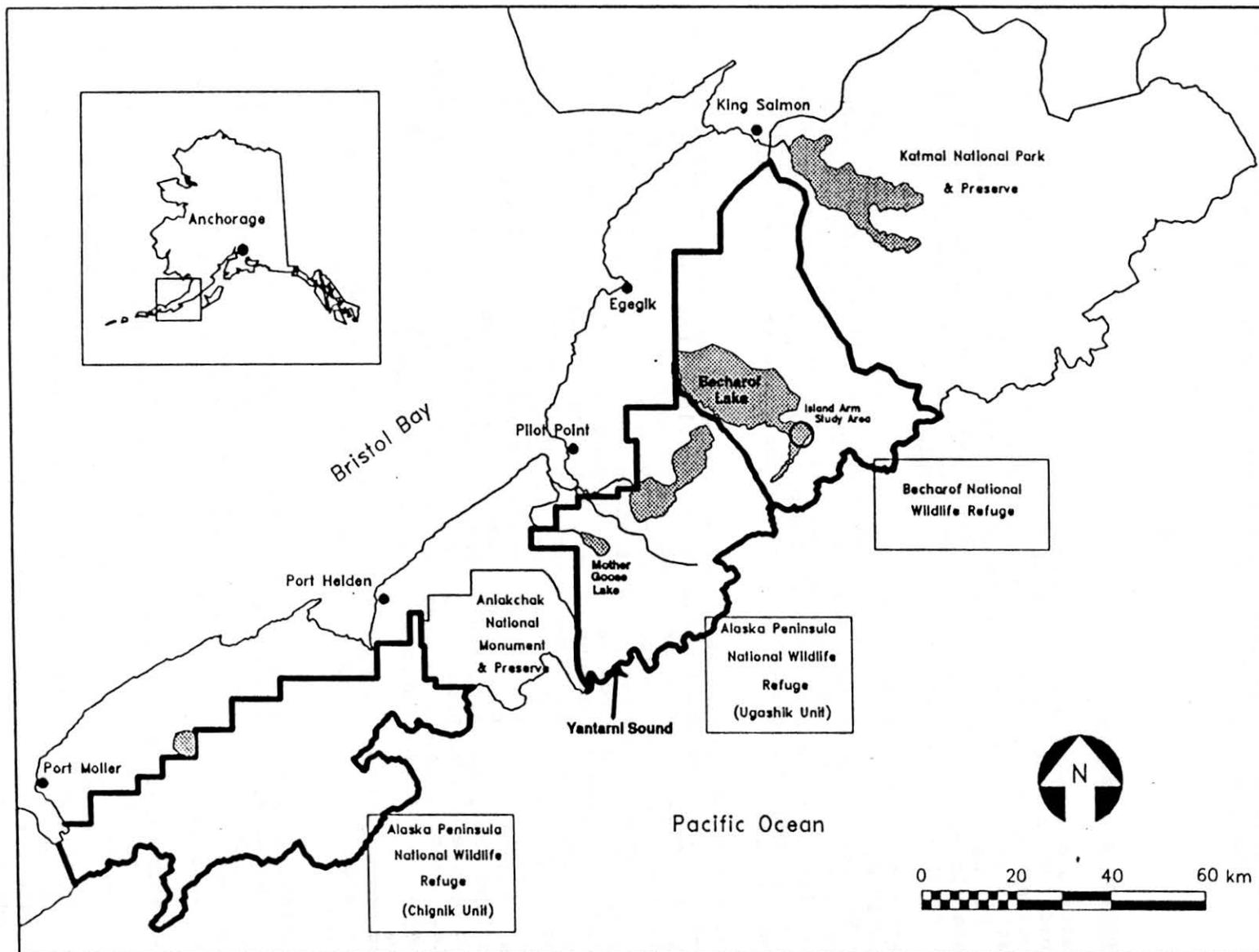


Fig. 1. Location of Yantarni Sound, relative to King Salmon and the Alaska Peninsula/Becharof Refuge Complex.

to the north runs "Camp Creek", which hosts a sizable coho salmon (*Oncorhynchus kisutch*) run in late fall. All nets were located in the alders and/or on the edge of the creek (Fig. 2). The main alder growth has little understory, although the edge of Camp Creek is lined with grass, cow parsnip (*Heracleum lanatum*) and fireweed (*Epilobium augustifolium*). Lining the tidal area of Yantarni Sound are salt grass dunes, dominated by Lyme grass (*Elymus arenarius* subsp. *mollis*).

METHODS

Mist Netting and Banding

Mist netting and banding operations paralleled as closely as possible those described for fall migration by Dewhurst et al. (1995). An array of 10 mist nets were set in a 0.8-ha (2-acre) area (Fig. 2). Seven of the nets were Association of Field Ornithologists (AFO) style "HTX" nets, three were Avinet brand. All nets were 12 m (37 ft) long, with 4 tiers of 30mm (1.2 in) mesh. Nets were closer together than at other sites [average 15 m (5 yd)] so that the entire operation could be run by 2 people.

Nets were run for a 6-hr period every day that weather permitted. Mist nets were opened within 45 min of published sunrise for King Salmon (National Weather Service, King Salmon, Alas. 1994). This modification from the standard, within 30 min of sunrise, was made for safety reasons to allow adequate light for spotting bears. Steady rain or wind strong enough to keep the net bags open (generally >15mph) were the criteria used to close the nets (Ralph et al. 1992).

During mist netting operations, birds were removed by the research staff, put into small, cloth bags and transferred to a holding box inside the processing weatherport. Captured birds were identified using standard field guides, aged using plumage attributes and/or skulling (Pyle et al. 1987), sexed if possible via plumage and examined for presence/absence of cloacal protuberance and brood patch. Captured birds were also weighed, measured, molt stage documented, examined for amount of body fat, and banded with a standard Fish & Wildlife Service leg band. Some additional measurements were taken as time permitted on Wilson's warblers (*Wilsonia pusilla*) (crown length) and Catharus thrushes (P_{10} - P_{cov}), as per standards established at other Alaska banding stations. All birds captured were capable of sustained flight and were released from the processing tent. Banding data were recorded on forms developed by the Alaska Bird Observatory, and later transferred to a dBase III+ file. Banding schedules were sent to the Bird Banding Laboratory, Laurel, MD., on standard National Biological Service forms.

Birds recaptured within one hour of processing were recorded but later eliminated from the data because of the likelihood that their flight path had been altered.

For analytical purposes, passerine species described in this report were categorized by migration strategies following models established by national and western regional committees of Partners in Flight (Gauthreaux 1992, Carter and Barker 1993, Handel et al. 1995). The following migration strategy categories were used:

- A = Neotropical migrant with majority of winter range south of U.S./ Mexico border
- B = Neotropical migrant with majority of winter range north of U.S./ Mexico border
- N = Nearctic migrant with entire or almost entire winter range in the U.S. and Canada
- P = Palearctic or Paleotropical migrant with entire winter range in Asia
- R = Resident species, non-migratory or very weakly migratory.

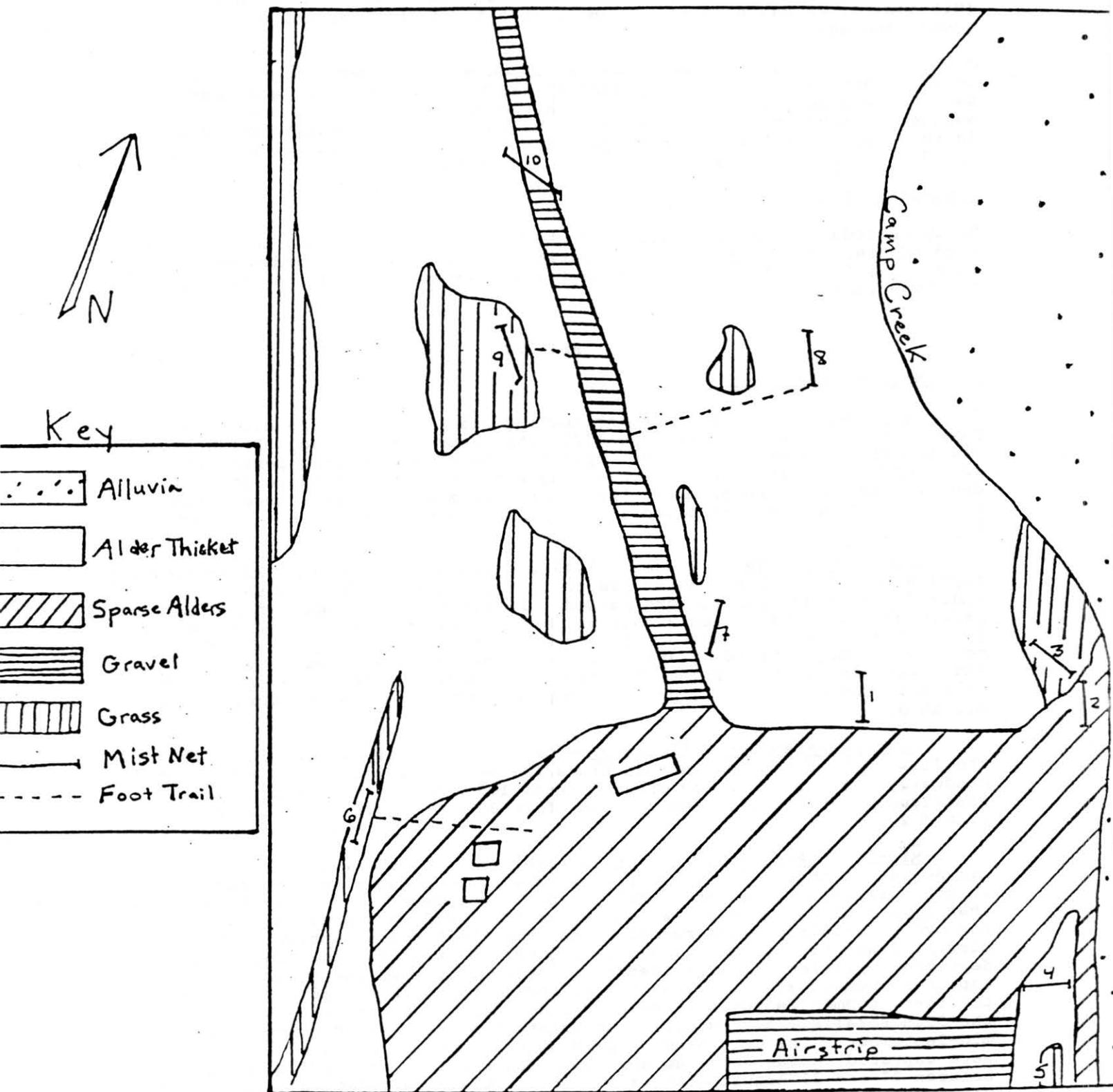


Figure 2. Mist net locations at Yantarni Sound, Alaska Peninsula, 1995.

Age composition of individual birds captured was divided into "Hatching Year" (HY) and "After Hatching Year" (AHY), with the latter including both sub-adults and adults.

Mist netting feasibility was examined by determining percentage of total days on which nets were opened, and also by calculating the average number of hours each net was run during the season. Although feasibility is a somewhat subjective term, bandable days should be roughly equivalent to other stations in the area. Results were compared with banding operations at Becharof Lake in 1995 and Mother Goose Lake in 1994 and 1995.

Incidental Sightings

Daily records were kept of all birds sighted during the study period. Habitat type (Kessel 1979) and behavior (Andres 1994) were also recorded on customized forms (FWS files, King Salmon, Alas.) and transferred into a computerized database (dBase III+).

RESULTS

Mist Netting and Banding

Mist Netting Success.-- Mist netting was possible on 25 out of the 37 days in camp. Nets were run for 1321 total hours, averaging 132.1 hrs/net. All 10 nets were able to be kept open for the entire banding period (6 hrs) on 13 of the 25 bandable days. Prevailing winds were E-SE, and in general due to dense cover, winds recorded in the banding site were notably lower than on the beach. Highest winds recorded in the banding site were 106 kph (66 mph) on 16 August.

Capture Success.-- Overall, 1440 individual landbirds of 20 species were captured during 1321 net hours (Table 1). Of those birds captured, 1375 individuals of 19 species were banded. In addition, a common snipe (*Gallinago gallinago*) was captured on 22 August, but not banded due to lack of band size 3. Of the 19 species banded, 11 were classified by Partners in Flight as neotropical migrants (4 Strategy A, 7 Strategy B), 6 were nearctic migrants, and 2 were residents. Palearctic species were neither captured nor banded at Yantarni Sound in 1995. Eighty-three percent of birds banded were Type A/B migrants.

Capture Rates/Net Efficiency.-- Capture rate was highest on 12 August, the first day of banding, at 240 birds/100 net hrs (Fig. 3). Capture rates gradually declined to a low of 36.7 birds/100 net hrs on 13 September. Individual mist net efficiency varied from 80.2 to 207.5 birds/100 net hrs (Table 2).

Migration Phenology.-- Capture rates for most species were highest in mid-August, although notable differences existed between species (Table 3). In general, Type A migrants displayed peak capture rates earlier in the season than Type B or N migrants. Wilson's warblers (*Wilsonia pusilla*), accounting for over one-third of the banded birds, had the highest capture rate of 122.9 birds/100 net hrs between 17 and 21 August and were last captured on 11 September. Yellow warblers (*Dendroica petechia*), with the second most captures, peaked at 32.3 birds/100 net hrs between 22 and 26 August. By contrast, common redpolls (*Carduelis flammea*), which primarily winter north of the 50th Parallel, demonstrated a consistent increase in capture rate through mid-September. The only other Type N migrant species of which > 2 individuals were captured, golden-crowned sparrows (*Zonotrichia atricapilla*) peaked between 27 and 31 August with capture rate remaining relatively consistent until the last 3 days of banding.

Recaptures.-- Recaptures comprised 9.8% of the total captures and involved 12 species (Table 1). With the exclusion of species represented by

Table 1. Age composition and relative abundance of landbirds banded at Yantarni Sound, Alaska Peninsula, 12 August - 17 September 1995.

Species	Type*	Number of birds banded			
		AHY	HY	Unknown	Total
Downy Woodpecker	R	0	0	1	1
Black-capped Chickadee	R	2	8	7	17
Winter Wren	N	0	0	1	1
Ruby-crowned Kinglet	B	0	2	0	2
Gray-cheeked Thrush	A	2	11	0	13
Hermit Thrush	B	16	87	16	119
Northern Shrike	N	0	1	0	1
Orange-crowned Warbler	A	6	50	0	56
Yellow Warbler	A	42	160	1	203
Wilson's Warbler	A	31	461	4	496
American Tree Sparrow	N	0	1	0	1
Savannah Sparrow	B	20	145	9	174
Song Sparrow	B	0	1	0	1
Fox Sparrow	B	10	59	7	76
Golden-crowned Sparrow	N	15	93	10	118
Gambel's White-crowned Sparrow	B	0	2	0	2
Slate-colored Junco	B	0	1	0	1
Common Redpoll	N	51	26	15	92
Hoary Redpoll	N	1	0	0	1
Total		196	1108	71	1375

* Migration strategy:

R = Resident

A = Neotropical Type A Migrant

B = Neotropical Type B Migrant

N = Nearctic Migrant

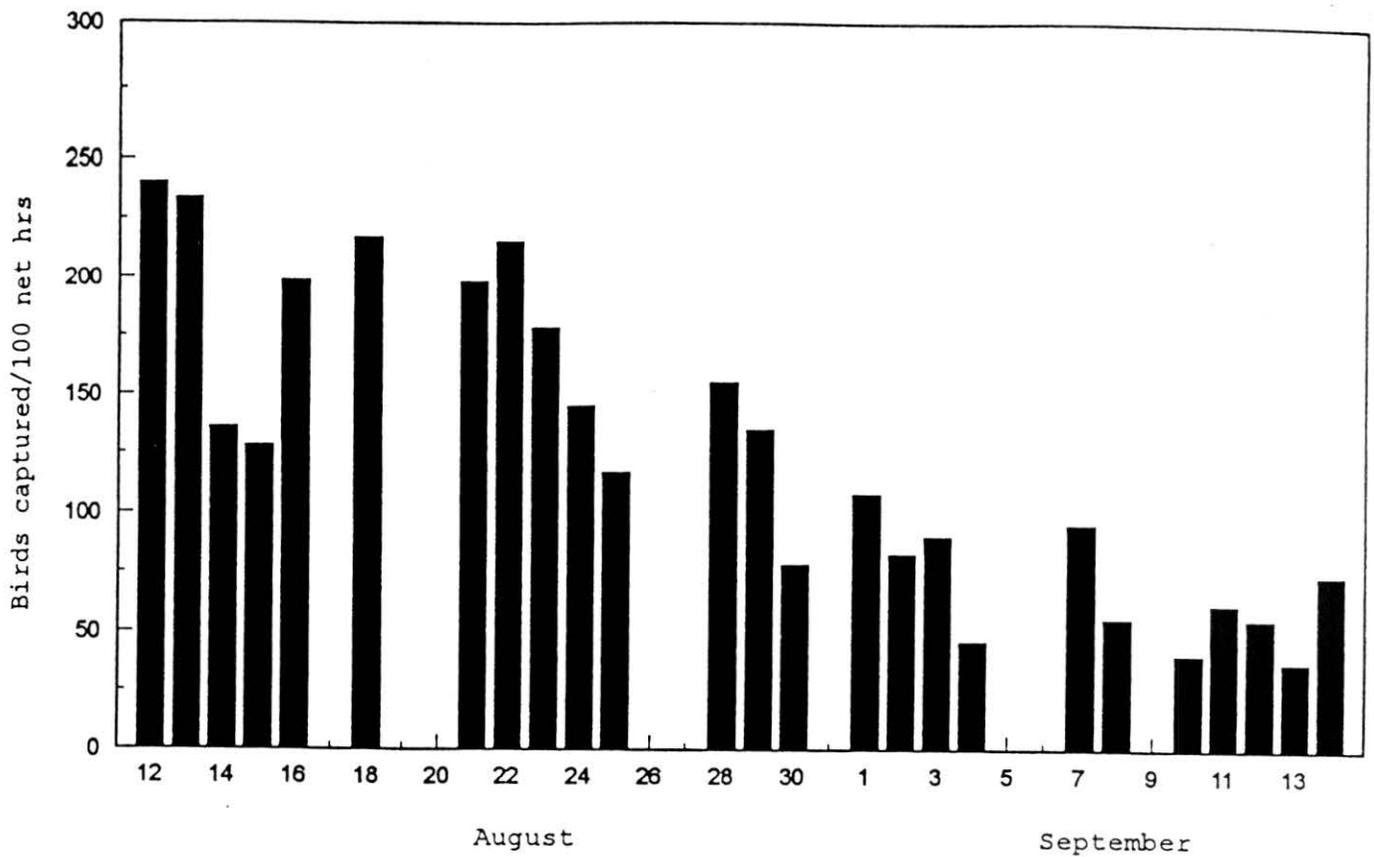


Figure 3. Capture rates of landbirds in mist nets during fall migration at Yantarni Sound, Alaska Peninsula, August-Sept. 1995.

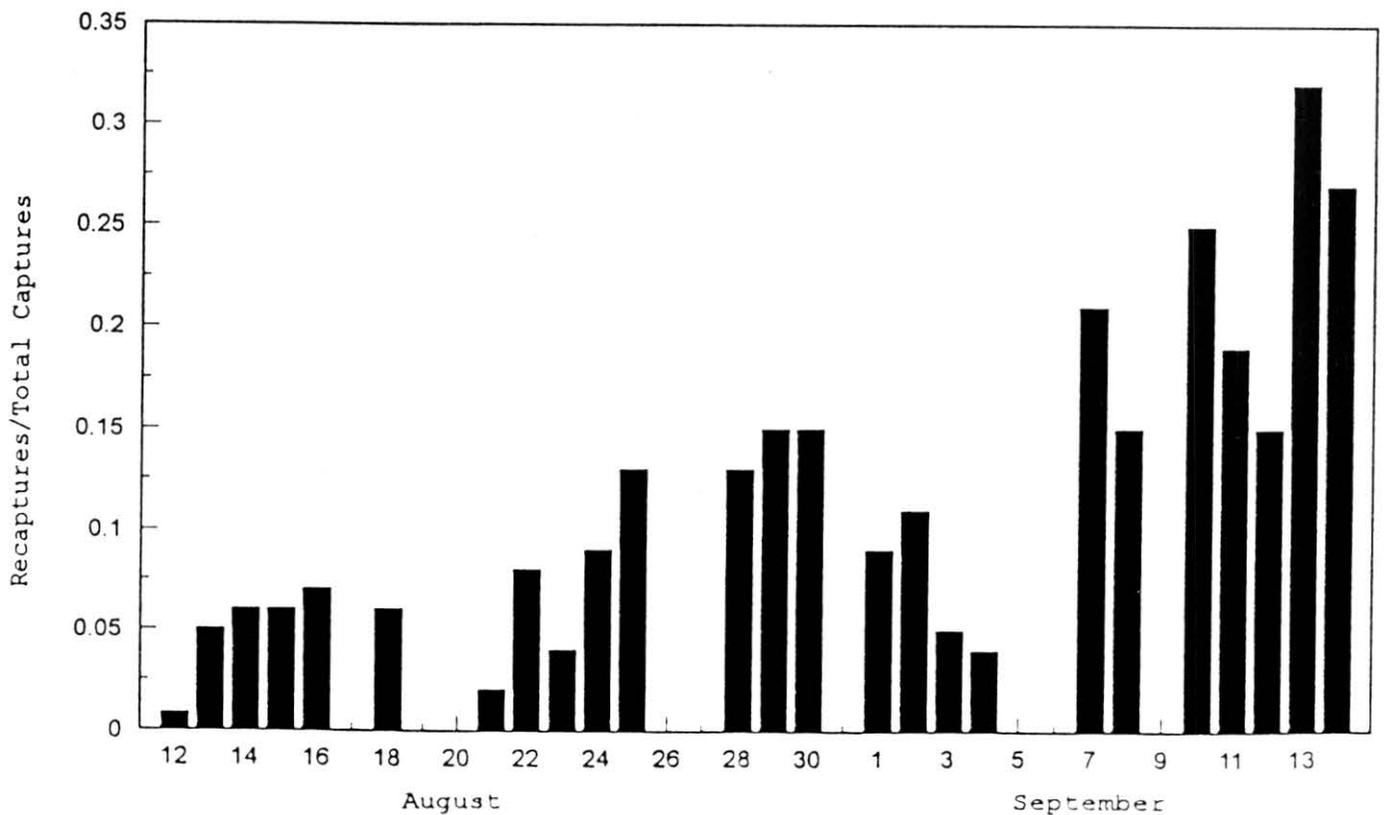


Figure 4. Recapture rates of landbirds in mist nets during fall migration at Yantarni Sound, Alaska Peninsula, August-Sept. 1995.

Table 2. Summary of individual mist net efficiencies during banding operations, Yantarni Sound, Alaska Peninsula, 1995. Catch rate is expressed in birds/100 net hrs.

Net #	1*	2	3	4	5	6*	7	8	9	10*	Total
Total Birds	140	276	146	188	200	114	135	165	118	106	1588
Net Hours	133.25	133.0	133.0	132.25	129.0	133.25	133.25	133.25	128.5	132.25	1321
Catch Rate	105.1	207.5	109.8	142.2	155.0	85.6	85.6	101.3	91.8	80.2	120.2

* indicates an Avi-Net brand net. All other nets are AFO style HTX.

Table 3. Seasonal variation in capture rates (birds/100 net hrs) of 9 abundant migrant landbirds during fall migration at Yantarni Sound, Alaska Peninsula, 1995.

Species Code	August 12-16	August 17-21	August 22-26	August 27-31	Sept. 1-5	Sept. 6-10	Sept. 11-15	Cumulative
Neotropical Migrants Type A								
Gray-cheeked Thrush	0.4	0	1.8	3.1	0.5	0	1.3	1.0
Orange-crowned Warbler	9.7	21.4	5.9	0.6	2.5	0	0	4.2
Yellow Warbler	15.8	20	32.3	31.4	14.2	8.0	3.75	15.4
Wilson's Warbler	99.2	122.9	62.3	13.2	9.1	2.3	0.8	37.5
Neotropical Migrants Type B								
Hermit Thrush	10.4	4.3	8.2	21.4	13.7	10.2	10.4	9.0
Savannah Sparrow	25.9	20	25.9	11.3	10.6	6.8	4.6	13.2
Fox Sparrow	12.4	2.9	8.6	11.9	7.6	2.8	3.8	5.8
Golden-crowned Sparrow	13.1	11.4	11.8	20.1	11.6	10.8	3.3	8.9
Nearctic Migrants								
Common Redpoll	1.9	0	2.3	6.3	7.1	16.5	22.9	7.0

only one individual, black-capped chickadees (*Parus atricapillus*), being a resident species, exhibited the highest recapture rate (47%). Of the well-represented species, lowest recapture rates were 2, 3, and 4% respectively for orange-crowned warblers, Wilson's warblers and Savannah sparrows. Overall recapture rate showed a fairly steady increase throughout the fall (Fig. 4), likely due to an increasing percentage of wintering species in the catch.

Mortality and Escapes.-- Mortality for the season consisted of 3 birds, equal to 0.18% of total captures. Specifically, mortalities were a golden-crowned sparrow killed in the net by a shrike, and 2 Wilson's warblers injured during capture.

Sixty-two birds escaped during handling and were not banded, representing 3.7% of total birds captured. Savannah sparrows (*Passerculus sandwichensis*) accounted for 32.8% of all escapes, but only 12% of all captures. In general, birds larger than warblers accounted for proportionately more escapes than captures.

Band Recoveries/Foreign Retraps.-- One AHY golden-crowned sparrow banded on 10 December 1994 (band #8001-33534) at Coyote Creek Riparian Station, near San Jose, California was recaptured at Yantarni on 25 August. The bird was originally banded in a riparian area adjacent to a weedy field (C. Otahal, Coyote Creek Riparian Station, San Jose, Calif., pers. commun.) and recaptured in the same area on 18 January 1995. At Yantarni, it was caught in Net 4 (Fig. 2), in dense alder immediately adjacent to Camp Creek.

Incidental Sightings

Appendix I is an annotated list of all species observed at Yantarni during fall 1995. Landbird species which were sighted or heard in the area but not captured included: belted kingfisher (*Ceryle alcyon*), bank swallow (*Riparia riparia*), black-billed magpie (*Pica pica*), common raven (*Corvus corax*), red-breasted nuthatch (*Sitta canadensis*), American dipper (*Cinclus mexicanus*), American robin (*Turdus migratorius*) and American pipit (*Anthus rubescens*). Three species were captured in mist nets but not observed at any other time: winter wren (*Troglodytes troglodytes*), ruby-crowned kinglet (*Regulus calendula*) and hoary redpoll (*Carduelis hornemanni*).

DISCUSSION

Avian Species Composition

Migratory bird observation data gathered should only be classified as baseline for the area. Noteworthy species documented during the fall included: Baird's sandpiper (*Calidris bairdii*), buff-breasted sandpiper (*Tryngites subruficollis*), slaty-backed gull (*Larus schistisagus*) and Cassin's auklet (*Ptychoramphus aleuticus*) (Appendix I).

Similarities in landbird species composition were apparent between Yantarni and the other fall migration banding stations on the Complex. During mist netting, Wilson's and yellow warblers, Savannah sparrows, hermit thrushes and golden-crowned sparrows showed relatively high capture rates at all 3 migration stations. American tree sparrows and Gambel's white-crowned sparrows were scarcely caught at Yantarni, while being well represented at Becharof and Mother Goose lakes. Two species, winter wren and song sparrow, were only captured at Yantarni. Because of variability in net placement, weather conditions and length of banding season, capture rates could not be compared between camps.

Migration Phenology

Starting the banding project as late as 12 August likely caused us to miss several significant aspects of fall migration. Because the highest capture

rates at Yantarni were recorded the first day of banding, peak migration may have been missed. To document the beginning of fall migration, a banding operation on the Alaska Peninsula should have been established by mid-July. According to recommendations established by Boreal Partners in Flight (Fadley et al. 1995), the essential window for Neotropical migrants is 1 August-20 September with an optimal seasonal period of 15 July-7 October. Early migrants such as swallows and flycatchers may have been entirely missed at Yantarni. At Mother Goose Lake in 1995, tree swallows (*Tachycineta bicolor*) and bank swallows (*Riparia riparia*) were not captured after 24 July and thereafter only seen in small groups until their disappearance on 12 August (Eskelin and Dewhurst 1995). Alder flycatchers (*Empidonax alnorum*) were not observed after 14 August; most captures and sightings were in late July. Because of the late start at Yantarni, both the peak of migration and the presence of some species were likely missed.

At Yantarni, use of mist nets from different distributors (AFO and Avinet) may have introduced some variability in capture rates. Although both brands of mist nets were distributed under the same specifications, AFO nets have larger bags (mean distance between trammels = 63mm compared to 51mm for Avi-Nets). Avinet mist nets used at sites 10, 6 and 1 (Fig. 2) accounted respectively for the 1st, 2nd, and 5th lowest capture rates, although an undeterminable portion of that may be due to net placement. Difference in capture rates may be more evident for large birds which rely on the bags rather than mesh to tangle them.

Site Feasibility

Mist netting on the Pacific side of the Aleutian range was surprisingly successful in 1995. Captures of Neotropical migrants were well above the 50% target recommended by Boreal Partners in Flight (Fadley et al. 1995). Bandable days were within the range of those during the same 37 day period at Mother Goose Lake and Becharof Lake (Table 4). Further, Yantarni averaged more hours per net (132.1) during the season than either of the other camps during that same period. Beneficial factors were a dry period during the first two weeks of banding and especially thick cover provided by the alder thicket. An additional factor, however, was the difference in research goals between camps. Because a question addressed at Yantarni was whether mist netting was possible in an area with known high winds, nets were experimentally opened under windier conditions than at the other camps. Net lanes were widened enough that bags could not get tangled in bushes, and net checks were increased when necessary. Universal weather guidelines would be necessary for a more accurate comparison between banding operations.

Habitat Use

Fall use of an alder thicket, one coastal habitat on the Alaska Peninsula, was successfully documented. Shrubbery appeared to be denser and have less understory than other area thickets, likely due to the age of the thicket. Proximity to the beach appeared more important than vegetation type for some species such as American pipits, Savannah sparrows and song sparrows (*Melospiza melodia*) (Appendix I). To understand these coastal habitat relationships better, sampling would need to encompass more of a cross-section of vegetation and topography types.

The Boreal Partners in Flight Working Group (Fadley et al. 1995) recommended that new migration stations should be run for at least 2 years, and ideally would have a long-term commitment of >10 years. This particular site was opportunistically chosen and does not lend itself to long-term study, especially in view of its disturbed vegetation.

Table 4. Total days and hours on which mist netting was possible at fall migration stations, 12 August-17 September, 1994 and 1995, Alaska Peninsula/Becharof Refuges, Alaska.

Location	1995 Yantarni	1995 Becharof Lake	1994 Mother Goose Lake	1995 Mother Goose Lake
Bandable days	25	23	25	27
% of total days bandable	68	62	68	73
Net hours	1321	1240	1576.7	1680.5
Hours/net/season	132.1	103.3	121.3	129.3

RECOMMENDATIONS

1. Banding stations on the Alaska Peninsula monitoring only fall migration should be established by mid-July to include the earlier migratory species and individuals.
2. Net types (manufacturers) should be standardized both within and between sites.
3. Universal weather criteria for opening and closing mist nets should be established and followed if comparisons are desired between banding sites.
4. Future migration monitoring in the area, if established, should ideally have a long-term commitment of >10 years and be part of a well thought out inventory plan.

ACKNOWLEDGEMENTS

This project was visualized and developed by Wildlife Biologist Donna Dewhurst. Considering the short timing and shortness of supplies, logistics ran incredibly smoothly. Banders at Yantarni included Wildlife Biologists Donna Dewhurst and Heather Moore, and Refuge Volunteers Fred Amidon and Nancy Elliot. King Salmon Fishery Resource Office staff, Biological Technician Ward Degner and Volunteer John Bulanda, helped pick nets on some busy days. This camp was the first cooperative effort between the Complex and KSFRO, and overall lots of money and resources were conserved. Thank you to KSFRO Project Leader Jim Larson and all of his staff, especially Fisheries Biologist Mary Faustini, who was instrumental in coordinating this cooperative effort. A big thanks to Complex Biological Technician Todd Eskelin for his care and patience during spring training, which extended into the summer, and for his continued birding guidance. Appreciation is finally extended to Administrative Technician Laura Shawback, Refuge Manager Ronald E. Hood and Deputy Manager Rick Poetter for administrative support of all bird work on the Complex.

LITERATURE CITED

- Andres, B. 1994. USFWS Checklist Project - 1995. U.S. Fish & Wildl. Serv., Admin. Memo., Anchorage, Alas. (Unpubl). 17pp.
- 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.
- Carter, M.F. and K. Barker. 1993. An interactive database for setting conservation priorities for western neotropical migrants. Pages 120-144 in D.M. Finch and P. Stangel, eds. Status and management of Neotropical migratory birds. U.S. Forest Serv. Gen. Tech. Rep. RM-229.
- Dewhurst, D.A., Eskelin, T.D., and J.E. Melton. 1995. Passerine breeding and fall migration monitoring at Mother Goose Lake, Alaska Peninsula National Wildlife Refuge, Alaska, June-September 1994. U.S. Fish & Wildl. Serv., King Salmon, Alas. (Unpubl.) 45pp.
- Eskelin, T.D. and D.A. Dewhurst. 1995. Passerine 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.) 22pp.
- Fadley, J., B. Andres, T. Pogson, K. Sowl, C. Sterne and A. Morkill. 1995. Boreal Partners in Flight working group - 1994 annual report. (Unpubl). 42pp.
- Gauthreaux, S.A., Jr. 1992. Preliminary lists of migrants for Partners in Flight Neotropical Migratory Bird Conservation Program, Page 30 in 1991 Ann. Rep. Partners in Flight Newsletter 2 (1), Natl. Fish & Wildl. Found., Wash. D.C.
- Gill, R.E., M.R. Peterson and P.D. Jorgensen. 1981. Birds of the northcentral Alaska Peninsula, 1976-1980. *Arctic* 34:286-306.
- Handel, C., D. Dewhurst, J. Fadley, J. Falk, B. McCaffery, P. Martin, T. Pogson, M. Williams, J. Wright and F. Zeillemaker. 1995. Relative abundance and habitat associations of Alaska landbirds during the summer season. Natl. Biol. Serv., Anchorage, Alas. (Unpubl Draft).
- Kessel, B. 1979. Avian habitat classification for Alaska. *The Murrelet* 60:86-94.
- Meyer, K. 1987. 1987 Bird surveys of Aniakchak caldera. Natl. Park Serv., King Salmon, Alas. (Unpubl). 11pp.
- Murie, O.J. and V.B. Scheffer. 1959. Fauna of the Aleutian Islands and Alaska Peninsula with notes on invertebrates and fishes collected in the Aleutians, 1936-38. N. Amer. Fauna No. 61., U.S. Fish & Wildl. Serv., U.S. Govt. Print. Off., Wash., D.C. 406pp.
- Narver, D.W. 1969. Birds of the Chignik River drainage, Alaska. *Condor* 72:102-105.
- Osgood, W.H. 1904. A biological reconnaissance of the base of the Alaska Peninsula. *North American Fauna* 24:51-81.

- Pyle, P., S.N.G. Howell, R.P. Yunick, and D.F. DeSante. 1987. Identification guide to North American passerines. Slate Creek Press, Bolinas, Calif. 278pp.
- Rappole, J.H., E.S. Morton, T.E. Lovejoy, III, and J.L. Ruos. 1983. Nearctic avian migrants in the neotropics. U.S. Dept. of Int., U.S. Fish & Wildl. Serv., Wash., D.C. 646pp.
- Ralph, C.J., G.R. Geupel, T.E. Martin, and D.F. DeSante. 1992. Field methods for monitoring landbirds. U.S. Forest Serv., Arcata, Calif. (Unpubl) 56pp.
- 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). 36pp.
- Starr, F. & P. 1988. Annotated bird observations, Aniakchak coast, June 17-August 30, 1988. Natl. Park Serv., King Salmon, Alas. (Unpubl). 5pp.
- Wilk, R.J. and K. 1989. Floral and faunal inventory of selected wildlife habitats and other observations in the Alaska Peninsula National Wildlife Refuge 1985-87. U.S. Fish & Wildl. Serv., King Salmon, Alas. (Unpubl). 71pp.

Appendix I. Annotated list of species observed at Yantarni Sound, Alaska, 12 August - 18 September 1995. Observers are listed in parentheses.

- Red-throated Loon (*Gavia stellata*) - 1-2 were sighted swimming offshore on 16 August, 24 August, and 15 September (DAD, FAA, HM, NJE).
- Double-crested Cormorant (*Phalacrocorax auritus*) - Small groups were sighted flying near Central Island several times a week. The high count of 27 was recorded on 11 September (HM, FAA, NJE).
- Pelagic Cormorant (*Phalacrocorax pelagicus*) - Groups of < 15 were sighted near Central Island on 16 August, 24 August and 11 September (DAD, FAA, HM).
- Red-faced Cormorant (*Phalacrocorax urile*) - 8 and 1, respectively, were observed flying offshore on 16 and 24 August (DAD, FAA, HM).
- Tundra Swan (*Cygnus columbianus*) - 1-2 sighted flying about once a week (FAA, HM).
- Emperor Goose (*Chen canagica*) - Sighted on the beach on 31 August, 2 and 14 September. High count was 14 birds on 14 September (FAA, HM, NJE).
- Green-winged Teal (*Anas crecca*) - Small groups observed flying near the coast about once a week. High count of 15 was recorded on 21 August (DAD, FAA, HM, NJE).
- Mallard (*Anas platyrhynchos*) - Flocks of up to 27 sighted regularly in August, as far inland as the banding site (HM, FAA).
- Common Merganser (*Mergus merganser*) - Small flocks (5-8) were sighted on Camp Creek on 30 August, 3 and 15 September (HM, NJE).
- Bald Eagle (*Haliaeetus leucophalus*) - Sighted almost daily, 11 on 19 August. Nested on cliffs near Dipper Creek (FAA, HM, NJE).
- Northern Harrier (*Circus cyaneus*). One female was observed flying along the beach on 2 and 15 September (HM, NJE).
- Merlin (*Falco columbarius*) - 1 observed repeatedly near camp between 15 and 31 August (FAA, DAD, HM).
- Peregrine Falcon (*Falco peregrinus*) - 1 observed flying along the beach on 16, 22 and 28 August (FAA, DAD, HM).
- Sandhill Crane (*Grus canadensis*) - Heard almost daily flying north past camp, sighted occasionally in groups of 3 or less (FAA, DAD, HM, NJE).
- Lesser Golden-Plover (*Pluvialis dominica*) - 1-4 sighted on inland tidal flats on 22 August, 31 August and 15 September (HM, FAA).
- Semipalmated Plover (*Craradrius semipalmatus*) - Sighted daily on the beach, groups of 100+ were recorded on 22 and 28 August which appeared to be migrating north (FAA, HM, NJE).
- Black Oystercatcher (*Haematopus bachmani*) - 2 were seen on 19 August on a rocky island several miles north of Yantarni Sound (HM, FAA).
- Greater Yellowlegs (*Tringa melanoleuca*) - 1 observed near the airstrip 28 August and 8 September, 3 were seen near Sandy Creek on 15 September (HM, FAA, NJE).

- Wandering Tattler (*Heteroscelus incanus*) - Groups of < 7 were sighted repeatedly on a rocky peninsula by the mouth of Dipper Creek (FAA, HM, NJE).
- Spotted Sandpiper (*Actitis macularia*) - At least 1 heard from camp every evening, 18-23 August (FAA, HM).
- Whimbrel (*Numenius phaeopus*) - 1 was observed flying along the beach on 13 August (FAA).
- Black Turnstone (*Arenaria melanocephala*) - 1-5 were sighted on 16, 19 and 31 August on the beach north of camp (DAD, FAA, HM).
- Surfbird (*Aphriza virgata*) - 1-3 were sighted on the beach on 15, 16, 19 and 28 August (FAA, DAD, HM).
- Sanderling (*Calidris alba*) - Flocks of 20-56 were observed in winter plumage moving north on the beach on 28 and 31 August and 11 September (HM, FAA, NJE).
- Western Sandpiper (*Calidris mauri*) - 1 was sighted on the beach south of camp on 28 August, 5 were sighted on 11 September (HM, NJE).
- Least Sandpiper (*Calidris minutilla*) - Groups of 4-22 were observed on the beach on 19 and 28 August and 11 September (HM, FAA, NJE).
- Baird's Sandpiper (*Calidris bairdii*) - 4 were observed feeding on an inland tidal flat on 20 August (HM, FAA).
- Rock Sandpiper (*Calidris ptilocnemis*) - 1-2 were sighted on the beach on 4 occasions, 13-26 August (DAD, HM, FAA).
- Dunlin (*Calidris alpina*) - 2-5 were sighted on the beach on 15 and 16 September (NJE, HM).
- Buff-breasted Sandpiper (*Tryngites subruficollis*) - 1 was observed feeding with Lesser-Golden Plovers on inland tidal flat, 22 August (HM, FAA).
- Parasitic Jaeger (*Stercorarius parasiticus*) - 2 were sighted flying the shoreline on 11 August (FAA).
- Mew Gull (*Larus canus*) - Up to were 200 sighted daily (FAA, DAD, HM, NJE).
- Slaty-backed Gull (*Larus schistisagus*) - 1 adult was observed on 16 August near the mouth of Camp Creek (DAD, FAA).
- Glaucous-winged Gull (*Larus glaucescens*) - Up to 500 were sighted daily in all habitats (DAD, FAA, HM, NJE).
- Glaucous Gull (*Larus hyperboreus*) - 1 immature bird was observed on the beach north of camp on 5 September (HM, NJE).
- Black-legged Kittiwake (*Rissa tridactyla*) - Flocks of up to 2000 were observed daily, concentrated on the sandy spit where Camp Creek empties into the sea (DAD, FAA, HM, NJE).
- Arctic Tern (*Sterna paradisaea*) - 2-4 were sighted near the beach on 17, 19 and 20 August (DAD, HM, FAA).
- Common Murre (*Uria aalge*) - 1-15 were observed far offshore on 4 occasions between 15 August and 15 September (FAA, DAD, HM).
- Pigeon Guillemot (*Cephus columba*) - 2-6 were observed far offshore by Central Island on four occasions between 15 and 24 August (FAA, HM).

Marbled Murrelet (*Brachyramphus marmoratus*) - 8 were sighted offshore on 16 August, 3 were observed on 24 August (DAD, FAA, HM).

Kittlitz's Murrelet (*Brachyramphus brevirostris*) - 2 were observed on 16 August and 1 was seen on 24 August (DAD, FAA, HM).

Ancient Murrelet (*Synthliboramphus antiquus*) - 1 was recorded near Central Island on 16 August (DAD, FAA).

Cassin's Auklet (*Ptychoramphus aleuticus*) - 1 was sighted feeding offshore on 16 August (DAD, FAA).

Tufted Puffin (*Fratercula cirrhata*) - Recorded daily near Central Island as visibility permitted. High count was 100+ on 11 September (FAA, DAD, HM, NJE).

Horned Puffin (*Fratercula corniculata*) - Recorded daily near Central Island as visibility permitted. High count was 500+ on 24 August (FAA, DAD, HM, NJE).

Belted Kingfisher (*Ceryle alcyon*) - 1 was observed along Camp Creek on 7 occasions between 22 August and 11 September (HM, FAA, NJE).

Downy Woodpecker (*Picoides pubescens*) - One bird was heard on 28 August (FAA). One HY bird was caught in our mist nets on 3 September.

Bank Swallow (*Riparia riparia*) - 5 were recorded flying high above Camp Creek on 4 occasions in mid August (FAA, DAD).

Black-billed Magpie (*Pica pica*) - 1-4 were observed daily on the beach between 15 August and 8 September (FAA, HM, NJE).

Common Raven (*Corvus corax*) - 1-20 were observed almost daily in all habitats (FAA, HM, NJE).

Black-capped Chickadee (*Parus atricapillus*) - 1-8 were heard daily in alder thicket (FAA, HM, NJE).

Red-breasted Nuthatch (*Sitta canadensis*) - 1 was heard in the banding area on 3 September (NJE).

American Dipper (*Cinclus mexicanus*) - 1-2 observed repeatedly at Dipper Creek (HM, FAA).

Gray-cheeked Thrush (*Catharus minimus*) - 1-2 were observed several times a week near camp (FAA, HM, NJE).

Hermit Thrush (*Catharus guttatus*) - Up to 10 were observed daily in all suitable habitat (FAA, HM, NJE).

American Robin (*Turdus migratorius*) - 1 was sighted on 30 August in the banding area (FAA).

American Pipit (*Anthus rubescens*) - Recorded almost daily along beach between 11 August and 5 September. High count of 100+ was recorded on 19 August. No birds were observed >1/4 mi from the beach (FAA, HM).

Northern Shrike (*Lanius excubitor*) - 1 was observed on 4 occasions, 11 August - 6 September (FAA, NJE).

Orange-crowned Warbler (*Vermivora celata*) - Up to 5 were observed several times a week in suitable habitat until 11 September (FAA, HM, NJE).

Yellow Warbler (*Dendroica petechia*) - Up to 10 were observed daily in suitable habitat until 12 September (FAA, HM, NJE).

Wilson's Warbler (*Wilsonia pusilla*) - Up to 10 were observed daily in suitable habitat until 19 August, in small numbers until 11 September.

American Tree Sparrow (*Spizella arborea*) - 1 was heard singing in the banding area on 28 and 30 August (FAA, HM). One individual was caught several times in our mist nets on 8 September.

Savannah Sparrow (*Passerculus sandwichensis*) - Observed daily in the banding area, on the gravel landing strip, and with higher concentrations towards the beach. High count was 100+ on 22 and 26 August (FAA, HM, NJE).

Fox Sparrow (*Passerella iliaca*) - Observed daily in the banding area and in other suitable habitat. High count was 12 recorded on 5 September (FAA, HM, NJE).

Song Sparrow (*Melospiza melodia*) - Observed regularly on the beach. High count was 50+ recorded on 5 September (FAA, DAD, HM, NJE). No birds were seen in the banding area, although one was caught in Net 5 on 11 September.

Golden-crowned Sparrow (*Zonotrichia atricapilla*) - Observed daily in the banding area and other suitable habitat. 20+ were recorded daily, 5-9 September (FAA, DAD, HM, NJE).

Common Redpoll (*Carduelis flammea*) - Observed daily in low numbers (<10) through August and in large feeding flocks during September. 500+ were recorded daily between 5 and 15 September (FAA, HM, NJE).

Key to observers:

FAA - Fred Amidon
DAD - Donna Dewhurst
NJE - Nancy Elliot
HM - Heather Moore