FEDERAL AID
FINAL PERFORMANCE REPORT

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF WILDLIFE CONSERVATION
PO Box 25526
Juneau, AK 99802-5526

COOPERATIVE ENDANGERED SPECIES CONSERVATION FUND

STATE: Alaska **GRANT AND SEGMENT NR.:** E - 2 - 1
PROJECT NR.: 1

GRANT TITLE: Nongame Bird Monitoring

WORK LOCATION: Southeast Alaska

PROJECT DURATION: September 26, 2002 – June 30, 2004

PROJECT REPORTING PERIOD: July 1, 2003 – June 30, 2004

PROJECT TITLE: Analysis of Queen Charlotte goshawk radiotelemetry and prey-habitat data in conjunction with the USDA Forest Service

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Project Objectives:

The following components will be analyzed and developed into reports or manuscripts as an objective of this study:

a) Coordinate, fund, and work with the Forest Service who will perform the spatial habitat analyses of the 1991-1999 radiotelemetry data.
b) Perform home range analyses by sex, age, and location on the Tongass given varying prey occurrence.
c) Perform resource selection modeling and habitat analyses based on GIS outputs as provided by the Forest Service.
d) Perform exploratory analysis of passerine bird dataset that was previously collected by the Forest Service.

Summary of Project Accomplishments during the current reporting period July 1, 2003 – June 30, 2004

Job A: Coordinate, fund, and work with the Forest Service who will perform the spatial habitat analyses of the 1991-1999 radiotelemetry data.

We contracted with the Forest Service (FS) to perform the spatial habitat analyses of our 1991-1999 goshawk radiotelemetry data using current coverages and layers for the Tongass National Forest. Subsequent to finalization of this contract, the FS encountered significant errors and inconsistencies in their GIS database, and were unable to complete the spatial habitat analysis to a degree of accuracy we found acceptable. Therefore, we were unable to complete this objective.

Job B: <u>Perform home range analyses by sex, age, and location on the Tongass given varying prey occurrence.</u>

This analysis was perfomed on data collected between 1991 and 1999, when ADF&G personnel radiotagged 57 adult goshawks (26 females and 29 males) at 28 nesting areas and 46 fledgling goshawks (17 males, 29 females) at 25 nesting areas (Flatten et al. 2001). Details of the criteria used to screen the data are included in Flatten et al. (2001). We defined a use area as the landscape area encompassing all radiotelemetry relocations documented for an individual during a year; this term is synonymous with home range. We defined the breeding season as 1 March to 15 August and the non-breeding season as 16 August to 29 February. We calculated 100% minimum convex polygons (MCP) using all relocations and 95% MCP to eliminate error associated with outliers (White and Garrott 1990, Samuel and Fuller 1994).

Mean 100% MCP use area sizes for females were 4,549 ha during the breeding season, 33,839 ha during the non-breeding season, and 47,567 ha year-round; mean MCP use area sizes for males was 6,043 ha during the breeding season, 19,454 ha during the non-breeding season, and 15,719 ha year-round (Table 1). During the breeding season, male use areas were larger than female use areas ($mean_{difference}$ = -1,494 ha, 95% CI = -4,210 – 1,222). However, in the non-breeding season, female use areas were much larger than males ($mean_{difference}$ = 14,384 ha, 95% CI = -8,077 – 36,845). Goshawk use area size varied with season (Table 1), being smaller during the breeding season when activity was centered on the nesting area (♀: $mean_{difference\ breeding\ vs\ nonbreeding}$ = -29,290 ha, 95% CI = -50,270 – 8,309; ♂: $mean_{difference\ breeding\ vs\ nonbreeding}$ = -13,412 ha, 95% CI = -23, 960 – 3,728). Within season, use area sizes were similar in prey rich versus prey poor portions of Southeast Alaska, except female use area size was much bigger during the winter for birds that nested in the prey poor area ($mean_{difference}$ = -89,920 ha, 95% CI = -125,168 – 40,673).

Determining the home range sizes for fledgling and juvenile goshawks was not an appropriate analysis tool because they do not have a home range per se during this dispersal period. Nevertheless the data collected allow us to analyze and report attributes associated with juvenile dispersal and movement.

Data from a few birds allowed us to determine what size area juveniles used pre-dispersal. We considered fledglings to have dispersed from their nesting areas when they were located ≥ 1.5 km from the nest and were not located again within this distance of the nest (Kenward et al. 1993). We captured juvenile goshawks approximately 3 – 8 weeks post-fledging and thus, we were not able to collect many pre-dispersal locations from many individual juveniles (7 goshawks with ≥ 5 locations). Mean maximum pre-dispersal distance from the nest for birds with ≥ 5 locations (0 males, 7 females) during this period was 0.75 ± 0.37 km (mean ± SD; n = 72 total locations; range = 0.41 – 1.47 km). Using this distance as the radius of a circular area, we estimated post-fledging area (PFA) size of 177 ha.

Movement of juveniles after dispersal could be better described with 27 radiotagged juveniles (9 males, 18 females) that were located at ≥1 dispersal location. Mean date of dispersal for all individuals was 22 August ± 9 days (SD; n = 9 males, 18 females; range = 1 August – 10 September; date of dispersal estimated by averaging date of last pre-dispersal location with date of first post-dispersal location). We recorded 10 post-dispersal locations (range = 1 – 34 locations per bird) for birds known to have dispersed. Mean duration that these birds were tracked after dispersal was 107 days (median = 88 days, range 1 – 343 days; Figure 1). The majority of these locations were recorded during August through November (Figure 2). Mean maximum post-dispersal distance from the nest was 65.2 ± 43.5 km (n = 9 males, 18 females; range = 16.5 – 162.7 km; Figure 1). Cumulative post-dispersal distance from the nest was calculated for each bird as the summation of distances between successive post-dispersal locations. Mean cumulative post-dispersal distance for birds with ≥ 5 locations was 209.9 ± 93.9 km (n = 3 males, 12 females; range = 31.7 – 368.4 km). Seven (25.9%) of 27 radiotagged juveniles (2 males, 5 females) that were known to have dispersed were confirmed as mortalities (Figure 1). One additional fledgling was found dead in August prior to dispersal.

Job C: Perform resource selection modeling and habitat analyses based on GIS outputs as provided by the Forest Service.

We contracted with the FS to provide the GIS outputs of various habitat coverages required for a habitat analyses and resource selection modeling as noted in Job A above. They were unable to complete this objective because of errors and inconsistencies in their GIS vegetation coverages that could not be rectified in the time allocated. After considering these problems in their coverages and the corrected data that the FS could provide, we decided that an analysis of goshawk habitat selection based on the data that the FS could provide currently was not credible. The FS's Tongass GIS database has high value, but additional funding and technical assistance, is required to correct the errors and inconsistencies. Doing so would allow an accurate and precise analysis of goshawk resource selection to be performed. This remains the highest priority analysis for the goshawk dataset, and completion of this task would improve our knowledge of goshawk habitat use across the Tongass National Forest.

Job D: Perform exploratory analysis of passerine bird dataset that was previously collected by the Forest Service.

We performed the exploratory analysis on data collected during 1990-1992, for a study designed by G. C. Iverson of the FS on the community of songbirds that inhabit forests of Southeast Alaska (G. C. Iverson, USFS, personal communication). The goal of the study was to evaluate habitat associations of the suite of breeding avifauna, particularly upland terrestrial species, in the major forest types of this region, as well as test Habitat Capability Models developed for 3 Management Indicator Species used by the Tongass National Forest, brown creeper (*Certhia americana*), hairy woodpecker (*Picoides villosus*), and red-breasted sapsucker (*Sphyrapicus ruber*; G. C. Iverson, USFS, personal communication). We are interested in these data because of their potential usefulness for an analysis of goshawk prey use versus availability. These data could provide a source of information on availability of some goshawk prey; data on prey use by goshawks were gathered previously, and are available in Lewis (2001) and Lewis et al. (*in review*).

Iverson used the variable circular plot method (VCP; Reynolds et al. 1980) to count birds at points stratified across various forest types (based on plant associations; Pawuk and Kissinger 1989) and landscape positions (Table 2). In 1990, VCP points were spaced 200 m apart along routes on Mitkof Island in 5 habitat types and 3 landscape positions. Points were repeatedly surveyed (range = 4 – 6 replicates) during the breeding season, and counts lasted 10 minutes. In 1991, these points were resurveyed and additional points were established on Mitkof, Kupreanof, and Kuiu Islands. These points were surveyed twice, with each survey lasting 8 min. In 1992, additional points were added on Kuiu Island; all points were surveyed once for 8 minutes.

During each count, observers estimated distance to the bird and the time during the count when it was detected. By the end of 1992, 490 VCP points had been established and surveyed for upland landbirds.

In its current form, the data describe relative abundance of birds in the various habitat types and is not useful for determining use of prey species vs. their availability. However, because distance estimates were made for each observation, these data could be used to identify detection probabilities for various birds and thus generate density estimates, but it would require a time-consuming re-aggregation of the data set. In addition one would need to better link the birds-counted data with the specific habitats in which they were found. If that were done, one could derive relative density and variability estimates for some goshawk prey and various habitat types in Southeast Alaska using these data and other sources (e.g., Kissling 2003).

The Iverson dataset contains unique and useful data on some prey species important to breeding goshawks. Point counts are useful for songbirds, especially if distance estimates are made to each detection, and may provide some information on grouse. Therefore, the data provided by this dataset in combination with other studies (Lewis 2001, Lewis et al. *in review*) would be an important part of the total necessary for an analysis of goshawk prey selection in Southeast Alaska.

Through the exploratory analysis of Job D we have determined what additional work is necessary to further describe goshawk prey availability. Given the work needed to generate densities of birds in the various habitat types, we recommend that this data be analyzed by someone familiar with distance estimation, and analysis of such data. Our preliminary analysis suggests that this large dataset can be used for an in-depth analysis of prey-habitat-predator relationships. We recommend that a detailed study plan be prepared by FWS, ADF&G and/or FS staff for the funding required to analyze this old, but important data. We subsequently learned of an additional 3 years of data collected by Iverson in a variety of forest stands of varying age since clear-cutting. These additional data would be a useful source of information on some goshawk prey in managed landscapes in Southeast Alaska.

In terms of any analysis of goshawk prey use versus availability, several pieces of information need to be gained before we can perform this analysis. First, we need accurate density estimates for the 2 key goshawk prey, blue grouse and red squirrel. For grouse, an understanding of how well point counts estimate grouse numbers would allow us to evaluate the usefulness of datasets such as this Iverson data for grouse density estimation. Some measure of squirrel density is needed before this analysis could be completed, and as yet no such estimation has been undertaken. However, a prey use versus availability analysis would be useful for gaining a better understanding of which prey species are most important to breeding goshawks and potentially to wintering goshawks as well.

Summary of Project Accomplishments during life of the project

During the first year of this project we were awaiting Forest Service spatial habitat analysis of the data set. Besides the activities described above, during the 2-year life of the project we cooperated with FS staff in disseminating information on our findings and provided expertise on suspected goshawk nests located by agency personal. We also conducted some monitoring of goshawk nest sites when FS staff were not available. Note, during this contract period, one biologist long associated with this project left ADF&G. This caused the delay in reporting and necessitated the extension to 27 December.

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Project Costs: Federal share $35,100 + state share $11,700 = total cost $46,800

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Table 1. Breeding (nesting), non-breeding, and year-round use areas (100% and 95% MCP) for adult northern goshawks radiotracked in Southeast Alaska, 1992–1999.

		Female			Male		
		Locations	100% MCP (ha)	95% MCP (ha)	Locations	100% MCP (ha)	95% MCP (ha)
Breeding season[a b]	Mean	31	4,549	4,153	27	6,043	4,862
	SD	18	2,465	2,423	17	4,860	3,400
	Median	27	4,304	4,223	24	4,603	4,089
Non-breeding season[a c]	Mean	26	33,839	31,784	27	19,454	16,503
	SD	14	42,134	41,965	11	16,464	15,601
	Median	24	14,718	12,186	25	13,358	13,024
Year-round[c]	Mean	44	47,563	42,451	45	15,719	12,431
	SD	29	57,943	55,694	28	16,036	14,495
		35	15,838	10,945	45	10,603	6,166

[a] Sample size in number of birds monitored: breeding season = 16 females and 20 males; non-breeding season = 18 females and 14 males; year-round = 25 females and 21 males.
[b] Does not include 1 adult female that moved >44 km from her nesting area on 3 August and returned on 7 August, resulting in a 100% MCP breeding season use area of 29,600 ha.
[c] Does not include 1 adult male that dispersed >80 km from its nesting area during the non-breeding season and whose non-breeding season and year-round 100% MCPs use areas were 231,509 ha.

Median

Table 2. Landscape position and habitat type at variable circular plot points used to survey birds in the Petersburg area of Southeast Alaska, 1990–1992.

	Habitat Type [a]									
LANDSCAPE POSITION	CC	TSHE	TSHE / CHNO	ISI	MXD CON	TSME	PICO	MP	AM	TOTAL
Beach	0	50	3 P	5	13	0	1	0	0	72
Upland	113	43	7	13	35	2	3	35	0	251
Riparian	0	34	0	75	0	0	0	0	0	109
Montane (alpine)	0	1	0	3	0	32	0	1	21	58
Total	113	128	10	96	48	34	4	36	21	490

[a] Habitat types based on Plant Associations (Pawuk and Kissinger 1989): CC = clearcut, TSHE = *Tsuga hererophylla*, TSHE / CHNO = mixed forest of *Tsuga hererophylla* and *Chamaecyparis nootkatensis*, PISI = *Picea sitchensis*, MXD CON = mixed conifer, TSME = *Tsuga mertensiana*, PICO = *Pinus contorta*, MP = muskeg, AM = alpine meadow.

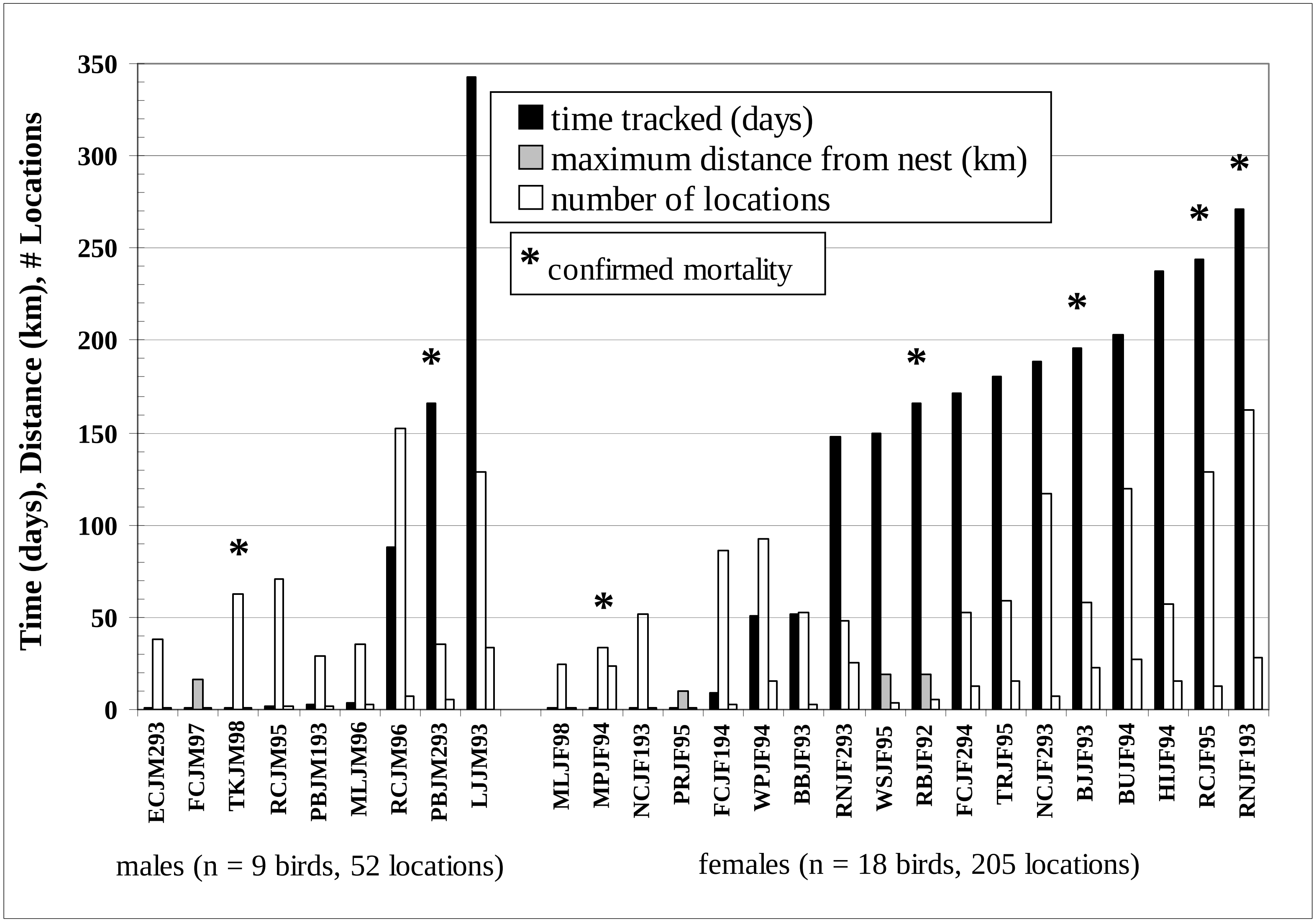

Figure 1. Time tracked, maximum distance from nest, and number of locations after dispersal for juvenile goshawks radiotagged at nesting areas in Southeast Alaska during 1992 – 1999.

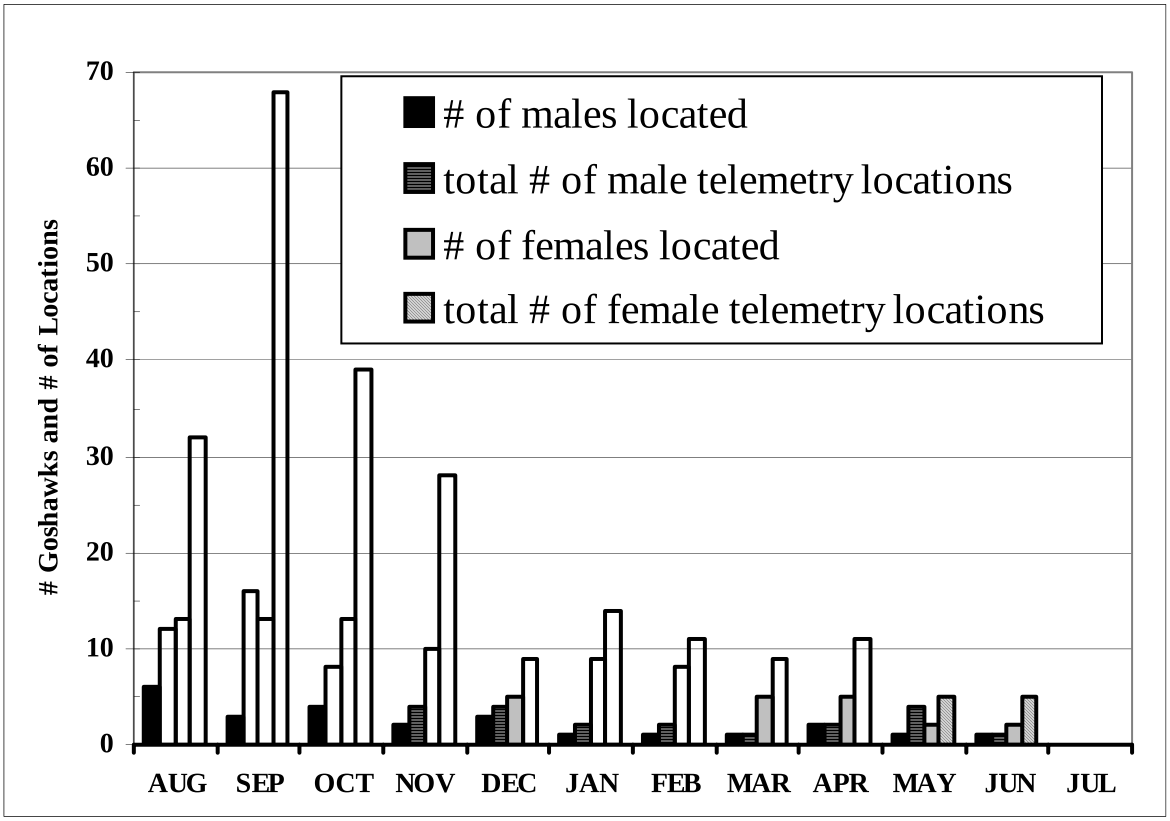

Figure 2. Post-dispersal locations by month for radiotagged juvenile goshawks captured at nesting areas in Southeast Alaska during 1992-99.