Ed. note: Page 17 missing from original file.

86.05

JOB PROGRESS REPORT

State: California

Project Number: W-65-R-2 Subproject Title: Nongame Wildlife Investigations

Job Number: II-2.0/5 Job Title: Diurnal Raptor Population Monitoring Program

Period Covered: July 1, 1984 - June 30, 1985 Job Type: Survey and Inventory

SUMMARY:

The Diurnal Raptor Population Monitoring Program during this period consists of reports dealing with the Raptor Population Survey, and the Diurnal Raptor Eyrie Monitoring Program. In previous years these were reported under separate job numbers.

Insufficient data were gathered on the Raptor Population Survey to permit meaningful analysis of statewide population trends. However, analysis of data from the period 1979-83 indicates abundant and stable populations of many soaring raptor species. The top three species in order of relative abundance were the Red-tailed Hawk (Buteo jamaicensis), Turkey Vulture (Cathartes aura), and the American Kestrel (Falco sparverius). Based on this analysis, which supports other work, it appears that the Swainson's Hawk (B. swainsoni) is maintaining a very small breeding population in California relative to other species.

Monitoring of Swainson's Hawks consisted of an intensive survey of four 36 square mile study plots in the Central Valley and a survey of the Sacramento River riparian system. Additional surveys were conducted by Peter H. Bloom in the Great Basin area of the State and by other cooperators throughout the State. Data gathered from these sources ranged from about 30 sites visited to one or two visited. A photographic survey (ground and aerial) was conducted of all study areas visited this year. A total of 114 Swainson's Hawk territories was visited; 82 were active. The number of known and active territories was higher in 1985. However, this probably does not represent an increasing population, but instead reflects the degree of survey intensity.

Habitat destruction continues to be the major threat to Swainson's Hawk survival. Certain agricultural practices provide unsuitable hunting habitat and decreased prey populations while nesting habitat is threatened by diminishing riparian areas. Also, competition with other stick-nest building raptors may be significant enough to reduce Swainson's Hawk populations in the future if trends continue to result in even more limited nesting and hunting habitat.

Thirty-six Osprey (Pandion haliaetus) territories were monitored in the Lake Almanor area in northern California by the Lassen National Forest. Results indicate the population is now reproducing at a rate that is more than twice as high as it was during the mid-1970's.

Most of the eyrie location, activity, and productivity information has been entered into the Nongame Wildlife Section microcomputer files. The data base is updated as more information becomes available.

BACKGROUND:

Department of Fish and Game personnel have reported on the location of diurnal raptor eyries since the 1950's. Much of the information was gathered in an informal manner; however, records obtained in the past dozen years have been filed systematically. There has been an effort to maintain a central file containing data on raptor nest locations, breeding success, and other facts on the nesting activities of several species. New information is added on a continuing basis. Currently, Department eyrie files contain information on the following diurnal raptors: Turkey Vulture, California Condor (Gymnogyps californianus), Black-shouldered Kite (Elanus leucurus), Northern Goshawk (Accipiter gentilis), Cooper's Hawk (A. cooperii), Sharp-shinned Hawk (A. striatus), Swainson's Hawk, Golden Eagle (Aquila chrysaetos), Bald Eagle (Haliaeetus leucocephalus), Osprey, Prairie Falcon (Falco mexicanus), Peregrine Falcon (F. peregrinus), and American Kestrel.

Reports on the locations of Northern Goshawk territories have been received, primarily from various National Forests within the species' range in California. More information on the Goshawk is contained in the report dealing with the Montane Forest Accipiter Study (W-65-R-1; II-11.0).

The raptor eyrie files contain data on over 2,000 nest sites and territories that have been active, both historically and recently. The files are most complete and contain the greatest number of records on Prairie Falcons (600+), Ospreys (350+), Golden Eagles (300+), Goshawks (250+) and Swainson's Hawks (250+). Files on species such as Black-shouldered Kite, Sharp-shinned Hawk, and Turkey Vulture are the least complete and no records have been entered into the microcomputer data base on these species.

Raptor population surveys were first conducted in 1970, and included 54 routes sampled 4 times a year. In 1975, the number of routes surveyed was reduced to 43, which were sampled twice a year. It was decided in 1976 to run the 43 survey routes every third year and a 15 route sample in the intervening years. In 1977, it was recommended that the 15 route sample be discontinued entirely, and the 43 route sample be conducted every 4 years.

In an effort to improve coverage of the survey areas and to more accurately determine trends in raptor populations, it was decided in 1979 that the 43 route sample would be conducted twice annually.

OBJECTIVE:

The objective of monitoring programs is to establish baseline data for use in evaluating raptor population trends. Information on the size and distribution of breeding populations and their breeding success on an annual basis is contained in the diurnal raptor eyrie files and used to monitor populations of selected raptor species and to determine research and management needs. Files must be current and up-to-date to be useful for a variety of research and management tasks.

The objective of raptor population surveys is to determine the relative abundance and population trends of raptors wintering and breeding in California. The surveys do not yield absolute population numbers, but provide a comparative index of population trends for many species of diurnal birds of prey.

PROCEDURES:

During raptor eyrie monitoring, information on territory or nest site location, date of nest check, status of occupancy, number of eggs or young, and other notes are recorded on field forms. Nest and territory records are completed by Department and cooperating field personnel, most frequently U.S. Forest Service biologists, and forwarded to the Nongame Wildlife Section. Land use changes that might adversely affect nests and nesting territories are noted. These data are also entered into the microcomputer file. Location information for endangered species and those species popularly used in falconry is kept confidential to reduce human disturbance and harassment. However, this information is available to Department personnel, biologists from cooperating agencies and bona fide researchers for use in planning and research activities. These same agencies and personnel often are the source of new raptor eyrie information. The raptor eyrie file often functions as a starting point when a study to determine the status of a particular species is undertaken. Information gained as a result of such studies is added to the system and facilitates periodic monitoring thereafter.

Swainson's Hawk surveys were conducted by Nongame Wildlife staff. Cooperating Department personnel included W. Bailey and R. Schoonover. D. Airola of U.S. Forest Service provided information on Osprey populations.

Department personnel are requested to run 43 routes once between the first and fifteenth of January, and again between the first and fifteenth of May. Survey routes are between 30 and 50 miles long, and are traveled at 20 mph or less, whenever possible. Surveys begin at 1100 hours and must be completed by 1500 hours. All raptor sightings are recorded on standardized forms. Weather conditions are noted at the beginning and end of each survey.

FINDINGS:

Raptor Eyrie Monitoring

Swainson's Hawk Intensive Survey

An intensive survey covering four 36 square mile study areas in the Central Valley was conducted during May and June, 1985. This is the second consecutive year the survey was conducted in this manner which defined known territories in each area and resulted in the discovery of several new territories (Table 1). Also, the number of known territories has increased in most Central Valley counties in 1985 (Table 2). Each survey area differed in the total number of territories and in the type and quality of habitat. Together they provided a reasonable cross-section of Swainson's Hawk habitat in the Central Valley.

Woodland - The Woodland survey area is located between the cities of Davis and Woodland in Yolo County. Of the four areas surveyed, Woodland had the most open habitat, was under the most agricultural use, had the least amount of riparian habitat, the highest density of Swainson's Hawks, the lowest density of Red-tailed Hawks, and the lowest density of all hawks (Table 3). Of the 13 active territories found, 8 were directly associated with riparian habitat, three were located along a non-riparian waterway, one included a nest site in a lone walnut tree in the middle of an open field, and one was along a roadside adjacent to farmland.

Nesting habitat is limited in this area, resulting in dense association of nest sites. Willow and Dry Sloughs are the only waterways through the area, providing two thin zones of riparian habitat. Much of the riparian vegetation has been removed in recent decades. Nest trees included oak, walnut, and one ornamental fir. Virtually all the land in the Woodland area is under agricultural use. The major crops are grains, tomatoes and corn. All Swainson's Hawks hunted in agricultural fields. The flat, open land and thin riparian zones still provide suitable habitat and support one of the highest densities of Swainson's Hawks in the State.

Wilton - The Wilton survey area is located near the town of Wilton in southeastern Sacramento County. This area had the greatest diversity of land use, including residential development, cropland, pasture (including hilly terrain), marsh and riparian habitat. Also, the lowest density of Swainson's Hawks and a high density of other hawks, particularly Red-tailed Hawks, were observed (Table 3). Suitable nesting habitat exists along Deer Creek and the Cosumnes River; however, little hunting habitat remains to support a large population of Swainson's Hawks. Human disturbance and the diversity of land-use patterns provided habitat more suitable to Red-tailed Hawks, which were common here. All six Swainson's Hawk territories found were associated with riparian habitat. Five of six pairs utilized agricultural areas to hunt, the other was found in pasture.

TABLE

1985 Swainson's Hawk Survey Results

Active = A
Not Active = NA

				Past Activity X = Active						1985 Survey			
Survey Area	Terr. #	85 A/NA	85 New	84	83	82	81	80	79	#Adults	Color Phase	Nest	Yng.
WOODLAND	Yo - 06	A		X	X	X	X		X	2	2 Med.	Nest	
	Yo - 07	NA		X		X			X				
	Yo - 12	A		X	X	X	X	X	X	1	Lt.		
	Yo - 13	A			X		X		X	2	2 Dk.		
	Yo - 16	NA		X		X	X		X				
	Yo - 18	NA						X					
	Yo - 19	A				X	X			2	1 Lt., 1 Dk.		
	Yo - 45	NA		X								Nest	
	Yo - 46	NA		X								Nest	
	Yo - 47	A		X						2	1 Lt., 1 Dk.	Nest	1
	Yo - 48	A		X						2	1 Lt., 1 Dk.	Nest	
	Yo - 49	NA		X									
	Yo - 50	A		X						2	2 Dk.	Nest	1
	Yo - 51	A		X						2	1 Lt., 1 Med.		
	Yo - 52	A		X						2	2 Lt.	Nest	
	Yo - 53	A		X						2	1 Lt., 1 Dk.	Nest	1
	Yo - 54	NA		X									
	Yo - 58	A	X							2		Nest	2
	Yo - 59	A	X							2		Nest	1
	Yo - 60	A	X							2		Nest	
WILTON	Sa - 13	A		X			X			1	1 Lt.		
	Sa - 24	A		X		X				1	1 Lt.	Nest	
	Sa - 25	A				X					1 Lt.		
	Sa - 36	NA		X						1	1 Lt.		
	Sa - 37	A		X						1			
	Sa - 38	A		X						1	1 Dk.		
	Sa - 39	A		X						2	1 Lt., 1 Med.		

TABLE 1 (continued)

1985 Swainson's Hawk Survey Results

Active = A
Not Active = NA

Past Activity X = Active

Survey Area	Terr. #	85 A/NA	85 New	84	83	82	81	80	79	1985 Survey # Adults	1985 Survey Color Phase	1985 Survey Nest	1985 Survey Yng.
GALT-THORNTON	Sa - 07	A							X	2	1 Lt., 1 Dk.		
	Sa - 08	A		X		X			X	2	1 Lt., 1 Dk.	Nest	1
	Sa - 40	A		X						1	Lt.		
	Sa - 41	A		X						2	1 Lt., 1 Dk.	Nest	
	Sa - 42	A		X						1	Lt.		
	Sa - 43	A		X						2	1 Lt.		2
	Sa - 47		X							2	1 Lt., 1 Dk.	Nest	2
	Sa - 48		X							2	1 Lt., 1 Dk.		
	Sa - 49		X							2			
	SJ - 02	NA		X					X				
	SJ - 22	NA		X									
	SJ - 23	A		X						1	Dk.		
	SJ - 24	A		X						1	Lt.		2
VERNALIS	SJ - 10	A		X				X		2	1 Lt., 1 Dk.	Nest	
	SJ - 11	A		X	X		X			1	Dk.		
	SJ - 12	A		X	X	X	X			1	Lt.	Nest	
	SJ - 13	NA					X						
	SJ - 14	NA					X						
	SJ - 17	A		X		X				2	1 Dk., 1 Lt.		
	SJ - 25	NA		X								Nest	
	SJ - 26	A		X						2	1 Lt., 1 Dk.	Nest	
	SJ - 27	A		X						1	1 Dk.	Nest	
	St - 02	NA							X				
	St - 03	NA							X				
	St - 04	A		X					X	2	1 Lt., 1 Dk.		
	St - 05	NA		X									
	St - 06	NA		X									

TABLE 2

Swainson's Hawk Territories, Central and Owens Valley
Survey 1979-85

County	Year	No. of Known Territories	No. of Territories Checked	No. of Active Territories
Butte	1979	1	1	1
	1980	2	1	1
	1981	2	0	0
	1982	4	2	2
	1983	4	0	0
	1984	4	0	0
	1985	5	2	2
Colusa	1979	3	3	3
	1980	4	4	2
	1981	9	6	6
	1982	11	11	3
	1983	12	11	5
	1984	14	3	1
	1985	15	6	4
Glenn	1979	2	2	2
	1980	2	0	0
	1981	2	1	1
	1982	2	0	0
	1983	2	0	0
	1984	2	0	0
	1985	7	5	5
Inyo	1979	0	0	0
	1980	0	0	0
	1981	1	1	1
	1982	2	1	1
	1983	2	1	1
	1984	2	0	0
	1985	3	2	2
Merced	1979	7	7	7
	1980	7	0	0
	1981	7	0	0
	1982	7	0	0
	1983	9	7	3
	1984	9	0	0
	1985	12	3	3

TABLE 2 (continued)

Swainson's Hawk Territories, Central and Owens Valley
Survey 1979-85

County	Year	No. of Known Territories	No. of Territories Checked	No. of Active Territories
San Joaquin	1979	9	9	9
	1980	10	5	1
	1981	16	8	8
	1982	19	17	5-6
	1983	22	13	10
	1984	30	16	14
	1985	30	13	7
Sacramento	1979	11	11	11
	1980	12	12	4
	1981	22	14	12
	1982	27	20	13
	1983	34	19	14
	1984	43	29	24
	1985	49	31	25
Solano	1979	0	0	0
	1980	0	0	0
	1981	0	0	0
	1982	2	2	2
	1983	4	3	3
	1984	4	0	0
	1985	4	1	0
Stanislaus	1979	4	4	4
	1980	4	0	0
	1981	4	0	0
	1982	4	1	0
	1983	4	3	0
	1984	6	5	3
	1985	6	5	3
Sutter	1979	7	7	7
	1980	9	3	1
	1981	10	3	3
	1982	14	11	7
	1983	17	8	7
	1984	20	10	8
	1985	21	7	3

TABLE 2 (continued)

Swainson's Hawk Territories, Central and Owens Valley
Survey 1979-85

County	Year	No. of Known Territories	No. of Territories Checked	No. of Active Territories
Yolo	1979	16	16	16
	1980	18	17	8
	1981	29	19	15
	1982	38	25	15-19
	1983	42	17	14
	1984	57	34	27
	1985	64	38	27
Total	1979	60	60	60
	1980	68	42	17
	1981	102	52	46
	1982	130	90	51
	1983	150	78	42
	1984	191	97	77
	1985	215	112	82

TABLE 3

Results of 1985 Swainson's Hawk Intensive Survey

	SURVEY AREA			
	Woodland	Wilton	Galt-Thornton	Vernalis
Swainson's Hawks (#) (#/mi.^{2})	(25) (0.70)	(7) (0.19)	(20) (0.56)	(11) (0.31)
Swainson's Hawk Terr. (#) (#/mi.^{2})	(13) (0.36)	(6) (0.17)	(11) (0.31)	(7) (0.19)
Red-tailed Hawk (#) (#/mi.^{2})	(3) (0.08)	(26) (0.72)	(29) (0.81)	(23) (0.64)
Red-tailed Hawk Terr. (#) (#/mi.^{2})	(2) (0.06)	(17) (0.47)	(19) (0.53)	(21) (0.58)
Other Raptors (#) (#/mi.^{2})	(9) (0.25)	(10) (0.28)	(37) (1.03)	(7) (0.19)
Other Raptor Terr. (#) (#/mi.^{2})	(5) (0.14)	(8) (0.22)	(25) (0.69)	(6) (0.17)
All Raptors (#) (#/mi.^{2})	(37) (1.03)	(43) (1.19)	(86) (2.39)	(41) (1.14)
All Raptor Terr. (#) (#/mi.^{2})	(20) (0.56)	(31) (0.89)	(55) (1.53)	(33) (0.92)
SH:RTH	8.33:1	0.27:1	0:69:1	0.48:1
SH Terr.: RTH Terr.	6.50:1	0.35:1	0.58:1	0.33:1
SH: Other Raptors (inc. RTH)	2.08:1	0.19:1	0.30:1	0.37:1
SH Terr: Other Raptor Terr. (inc. RTH)	1.86:1	0.24:1	0.25:1	0.26:1

Galt-Thornton - The Sacramento-San Joaquin county line divides the Galt-Thornton survey area. Here, a variety of habitat types limit the density of Swainson's Hawks by limiting the amount of open range. Still, the discovery of two new territories results in the area having the second highest density of Swainson's Hawks. Of the 11 territories here (Table 3), 10 are directly associated with riparian habitat; the other is in a lone tree surrounded by open pasture. All known nest trees in this area are oak. Several waterways pass through the area including the Mokelumne and Consumnes Rivers, Dry Creek, Grizzly Slough and Bear Slough. This situation provided adequate riparian nesting habitat for Swainson's Hawks as well as other raptors resulting in the highest density of Red-tailed Hawks and of all raptors. Approximately 25% of the area was open pasture which supported three Swainson's Hawk pairs, 40% was agricultural fields which supported two pairs. The remaining pairs appeared to utilize both habitat types for hunting. Nineteen Red-tailed Hawk territories were found. Most habitat types were used by Red-tails for nesting and hunting.

Vernalis - The San Joaquin-Stanislaus county line divides the Vernalis area. This area was characterized by extensive riparian habitat, large open pasture and farmland. Fewer raptors, including Swainson's Hawks, were observed here than last year (Table 3). Both the Stanislaus and the Tuolumne Rivers run through the area, as well as a number of small sloughs, which provided adequate nesting habitat. Seven pairs were found here, utilizing riparian habitat to nest. The location of 1 nest site is unknown. Approximately one-half of the area was pasture, the other half was crop lands. The birds in 2 territories utilized pasture to hunt, 4 utilized agricultural lands, and 1 hunted in both.

Much of the Vernalis area contains excellent Swainson's Hawk habitat, providing adequate riparian nesting habitat and sufficient hunting habitat. The Vernalis area also supported 23 Red-tailed Hawk individuals in 21 territories, which were observed utilizing typical Swainson's Hawk nesting and hunting habitat, as well as other habitat types.

Swainson's Hawk River Survey

During the report period the Sacramento River was surveyed by boat from Red Bluff diversion dam to the Sacramento-San Joaquin Delta near Grand Island. In addition, Steamboat Slough was surveyed for nesting hawks. The total distance was 240 river miles (Table 4). A 141 mile stretch from Colusa to the delta had been surveyed in 1981, 1983 and 1984 (Tables 5 and 6); the 99 mile section from Red Bluff to Colusa was surveyed initially in 1982. This was the first year the entire riparian area known to support nesting Swainson's Hawks was surveyed. Results of surveys since 1981 indicate a certain degree of stability in the Colusa to Delta nesting population. However, results of the 1982 survey indicate that timing of survey, inexperience of observers and a few other factors may have been responsible for fewer Swainson's Hawk sightings. During the 1985 survey, nesting habitat appeared available to support a much larger breeding population than was found (Table 4). However, close inspection of adjacent areas along the survey route reveal that foraging habitat suitable

for an open plains adapted raptor such as the Swainson's Hawk were not always associated with the best nest sites.

The entire survey area appears to support a healthy population of Red-tailed Hawks and other stick-nesting raptors (potential competitors with Swainson's Hawks for nest sites should habitat become further limited) (Tables 4, 5, and 6).

The results of the Sacramento River survey on the Colusa to Delta section were similar to those for 1983 and 1984 except that several new territories were discovered while other known territories were inactive. Since Swainson's Hawks are highly territorial and often return to the same nest site year after year, the pattern of activity evident in the study area may indicate an unstable population with a high adult turnover rate (Pete Bloom, pers. comm.). The river survey also indicates the importance of habitat quality. Although there was adequate nesting habitat in several portions of the area covered, 85% of the 141 miles of river from Colusa to the Delta was unsuitable as nesting habitat for Swainson's Hawks. The results can be partially attributed to large reductions of suitable habitat in the adjacent foraging areas, caused by replacing annual crops with orchards, as well as the loss of nest trees. Nesting habitat in the Red Bluff to Colusa section was reasonably good but many acres of potential foraging area had incompatible crops such as orchards.

Eighty-five percent of all known nest sites in the Central Valley were found within riparian zones (Table 7). This diminishing habitat type is critical to the preservation of a healthy population of Swainson's Hawks in this region of the state.

Osprey Survey

Results of the U.S. Forest Service's 1985 survey at Lake Almanor (Table 7) and the trend in reproductive success (based on number of young per occupied nest) indicate that the population is still maintaining at a reasonable level (Fig. 1). Both the number of young per occupied nest and the number of young per successful nest were down from 1984, but the percentage of successful nests is up (Table 8).

Even though pesticide use within Osprey range does not appear to be significant enough to cause reproductive failure, the Department is still concerned that disturbance caused by logging activities and the potential for loss of snags and live nest trees continues to threaten the population on both public and private lands.

ANALYSIS:

Each year the amount of information contained in the eyrie files increases. The data files contain sufficient information to determine population trends of certain species. Ironically, more is known about the population status of the less common species, such as the Swainson's Hawk, than raptors such as the

TABLE 4

SURVEY OF RIPARIAN ZONE OF
SACRAMENTO RIVER FOR NESTING SWAINSON'S HAWKS
AND OTHER STICK NESTING RAPTORS, 1985

Swainson's Hawk & Other Raptor Sighting & Territory Frequencies	Section of Sacramento River			
	Red Bluff Diversion Dam-Woodson Bridge	Woodson Bridge-Chico Landing	Chico Landing-Butte City	Butte City-Colusa
Swainson's Hawks per river mi.	1/25; 0.04	0/24; 0	9/25; 0.36	1/25; 0.04
River mi. per hawk	25/1; 25.0	24/0; 0	25/9; 2.8	25/1; 25.0
Swainson's terr.	1/25; 0.04	0/24; 0	6/25; 0.24	1/25; 0.04
River mi. per terr.	25/1; 25.0	24.0; 0	25/6; 4.2	25/1; 25.0
Swainson's per suitable hab. mi.	1/11; 0.09	0/10; 0	9/12; 0.75	1/7; 0.14
Suitable hab. mi. per hawk	11/1; 11.0	10/0; 0	12/9; 1.3	7/1; 7.0
Swainson's terr. per suitable mi.	1/11; 0.09	0/10; 0	6/12; 0.50	1/7; 0.14
Suitable mi. per Swainson's terr.	11/1; 11.0	10/1; 0	12/6; 2.0	7/1; 7.0
Other raptors per river mi.	6/25; 0.24	8/24; 0.33	7/25; 0.28	8/25; 0.32
River mi. per other raptor	25/6; 4.2	24/8; 3.0	25/7; 3.6	25/8; 3.1
Other raptor terr. per river mi.	4/25; 0.16	6/24; 0.25	6/25; 0.24	6/25; 0.24
River mi. per other raptor terr.	25/4; 6.3	24/6; 4.0	25/6; 4.2	25/6; 4.1
Other raptor per suitable hab. mi.	6/11; 0.55	8/10; 0.80	7/12; 0.58	8/7; 1.1
Suitable hab. mi. per other raptor	11/6; 1.8	10/8; 1.3	12/7; 1.7	7/8; 0.88
Other raptor terr. per suitable mi.	4/11; 0.36	6/10; 0.60	6/12; 0.50	6/7; 0.86
Suitable mi. per other raptor	11/4; 2.8	10/6; 1.7	12/6; 2.0	7/6; 1.2

TABLE 4 (Cont'd.)

SURVEY OF RIPARIAN ZONE OF
SACRAMENTO RIVER FOR NESTING SWAINSON'S HAWKS
AND OTHER STICK NESTING RAPTORS, 1985

Swainson's Hawk & Other Raptor Sighting & Territory Frequencies	Section of Sacramento River				
	Colusa-Steiner Bend	Steiner Bend-Knights Landing	Knights Landing-Discovery Park	Discovery Park-Hood	Hood-Grand Island
Swainson's Hawks per river mi.	2/28; 0.07	9/27; 0.33	12/30; 0.40	11/21; 0.52	3/35; 0.09
River mi. per hawk	28/2; 14.0	27/9; 3.0	30/12; 2.5	21/11; 1.9	35/3; 11.7
Swainson's terr. per river mi.	2/28; 0.07	7/27; 0.26	9/30; 0.30	6/21; 0.29	2/35; 0.06
River mi. per terr.	28/2; 14.0	27/7; 3.9	30/9; 3.33	21/6; 3.5	35/2; 17.5
Swainson's per suitable hab. mi.	3/10; 0.20	9/6; 1.5	12/20; 0.60	11/3; 3/7	3/2; 1.5
Suitable hab. mi. per hawk	10/2; 5.0	6/9; 0.67	20/12; 1.7	3/11; 0.27	2/3; 0.6
Swainson's terr. per suitable mi.	2/10; 0.20	7/6; 1.2	9/20; 0.45	6/3; 2.0	2/2; 1.0
Suitable mi. per Swainson's terr.	10/2; 5.0	6/7; 0.86	20/9; 2.2	3/6; 0.50	2/2; 1.0
Other raptors per river mi.	19/28; 0.68	14/27; 2.0	15/30; 0.50	2/21; 0.10	0/35; 0
River mi. per other raptor	28/19; 1.5	27/14; 1.9	30/15; 2.0	21/2; 10.5	35/0; 0
Other raptor terr. per river mi.	12/28; 0.43	12/27; 0.44	12/30; 0.40	1/21; 0.05	0/35; 0
River mi. per other raptor terr.	28/12; 2.3	27/12; 2.3	30/12; 2.5	21/1; 21.0	35/0; 0
Other raptor per suitable hab. mi.	19/10; 1.9	14/6; 2.3	15/20; 0.75	2/3; 0.67	0/2; 0
Suitable hab. mi. per other raptor	10/19; 0.53	6/14; 0.43	20/15; 1.3	3/2; 1.5	2/0; 0
Other raptor terr. per suitable mi.	12/10; 1.2	12/6; 2.0	12/20; 0.60	1/3; 0.33	0/2; 0
Suitable mi. per other raptor terr.	10/12; 0.83	6/12; 0.50	20/12; 1.7	3/1; 3.0	2/0; 0

...BLE 5

SURVEY OF RIPARIAN ZONE OF
SACRAMENTO RIVER FOR NESTING SWAINSON'S HAWKS
AND OTHER STICK NESTING RAPTORS, 1984

Swainson's Hawk & Other Raptor Sighting & Territory Frequencies	Section of Sacramento River				
	Colusa-Fraziers Landing	Steiner-Bend Knights Landing	Knights Landing-Discovery Park	Discovery-Park-Hood	Hood-Grand Island
Swainson's Hawks per river mi.	6/28; 0.21	4/27; 0.15	14/30; 0.47	9/21; 0.43	3/35; 0.09
River mi. per hawk	28/6; 4.67	27/4; 6.75	30/14; 2.14	21/9; 2.33	35/3; 11.67
Swainson's territories per river mi.	5/28; 0.18	2/27; 0.07	9/30; 0.30	6/21; 0.29	2/35; 0.06
River mi. per terr.	28/5; 5.60	27/2; 13.5	30/9; 3.33	21/6; 3.50	35/2; 17.5
Swainson's per suitable hab. mi.	6/10; 0.60	4/6; 0.67	14/20; 0.70	9/3; 3.0	3/2; 1.50
Suitable hab. mi. per hawk	10/6; 1.67	6/4; 1.5	20/14; 1.43	3/9; 0.33	2/3; 0.67
Swainson's terr. per suitable mi.	5/10; 0.50	2/6; 0.33	9/20; 0.45	6/3; 2.0	2/2; 1.0
Suitable mi. per Swainson's terr.	10/5; 2.0	6/2; 3.0	20/9; 2.22	3/6; 0.5	2/2; 1.0
Other raptors per river mi.	14/28; 0.50	19/27; 0.70	11/30; 0.37	2/21; 0.10	0/35; 0.0
River mi. per other raptor	28/14; 2.0	27/19; 1.42	30/11; 2.73	21/2; 10.5	35/0; 0.0
Other raptor terr. per river mi.	12/28; 0.43	14/27; 0.52	7/30; 0.23	2/21; 0.10	0/35; 0.0
River mi. per other raptor terr.	28/12; 2.33	27/14; 1.93	30/7; 4.29	21/2; 10.5	35/0; 0.0
Other raptor per suitable hab. mi.	14/10; 1.40	19/6; 3.17	11/20; 0.55	2/3; 0.67	0.2; 0.0
Suitable hab. mi. per other raptor	10/14; 0.71	6/19; 0.32	20/11; 1.82	3/2; 1.50	2/0; 0.0
Other raptor terr. per suitable mi.	12/10; 1.20	14/6; 2.33	7/20; 0.35	2/3; 0.67	0/2; 0.0
Suitable mi. per other raptor	10/12; 0.83	6/14; 0.43	20/7; 2.86	3/2; 1.50	2/0; 0.0

TABLE 6

SURVEY OF RIPARIAN ZONE OF
SACRAMENTO RIVER FOR NESTING SWAINSON'S HAWKS
AND OTHER STICK NESTING RAPTORS, 1983

Swainson's Hawk and Other Raptor Sighting and Territory Frequencies	Section of Sacramento River				
	Colusa-Fraziers Landing	Steiner Bend-Knights Landing	Knights Landing-Discovery Park	Discovery Park-Hood	Hood-Grand Island
Swainson's Hawks per river mi.	4/28; 0.14	5/27; 0.19	18/30; 0.60	3/21; 0.14	4/35; 0.11
River mi. per hawk	28/4; 7.0	27/5; 5.4	30/18; 1.7	21/3; 7.0	35/4; 8.8
Swainson's territories per river mi.	3/28; 0.11	4/27; 0.15	14/30; 0.47	2/21; 0.10	3/35; 0.09
River mi. per terr.	28/3; 9.3	27/4; 6.8	30/14; 2.1	21/2; 10.5	35/3; 11.7
Swainson's per suitable hab. mi.	4/10; 0.40	5/6; 0.83	18/20; 0.90	3/3; 1.0	4/2; 2.0
Suitable hab. mi. per hawk	10/4; 2.5	6/5; 1.2	20/18; 1.1	3/3; 1.0	2/4; 0.50
Swainson's terr. per suitable mi.	2/10; 0.30	4/6; 0.67	12/20; 0.60	2/3; 0.67	3/2; 1.5
Suitable mi. per Swainson's terr.	10/3; 3.3	6/4; 1.5	20/12; 1.7	3/2; 1.5	2/3; 0.67
Other raptors per river mi.	10/28; 0.36	23/27; 0.85	22/30; 0.73	3/21; 0.14	1/35; 0.03
River mi. per other raptor	28/10; 2.8	27/23; 1.2	30/22; 1.4	21/3; 7.0	35/1; 35.0
Other raptor terr. per river mi.	10/28; 0.36	14/27; 0.52	15/30; 0.50	3/21; 0.14	1/35; 0.03
River mi. per other raptor terr.	28/10; 2.8	24/14; 1.9	30/15; 2.0	21/3; 7.0	35/1; 35.0
Other raptors per suitable hab. mi.	10/10; 1.0	23/6; 3.8	22/20; 1.1	3/3; 1.0	1/2; 0.50
Suitable hab. mi. per other raptor	10/10; 1.0	6/23; 0.26	20/22; 0.91	3/3; 1.0	2/1; 2.0
Other raptor terr. per suitable mi.	10/10; 1.0	14/6; 2.3	15/20; 0.75	3/3; 1.0	1/2; 0.50
Suitable mi. per other raptor	10/10; 1.0	6/14; 0.43	20/15; 1.3	3/3; 1.0	2/1; 2.0

TABLE 7 (continued)

Nesting and Hunting Habitat Types of Known
Swainson's Hawk Nest Sites in the Central Valley

County	Territory #	Nesting Habitats	Hunting Habitat
San Joaquin	SJ - 01	R	A
	SJ - 08	R	A
	SJ - 09	R	A
	SJ - 10*	R	P
	SJ - 11	R	A
	SJ - 12	R	P
	SJ - 17*	R	A
	SJ - 20	R	A
	SJ - 21	R	A
	SJ - 25	NR	P
	SJ - 26*	R	A
	SJ - 27*	R	A/P
Solano	Sl - 01	R	A
Sutter	Su - 01	R	A
	Su - 05	R	A
	Su - 06	R	A
	Su - 13	R	A
	Su - 15	R	A
	Su - 16	R	A
	Su - 17	R	A
	Su - 19	R	A
Yolo	Yo - 01	R	A
	Yo - 02	NR	A
	Yo - 03	NR	A
	Yo - 04	NR	A
	Yo - 05	NR	A
	Yo - 06*	R	A
	Yo - 07	R	A
	Yo - 08	NR	A
	Yo - 11	R	A
	Yo - 12*	R	A
	Yo - 13	R	A
	Yo - 16	R	A
	Yo - 23	R	A
	Yo - 24	R	A
	Yo - 25	R	A
	Yo - 29	R	A
	Yo - 38	R	A
	Yo - 41	R	A

TABLE 7 (continued)

Nesting and Hunting Habitat Types of Known
Swainson's Hawk Nest Sites in the Central Valley

County	Territory #	Nesting Habitat	Hunting Habitat
Yolo	Yo - 42	R	A
	Yo - 43	R	A
	Yo - 45*	NR	A
	Yo - 46*	R	A
	Yo - 47*	R	A
	Yo - 48	NR	A
	Yo - 50	NR	A
	Yo - 52	R	A
	Yo - 58*	NR	A
	Yo - 59*	NR	A
	Yo - 60*	NR	A
	Yo - 53*	R	A
	Yo - 55	R	A
	Yo - 56	R	A

Figure 1

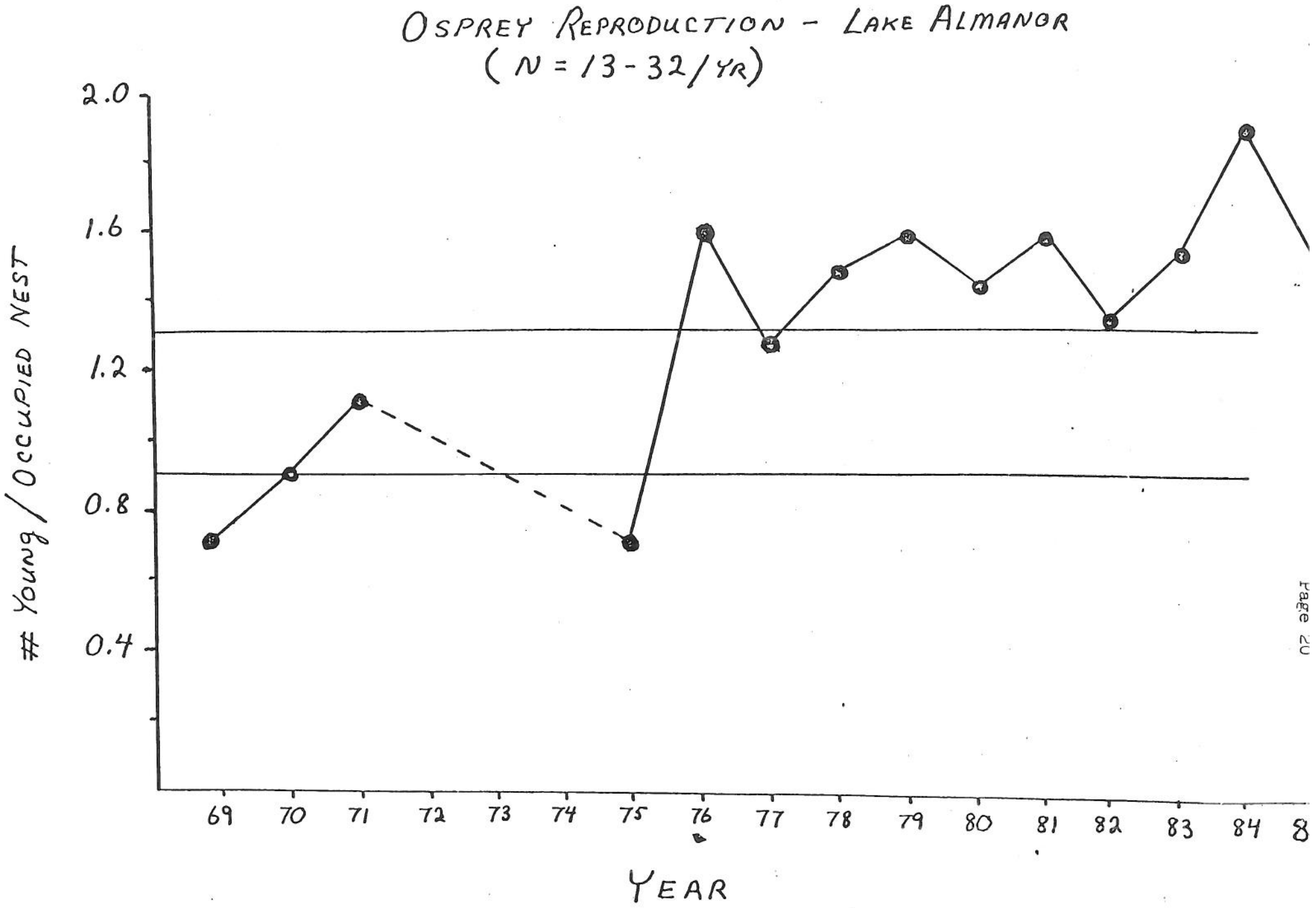
OSPREY REPRODUCTION - LAKE ALMANOR
(N = 13-32/YR)
YOUNG / OCCUPIED NEST
2.0
1.6
1.2
0.8
0.4
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
YEAR

TABLE 8

1983 and 1984 Lake Almanor Osprey Survey Results

	1983	1984
#Occupied Nests	29 (+6)[a/]	31 (+1)
#Successful Nests	20 (+3)	24 (+1)
#Young Produced	43 (+6)	57 (+1)
%Nests Successful	20/29 = 69% (23/35 = 66%)	24/31 = 77% (25/32 = 78%)
%Young/Occupied Nest	43/29 = 1.48 (49/35 = 1.40)	57/31 = 1.84 (58/32 = 1.81)
#Young/Successful Nest	43/20 = 2.15 (49/23 = 2.13)	57/24 = 2.38 (58/25 = 2.32)

a/ Numbers in parentheses are values for nests found late in the season.

1984 and 1985 Lake Alamanor Osprey Survey Results

	1984	1985
#Occupied Nests	31 (+1)	30 (+1)
#Successful Nests	24 (+1)	25 (+2)
#Young Produced	57 (+1)	44 (+5)
%Nests Successful	24/31 = 77%	25/30 = 83%
%Young/Occupied Nest	57/31 = 1.84 (58/32 = 1.81)	44/30 = 1.47 (49/31 = 1.48)
#Young/Successful Nest	57/24 = 2.38 (58/25 = 2.32)	44/25 = 1.76 (49/27 = 1.69)

Red-tailed Hawk, Turkey Vulture, and American Kestrel. Since it has always been assumed the latter species were abundant and not threatened in any way, no effort has been made to study their populations. It will be important to establish a baseline population level for such species should they show signs of decline in the future.

The 1985 Raptor Survey was too incomplete to yield meaningful trend data. The problem of increased workload and other priorities within Regions often results in incomplete and sometimes invalid sets of data reported to the Nongame Section. Greater commitment and accountability is necessary in future surveys, otherwise it will be necessary to modify the survey to ensure that the chronic problem of incomplete data sets is solved. One method might be to identify those routes that have a high frequency of completeness over the past several years and form the survey around those. Additional key routes that are often not completed by Regional personnel will become the responsibility of the Nongame Section staff, volunteers and cooperators. Using this scheme the number of survey routes would be reduced from the present 43 to 20 or 30. However, it is expected that there will be a high degree of completeness of surveys and thus more valid results.

Swainson's Hawk:

In 1983, the Swainson's Hawk was listed as a Threatened species by the California Fish and Game Commission. This was in response to recommendations from the Department based on results of surveys taken since 1979 showing drastic population reduction of this species since historic times. The Swainson's Hawk and its habitat have been afforded some measure of increased protection. Greater effort is to be expended toward the species' recovery in California. The 1985 survey was the most extensive since Pete Bloom's original original survey was completed in 1979. There are 215 known territories in the Sacramento Valley, up from 191 in 1984 and 60 in 1979. The number of active territories was 82 this year, up from 77 in 1984. This increase does not necessarily represent an increasing population, but may instead reflect the degree of survey intensity. Each year known territories are checked and new territories are added as they are discovered.

Prior to 1984, the survey covered most of the suitable habitat in the Central Valley. The general method was to recheck previously known territories. Any new sightings were recorded accordingly. For the 1984 survey, a new method was developed. Four township-sized areas (36 sq. mi.) were chosen in four different areas in the Valley. Together they make up a reasonable cross section of most of the Swainson's Hawk breeding range in California. An intensive survey was completed on each area, which covered every accessible location within the boundary. This is the second consecutive year using this survey method.

By performing the survey in this manner a more accurate population index can be derived. By intensively surveying a smaller defined area, which includes most habitat types utilized by the Swainson's Hawk in California, it is possible to determine preferred and critical nesting and hunting habitat as well as the influence of various agricultural practices.

Unlike its conspecifics in other parts of the country, the Central Valley population of Swainson's Hawks is more closely associated with riparian habitat that is close to flat, open country for hunting. The importance of this relationship is demonstrated by the number of nesting territories that were found in riparian zones. Seventeen of 21 nests located within the survey areas were in riparian habitat.

The presence of agricultural development appeared to have both positive and negative consequences. Swainson's Hawks have shown a decrease in productivity when utilizing agricultural land compared to grasslands, but many agricultural lands also maintain the essential requirement of flat, wide-open terrain. Vineyards and orchards are of little to no value to hunting Swainson's Hawks. San Joaquin County, in particular, was found to have extensive areas under grape production. Crops compatible to the needs of Swainson's Hawks are those that support adequate prey populations that are also available to the birds. No Swainson's Hawks were observed hunting in vegetation above 1 foot in height. There is a link between type of land use and prey densities, as well as a relationship between type of vegetation and the ability of Swainson's Hawks to effectively hunt there.

In all survey areas except Woodland, Red-tailed Hawks were much more numerous than Swainson's Hawks. In the Galt-Thornton area, 29 Red-tailed Hawks were observed. The other three areas had much more diversity in land-use than the Woodland area, and the Red-tailed Hawk, being more of a generalist species than the Swainson's Hawk, was able to utilize those areas. Red-tailed Hawks were observed nesting and hunting in typical Swainson's Hawk habitat, as well as most other habitat types found within the survey area. If habitat destruction continues, there is a potential for population decline of the Swainson's Hawk in response to competition with the Red-tailed Hawk and other stick-nest building raptors.

The results of the 1985 Swainson's Hawk survey clearly show the significance of three important population limiting factors -- the availability of riparian habitat for nesting, suitable open land for hunting, and the influence of competition with other species, particularly the Red-tailed Hawk. Consideration of these factors is crucial to the effective management of this Threatened California raptor.

Osprey:

Results of Osprey surveys conducted by the U.S. Forest Service and the Department indicate that the decline in the 50's and 60's, attributed to pesticide contamination of the Osprey's food and the resultant reproductive failure, has for the most part, been halted. Habitat disturbance and loss, however, continues. Thus, even though the problems associated with pesticide contamination appear to have abated, there is still reason to closely monitor the population trends of Ospreys in California.

TABLE 9

Osprey Nest Success - Lake Almanor and Vicinity, 1985

	Almanor Area Checked Early	Almanor Area Found Late	Almanor Area Not Surveyed	Almanor Total	"Mt. Meadows"	Total
#Nests Occupied	30	3	1	33 (+1)	3	36 (+1)
#Nests Successful	25	2	--	27	1	28
#Young Produced	44	5	--	49	2	51
%Nests Successful	83	67		82	33	78
#Young/ Successful Nest	1.76	2.5		1.69	2.00	1.82
#Young/ Occupied Nest	1.49	1.67		1.48	0.67	1.42

RECOMMENDATIONS:

1. Continue to gather baseline population and productivity information on species of diurnal raptors nesting in California.

2. Monitor habitat disturbance and destruction caused by activities, such as logging, agricultural development, recreation, etc.

3. Place information in a computer data storage and retrieval system and develop the means whereby data can be utilized by a greater number of researchers within and outside the Department.

4. Maintain confidentiality of certain file information to protect sensitive and endangered raptors from disturbance and illegal take.

5. Determine, through monitoring, if annual productivity is sufficient to maintain populations of these species.

6. Modify raptor population survey methodology to ensure complete data sets.

Prepared by: for James A. Estep
Student Assistant

Approved by: Kent A. Smith
Nongame Wildlife Coordinator

Approved by: for Eldridge G. Hunt, Chief
Wildlife Management Branch
California Department of
Fish and Game

Date: 1-7-86