

California Department of Fish and Game
Job Final Report

Project Number: W-65-R-4 Project Title: Nongame Wildlife Investigations

Job Number: II-15 Job Title: Diurnal Raptor Population Monitoring
Program

Period Covered: July 1, 1986 - June 30, 1987

Summary:

Monitoring of Swainson's Hawks occurred in intensive surveys of four 36 mi² study areas and a survey of the Sacramento River riparian system. Additional information was gathered from cooperators in the Central Valley, Great Basin, and Butte Valley, Siskiyou County. Two hundred thirty-eight Swainson's Hawk territories were visited; 192 were active. The number of known and active territories was higher in 1987 due to increased survey intensity and does not represent an expanding population.

Information on Osprey (Pandion haliaetus) and Northern Harrier (Circus cyaneus) populations, which normally would be presented here, is reported in jobs II-18 and II-19, respectively.

Background:

Department of Fish and Game personnel have reported the locations of diurnal raptor eyries since the 1950's. Much of the information was gathered in an informal manner; however, records obtained in the past several years have been filed systematically. There has been an effort to maintain a central file on raptor nest locations, breeding success, and other facets of nesting activity. New information is added on a continuing basis. Currently, Department eyrie files contain information on the following diurnal raptors: Turkey Vulture (Cathartes aura), California Condor (Gymnogyps californianus), Black-shouldered Kite (Elanus leucurus), Northern Harrier, 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 (Falco sparverius). Several records have also been added to the Department's Natural Diversity Data Base files.

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, Ospreys, Golden Eagles, Goshawks and Swainson's Hawks. 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.

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. Because of that action, the Swainson's Hawk and its habitats have been afforded some measure of increased protection. Greater effort is now expended toward research and monitoring of this species in California.

A study to determine patterns of habitat use of the Swainson's Hawk in the Central Valley was begun in 1986 and is due to be completed in fall 1987. Results will be presented in a Departmental report.

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. These data are used to monitor populations of selected raptor species and to determine research and management needs. Files must be current and accurate to be useful for a variety of research and management tasks.

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 cooperating state and federal agency biologists, and forwarded to the Nongame Wildlife Section. Land use changes that might adversely affect nests and nesting territories are noted. These data also are 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.

Prior to 1984, the Swainson's Hawk 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. Beginning in 1984, 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. Annually, an intensive survey was completed on each area, which covered every accessible location within the boundary. This is the fourth consecutive year using this survey method.

By performing the survey in the 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 the Central Valley of California, it is possible to determine preferred and critical nesting and hunting habitat as well as the influence of various agricultural practices.

Swainson's Hawk surveys were conducted by Nongame Wildlife staff. Cooperating Department personnel included W. Bailey and R. Schoonover. S. Hawks and B. Woodbridge provided information from the Klamath Basin and Butte Valley, Siskiyou County, respectively.

Findings:

SWAINSON'S HAWK INTENSIVE SURVEY

The number of active territories has increased this year by 53.8% from 1986 (Table 1). The increased survey intensity of the Swainson's Hawk habitat utilization study resulted in a higher and more accurate estimate of Swainson's Hawk breeding density within the survey area, and does not represent an increasing population. Each survey area differed in the total number of territories and in the percentage of land-use types. Together they represent a 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 intensive agricultural use, had the least amount of riparian habitat and the highest density of Swainson's Hawks. Twenty active territories were identified, an increase of 4 from 1986 (Table 2). Twelve (60%) occupied nests were within riparian zones. Eight (40%) nested in lone trees, or within a small group of trees, in open fields or along roadsides. Twelve (60%) nests were in oak trees, 6 (30%) were in walnut trees, and 2 (10%) were in cottonwood trees.

Nesting habitat is limited to this area, resulting in dense association of nest sites. For example, there were four active Swainson's Hawk nests along the 0.5 mile stretch of Willow Slough this year. 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. Virtually all the land in the Woodland area is under agricultural use. The major crops are wheat, tomatoes, corn, and sunflowers. All Swainson's Hawks hunted in agricultural fields. The flat, open land and thin riparian zones still provide suitable habitat and support of the highest densities of Swainson's Hawks in the state.

Table 1. Swainson's Hawk Breeding Densities--Intensive Survey Areas, 1984-1987

T = # of territories

		Survey Area									
		Woodland		Wilton		Galt-Thornton		Vernalis		Total	
1984	(T) (T/mi ²)	(14)	(0.39)	(6)	(0.17)	(9)	(0.25)	(10)	(0.28)	(39)	(0.27)
	(mi ² /T)	(2.57)		(6.0)		(4.0)		(3.6)		(3.69)	
1985	(T) (T/mi ²)	(13)	(0.36)	(6)	(0.17)	(11)	(0.31)	(7)	(0.19)	(37)	(0.26)
	(mi ² /T)	(2.77)		(6.0)		(3.27)		(5.14)		(3.89)	
1986	(T) (T/mi ²)	(16)	(0.44)	(5)	(0.14)	(12)	(0.33)	(6)	(0.17)	(39)	(0.27)
	(mi ² /T)	(2.25)		(7.20)		(3.0)		(6.0)		(3.69)	
1987	(T) (T/mi ²)	(20)	(0.55)	(11)	(0.31)	(16)	(0.44)	(13)	(0.36)	(60)	(0.42)
	(mi ² /T)	(1.80)		(3.27)		(2.25)		(2.77)		(2.40)	

Table 2. 1987 Swainson's Hawk Intensive Survey Results

Active = A

Not Active = NA

1987 Survey																		
Survey Area	Terr. #	87 A/NA	Past Activity X=Active												#Adults	Plumage Phase	Nest Tree Species	#Young Fledged
			86	85	84	83	82	81	80	79								
Woodland	Yo - 06	A	X	X	X	X	X	X	X	X	2	1 Lt., 1 Dk.	Oak	0				
	Yo - 07	A	X	X	X	X	X	X	X	X	2	2 Lt.	Oak	2				
	Yo - 12	A	X	X	X	X	X	X	X	X	2	1 Dk., 1 Med.	Cottonwood	1				
	Yo - 16	A	X	X	X	X	X	X	X	X	2	1 Lt., 1 Dk.	Oak	1				
	Yo - 19	A	X	X	X	X	X	X	X	X	2	2 Lt.	Oak	2				
	Yo - 45	NA			X						2			0				
	Yo - 46	A			X						2	1 Dk., 1 Lt.	Oak	2				
	Yo - 47	A			X						2	1 Dk., 1 Lt.	Oak	1				
	Yo - 48	A	X	X	X	X					2	1 Dk., 1 Lt.	Walnut					
	Yo - 50	A	X	X	X	X					2	1 Dk., 1 Med.	Walnut	1				
	Yo - 51	A	X	X	X	X					2	1 Dk., 1 Lt.	Oak	2				
	Yo - 52	A	X	X	X	X					2	2 Lt.	Oak	1				
	Yo - 53	A	X	X	X	X					2	2 Med.	Oak	1				
	Yo - 58	A	X	X	X	X					2	1 Dk., 1 Med.	Oak	1				
	Yo - 59	A	X	X	X	X					2	1 Dk., 1 Lt.	Walnut	0				
	Yo - 60	A	X	X	X	X					2	2 Med.	Cottonwood	1				
	Yo - 65	A	X								2	1 Dk., 1 Lt.	Oak	1				
	Yo - 66	A	X								2	1 Dk., 1 Med.	Walnut	0				
	Yo - 69	A	X								2	1 Dk., 1 Med.	Walnut	1				
	Yo - 70	A	X								2	1 Dk., 1 Lt.	Walnut	1				
	Yo - 71	A	X								2	1 Dk., 1 Med.	Oak	0				
Wilton	Sa - 13	A	X	X	X				X		2	1 Dk., 1 Med.	Oak	1				
	Sa - 24	A	X	X	X		X				2	2 Med.	Oak	1				
	Sa - 25	A	X	X	X	X					2	1 Lt., 1 Med.	Cottonwood	1				
	Sa - 37	A			X						2		Oak	1				
	Sa - 38	A	X	X	X						2	1 Dk., 1 Lt.	Oak	3				
	Sa - 39	A	X	X	X						2	1 Lt., 1 Med.	Oak	1				
	Sa - 56	A									2		Oak					
	Sa - 57	A									2	2 Lt.	Oak	1				
	Sa - 58	A									2	1 Lt., 1 Med.	Oak	1				
	Sa - 59	A									2	1 Lt., 1 Dk.	Oak	1				
	Sa - 60	A									2	1 Lt., 1 Dk.	Oak	1				

Table 2. 1987 Swainson's Hawk Intensive Survey Results (cont'd.)

Active = A
Not Active = NA

Survey Area	Terr. #	87 A/NA	87 New	Past Activity X = Active										# Adults	Plumage Phase	Nest Tree Species	# Young Fledged
				86	85	84	83	82	81	80	79						
Galt-Thornton	Sa - 07	A		X	X							X	1	1 Lt.	Oak	1	
	Sa - 08	A		X	X	X						X	2	2 Lt.	Oak		
	Sa - 40	NA		X	X	X											
	Sa - 41	A		X	X	X							2	1 Lt., 1 Dk.	Oak	2	
	Sa - 42	A		X	X	X							2	1 Lt.	Oak		
	Sa - 43	A		X	X	X							2	2 Lt.	Oak	2	
	Sa - 47	A		X	X								1	1 Lt.		0	
	Sa - 48	A		X	X								2	2 Lt.	Oak		
	Sa - 49	A		X	X								1	1 Lt.			
	Sa - 52	A		X									1	1 Lt., 1 Dk.	Oak	1	
	Sa - 53	A		X									2	1 Med., 1 Dk.	Oak	2	
	Sa - 61	A	X										2	1 Lt., 1 Med.	Oak	0	
	Sa - 62	A	X										2	2 Lt.	Oak	2	
Vernalis	SJ - 02	A		X		X						X	1	1 Dk.	Oak	2	
	SJ - 23	A		X		X							2	1 Lt.			
	SJ - 24	A		X									1	1 Lt.	Oak	2	
	SJ - 31	A			X								2	1 Lt.	Oak	1	
	SJ - 10	A		X	X	X					X	2	1 Lt., 1 Med.				
	SJ - 11	A		X	X	X				X		2	1 Lt., 1 Dk.	Oak	1		
	SJ - 12	A		X	X	X		X	X			2	2 Lt.				
	SJ - 17	A		X	X	X		X	X			2	1 Lt., 1 Dk.	Oak	1		
	SJ - 26	A		X	X	X						2	1 Dk., 1 Med.	Oak	3		
	SJ - 27	A		X	X	X						2	1 Lt., 1 Dk.	Willow	1		
	SJ - 32	A		X								2	1 Dk., 1 Lt.	Oak	0		
	SJ - 33	A	X									2	1 Dk., 1 Lt.	Oak	2		
	SJ - 34	A	X									2	1 Dk., 1 Lt.	Oak	2		
SJ - 35	A	X									2	1 Dk., 1 Lt.	Oak	2			
SJ - 36	A	X									1	1 Dk., 1 Lt.	Oak	2			
ST - 04	A		X	X							1	1 Lt.			1		
ST - 05	A										X	1	1 Lt.	Oak	2		

Wilton - This survey area is located near Wilton in southeastern Sacramento County. This survey area had the greatest diversity of land use and includes residential development, cropland, pasture (including hilly terrain), marsh and riparian habitat. Eleven Swainson's Hawk territories were identified here, the lowest of the four survey areas (Table 2). Suitable nesting habitat exists along Deer Creek and the Cosumnes River. However, the increase in both high and low density residential development throughout much of the area continues to reduce the amount of suitable foraging habitat for Swainson's Hawks. All pairs nested within riparian habitat. Of eight nest trees identified, seven were oak and one was cottonwood.

Galt-Thornton - The Sacramento-San Joaquin county line divides the Galt-Thornton survey area. The city of Galt lies on the east boundary, and Thornton on the west boundary. Riparian habitat dissects the area in several locales; the Cosumnes River in the northwest, the Mokelumne River and Dry Creek in the south, and Grizzly and Bear Sloughs in the west. Residential development in the city of Galt is expanding westward, reducing available foraging habitat in the eastern part of the survey area. Between the riparian systems exists open farmland and pasture providing suitable foraging to support the 16 active territories identified here (Table 2). Fourteen pairs (87.5%) nested within riparian zones. All known nest trees were oak.

Vernalis - The San Joaquin-Stanislaus county line divides the Vernalis survey area. The town of Vernalis is located one mile west of the southwest corner of the area. Caswell State Memorial Park is located near the northeast corner. This area is relatively rich in riparian systems. The Stanislaus River enters from the northeast and empties into the San Joaquin River which enters from the southeast. Red Bridge Slough runs through farmland in the northwest corner, and Riley Slough runs through pastureland in the central part of the study area. Approximately 9 mi² is unbroken pasture, most of the remaining 27 mi² is farmland. Thirteen active territories were located here (Table 2). All pairs nested within riparian zones. Three nests were located. Of the eight nest trees identified, seven were oak and one was willow.

SWAINSON'S HAWK RIVER SURVEY

The Sacramento River was surveyed by boat from Colusa to the Sacramento-San Joaquin Delta near Grand Island. In addition, Steamboat Slough was surveyed for nesting hawks. The total distance was 141 river miles (Table 3). In 1982 and 1985 the 99 mile reach between Red Bluff Diversion Dam and Colusa was surveyed (Table 4). In 1987, information was collected on a few of the Swainson's Hawk territories within this reach by cooperators working on other riparian related projects. However, data collected on this reach is inadequate to determine the population stability of the area. Federal and state sponsored bank protection projects are planned for several areas along the river which may adversely affect the suitability of this habitat for nesting Swainson's Hawks.

The total number of nesting Swainson's Hawk pairs in the Colusa to Sacramento-San Joaquin Delta reach was down 8.8% in 1987 (Tables 3 and 5). However, trend data indicate a relatively stable population and an overall increase in active territories since 1981 (Figure 1). The number of other nesting raptors

TABLE 3

SURVEY OF RIPARIAN ZONE OF SACRAMENTO RIVER FOR NESTING
SWAINSON'S HAWKS AND OTHER STICK NESTING RAPTORS, 1987

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.	3/28; 0.12	11/27; 0.41	12/30; 0.40	10/21; 0.48	6/35; 0.17
River mi. per hawk	28/3; 9.33	27/11; 2.45	30/12; 2.50	21/10; 2.10	35/6; 5.83
Swainson's terr. per river mi.	3/28; 0.12	8/27; 0.30	9/30; 0.30	6/21; 0.29	4/35; 0.11
River mi. per terr.	28/3; 9.33	27/8; 3.38	30/9; 3.33	21/6; 3.50	35/4; 8.75
Swainson's per suitable hab. mi.	3/10; 0.30	11/6; 1.83	12/20; 0.60	10/31; 3.33	6/2; 3.0
Suitable hab. mi. per hawk	10/3; 3.33	6/11; 0.55	20/12; 1.67	3/10; 0.30	2/6; 0.33
Swainson's terr. per suitable mi.	3/10; 0.30	8/6; 1.33	9/20; 0.45	6/3; 2.0	4/2; 2.0
Suitable mi. per Swainson's terr.	10/3; 3.33	6/8; 0.75	20/9; 2.22	3/6; 0.5	2/4; 0.5
Other raptors per river mi.	5/28; 0.18	13/27; 0.48	7/30; 0.23	4/21; 0.19	1/35; 0.03
River mi. per other raptor	28/5; 5.6	27/13; 2.08	30/7; 4.29	21/4; 5.25	35/1; 35.0
Other raptor terr. per river mi.	5.28; 0.41	11/27; 0.41	7/30; 0.23	4/21; 0.19	1/35; 0.03
River mi. per other raptor terr.	28/5; 5.6	27/11; 2.45	30/7; 4.28	21/4; 5.25	35/1; 35.0
Other raptor per suitable hab. mi.	5/10; 0.5	13/6; 2.17	7/20; 0.35	4/3; 1.33	1/2; 0.5
Suitable hab. mi. per other raptor	10/5; 0.5	6/13; 0.46	20/7; 2.86	3/4; 0.75	2/1; 2.0
Other raptor terr. per suitable mi.	5/10; 0.5	11/6; 1.83	7/20; 0.35	4/3; 1.33	1/2; 0.5
Suitable mi. per other raptor terr.	10/5; 2.0	6/11; 0.55	20/7; 2.86	3/4; 0.75	2/1; 2.0

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

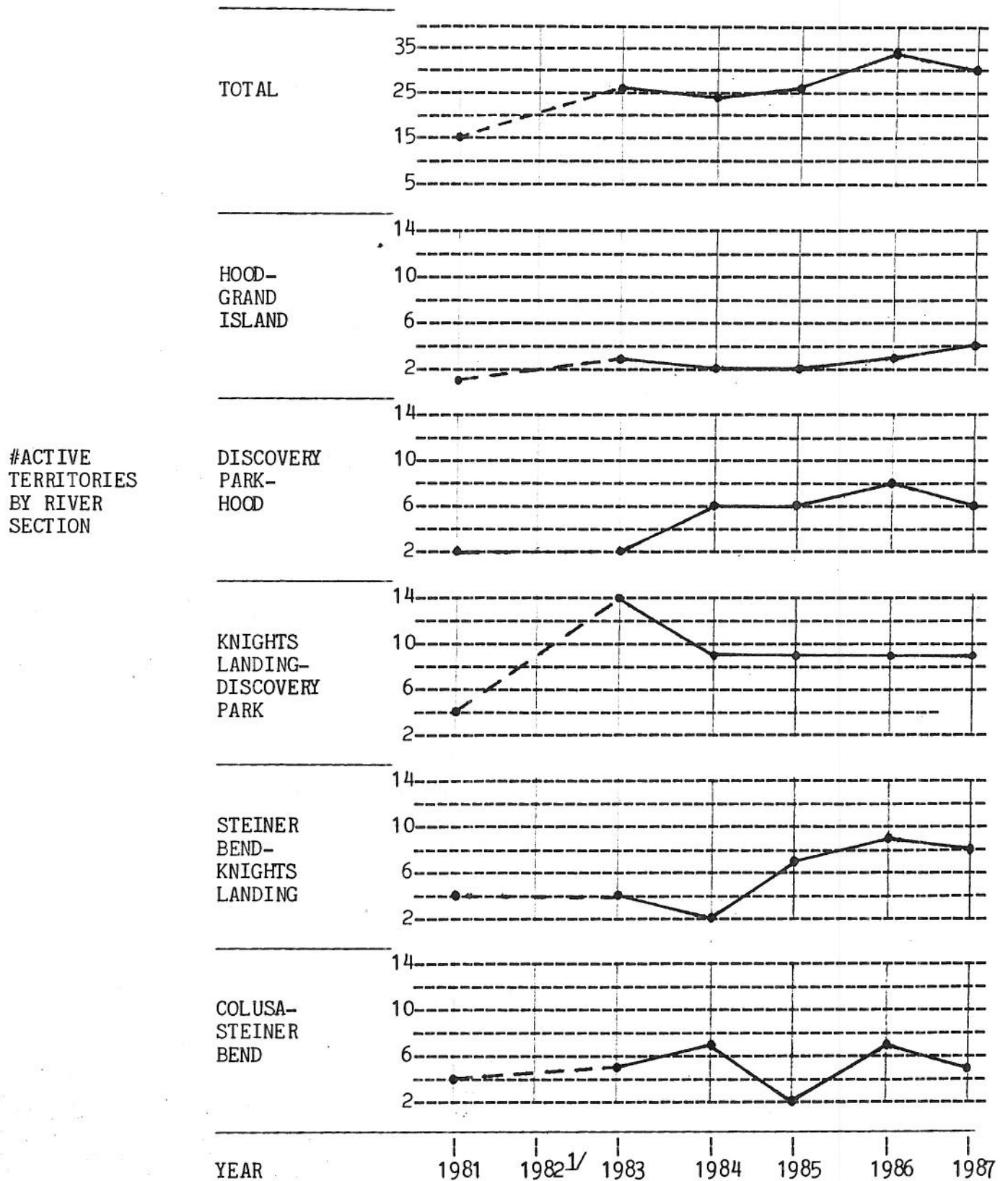
TABLE 5

SURVEY OF RIPARIAN ZONE OF SACRAMENTO RIVER FOR NESTING
SWAINSON'S HAWKS AND OTHER STICK NESTING RAPTORS, 1986

Adult Swainson's Hawk and Other Raptor
Sighting and 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.	4/28; 0.14	10/27; 0.37	12/21; 0.57	8/35; 0.23	1/35; 0.03
River mi. per hawk	28/4; 7.0	27/9; 3.0	30/10; 3.0	21/8; 2.63	35/1; 35.0
Swainson's territories per river mi.	5/28; 0.18	9/27; 0.33	9/30; 0.3	8/21; 0.38	3/35; 0.09
River mi. per S.H. terr.	28/5; 5.6	27/9; 3.0	30/9; 3.3	21/8; 2.63	35/3; 11.67
Swainson's per suitable hab. mi.	4/10; 0.4	10/6; 1.67	12/20; 0.6	8/3; 2.67	1/2; 0.5
Suitable hab. mi. per hawk	10/4; 2.5	6/9; 0.67	20/10; 2.0	3/8; 0.38	2/1; 1.0
Swainson's terr. per suitable mi.	5/10; 0.5	9/6; 1.5	9/20; 0.45	8/3; 2.67	3/2; 1.5
Suitable mi. per Swainson's terr.	10/5; 2.0	6/9; 0.67	20/9; 2.22	3/8; 0.38	2/3; 0.67
Other raptors per river mi.	8/28; 0.29	8/27; 0.30	10/30; 0.33	4/21; 0.19	2/35; 0.06
River mi. per other raptor	28/8; 3.5	27/8; 3.38	30/10; 3.0	21/4; 5.25	35/2; 17.5
Other raptor terr. per river mi.	7/28; 0.25	9/27; 0.33	8/30; 0.27	4/21; 0.19	1/35; 0.03
River mi. per other raptor terr.	28/7; 4.0	27/9; 3.0	30/8; 3.75	21/4; 7.25	35/1; 35.0
Other raptors per suitable hab. mi.	8/10; 0.8	8/6; 1.33	10/20; 0.5	4/3; 1.33	2/2; 1.0
Suitable hab. mi. per other raptor	10/8; 1.25	6/8; 0.75	20/10; 2.0	3/4; 1.75	2/2; 1.0
Other raptor terr. per suitable mi.	7/10; 0.7	9/6; 1.5	8/20; 0.4	4/3; 1.33	1/2; 0.5
Suitable mi. per other raptor	10/7; 1.43	6/9; 0.67	20/8; 2.5	3/4; 1.75	2/1; 2.0

Figure 1. Trends of Swainson's Hawk activity along the Sacramento River, 1981-1987.



^{1/} No survey this year

was down 17.3% from 1986. As in past years, 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, this 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. Nesting habitat in the Red Bluff to Colusa reach was reasonably good but many acres of adjacent potential foraging area had incompatible crops such as orchards.

In 1985, 85% of all known nest sites in the Central Valley were found within riparian zones. This year 83% of nests in the intensive survey areas were in riparian zones. This diminishing habitat type is critical to the preservation of a healthy population of Swainson's Hawks in this region of the state.

In addition to the Swainson's Hawk intensive and river surveys, activity information was gathered from other Central Valley locales (Table 6), as well as from the Great Basin population. Forty-three active territories were reported from Butte Valley, Siskiyou County, and 42 were reported from the Klamath Basin, Modoc and Lassen counties. Survey effort was increased in both of these areas in 1987. These data do not indicate a population increase.

Analysis:

Each year the amount of information gathered 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 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 1987 survey was the most extensive since surveys were begun in 1979 (Table 6). There are 265 known territories in the Sacramento Valley, up from 238 in 1986 and 60 in 1979. The number of active territories this year was 107 of 124 checked, up from 98 of 118 checked in 1986. Each year known territories are checked and new territories are added as they are discovered.

As interest in the Swainson's Hawk increases, so does the amount of information gathered. While the total number of known and active territories increases each year, this may not indicate an increasing population.

Unlike its conspecifics in other parts of the country, the Central Valley population of Swainson's Hawk 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. Fifty of 60 nests located within the survey areas were in riparian habitat.

Table 6. Swainson's Hawk Territories, Central and Owens Valley, 1979-87

<u>County</u>	<u>Year</u>	<u>No. of Known Territories</u>	<u>No. of Territories Checked</u>	<u>No. of Active Territories</u>
Butte	1979	1	1	1
	1980	2	1	1
	1981	2	0	-
	1982	4	2	2
	1983	4	0	-
	1984	4	0	-
	1985	5	2	2
	1986	5	1	1
	1987	5	0	-
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
	1986	17	7	5
	1987	19	9	5
Glenn	1979	2	2	2
	1980	2	0	-
	1981	2	1	1
	1982	2	0	-
	1983	2	0	-
	1984	2	0	-
	1985	7	5	5
	1986	7	0	-
	1987	7	0	-
Inyo	1979	0	0	-
	1980	0	0	-
	1981	1	1	1
	1982	2	1	1
	1983	2	1	1
	1984	2	0	-
	1985	3	2	2
	1986	4	4	2
	1987	4	0	-

Table 6. Swainson's Hawk Territories, Central and Ownes Valley, 1979-87
(cont'd.)

<u>County</u>	<u>Year</u>	<u>No. of Known Territories</u>	<u>No. of Territories Checked</u>	<u>No. of Active Territories</u>
Merced	1979	7	7	7
	1980	7	0	-
	1981	7	0	-
	1982	7	0	-
	1983	9	7	3
	1984	9	0	-
	1985	12	3	3
	1986	12	1	1
	1987	13	1	1
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
	1986	31	17	13
	1987	35	19	19
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
	1986	56	31	27
	1987	63	39	33
Solano	1979	0	0	-
	1980	0	0	-
	1981	0	0	-
	1982	2	2	2
	1983	4	3	3
	1984	4	0	-
	1985	4	1	0
	1986	4	2	1
	1987	5	3	3

Table 6. Swainson's Hawk Territories, Central and Owens Valley, 1979-87
(cont'd.)

<u>County</u>	<u>Year</u>	<u>No. of Known Territories</u>	<u>No. of Territories Checked</u>	<u>No. of Active Territories</u>
Stanislaus	1979	4	4	4
	1980	4	0	-
	1981	4	0	-
	1982	4	1	0
	1983	4	3	0
	1984	6	5	3
	1985	6	5	3
	1986	6	2	1
	1987	6	5	5
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
	1986	23	9	8
	1987	24	3	1
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
	1986	73	44	39
	1987	84	45	40
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
	1986	238	118	98
	1987	265	124	107

Continued urban expansion and incompatible agricultural crops and practices reduce available foraging and nesting habitat, thereby posing a continuing threat to the Central Valley Swainson's Hawk population. Consideration of important population limiting factors, such as riparian nesting habitat, and suitable open land for foraging is crucial to the effective management of this Threatened California raptor.

The availability of adequate nesting habitat in the form of mature tall trees is of critical importance to maintenance of healthy reproductive Swainson's Hawk populations. Tree loss is occurring in all four intensive survey areas as well as along the Sacramento River survey route. Channelization and bank stabilization projects, and tree removal to increase cultivated acreage, are the major causes of tree loss in agricultural areas.

The presence of agricultural development appeared to have both positive and negative consequences. Most of the Central Valley agricultural lands maintain the essential requirement of flat, wide-open terrain. However, certain crop types, such as rice, 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 with the needs of Swainson's Hawks are those that support adequate abundance and availability of prey populations.

Recommendations:

1. Periodically conduct statewide research to review the status of declining raptor populations that are either on the Threatened or Endangered species list or on the list of Bird Species of Special Concern.
2. Continue to gather baseline population and productivity information on species of diurnal raptors nesting in California.
3. Monitor habitat alteration and destruction caused by activities, such as logging, agricultural development, recreation, etc.
4. 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.
5. Maintain confidentiality of certain file information to protect sensitive and endangered raptors from disturbance and illegal take.
6. Determine through monitoring, if annual productivity is sufficient to maintain populations of these species.

Prepared by: James A. Estep
James A. Estep
Student Assistant

Reviewed by: Kent A. Smith by Gault
Kent A. Smith, Coordinator
Nongame Bird and Mammal Section

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

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