

State of California  
The Resources Agency  
Department of Fish and Game

DISTRIBUTION, DENSITY AND HABITAT REQUIREMENTS OF THE  
CALIFORNIA YELLOW-BILLED CUCKOO IN THE SACRAMENTO VALLEY: 1972-73<sup>1/</sup>

by

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ABSTRACT

Floodplain riparian habitat in the Sacramento Valley was surveyed in 1972-73 using tape-recorded calls of the yellow-billed cuckoo. Cuckoos were found at 32 sites along the Sacramento River from Red Bluff, Tehama County to Colusa, Colusa County and in the Butte Sink, Butte County. None could be found in seemingly similar but less extensive habitat along the Feather River.

At sites where cuckoos were present, (1) riparian vegetation exceeded 100 meters in width and 10 hectares in total extent, (2) standing or slow-moving water was present within 100 meters, and (3) there was dense understory vegetation, thickets of willow and usually large cottonwood trees. Roughly 10 hectares support a pair. As of March 1972, approximately 1,200 hectares of suitable habitat remained in the Sacramento Valley exclusive of the Feather River. This would support 120 pairs of yellow-billed cuckoos if all habitat were occupied. Survey work suggests 80 percent occupancy, but because the cuckoo is easily overlooked, this figure is uncertain.

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## RECOMMENDATIONS

Based on the results of this study, the following recommendations, if implemented, will help assure continued survival of the California yellow-billed cuckoo in the Sacramento Valley:

1. The west bank of Woodson Bridge State Park be designated as an ecological reserve for the yellow-billed cuckoo.
2. A statewide survey be undertaken to determine the status of yellow-billed cuckoo in California.
3. Habitat critical to the survival of the yellow-billed cuckoo be designated and acquired as ecological reserves.
4. Studies be undertaken to determine conditions requisite to maintenance and enhancement of habitat including the preservation of backwater sloughs, oxbow lakes, etc.
5. Evaluation be made of all flood control and water projects affecting yellow-billed cuckoos.

## INTRODUCTION

Decline in populations of the western race of the yellow-billed cuckoo (Coccyzus americanus occidentalis) in California was noted by Grinnell and Miller (1944) who stated, "because of removal widely of essential habitat conditions, this bird is now wanting in extensive areas where once found." The paucity of recent records has led ornithologists to speculate that the cuckoo presently may be absent from much of its former range. Guy McCaskie suggests that the area above Laguna Dam on the Colorado River may be "the last stronghold for the yellow-billed cuckoo in California" (personal communication, 1972).

Because of these reports and the paucity of recent sightings, the California Fish and Game Commission on May 21, 1971 declared the yellow-billed cuckoo to be rare.

Discovery of a yellow-billed cuckoo along the Sacramento River near Chico in the summer of 1971 raised hopes that breeding populations might persist in the upper Sacramento Valley. Subsequent study indicated that cuckoos occurred from Colusa County north to Red Bluff in suitable habitat. This report presents data on the status and habitat of this population and reviews information concerning the past and present status and distribution of the yellow-billed cuckoo in California.

## HISTORY OF OCCURRENCE

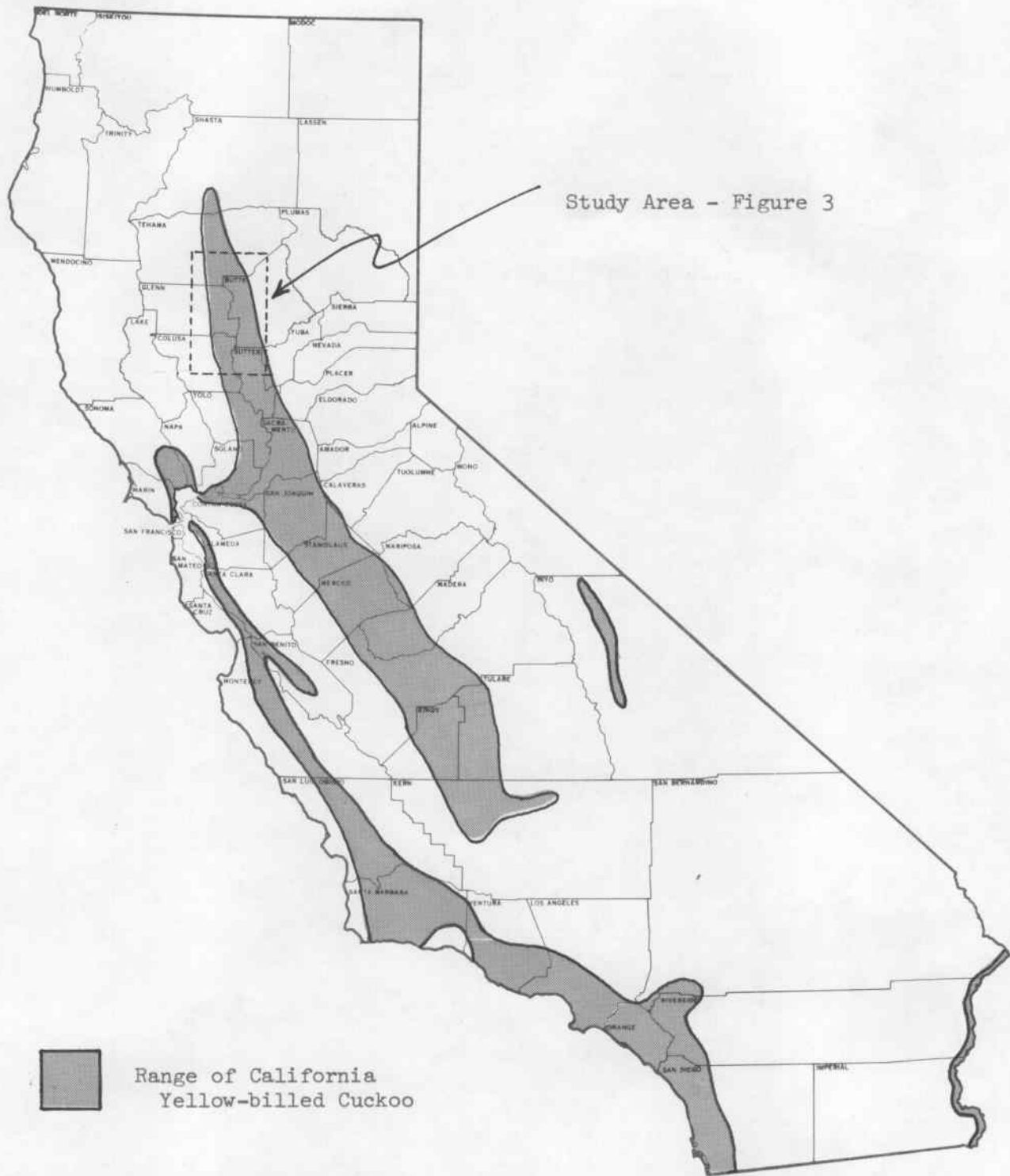
Historical breeding range of the yellow-billed cuckoo in California extended northwest from the Mexican line in western San Diego County, along the coast belt through the San Francisco Bay region as far as Sebastopol, Sonoma County, through the San Joaquin and Sacramento Valleys, from the vicinities of Bakersfield and Weldon, Kern County, to the vicinity of Redding, Shasta County, and along the Colorado River in Imperial and Riverside Counties (Figure 1). It also has been recorded from the following isolated, outlying localities: Shasta River, Edgewood and Sisson, Siskiyou County; Bishop, Independence and Death Valley, Inyo County; and Kelso, San Bernardino County (Grinnell and Miller, 1944; Audubon Field Notes).

Original density of yellow-billed cuckoos in California probably was greater than the literature implies. By the late nineteenth century, before the first studies were published, large tracts of floodplain riparian forest had been cut or cleared for fuel or to allow for grazing of cattle or the growing of crops (Thompson, 1961). Destruction of habitat, as a factor in reducing numbers of cuckoos, was recognized in 1911 (Jay, 1911). Nevertheless, the species was still considered "fairly common" in 1915 (Grinnell, 1915). In 1944, however, Grinnell and Miller concluded, "in general, population thinly spread; fairly common to even common in earlier years in a few, most favorable localities."

Land use changes, mainly diversion of water for irrigation and depletion of ground water, to a large extent have claimed the habitat of the cuckoo, particularly in the Central Valley and southern California. The Santa Ana River in the San Bernardino Valley is an excellent example. Hanna (1937) who found 24 nests of the yellow-billed cuckoo there in the 1920's, observed, "in contrast with those good old times we now have very little water in Warm Creek and seldom any surface

Figure 1

HISTORICAL RANGE OF THE CALIFORNIA YELLOW-BILLED CUCKOO  
AND LOCATION OF STUDY AREA



water in the Santa Ana River, the large thickets have been replaced by farms and pastures, the trees cut down, and the evergrowing population has crowded in on the old haunts of the cuckoo to such an extent that if they come here now at all they must be exceedingly rare." Eugene Cardiff (reported in Hamilton and Hamilton 1965), referring to the same area, reports that "through the late 1940's, the yellow-billed cuckoo could be located quite easily in several areas along the Santa Ana River, but because of a series of dry years and the heavy pull on the underground water supply, the water table has dropped to the point where most of the cottonwood-willow thickets have died out." Hamilton (personal communication) spent the first 11 days of June, 1963 in an unsuccessful search of this area for yellow-billed cuckoos.

In recent years, probable breeding populations of yellow-billed cuckoos have been sighted only along the Colorado River and in the Sacramento Valley and delta region (Table 1 and Figure 1). The area above Laguna Dam on the Colorado River is, according to McCaskie, in imminent danger of destruction since "it is becoming a very popular area for recreation, many trees are being felled and brush is being cleared" (personal communication, 1972). Riparian forest along the Sacramento River is being cleared for orchards or as a result of the Army Corps of Engineer's riverbank protection projects.

The present status of yellow-billed cuckoo in California will remain conjectural until a statewide survey is completed. That its numbers are low and localized, however, can hardly be doubted.

#### OBJECTIVES OF PRESENT STUDY

1. Gather natural history data, in particular, habitat requirements and population density.
2. Develop a reliable census method.
3. Survey Sacramento Valley populations.

#### METHODS

United States Geological Survey topographical maps, aerial photographs and land use quads were used to locate riparian forest habitat in the Sacramento Valley. Census sites were selected to sample the range of available habitat; cottonwood-willow forest, oak sycamore forest, areas cleared of understory, and xeric and mesic areas. Access was by car, foot, and/or canoe. A tape recording of the "kowlp" call of the cuckoo was played at well-spaced intervals for 10 to 30 minutes in each area. Photographs were taken of each distinctive habitat type.

A study area was established on the west bank of the Sacramento River about 6.5 km. (4 miles north) of Glenn in Glenn and Butte Counties. A pair of yellow-billed cuckoos was followed and their movements mapped. Notes were taken on courtship display, vocalizations, foraging behavior, and nesting.

TABLE 1. Sightings of the yellow-billed cuckoo in California, 1962-1973.

Year	Date	Locality	No.	
1962	2 July	Orangevale, Sacramento Co.	1	Audubon Field Notes (AFN) 16: 504
	1 August	Sacramento, Sacramento Co.	1	AFN 16: 504
	September	Mouth of Stanislaus River, Stanislaus Co.	5	AFN 17: 65
	September 30	Mouth of Stanislaus River	1	AFN 17: 65
1963	25 June	Mouth of Stanislaus River	1	Hamilton, pers. comm.
	30 June	Montecito, Santa Barbara Co.	1	Metcalf, 1967
1964	27 June	Morongo Valley, San Bernardino Co.	1	AFN 18: 536
	18-19 July	Laguna Dam, Imperial Co.	10	McCaskie, pers. comm.
	August	"three Central Valley locations"	5	AFN 18: 533
1965	29 June	Willow Slough, Yolo Co.	1	Kimball, pers. comm.
	8 July	Farallon Islands, San Francisco Co.	1	Condor 69: 582
	14 July	Mouth of Stanislaus River	3	Kimball, pers. comm.
	June-July	Laguna Dam, Imperial Co.	12	McCaskie, pers. comm.
1966	25 June	Laguna Dam, Imperial Co.	1	McCaskie, pers. comm.
	4 August	Mouth of Stanislaus River	2	Kimball, pers. comm.
1967	16 June	Laguna Dam, Imperial Co.	3	McCaskie, pers. comm.
	22 June	Santa Barbara, Santa Barbara Co.	1	Metcalf, 1967
1968	27 June	Earp, San Bernardino Co.	1	McCaskie, pers. comm.
	June-July	Laguna Dam, Imperial Co.	10	McCaskie, pers. comm.
1969	14-15 June	Laguna Dam, Imperial Co.	3	McCaskie, pers. comm.
	23 August	Oceanside, San Diego Co.	1	AFN 24: 100a
1970	24 May	Sespe Canyon, Ventura Co.	1	American Birds (AB) 24: 645
	5 July	Rialto, San Bernardino Co.	1	AB 24: 717
	June-July	Laguna Dam, Imperial Co.	4	McCaskie, pers. comm.
1971	14 June	Santa Barbara	1	AB 25: 906
	16 June - 8 August	Sacramento River near Chico, Butte Co.	1	AB 25: 902
	5 July	Laguna Dam, Imperial Co.	2	McCaskie, pers. comm.
	8 August	Hatfield State Park, Merced Co.	1	AB 25: 902
	27 August	Honey Lake, Lassen Co.	1	Manolis, pers. comm.

TABLE 1. (continued)

Sightings of the yellow-billed cuckoo in California, 1962-1973.

Year	Date	Locality	No.	
1972	18 June - 30 July	Sacramento River near Chico	5	AB 26: 898
	24 June	Laguna Dam, Imperial Co.	4	McCaskie, pers. comm.
	5 July - 10 August	15 localities along Sacramento River in Tehama, Glenn, Butte and Colusa Counties	28	AB 26: 898
	16 July	Mouth of Stanislaus River	1	AB 26: 898
	2 September	Furnace Creek Ranch, Inyo Co.	1	McCaskie, pers. comm.
1973	16 May - 28 August	20 localities along Sacramento River in Tehama, Glenn, Butte, and Colusa Counties	27	Gaines et al
	24 June	Indian Resort, near Tracy San Joaquin Co.	1	AB in press
	28 June	South end, Clear Lake, Lake Co.	1	AB in press
	5 July - 2 August	Lower Butte Sink, Butte Co.	4	Gaines et al
	19 July	Colorado River near Picacho State Park	7	Stacey, pers. comm.
	-	Mouth of Stanislaus River	1	Mans, pers. comm.

Applying the results of field study, aerial photographs were analyzed to determine extent and location of remaining habitat suitable for yellow-billed cuckoos in the Sacramento Valley.

#### SURVEY RESULTS

The Sacramento Valley is a level, almost featureless plain formed by the accumulation of sediments in a great structural trough lying between the Coast Ranges and the Cascade-Sierra Nevada Mountains. The Sacramento River, an alluvial stream with meandering characteristics, traverses the 150 mile length of the valley and is fed by numerous tributaries, the most important for our purposes being the Feather River and Butte Creek. In the past, before construction of dams and levees, seasonal flooding deposited sediment along the banks of the larger streams. Consequently, natural levees or "rimlands" five to 20 feet high and grading off for a distance of up to several miles from the watercourses were formed. In their pristine state, these were clothed by forest. Their rich soil and immunity to all but the most severe floods attracted early settlement and agricultural development. Timber was felled to heat homes and to fuel river steamers and levees were constructed to contain the river. By the end of the nineteenth century, most of the forest had given way to orchards and fields. Fragments and "rimland" remained in narrow, discontinuous strips between the levees and the rivers and, especially to the north, on islands, bends in the river, and around oxbow lakes where areas were subjected to flooding and thus not suited to agriculture. The more extensive of these areas supported a population of yellow-billed cuckoos.

Surveys were undertaken along the Feather River from Oroville to its mouth, along the Sacramento River south of Red Bluff, and in the lower Butte Sink. Survey accounts are appended at the end of this report.

Most, but not all, contacts with cuckoos resulted from response to tape-recorded calls. Cuckoos typically would respond by alighting near the sound source in the crown of a willow or cottonwood. There they would call at irregular and well-spaced intervals and/or coo persistently, occasionally spreading their tails and shuffling their wings, and thereby accentuating the white tail spots and bright rufous patches on the primaries. Few cuckoos were heard or sighted which did not respond to the taped calls. Winds in excess of Beaufort 3.0 and temperatures above 90° F. reduced the effectiveness of the census technique.

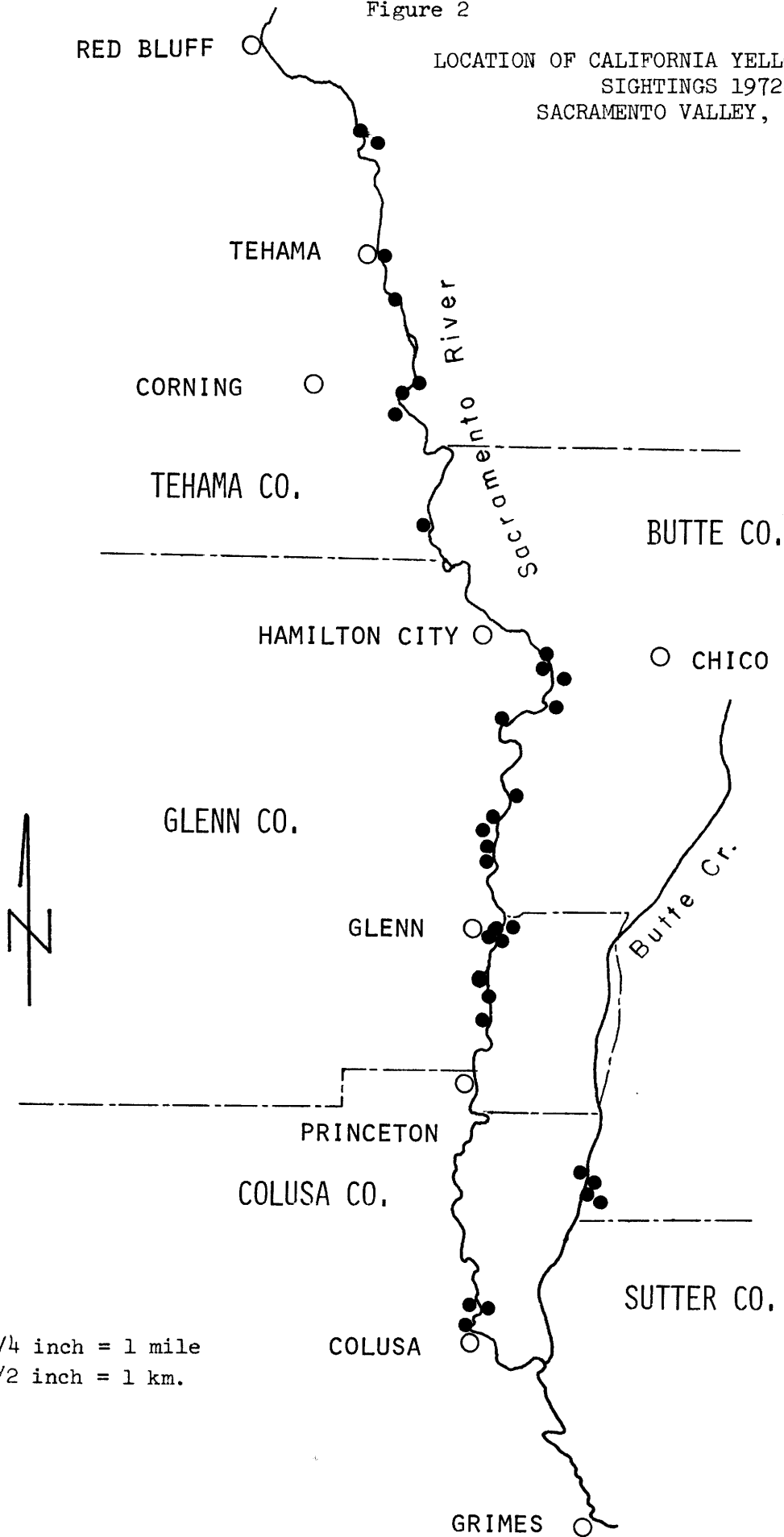
Forty-two yellow-billed cuckoos were observed at 28 localities along the Sacramento River between Red Bluff, Tehama County and Colusa, Colusa County. Five cuckoos were observed at four localities in the Butte Sink. None were found along the Feather River or along the Sacramento River south of Colusa. Figure 2 indicates the location of yellow-billed cuckoos sighted during this study.

Cuckoos usually inhabited stands of willows and cottonwoods. These varied from stands 20 to 30 meters high with a dense, woody and herbacious understory to low, shrubby but dense stands of irregular distribution. The species was found most frequently in areas where extensive riparian vegetation is interspersed with lakes, sloughs and/or marshy areas. On three occasions, cuckoos were observed in adjacent walnut orchards. In the Butte Sink they occupied dense, clumped, willow thickets in marshy bottomland where cottonwood was scarce.



Figure 2

LOCATION OF CALIFORNIA YELLOW-BILLED CUCKOO  
SIGHTINGS 1972-73  
SACRAMENTO VALLEY, CALIFORNIA



Cuckoos were not found in the oak-sycamore association where understory vegetation had been removed, nor along the narrow (20 to 100 meters wide) strips of seemingly suitable habitat that border the Sacramento and Feather Rivers in many places (Figure 3).



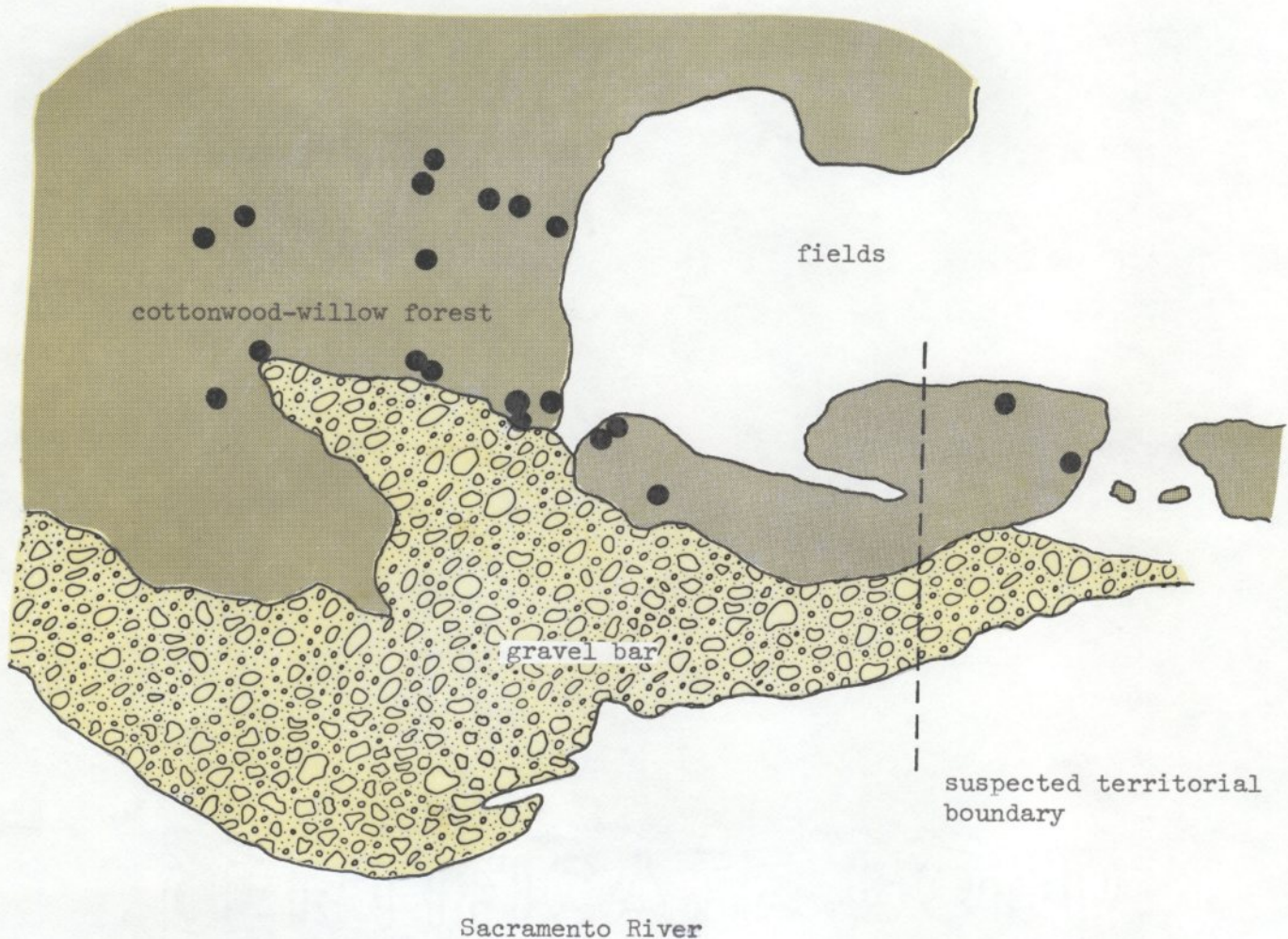
FIGURE 3. DISTURBED RIPARIAN HABITAT WHERE UNDERSTORY VEGETATION HAS BEEN REMOVED.

#### STUDY AREA RESULTS

The Glenn County Study Area, approximately 6.5 km. (4 miles) north of Glenn, Glenn County, was selected. The area, along the west bank of the Sacramento River, occupied 30 hectares of which 70 percent is dense cottonwood-willow forest and 30 percent fields and gravel banks (Figure 4). Seasonal inundation by flood waters prevented intrusion by valley oaks (Quercus lobata) and sycamores (Platanus racemosa). The canopy consisted entirely of Fremont cottonwoods (Populus fremontii) and willow (Salix spp.). Many trees were draped with grape vines (Vitis californica). Willows, blue elderberry (Sambucus caerulea), box elder (Acer negundo) and lesser numbers of black walnut (Juglans nigra), seep-willow (Baccharis glutinosa), white alder (Alnus rhombifolia) and Oregon ash (Fraxinus latifolia) formed a well-defined and nearly impenetrable woody understory. Ground cover, most prominent where this understory was lacking was composed predominantly of mugwort (Artemisia vulgaris), stinging nettle (Urtica holoserica), horsetail (Equisetum spp.), poison-oak (Rhus diversiloba) and blackberry (Rubus spp.). A fair number of dead willow and cottonwood stumps were dispersed throughout the site. An old river channel cut through the south end of the plot. Piles of dead wood, deposited by winter floods, littered this and other parts of the area.

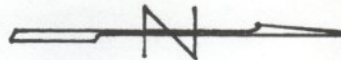
Figure 4

THE GLENN COUNTY STUDY AREA  
6.5 Km. NORTH OF GLENN, SHOWING THE LOCATIONS  
OF ONE PAIR OF CALIFORNIA YELLOW-BILLED CUCKOOS



Scale: 4 cm. = 100 m.

● = sightings of cuckoos



Attempts to follow and observe a pair of yellow-billed cuckoos in this area met with limited success. After the first day, the cuckoos rarely responded to tape-recorded calls. Although easily tracked in flight, they vanished quickly in the dense foliage. Rarely was it possible to watch a cuckoo for extended periods. Contact was made only for four percent of the total 42 hours spent at the site.

Observations of feeding suggested relatively large prey. Foraging occurred at all heights in cottonwoods and willows. Cuckoos moved slowly and deliberately, flying but a few feet to a new branch or neighboring tree. Usually they remained motionless and scanned the foliage for food. Prey was taken at an average rate of one per 12 minutes foraging (based on 48 minutes total observation time).

The first yellow-billed cuckoo of the season was heard on the site on May 16.

Although no nest was found, a cuckoo was seen on three occasions flying with food into the densest vegetation of the site - an impenetrable tangle of cottonwood and willow draped with grape. Therefore, existence of a nest was suspected.

Figure 4 depicts the Glenn County Study Area showing the locations of the pair of cuckoos observed during the study.

The ten hectares occupied is an extensive territory for a bird this size, but correlates well with observations of other pairs. Estimated areas occupied by pairs of cuckoos at six other sites averaged one pair per every 10 hectares of suitable habitat.

#### DISCUSSION

The distribution of yellow-billed cuckoo in the Sacramento Valley appeared to be limited by the availability of sufficiently extensive floodplain riparian habitat. Sites where cuckoos were located had the following features in common: (1) riparian vegetation in excess of 100 meters in width and 10 hectares in total extent, (2) water present within 100 meters, and (3) dense understory vegetation and thickets of willow. Figures 5 and 6 show areas of suitable habitat for yellow-billed cuckoos. Conditions for supporting yellow-billed cuckoos were not found on the Sacramento River south of Grimes, Colusa County, in the delta region, and along most of the Feather River.

Seemingly suitable habitat was present in two disjunct areas (Abbott's Lake and Lake of the Woods) along the Feather River. Absence of cuckoos may have been due to partial clearing of understory vegetation and/or lack of sufficiently extensive continuous habitat.

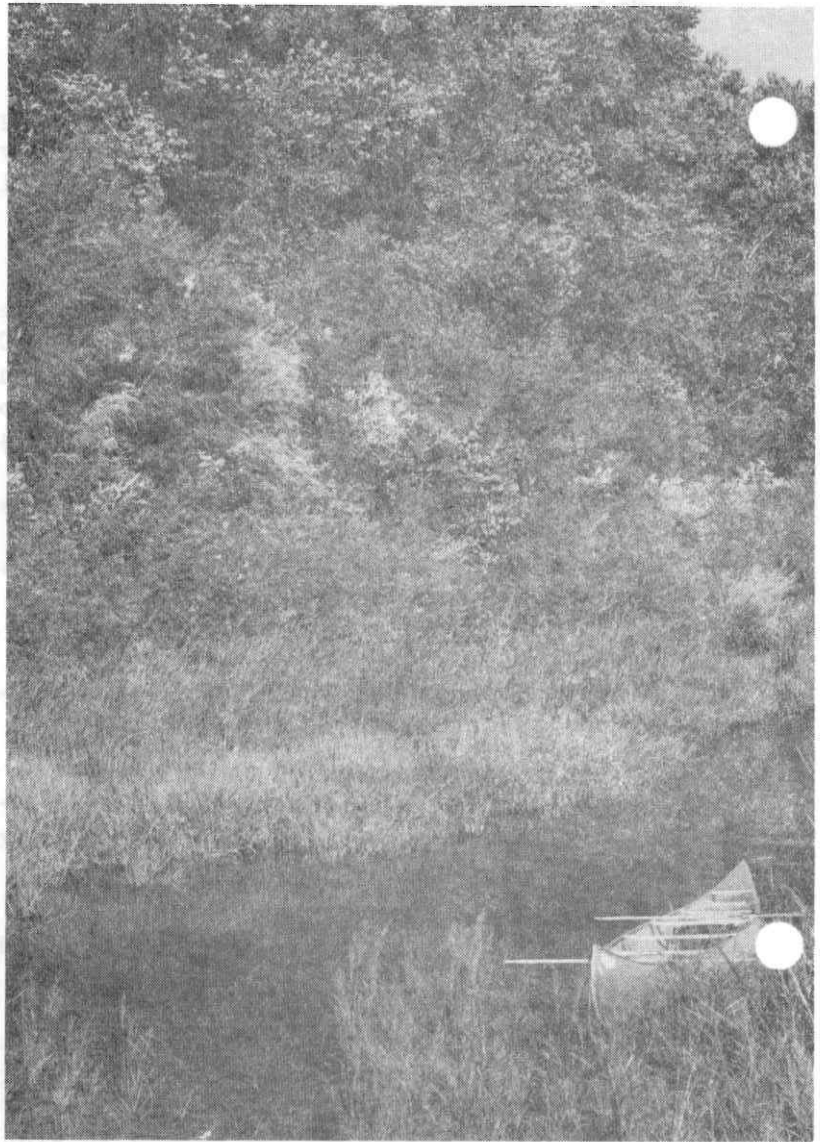
Because they feed on relatively large prey, yellow-billed cuckoos require extensive foraging space and thus occur in lower density than other birds of similar size. This accounts for large territory size (averaging 10 hectares) established by pairs along the Sacramento River. Narrow, strip vegetation, no matter how long, apparently was not utilized.

As of March, 1972, approximately 1200 hectares of habitat remained in the Sacramento Valley exclusive of the Feather River. This would support 120 pairs of yellow-billed cuckoos if all habitat were occupied. The surveys suggested 80 percent occupancy, but, because the species was easily overlooked, this figure is uncertain.



FIGURES 5 and 6

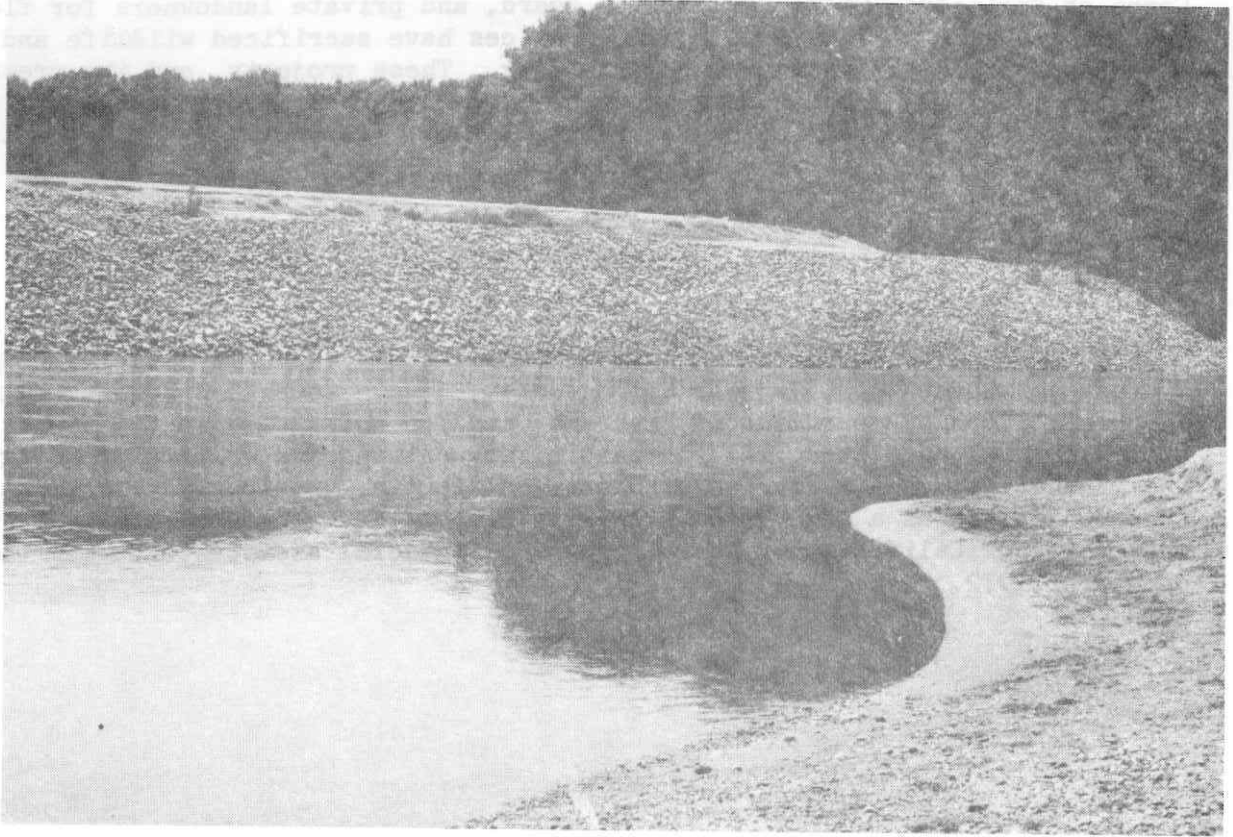
RIPARIAN HABITAT SUITABLE  
FOR YELLOW-BILLED CUCKOOS



In recent years, sizable areas of riparian forest have been cleared by the Army Corps of Engineers, State Reclamation Board, and private landowners for flood control and land reclamation. Such practices have sacrificed wildlife and aesthetic values for engineering efficiency. These projects, and the pressure to clear more land for orchards, are the two most pressing threats to the yellow-billed cuckoo's habitat in the Sacramento Valley. Figures 7 and 8 demonstrate destruction of the natural riparian habitat.

#### ACKNOWLEDGEMENTS

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RIPARIAN HABITAT DESTROYED BY THE CONSTRUCTION OF A LEVEE FOR WATER CONTROL PURPOSES



FIGURE 8  
AREA OF RIPARIAN HABITAT WHICH HAS BEEN CLEARED AND AN ORCHARD REPLANTED

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APPENDIX I. Survey accounts for the Sacramento River. All geographical names and river mileages have been adapted from the U.S.G.S. 7.5' series of topographical maps. Information on areas of suitable habitat not covered was obtained from aerial photographs taken in March, 1972.

REACH: Red Bluff to Tehama, Tehama County.

AREA COVERED: N. of Butler Slough and Todd Island (40 h).

AREAS OF SUITABLE HABITAT NOT COVERED: E. bank N. of Salt Creek (30 h), Mooney Island (37 h), mouth of Oat Creek (8 h), island near mouth and N. of Dye Creek (38 h), W. bank N. of Elder Creek (33 h).

GENERAL DESCRIPTION: Todd Island is over 50 percent covered with dense cottonwood-willow forest.

SURVEY RESULTS: On July 22, 1972 at least five yellow-billed cuckoos were observed in the area. One flew toward the observer from Mooney Island, indicating occurrence at that locality. The area was revisited on July 29, 1972 and at least four cuckoos were noted.

REACH: Tehama to Woodson Bridge, Tehama County.

AREA COVERED: The entire reach was covered by canoe and the Woodson Bridge area on foot.

GENERAL DESCRIPTION: Suitable habitat is scattered, but occurs at the following locations - E. bank to two miles S. of Tehama including island at mouth of Millrace Creek (45 h), E. Bank at river mile 226 (17 h), island near mouth of Toomes Creek and vicinity (30 h), E. bank west of Deer Creek (28 h), Koptka Slough and Woodson Bridge area (50 h). Of these, the Koptka Slough area of Woodson Bridge and the island at the mouth of Toomes Creek contained the most extensive and dense stands of riparian vegetation.

SURVEY RESULTS: On July 21, 1972, a cuckoo was heard at the mouth of Antelope Creek just N. of Woodson Bridge State Park; one and possibly two were heard the same day at Koptka Slough across the river to the west. On July 20, 1973, the entire stretch was surveyed by canoe. Cuckoo were heard .5 miles and 3.2 miles S. of Tehama on the E. bank. A moderate wind made observation difficult and interfered with the tape recorded calls; this probably accounts for failure to contact the species in several areas of suitable habitat, as at the mouth of Toomes Creek.

REACH: Woodson Bridge, Tehama County to Hamilton City, Glenn County.

AREAS COVERED: W. bank, end of Post Avenue, Tehama County (9 h) and W. bank, end of Merrill Ave., Tehama County (10 h).

AREAS OF SUITABLE HABITAT NOT COVERED: river miles 212-215, W. bank, including island at N. end (72 h), Foster Island (13 h), E. bank, Dicus Slough (40 h), N. and E. of Birch Creek (20 h), Snaden Island and vicinity (13 h), island N. of pumping station, E. end of Cutler Ave. (21 h).

GENERAL DESCRIPTION: At Post Avenue, a bluff descends to Birch Creek which leads to the river. The creek, which consists of stagnant ponds in the summer, is lined with cottonwood, willow, walnut and box elder. Merrill Avenue ends in a dense grove of second growth cottonwoods and willows about 10 m. in height.

SURVEY RESULTS: On July 21, 1972, two cuckoos were noted at the Post Avenue locality and one at Merrill Avenue. On June 26, 1973, two cuckoos were at Post Avenue. No cuckoos were observed at Merrill Avenue on June 23, 1973.

REACH: Hamilton City, Glenn County to Ord Ferry Bridge, Glenn and Butte Counties.

AREAS COVERED: The reach from the mouth of Pine Creek, Butte County to the W. bank, end of Road 29, Glenn County, was covered by canoe. The W. Bank N. of Ord Ferry Bridge was covered by foot (13 h).

AREA OF SUITABLE HABITAT NOT COVERED: Shannon Slough (13 h).

GENERAL DESCRIPTION: Murphy Slough, Golden State Island and the area along the E. bank for two miles north contains 96 h. of exceptional habitat; only the W. edge was surveyed. An additional 30 h. of habitat occurs in the vicinity of the mouth of Big Chico Creek.

SURVEY RESULTS: A cuckoo was heard at the mouth of Big Chico Creek July 6, 1972 and two were seen there June 27, 1973. A cuckoo was observed at Golden State Island on July 16, 1972 and on July 10, 1973. At least 4 cuckoos were observed between the mouth of Pine Creek and the mouth of Big Chico Creek on July 11, 1973. At least two were on the W. bank N. of Ord Ferry Bridge (beyond new county park) on July 8, 1972, one was there on June 26, 1973, and two were there June 31, 1973; on two occasions, these birds were observed to enter the adjacent walnut and orange orchards.

REACH: Ord Ferry Bridge, Glenn and Butte Counties to Butte City, Butte County.

AREAS COVERED: The entire reach was covered by canoe.

GENERAL DESCRIPTION: Suitable habitat occurs over much of this stretch, in particular, at the following sites: both banks, vicinity of river mile 183 (39 h), E. of Jacinto (39 h), E. bank, N. of river mile 177 (23 h), island at river mile 175 (23 h), E. of Hansen Island and E. bank to north (44 h).

SURVEY RESULTS: On July 8, 1972, two cuckoos were observed 1.2 miles S. of the Ord Ferry Bridge on the W. bank and on July 9, 1972, one was near Jacinto, Glenn County on the W. bank and two were there on August 8, 1972. Cuckoos were observed by canoe at four different locations between the Ord Ferry Bridge and Jacinto on July 1, 1973 and at least 2 additional individuals were known to haunt the Jacinto study area (see report). A canoe trip along the remainder of the stretch on July 19, 1973, contacted at least eight cuckoos at six different localities.

REACH: Butte City, Butte County to Colusa, Colusa County.

AREAS COVERED: Packer Lake (37 h), Cobbs Bend (36 h) and Colusa State Park (14 h).

AREAS OF SUITABLE HABITAT NOT COVERED: W. bank S. of Princeton (12 h), Bogg's Bend, E. bank (49 h), W. bank E. of Stegeman (43 h), E. bank, E. of Reese Avenue (18 h).

GENERAL DESCRIPTION: Packer Lake consists of thick, scrubby undergrowths of willow and box elder with a few scattered cottonwoods; the area is more forested to the south. Cobb's Bend and Colusa State Park are covered with moderately dense cottonwood-willow forest. Habitat along this stretch is more dispersed than it is to the north.

SURVEY RESULTS: A cuckoo was located at the N. end of Packer Lake on July 9, 1972. Two were observed copulating in Colusa State Park later the same day and a third bird was observed to the north. At least two birds were in the vicinity of Cobb's Bend on August 10, 1972.

REACH: Colusa, Colusa County, to the delta.

AREAS COVERED: W. bank along Road 117, 2-3 miles N. of Highway 16, Yolo County; W. bank near Elkhorn, Yolo County; E. bank along Garden Highway, 2 miles S. of Interstate 5, Sacramento County; Sacramento Bypass, Yolo County; W. bank at end of Babel Slough Road, Yolo County.

AREAS OF SUITABLE HABITAT NOT COVERED: A few areas between Grimes and Colusa, Colusa County, in particular, E. bank N. of Tisdale Bypass, Cecil Lake, Ogden Bend and Moon's Bend, might harbor cuckoos.

GENERAL DESCRIPTION: South of Grimes, habitat is limited to narrow strips on the berms between levee and river - extensive sites are lacking. The vegetation in these sites, however, often appears seemingly similar to that in areas where cuckoos occur, i.e., dense cottonwood-willow forest.

SURVEY RESULTS: no cuckoos were observed at any of these sites, which were thoroughly surveyed on July 10, 11 and 17, 1972 and again on July 4 and 5, 1973.

APPENDIX II. Survey accounts for the lower Butte Basin.

AREA COVERED: W. of Cherokee Canal approx. 1.5 miles to Butte Creek from the Wild Goose Country Club (just N. of Butte County line) N. 1.4 miles to Sanborn Slough; approx. .5 miles N. up Sanborn Slough by canoe; N. along Butte Slough by canoe from Meridian Road to Butte Creek.

AREAS OF SUITABLE HABITAT NOT COVERED: Willow-tule swamps south of Wild Goose Club and west of the Cherokee Canal.

GENERAL DESCRIPTION: In vicinity of Wild Goose Club-- tules thickly clustered around scattered ponds and frequent dense thickets of willow and buttonwillow; a very few cottonwood trees here and there. Along Butte Slough, the habitat is drier, the corridor of trees along the slough very narrow and cottonwoods and oaks much more prevalent.

SURVEY RESULTS: Cuckoos were observed at four localities north and west of the Wild Goose Club on July 5 and 6, 1973. A pair was observed along Sanborn Slough on August 2, 1973. None were observed along Butte Slough.

APPENDIX III. Survey accounts for the Feather River.

REACH: Oroville, Butte County to Yuba City, Sutter County.

AREAS COVERED: Borrow area, W. bank. E. end of Palm Avenue; E. bank near Honcut Creek; E. bank, W. end of Woodruff Road.

GENERAL DESCRIPTION: Most areas too narrow, too dry or too sparsely covered with vegetation to rank as prime cuckoo habitat.

SURVEY RESULTS: The areas were visited on July 12, 1973. No cuckoos were noted.

REACH: Yuba City, Sutter County to 3.5 miles southwest of Nicolaus, Sutter County.

AREAS COVERED: The stretch from Nicolaus north to Yuba City was covered by driving levee roads. Abbott's Lake was covered by canoe. The stretch south of Nicolaus (W. bank along the Sutter bypass) was covered in the north by car and to the south by canoe.

GENERAL DESCRIPTION: The only extensive habitat was found in the following three areas: Abbott's Lake (60 h), S. of O'Connor Lakes (20 h) and Lake of the Woods (24 h). Abbott's Lake, in particular, seemed to offer ideal habitat, i.e., dense thickets of willow and cottonwood surrounding a moist locality. Considerable evidence of recent disturbance was noted along the river. The area around the O'Connor Lakes, for instance, had been recently cleared of vegetation and the lakes were nearly dry. The area between Lake of the Woods and the Bear River had also been partially denuded of vegetation in the recent past.

SURVEY RESULTS: The areas were surveyed on July 12 and 13, 1972 and again on July 11 and 12, 1973. No cuckoos were noted.