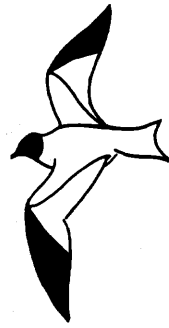


WESTERN BIRDS



Volume 5, Number 3, 1974

A NEW LOOK AT THE NESTING RIPARIAN AVIFAUNA OF THE SACRAMENTO VALLEY, CALIFORNIA

DAVID GAINES, 405 Russell St., Winters, California 95694

The riparian forests and gravel bars of the Sacramento Valley, California, are remnants of a vanishing natural community that has received little attention from field biologists. This type of habitat has been extensively cleared for fuel, agriculture, levee construction and urban development (Thompson 1961, Davis 1973). Except for Grinnell's survey (Grinnell 1924; Grinnell, Linsdale and Dixon 1930), the nesting avifauna has not been studied. The objectives of my research were to census the nesting avifauna of the Sacramento Valley riparian zone and compare the present status of breeding birds with that given in Grinnell and Miller's *The Distribution of the Birds of California* (1944).

METHODS

United States Geological Survey topographical maps and aerial photographs taken by the California Resources Agency in March 1972 were used to locate riparian forest habitat in the Sacramento Valley. Extent of habitat was determined from aerial photographs by counting the number of one-half inch grid squares more than 50% covered by uncultivated woody vegetation.

From April through July 1973 I surveyed bird populations at sites along the Sacramento River between Red Bluff, Tehama County and Colusa, Colusa County and between Knight's Ferry and Babel Slough Road, Yolo County, along Sanborn Slough in the lower Butte Sink, Butte and Sutter counties, along the Feather River between Oroville, Butte County and Verona, Sutter County, along Putah Creek at Steven's

RIPARIAN AVIFAUNA

Bridge, Yolo and Solano counties and along the Consumnes River north of Thornton, Sacramento County. At each site, I walked through the habitat and recorded the number of each bird species heard or sighted.

A study area was established along the Sacramento River 4.3 miles north of Glenn, Glenn and Butte Counties, 39° 35'N, 122° 00'W. I used the mapping methods recommended by the International Bird Census Committee (Svensson 1970) to census breeding birds on three plots within this area. The plots were censused on 11 days between 11 April and 10 July 1973.

Scientific names not otherwise mentioned in the text are included in Table 1.

HABITAT

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 mountain chain (Figure 1). In the past, before construction of dams and levees, seasonal flooding deposited sediment along the banks of the Sacramento River and other large streams. In consequence, 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 (Thompson 1961). The groves that remain, however, amount to less than one percent of this originally wooded area.

The riparian flora is unique not in terms of species, but in terms of growth form. Nowhere else in the arid West does one encounter a humid, broad-leaved, distinctly stratified forest, so draped with vines as to suggest, in the words of John Muir (1894), "fine jungles of tropical luxuriance."

Extensive gravel bars, submerged except in the dry season, support herbaceous plants and small willows (Figure 2). The edges or meander lines of flowing streams are marked by thickets of Sandbar Willow (*Salix sessilifolia*) and Yellow Willow (*S. lasiandra*). Black Willow (*S. nigra*) and Fremont Cottonwood (*Populus fremontii*) thrive at slightly higher elevations (Figure 3). On the least frequently flooded land grow Valley Oak (*Quercus lobata*) and Sycamore (*Platanus racemosa*). The dense canopy of large, matured trees creates a habitat niche for a shade-tolerant understory of small trees, shrubs, vines and forbs, e.g., Box Elder (*Acer negundo*), Blue Elderberry (*Sambucus caerulea*), White Alder (*Alnus rhombifolia*), Oregon Ash (*Fraxinus latifolia*), Button Willow (*Cephalanthus occidentalis*), Black Walnut (*Juglans nigra*), blackberry (*Rubus* spp.), Wild Grape (*Vitis californica*), Stinging Nettle (*Urtica holosericea*), Mugwort (*Artemisia vulgaris*), Ragweed (*Ambrosia psilostachya*), etc.

RIPARIAN AVIFAUNA

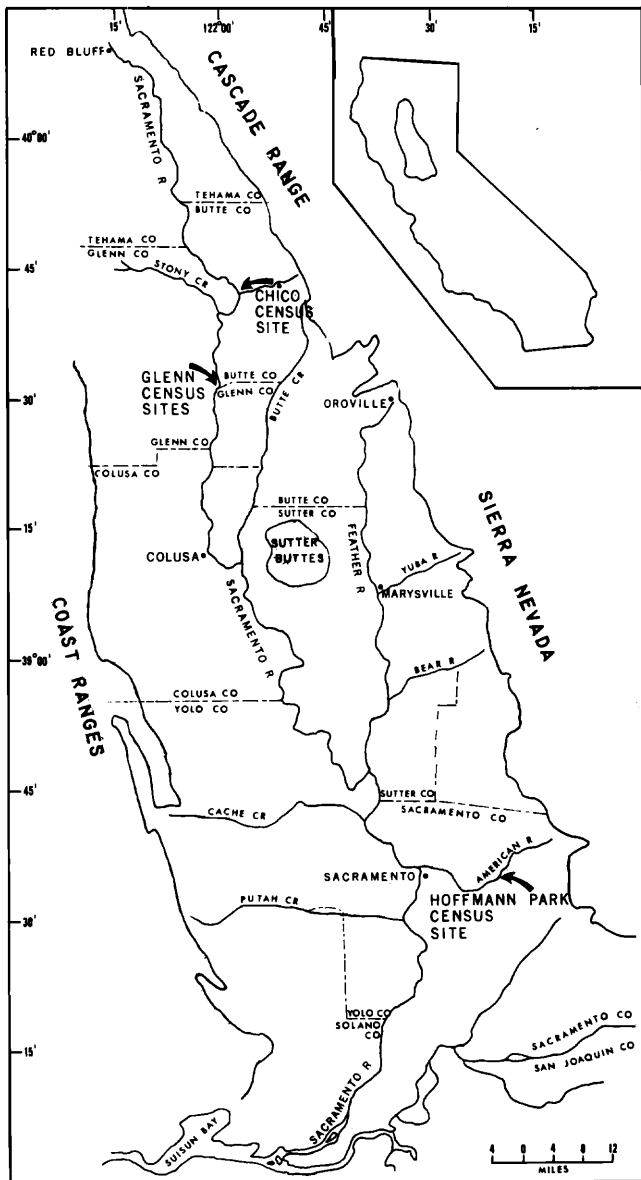


Figure 1. The Sacramento Valley, California and location of breeding bird census sites.

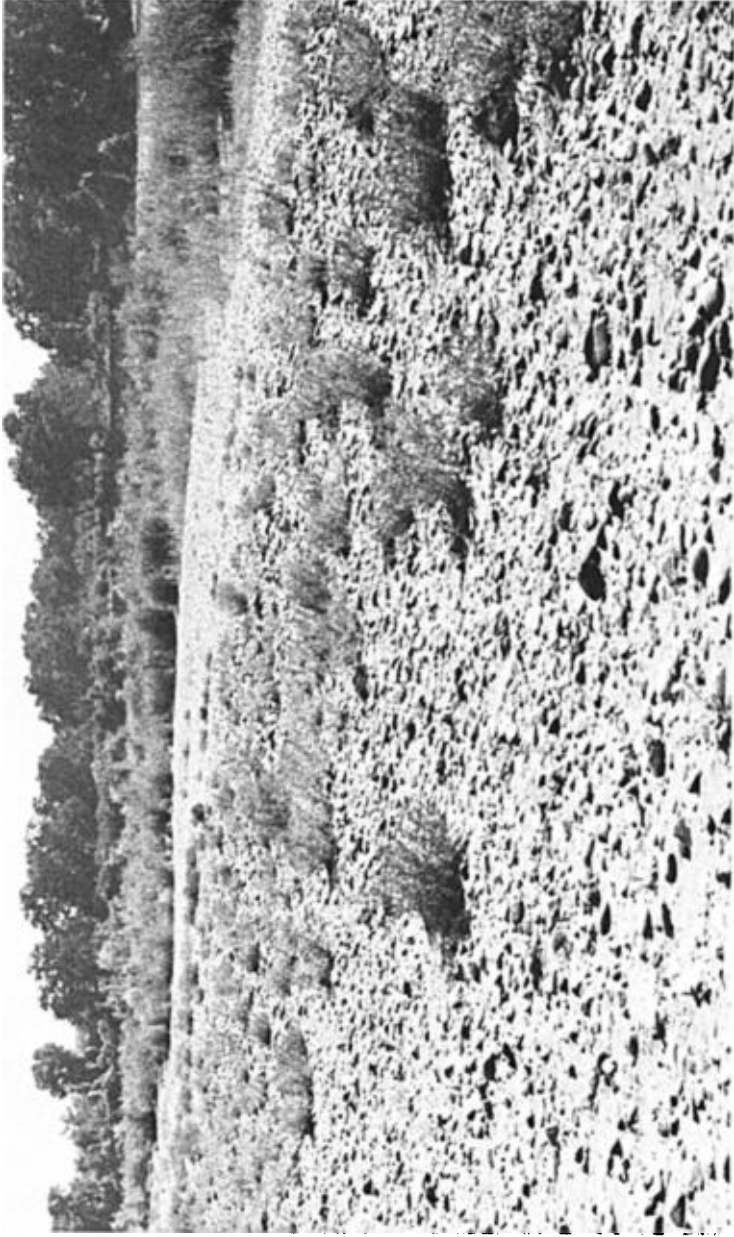


Figure 2. A gravel bar along the Sacramento River 4.3 miles north of Glenn, Glenn County, California.

RIPARIAN AVIFAUNA

DESCRIPTIONS OF STUDY AREA CENSUS PLOTS

The study area occupies 70 ha on the floodplain of the Sacramento River of which 60% is cottonwood and willow forest, 20% brushy fields and 20% gravel bar. Descriptions of the plots follow.

- A. Gravel bar. Size: 8.2 ha. The plot consists of a bar of small rocks and gravel submerged by water except in the late spring and summer dry season. Clumped willow thickets 1-2 m high cover approximately 10% of the area. Herbaceous annuals, mainly composites, form a sparse ground cover.

- B. Brushy field and cottonwood-willow edge. Size: 8.0 ha. The plot consists of a brushy field densely grown to star thistle (*Centaurea* sp.), Mugwort, Ragweed and burdock (*Arctium* sp.). Six Black Walnuts, 4-5 m high, occupy the northeast corner. A narrow slough intersects the plot on the west side. An abundant flow of water enters the slough via an irrigation run-off canal. Three large Sycamores, 20 m high, border the slough in the north-west corner. To the south, the plot abuts on a dense stand of cottonwood and willow forest. The line of trees adjacent to the field was included in the census.

- C. Cottonwood and willow woodland. Size: 10.4 ha. The plot is a remnant of the dense forests that once occupied the floodplain levees of the Sacramento River. The canopy consists of cottonwood and willow about 25 m high. Many trees are draped with Wild Grape. There is a dense understory of small trees and shrubs. A dry river channel divides the plot. Piles of dead wood, deposited by winter floods, litter this and other parts of the area. (For a detailed vegetation analysis, see Gaines 1973.)

RESULTS

Extent of Habitat

Excluding strips of vegetation less than 100 meters wide, approximately 1200 hectares of riparian woodland, mostly cottonwood and willow, persist today in scattered groves in the Sacramento Valley. These groves are restricted to 34 sites along the Sacramento River between Red Bluff and Colusa, one site in the lower Butte Sink and three sites along the Feather River between Marysville and Nicolaus. Most are on islands, bends in the river or around oxbow lakes and marshes, i.e., areas subject to flooding and thus unsuited to agriculture. Smaller patches of woodland line many other stretches of Valley watercourses.

RIPARIAN AVIFAUNA

The Nesting Avifauna

Habitat and status, derived from survey data, of birds which are known to nest in the Sacramento Valley riparian zone (Grinnell and Miller 1944) are summarized in Table 1. Habitat is classed as follows:

W	woodland (any type of forest; subsumes the following two classes)
OK	Valley Oak woodland (usually mixed with Sycamore and/or cottonwood and with shrubby understory)
CT-WL	cottonwood and willow woodland
OK-SY	Valley Oak and Sycamore woodland
E	edge—the forest-field and forest-gravel bar interfaces
F	fields and brushy areas
G	gravel bars
B	riverbanks

Abundance is indicated as follows:

A	abundant (occupies 80-100% of suitable habitat)
C	common (60-80%)
F	fairly common (40-60%)
U	uncommon (20-40%)
R	rare (less than 20%)
?	unrecorded on the author's surveys

The "Upper Sac" refers to the Sacramento River and its tributaries from Colusa County north, the "Lower Sac" to the Sacramento River from Knight's Landing to Babel Slough, Yolo and Sacramento counties and the "Feather" to the Feather River from Oroville, Butte County to Verona, Sutter County. Data on density are derived from breeding bird censuses conducted at the sites shown in Figure 1. Only the Glenn sites were censused by the author. In Table 1, the sites are numbered as follows:

1A	Clumped cottonwood and willow woodland, 5.75 miles west of Chico, Butte County, 1972 (Demboasz, Fickett and Manolis 1972)
1B	Same as 1A, 1973 (Manolis 1973)
2	Gravel bar, Glenn study area
3	Brushy field and cottonwood and willow edge, Glenn study area
4	Cottonwood and willow woodland, Glenn study area (Gaines 1973)
5A	Riparian oak woodland, Ancil Hoffmann County Park, Sacramento County, 1971 (Tangren 1971)
5B	Same as 5A, 1972 (Tangren 1972)

RIPARIAN AVIFAUNA

Table 1. The nesting avifauna of the Sacramento Valley riparian zone. Species followed by an asterisk (*) are discussed individually in the text.

SPECIES	STATUS			TERRITORIAL MALES/KM ²							
	NESTING HABITAT	Upper Sac.	Lower Sac.	Feather	1A	1B	2	3	4	5A	5B
Double-crested Cormorant <i>Phalacrocorax auritus</i>	W	?	?	?	-	-	-	-	-	-	-
Great Blue Heron <i>Ardea herodias</i>	W	C	U	U	-	-	-	-	-	-	-
Green Heron <i>Butorides virescens</i>	W	R	R	U	-	-	-	-	-	+	-
Great Egret <i>Casmerodius albus</i>	W	U	R	R	-	-	-	-	-	-	-
Black-crowned Night Heron <i>Nycticorax nycticorax</i>	W	R	R	R	-	-	-	-	-	-	-
Wood Duck <i>Aix sponsa</i>	W	U	R	R	-	-	-	-	-	-	+
Common Merganser* <i>Mergus merganser</i>	W	R	?	?	-	-	-	-	-	-	-
White-tailed Kite <i>Elanus leucurus</i>	E	R	R	R	-	-	-	-	-	+	+
Cooper's Hawk* <i>Accipiter cooperii</i>	W	?	?	?	-	-	-	-	-	-	-
Red-tailed Hawk <i>Buteo jamaicensis</i>	W	F	F	F	-	-	-	-	-	-	-
Red-shouldered Hawk* <i>Buteo lineatus</i>	W	U	?	?	+	+	-	-	-	+	-
American Kestrel <i>Falco sparverius</i>	E	U	F	F	-	-	-	+	-	-	-
California Quail <i>Lophortyx californicus</i>	WF	A	U	F	40	43	-	38	30	78	85
Ring-necked Pheasant <i>Phasianus colchicus</i>	F	U	U	U	-	+	-	-	-	+	-
Killdeer <i>Charadrius vociferus</i>	G	C	U	U	-	-	25	-	-	-	-
Spotted Sandpiper* <i>Actitis macularia</i>	G	C	?	R	-	-	+	-	-	-	-
Mourning Dove <i>Zenaidura macroura</i>	W	A	C	A	35	26	-	-	+	+	+
Yellow-billed Cuckoo* <i>Coccyzus americanus</i>	CT-WL	U	?	?	+	+	-	-	+	-	-
Screech Owl <i>Otus asio</i>	W	C	C	C	Not censused						
Great Horned Owl <i>Bubo virginianus</i>	W	C	U	C	Not censused						
Long-eared Owl* <i>Asio otus</i>	W	?	?	?	Not censused						
Lesser Nighthawk <i>Chordeiles acutipennis</i>	G	U	?	?	-	-	25	-	-	-	-
Anna's Hummingbird <i>Calypte anna</i>	W	R	R	R	-	-	-	-	-	+	+
Black-chinned Hummingbird <i>Archilochus alexandri</i>	W	R	?	R	-	-	-	-	-	-	-

RIPARIAN AVIFAUNA

Table 1 (cont.)

SPECIES	NESTING HABITAT	STATUS			TERRITORIAL MALES/KM ²						
		Upper Sac.	Lower Sac.	Feather	1A	1B	2	3	4	5A	5B
Belted Kingfisher <i>Megaceryle alcyon</i>	B	A	U	U	-	-	-	-	-	-	-
Common Flicker <i>Colaptes auratus</i>	W	F	F	C	+	+	-	-	+	+	+
Acorn Woodpecker <i>Melanerpes formicivorus</i>	OK	A	A	A	-	-	-	-	-	28	39
Downy Woodpecker <i>Dendrocopos pubescens</i>	W	C	?	F	26	34	-	-	30	+	-
Nuttall's Woodpecker <i>Dendrocopos nuttallii</i>	W	A	A	A	35	43	-	25	50	+	+
Western Kingbird <i>Tyrannus verticalis</i>	E	C	A	C	26	+	-	38	-	-	-
Ash-throated Flycatcher <i>Myiarchus cinerascens</i>	W	C	C	A	57	34	-	25	40	22	+
Black Phoebe <i>Sayornis nigricans</i>	EBG	C	F	F	+	-	-	-	-	-	+
Willow Flycatcher* <i>Empidonax traillii</i>	CT-WL	?	?	?	-	-	-	-	-	-	-
Western Flycatcher* <i>Empidonax difficilis</i>	W	?	?	?	-	-	-	-	-	-	-
Western Wood Pewee* <i>Contopus sordidulus</i>	W	A	U	A	62	82	-	-	45	-	-
Tree Swallow <i>Iridoprocne bicolor</i>	W	A	F	F	44	+	-	75	+	-	-
Bank Swallow <i>Riparia riparia</i>	B	U	?	?	-	-	-	-	-	-	-
Rough-winged Swallow <i>Stelgidopteryx ruficollis</i>	B	F	?	R	-	-	-	-	-	-	-
Purple Martin <i>Progne subis</i>	W	R	?	U	-	-	-	-	-	-	-
Scrub Jay <i>Aphelocoma coerulescens</i>	W	A	C	A	48	38	-	-	35	55	58
Yellow-billed Magpie <i>Pica nuttalli</i>	E	R	R	R	-	-	-	-	-	-	+
Plain Titmouse <i>Parus inornatus</i>	W	A	C	C	26	43	-	+	30	68	66
Bushtit <i>Psaltriparus minimus</i>	W	F	F	C	26	26	-	25	30	50	42
White-breasted Nuthatch <i>Sitta carolinensis</i>	OK-SY	C	F	C	-	-	-	-	-	+	+
Wrentit* <i>Chamaea fasciata</i>	W	?	F	A	-	-	-	-	-	-	-
House Wren <i>Troglodytes aedon</i>	W	F	U	F	-	-	-	-	30	-	+
Bewick's Wren <i>Thryomanes bewickii</i>	W	A	C	A	114	163	-	25	80	55	50
Mockingbird <i>Mimus polyglottos</i>	E	?	?	?	-	-	-	-	-	+	+

RIPARIAN AVIFAUNA

Table 1 (cont.)

SPECIES	NESTING HABITAT	STATUS			TERRITORIAL MALES/KM ²									
		Upper Sac.	Lower Sac.	Fea-ther	1A	1B	2	3	4	5A	5B			
Robin														
<i>Turdus migratorius</i>	W	C	R	F	26	34	-	-	50	+	+			
Swainson's Thrush*														
<i>Hylocichla ustulata</i>	W	?	?	?	-	-	-	-	-	-	-			
Blue-gray Gnatcatcher*														
<i>Poliophtila caerulea</i>	W	?	?	?	-	-	-	-	-	-	-			
Starling*														
<i>Sturnus vulgaris</i>	E	A	A	C	26	26	-	50	-	102	100			
Hutton's Vireo*														
<i>Vireo buttoni</i>	W	R	?	?	-	+	-	-	-	-	-			
Bell's Vireo*														
<i>Vireo bellii</i>	CT-WL	?	?	?	-	-	-	-	-	-	-			
Warbling Vireo*														
<i>Vireo gilvus</i>	W	?	?	?	-	-	-	-	-	-	-			
Yellow Warbler*														
<i>Dendroica petechia</i>	W	U	?	?	-	34	-	-	+	-	-			
Common Yellowthroat*														
<i>Geothlypis trichas</i>	E	U	R	U	+	+	-	-	-	-	-			
Yellow-breasted Chat														
<i>Icteria virens</i>	E	C	?	U	+	+	-	25	-	-	-			
Western Meadowlark														
<i>Sturnella neglecta</i>	F	?	?	?	-	-	-	-	-	+	+			
Northern Oriole														
<i>Icterus galbula</i>	W	A	A	A	44	60	-	38	50	-	-			
Brewer's Blackbird														
<i>Euphagus cyanocephalus</i>	FG	U	U	U	-	-	75	100	-	-	-			
Brown-headed Cowbird														
<i>Molothrus ater</i>	W	A	A	A	35	26	-	38	40	-	-			
Black-headed Grosbeak														
<i>Pheucticus melanocephalus</i>	W	A	C	A	123	158	-	75	130	-	-			
Blue Grosbeak														
<i>Guiraca caerulea</i>	EF	U	U	U	-	+	-	+	-	-	-			
Lazuli Bunting														
<i>Passerina amoena</i>	EF	F	F	U	40	+	-	38	-	-	-			
House Finch														
<i>Carpodacus mexicanus</i>	W	C	C	C	-	+	-	+	35	-	-			
American Goldfinch														
<i>Spinus tristis</i>	W	C	U	C	-	26	-	25	80	-	-			
Lesser Goldfinch														
<i>Spinus psaltria</i>	W	C	F	U	35	43	-	-	+	-	-			
Rufous-sided Towhee														
<i>Pipilo erythrophthalmus</i>	W	A	A	A	92	94	-	38	60	62	58			
Brown Towhee														
<i>Pipilo fuscus</i>	W	C	U	F	44	+	-	25	+	+	+			
Lark Sparrow														
<i>Chondestes grammacus</i>	F	U	?	R	-	-	25	-	-	-	-			
Song Sparrow*														
<i>Melospiza melodia</i>	E	?	?	?	-	-	-	-	-	-	-			

RIPARIAN AVIFAUNA

Breeding bird census data from the Sacramento Valley riparian zone are summarized in Table 2. Greatest species diversity and overall density occurred in clumped cottonwood-willow (1A and 1B). In continuous cottonwood-willow (4), slightly lower figures were obtained. Diversities and densities were much lower in riparian oak woodland (5A and 5B) and brushy field (3) and lowest on the gravel bar (2). The percentage of the total number of nesting birds which migrate to tropical or subtropical areas averaged to 37.2 in cottonwood-willow and 3.7 in oak.

Following are survey results for nesting birds whose status appears to have changed since publication of *The Distribution of the Birds of California* (Grinnell and Miller 1944). All references to prior status refer to this publication unless noted otherwise.

Double-crested Cormorant. Despite "marked reduction in numbers of individuals and breeding colonies," was considered "locally common" within a range which included the Sacramento Valley. None were recorded on my surveys.

Common Merganser. There are no previous reports of nesting in the Sacramento Valley. Individual adult females were observed on 13 May 1973 on the Sacramento River south of Dye Creek, Tehama County and on 11 July 1973 on the Sacramento River south of Pine Creek, Butte and Glenn counties. A female with eight flightless young was observed on 19 July 1973 on the Sacramento River 1.5 miles south of Glenn, Glenn and Butte counties and a female with five flightless young was observed on 20 July 1973 on the Sacramento River 2.0 miles south of Tehama, Tehama County.

Cooper's Hawk. Was formerly considered "common" within a range which included the Sacramento Valley. My sole observation during the nesting season was of a single bird 13 May 1973, along the Sacramento River south of Antelope Creek, Tehama County.

Red-shouldered Hawk. Was considered "originally common" within a range which included the Sacramento Valley. I recorded the species at six of 20 survey sites along the upper Sacramento River. None were found elsewhere.

Spotted Sandpiper. There are no previous reports of nesting in the Sacramento Valley. Grinnell, however, shot a female with an egg ready for laying along the Sacramento River near Red Bluff 11 May 1924 (Grinnell, Dixon and Linsdale 1930). I recorded the species at 14 of 20 survey sites along the upper Sacramento River. One was present on 4 July 1973 along the Feather River near Oroville, Butte County. Three downy young were found 4.3 miles north of Glenn, Butte County, on 10 July 1973.

Yellow-billed Cuckoo. A total of 42 individuals were observed or heard at 28 localities along the Sacramento River between Red Bluff and Colusa. Five were observed at four localities in the Butte Sink, Butte and Sutter counties. None were observed along the Feather River or in the lower Sacramento Valley. The last report for the lower valley was one at Willow Slough, Yolo County, 29 June 1965 (Betty Kimball pers. comm.).

Long-eared Owl. Was considered common within a range which included the Sacramento Valley. None were recorded on my surveys.

Willow and Western Flycatchers. The Sacramento Valley was included within their nesting ranges. I recorded neither on my surveys.

RIPARIAN AVIFAUNA

- Western Wood Pewee. Was not thought to nest in the Sacramento Valley. Grinnell (1924) considered the few he encountered in May 1924 south of Red Bluff transients. I recorded this species at 19 of 20 survey sites along the upper Sacramento River, seven of eight sites along the Feather River and three of nine sites in the lower Sacramento Valley. Nests were located at the Chico and Glenn census sites.
- Wrentit. The Sacramento Valley was included within its nesting range. I recorded this species at seven of eight survey sites along the Feather River and four of nine sites in the lower Sacramento Valley, but found none along the upper Sacramento River.
- Swainson's Thrush. The Sacramento Valley was included within its nesting range. I found none on my surveys.
- Blue-gray Gnatcatcher. Was considered local in riverbottoms of the valleys. I found none on my surveys.
- Starling. Has become abundant since 1964, when it was first observed in the Sacramento Valley.
- Hutton's Vireo. There are no previous reports of nesting in the Sacramento Valley. One was on Dog Island, Red Bluff, on 14 May 1973. A pair nested in 1973 along the Sacramento River 5.75 miles west of Chico, Butte County and was parasitized by Brown-headed Cowbird (T. Manolis pers. comm.).
- Bell's Vireo. The Sacramento Valley was included within its nesting range. In May 1924, Grinnell thought it fairly common along the Sacramento River south of Red Bluff (Grinnell 1924; Grinnell, Linsdale and Dixon 1930). An individual along Butte Creek, 4.0 miles southwest of Chico, Butte County, on 5 May 1958 was the last reported in the Sacramento Valley (Cogswell 1958). None were found on my surveys.
- Warbling Vireo. The Sacramento Valley was included within its nesting range. None were found on my surveys.
- Yellow Warbler. Was considered common within a range which included the Sacramento Valley. In May 1924, along the Sacramento River south of Red Bluff, Tehama County, Yellow Warbler and Bell's Vireo were the "usual companions in riverside willows..." (Grinnell 1924). I recorded this species at four of 20 survey sites in the upper Sacramento Valley. None were found elsewhere.
- Common Yellowthroat. Was considered common within a range which included the Sacramento Valley. I recorded this species at four of 20 survey sites along the upper Sacramento River, three of eight sites along the Feather River and one of nine sites in the lower Sacramento Valley.
- Song Sparrow. Was considered common within a range which included the Sacramento Valley. I failed to locate any in riparian woodland, but they were fairly common in the tule marshes of the lower Butte Sink on 5 July 1973. A pair was observed on a drainage canal grown to tules near the Sacramento Bypass, Yolo County, on 1 June and 4 July 1973.

DISCUSSION

Comparison with other California Habitat Formations

Miller (1951), in the only published discussion of California's riparian avifauna, stated that "the number of species of birds associated with riparian woodland is larger than that of any other [California] forma-

RIPARIAN AVIFAUNA

tion." Miller, however, did not restrict attention to lowland areas, but included streamside woodlands ranging zonally from Lower Sonoran to Canadian. His list of riparian birds includes nine species restricted to the mountains¹ and 13 species restricted to the extreme northwestern, eastern or southeastern parts of California². Great Blue Heron, Great Egret, California Quail, Acorn Woodpecker, Scrub Jay, White-breasted Nuthatch and Wrentit are excluded, although all nest in riparian woodland. Miller's conclusion, therefore, needs to be reviewed.

Cottonwood-willow riparian woodland supports a greater diversity and density of nesting birds than oak woodland (Table 2). This is attributable to a much more dense and stratified foliage, which provides a greater range of foraging space for trunk, branch and leaf gleaners and more mesic conditions, which promote lusher plant growth, higher invertebrate populations and, therefore, more available food. Let us compare this cottonwood-willow nesting avifauna with those of other California habitat formations.

Since 1950, breeding birds have been censused on 50 plots in California. In a region so diverse in habitat types and in which variations in rainfall significantly alter breeding bird densities from year to year, such a sample can be used only for general comparisons. Stewart (1972) grouped 29 of these censuses into the following habitat types: (1) non-coniferous mixed forest with oaks, (2) coastal mixed forest with conifers, (3) coastal coniferous forest, (4) Sierra coniferous forest (about 6000 feet) and (5) chaparral. In Table 3, I compare the data from Sacramento Valley cottonwood and willow plots (three censuses at two localities) with that from each of these five habitat types. All censuses were within the geographic boundaries of the California biotic province as discussed by Miller (1950). According to these data, the Sacramento Valley cottonwood and willow riparian woodland supports a diversity and density of breeding birds equal to or higher than other censused California habitats.

1. Hairy Woodpecker (*Dendrocopos villosus*), Yellow-bellied Sapsucker (*Sphyrapicus varius*), Steller's Jay (*Cyanocitta stelleri*), Solitary Vireo (*Vireo solitarius*) Orange-crowned Warbler (*Vermivora celata*), MacGillivray's Warbler (*Oporornis tolmiei*), Wilson's Warbler (*Wilsonia pusilla*), Purple Finch (*Carpodacus purpureus*) and Fox Sparrow (*Passerella iliaca*)

2. Harris' Hawk (*Parabuteo unicinctus*), Ruffed Grouse (*Bonasa umbellus*), Ground Dove (*Columbigallina passerina*), "Gilded" Flicker (*Colaptes auratus chrysoides*), Gila Woodpecker (*Centurus uropygialis*), Ladder-backed Woodpecker (*Dendrocopos scalaris*), Eastern Kingbird (*Tyrannus tyrannus*), Vermilion Flycatcher (*Pyrocephalus rubinus*), Black-billed Magpie (*Pica pica*), Black-capped Chickadee (*Parus atricapillus*), Chestnut-backed Chickadee (*Parus rufescens*), Summer Tanager (*Piranga rubra*), Cardinal (*Cardinalis cardinalis*) and Abert's Towhee (*Pipilo aberti*)

RIPARIAN AVIFAUNA

Table 2. Summary of breeding bird census data on the nesting riparian avifauna of the Sacramento Valley, California.

SITE	HABITAT	NO. OF SPP.	MALES/KM ²	% INDIVIDUALS MIGRATORY
1A	Clumped cottonwood-willow	27	1016	39.8
1B	Clumped cottonwood-willow	32	1140	37.4
2	Floodplain gravel bar	5	150	16.7
3	Brushy field and cot-wil edge	22	728	46.6
4	Cottonwood-willow	25	945	34.3
5A	Riparian oak woodland	23	638	3.7
5B	Riparian oak woodland	24	625	3.7

Table 3. Comparison of breeding bird census data from Sacramento Valley cottonwood and willow riparian woodland with that from other California habitats (\bar{x} = mean, SD = standard deviation, DF = degrees of freedom, T = t statistic, SIG = significance level).

HABITAT	NUMBER OF SPECIES					TERRITORIAL MALES/KM ²				
	\bar{x}	SD	DF	T	SIG	\bar{x}	SD	DF	T	SIG
Cot-wil	28.0	3.6	—	—	—	1034	99	—	—	—
Non-coniferous	21.6	4.9	13	2.09	0.1	1135	504	13	0.34	not sig
Coastal mixed	21.1	4.5	9	2.35	0.05	784	180	9	2.22	0.1
Coastal coniferous	25.1	3.2	12	1.37	not sig	848	158	11	1.89	0.1
Sierra coniferous	19.8	4.8	5	2.48	0.1	318	109	5	8.89	0.001
Chaparral	12.2	2.7	11	8.32	0.001	485	107	11	7.86	0.001

Sources of breeding bird census data (AFN=Audubon Field Notes, AB=American Birds):

Cottonwood-willow: AB 26:978-9, 1002-3, 1972; AB 27:994-95, 1973.

Non-coniferous: AFN 1:201, 1947; AFN 10:433-34, 1956; AFN 15:505-06, 1961; AFN 20:633-43, 1966; AB 24:749-51, 1970; AB 25:967-69, 983-84, 1971; AB 26:977-78, 979, 981-83, 1001-2, 1972.

Coastal mixed: AFN 12:448-49, 1958; AFN 13:464-65, 1959; AFN 16:529-31, 1962; AFN 17:503, 1963; AFN 20:629-30, 1966; AFN 21:629, 1967; AB 26:981, 982-83, 1972.

Coastal coniferous: AFN 6:312-14, 1952; AFN 7:351, 1953; AFN 21:649, 1967; AB 25:987-88, 1971; AB 26:983-84, 984, 984-85, 985-86, 986, 1972.

Sierra coniferous: AFN 5:316, 1951; AFN 20:625-26, 1966; Condor 72:182-89, 1970.

Chaparral: AFN 9:424-25, 1955; AFN 10:428, 1956; AFN 15:514-15, 1961; AFN 16:533-34, 1962; AFN 18:561-62, 1964; AFN 19:612-14, 1965; AB 25:1003-04, 1971; AB 26:987, 1972.



Figure 3. Cottonwood and willow vegetation along the Sacramento River 5.0 miles north of Glenn, Glenn County, California.

RIPARIAN AVIFAUNA

Avifaunal Changes

The results of my study suggest that four species (Common Merganser, Spotted Sandpiper, Western Wood Pewee and Starling) have increased as nesting birds in the Sacramento Valley riparian zone since publication of Grinnell and Miller (1944). In addition, the Brown-headed Cowbird has colonized the valley during the present century (Grinnell and Miller 1944). Twelve species (Cooper's Hawk, Red-shouldered Hawk, Yellow-billed Cuckoo, Willow Flycatcher, Western Flycatcher, Swainson's Thrush, Blue-gray Gnatcatcher, Bell's Vireo, Warbling Vireo, Yellow Warbler, Common Yellowthroat and Song Sparrow) appear to have declined or disappeared.

Shasta Dam, completed in 1945, has increased the flow and lowered the water temperature of the Sacramento River during the dry season (Davis 1973). This may have permitted Common Merganser and Spotted Sandpiper to nest in the valley.

In Tables 4 and 5, I indicate susceptibility to Brown-headed Cowbird parasitism of passerine species which have declined and for those which have maintained or increased their numbers as nesting birds in Sacramento Valley riparian woodland. Susceptibility is derived from Hanna (1928), Rowley (1930), Friedmann (1929 and 1963) and Payne (1973). With the exception of Swainson's Thrush, the nine species which have declined are precisely those most often victimized by cowbirds.

Brown-headed Cowbirds were able to colonize the Sacramento Valley when the reclamation and irrigation projects of the early century allowed for widespread agricultural land-use. Although Grinnell (1924) observed none at all along the Sacramento River south of Red Bluff in May 1924, they were common in the valley by 1930 (Neff 1930). Pressure from the parasitic cowbird might lower reproductive success of susceptible species.

Bell's Vireo, Yellow Warbler and Common Yellowthroat were known to be numerous in pre-cowbird times (Grinnell 1924; Grinnell, Linsdale and Dixon 1930). Of these, only the Bell's Vireo has vanished entirely. Perhaps Yellow Warbler and Common Yellowthroat have managed to maintain themselves through accretion from neighboring, better insulated populations, for instance, in the case of the Yellow Warbler, those of mountain canyons. The range of Bell's Vireo, in contrast, was entirely limited to lowland riparian where pressure from cowbirds was greatest.

The decline of Cooper's Hawk, Red-shouldered Hawk and Yellow-billed Cuckoo is at least partially attributable to the lack of sufficiently extensive riverbottom woodland. Red-shouldered Hawk and Yellow-billed Cuckoo were found only in the upper valley where patches of habitat in excess of 100 meters in width and 10 hectares in overall ex-

RIPARIAN AVIFAUNA

tent persist. I am unable to account for the absence of Cooper's Hawk in areas of seemingly suitable habitat.

Table 4. Susceptibility to cowbird parasitism of species which have declined as nesters in Sacramento Valley riparian woodland.

SPECIES	SUSCEPTIBILITY
Willow Flycatcher	Very high
Western Flycatcher	Moderate (?)
Swainson's Thrush	Low (?)
Blue-gray Gnatcatcher	High
Bell's Vireo	Very high
Warbling Vireo	Very high
Yellow Warbler	High
Common Yellowthroat	High
Song Sparrow	High

Table 5. Susceptibility to cowbird parasitism of species which have maintained or increased their numbers as nesters in Sacramento Valley riparian woodland.

SPECIES	SUSCEPTIBILITY
Western Kingbird	Very low
Ash-throated Flycatcher	No records of being parasitized
Western Wood Pewee	Low?
Tree Swallow	Low
Bank Swallow	Very low
Rough-winged Swallow	No records
Purple Martin	No records
Scrub Jay	No records
Plain Titmouse	No records
Bushtit	Low
House Wren	Very low
Bewick's Wren	Low
Robin	Low
Starling	Very low
Yellow-breasted Chat	Moderate?
Northern Oriole	Low
Black-headed Grosbeak	Moderate?
Lazuli Bunting	Moderate
House Finch	Low
American Goldfinch	Moderate?
Lesser Goldfinch	Low

RIPARIAN AVIFAUNA

SUMMARY

About 65 species of bird nest in the forests and gravel bars of the Sacramento Valley riparian zone. The luxuriant cottonwood and willow woodlands, in particular, support a density and diversity of breeding birds equal to or greater than other censused California habitats. This is in spite of the fact that man has reduced these forests to a few, insular patches.

Man has affected the nesting avifauna directly through destruction and alteration of the habitat. Only in a few places, for instance, is there sufficiently extensive riverbottom woodland to meet the needs of Red-shouldered Hawk and Yellow-billed Cuckoo. The spread of Brown-headed Cowbirds into riparian forest has resulted in the decline or disappearance of nine species of passerines susceptible to nest parasitism. In sum, four species (Common Merganser, Spotted Sandpiper, Western Wood Pewee and Starling) have increased and 12 species (Cooper's Hawk, Red-shouldered Hawk, Yellow-billed Cuckoo, Willow Flycatcher, Western Flycatcher, Swainson's Thrush, Blue-gray Gnatcatcher, Bell's Vireo, Warbling Vireo, Yellow Warbler, Common Yellowthroat and Song Sparrow) have declined or disappeared as nesting birds since publication of Grinnell and Miller (1944).

CONSERVATION NOTE

In recent years, a growing population has claimed more and more lowland riparian habitat for agriculture, homes and recreational areas. The Army Corps of Engineers continues to convert miles of river forest into treeless, rock-lined channels, sacrificing aesthetic and wildlife values to engineering efficiency (Davis 1973; Figure 4). It falls on us to preserve, protect and appreciate this richly beautiful biotic community.

ACKNOWLEDGMENTS

I wish to thank Peter Brown, William Grenfell, Sally Judy, Ron Jurek, Howard Leach, Robert Malette, Tim Manolis, David Shuford and Bruce Webb for assistance in the field and Richard Stallcup, Tim Manolis and Profs. W. J. Hamilton, III, D. G. Raveling and R. L. Rudd for helpful suggestions and critical reading of the manuscript. Louis Henrich of Glenn, California graciously gave permission to use his land as a study area. The Division of Environmental Studies, University of California at Davis (1972) and the California Department of Fish and Game (1973) provided financial assistance for censusing cuckoos.

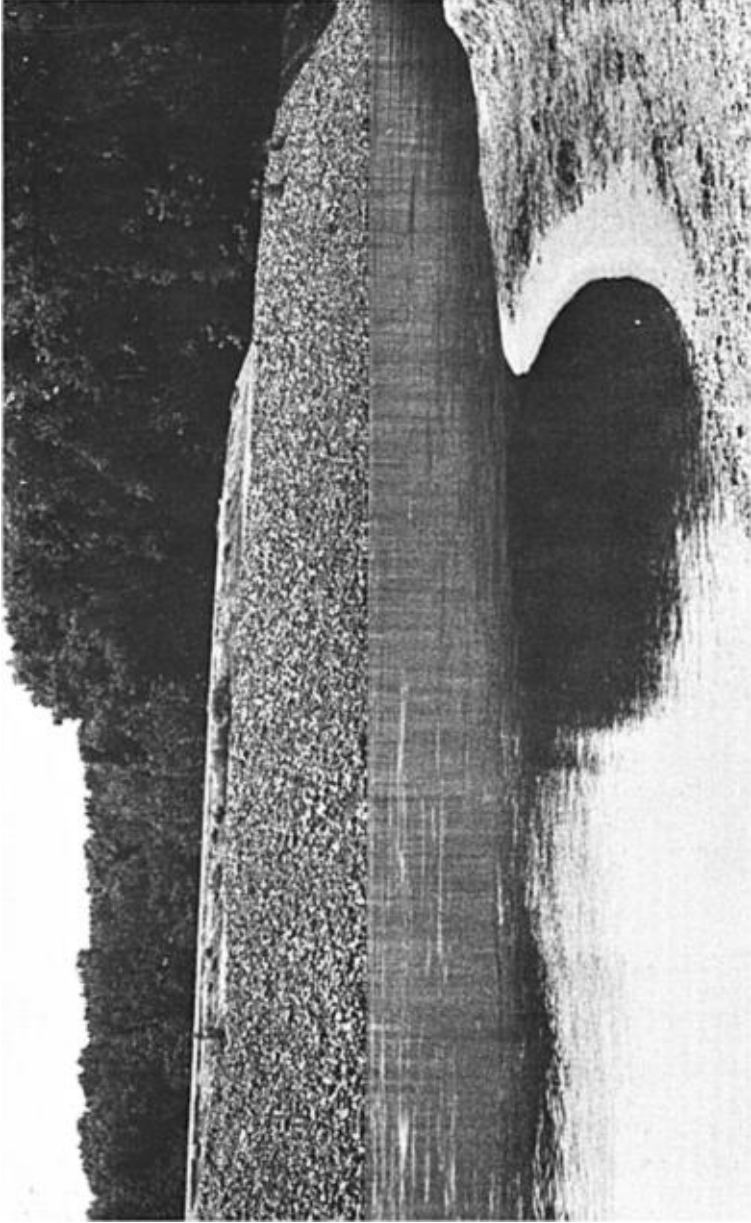


Figure 4. Riparian forest replaced by "bank improvement," the work of the Army Corps of Engineers along the Sacramento River near Colusa, Colusa County, California.

RIPARIAN AVIFAUNA

LITERATURE CITED

- Cogswell, H. L. 1958. The spring migration. Middle Pacific Coast region. Aud. Field Notes 12:379-384.
- Davis, K. J. 1973. Saving the Sacramento River. Military Engineer 42:76-78.
- Dembosz, D., K. Fickett and T. Manolis. 1972. Breeding bird census. Disturbed floodplain woodland. Am. Birds 26:978-979.
- Friedmann, H. 1929. The cowbirds—a study in the biology of social parasitism. C. C. Thomas, Springfield, Ill.
- Friedmann, H. 1963. Host relations of the parasitic cowbirds. U. S. Natl. Mus. Bull. 233.
- Gaines, D. 1973. Breeding bird census. Floodplain riparian woodland. Am. Birds 27:995.
- Grinnell, J. 1924. Unpublished notebooks. Museum of Vertebrate Zoology, Univ. of California, Berkeley.
- Grinnell, J., J. M. Linsdale and J. Dixon. 1930. Vertebrate natural history of a section of northern California through the Lassen Peak region. Univ. California Press, Berkeley.
- Grinnell, J. and A. H. Miller, 1944. The distribution of the birds of California. Pac. Coast Avifauna 27.
- Hanna, W. C. 1928. Notes on the Dwarf Cowbird in southern California. Condor 30:161-162.
- Manolis, T. 1973. Breeding bird census. Disturbed floodplain woodland. Am. Birds 27:994-995.
- Miller, A. H. 1951. An analysis of the distribution of the birds of California. Univ. California Publ. Zool. 50:531-643.
- Muir, J. 1894. The mountains of California. T. Fisher Unwin, London.
- Neff, J. A. 1930. Cowbirds in the Sacramento Valley. Condor 32:250-252.
- Payne, R. B. 1973. The breeding season of a parasitic bird, the Brown-headed Cowbird, in central California. Condor 75:86-99.
- Rowley, J. S. 1930. Observations on the Dwarf Cowbird. Condor 32:130.
- Svensson, S. 1970. An international standard for a mapping method in bird census work recommended by the International Bird Census Committee. Aud. Field Notes 24:722-726.
- Stewart, R. M. 1972. A summary of bird surveys in California. Pt. Reyes Bird Observatory Newsletter 21:3.
- Tangren, G. 1971. Breeding bird census. Riparian oak woodland. Am. Birds 25:967-969.
- Tangren, G. 1972. Breeding bird census. Riparian oak woodland. Am. Birds 26:977-978.
- Thompson, K. 1961. Riparian forests of the Sacramento Valley, California. Annals Assoc. of Am. Geog. 51:294-315.

RIPARIAN AVIFAUNA



Sketch by Dave Winkler