

# RIPARIAN HABITATS AND AVIAN DENSITIES ALONG THE SACRAMENTO RIVER

by

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## SUMMARY

During the month of August, 1973, a study was undertaken to determine the value of riparian vegetation to bird populations along parts of the Sacramento River. Nine study quadrats were selected in riparian habitats along the river. Avian populations were studied to determine bird density and diversity. A total of 47 species, including the Yellow-billed Cuckoo, were identified. On the basis of five censuses in each quadrat all wooded riparian habitats studied were shown to support high bird populations. Densities ranged from 7 to 14.1 birds per acre. Vegetation was sampled and woody plant associations for each quadrat are described. Banks, berms and levees were measured and physical descriptions of each quadrat are included.

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## INTRODUCTION

The Sacramento River of Northern California has along it's banks the only significant wooded stands of riparian habitat in the Sacramento Valley. These wooded stands, depending on the configuration of the levee system, range from a few meters (where the levee serves as the river bank), to a berm of varying width, to a flood plain several hundred meters wide. The banks in some areas are natural and in others have been cleared and rocked.

The purpose of this project was to study avian populations associated with this riparian habitat and to determine bird densities and species diversity in specific plant association communities. This was accomplished by selecting a variety of representative areas along the river and conducting censuses. A vegetational analysis was made of dominant woody species of each area along with a written visual description and photographs. Census plot maps, cross sectional drawings and measurement of the area under consideration are included where appropriate.

Utilizing the quadrat method sample censuses were conducted over nine different segments of the riparian habitat during the month of August, 1973. The figures obtained during these censuses were used to formulate a bird density in terms of birds per acre. This can then be used for judging supporting capabilities of various habitat types and for comparison purposes between different areas.

Censuses conducted over only one season and over limited areas are subject to question as to their scientific validity. The information presented here should therefore be viewed with this in mind.

Mammals seen in study areas were noted and listed (Table 3).

### STUDY AREAS

There were nine study areas selected for this project. Each was individual in vegetative composition and bank-berm configuration. The purpose in selecting widely divergent areas was to obtain a cross-section of avian populations in various habitat types. The northern most area was one mile North of Princeton in Glenn County, the southern most was one mile South of Grimes in Colusa County. The remainder of the areas were between these points and on both sides of the river. Study area designations, exact locations, bank-berm configurations and measurements are listed (Figures 1 through 10).

All study areas were cottonwood dominated to varying degrees. Accompanying the cottonwoods were various other species of trees and shrubs. Ground cover was a mixture of herbs and grasses.

### METHODS

#### BIRDS:

The quadrat method was employed here and each was attempted to be kept to a size of three acres. Each area was measured off with a metal tape and marked with red flagging. Quadrats were for the most part rectangular in shape with a levee for one border and the river for the other. This type of situation increases the ac-

curacy of a census as the borders are well defined and birds are definitely in or out of the study area. Levee slopes were included in quadrats when they were not burned.

All censuses were conducted between 0600 and 1200. With the advent of afternoon heat bird activity decreases markedly. Areas I, II and III were parts of large wooded areas and could be censused later into the morning than the remaining areas. In the remaining areas (IV through IX), bird activity began to diminish as soon as the day warmed, while in the larger wooded areas activity remained high throughout the morning.

Censusing was done by walking slowly through the quadrat and observing birds with 8x50 field glasses and listening for bird songs. All birds were sight identified. Songs were used to locate birds which were then usually seen. A tape recording of the Yellow-billed Cuckoo was used to verify a possible cuckoo heard but not seen. The bird responded to the recording and exposed itself. Birds unable to be seen or those not seen well enough for positive identification were listed in the census tally as unidentified. During the course of the study I felt that most birds in each study area were seen. The unidentified listing therefore should signify birds unidentified in that census period but not species unknown during the course of the study.

In the long rectangular quadrats censusing was done in one direction only. The larger areas were covered by setting up a path covering the area and using it each time counting in one direction only. All identification was based on A Field Guide To The Identi-

fication Of North American Birds (Robbins, 1966).

Weather conditions were essentially the same for all study periods. It was clear and sunny at all times with little or no wind and temperatures ranging from 60° to 80° Farenheight.

VEGETATION:

The quadrat method of sampling was used with the woody vegetation in areas where there was other than a single species dominance. A 100 square foot circular quadrat was used. Sampling was random through the stands and quadrats containing no woody vegetation were rejected. Sampling was continued until twenty quadrats were obtained containing a form of woody vegetation. The purpose in this being that it was desired to show relationships between the species of woody vegetation and not over a unit area. A description of the stands as they appear visually is included and photographs of each study area accompany this report. Data is presented in figures 1 through 10.

RESULTS

Five counts were made on each of the study areas during the month of August and a total of 47 species of birds were identified on the study areas (Table 1). Data for each study area and each study period are listed (Tables 6 through 14). The means of all habitat types were divided by quadrat area and converted to mean birds per acre. The confidence limits (between which the true mean lies) were calculated at the 95% level (Table 3). These limits are not as reliable as they could be due to the small number of samples and high variation in sample numbers in individual study areas.

However I feel that they give an adequate indication of the position of the true mean, and can be used for general comparison purposes as presented in table 5.

#### DISCUSSION

This study was performed during the late summer so breeding season was essentially over. With the end of breeding season territoriality and vocalization decreases. This leads to problems in censusing as the birds are quieter and tend to move around more. Birds were frequently noted flying in and out of the study areas during censusing, and birds definitely present at one period would not be present or could not be seen the next. Trees were tall in all study areas, shrubs frequently thick, and all were in full foliage. Due to these factors the results obtained in this study could be considered as a minimum numbers count, the true density would then lie at some point above the mean. The taking of a number of samples then, and computing average densities can provide a comparison figure for different areas. The higher limits in table 3 may be more indicative of true densities than the mean.

High bird populations are 6 to 18 birds per acre with a mean of 9.4, low density areas have 1 to 3.25 birds per acre (Peterson, "How many birds are there", Audubon, 1941). As can be seen (Table 4) the densities for all wooded areas fall well into the high density area. Areas VII and IX are on the low end of the spectrum and the reason for this is probably that these are even age stands of cottonwoods. They have little or as in the case of area IX, no understory vegetation. Area V was also essentially 100% cottonwood

but it was adjoined on one side by a prune orchard which may have contributed to a rise in it's density. The important point to note is that the means for all the study areas that were wooded fall within the high density criterion stated by Peterson. On the basis of this study then it could be stated that all the wooded riparian habitats support high summer bird populations.

A winter bird study I feel would show some distinct changes in this density pattern. More ground and shrub oriented birds would be present so the areas having a diverse vegetational stand would probably be shown to support significantly higher densities than the pure stands. Also to be considered is that as winter approaches and fields are plowed and orchards emptied the available bird habitat shrinks accordingly. This could tend to force more birds into the riparian areas and increase their value in a wildlife supporting capacity. Considering the intensive clean farming techniques of the Sacramento Valley, the river riparian habitats should be considered as extremely important in maintaining Valley avian populations.

Table 1. Listing of all species identified on study areas. Order and nomenclature follow American Ornithologists Union.

<u>Common Name</u>	<u>Scientific Name</u>
1. Great Blue Heron .....	<u>Ardea herodias</u>
2. Turkey Vulture .....	<u>Cathartes aura</u>
3. Cooper's Hawk .....	<u>Accipiter cooperii</u>
4. Red-tailed Hawk .....	<u>Buteo jamaicensis</u>
5. Sparrow Hawk .....	<u>Falco sparverius</u>
6. California Quail .....	<u>Lophortyx californicus</u>
7. Ring-necked Pheasant .....	<u>Phasianus colchicus</u>
8. Killdeer .....	<u>Charadrius vociferous</u>
9. Mourning Dove .....	<u>Zenaidura macroura</u>
10. Yellow-billed Cuckoo .....	<u>Coccyzus americanus</u>
11. Barn Owl .....	<u>Tyto alba</u>
12. Belted Kingfisher .....	<u>Megaceryle alcyon</u>
13. Red-shafted Flicker .....	<u>Colaptes cafer</u>
14. Acorn Woodpecker .....	<u>Melanerpes formicivorus</u>
15. Downy Woodpecker .....	<u>Dendrocopos pubescens</u>
16. Nuttall's Woodpecker .....	<u>Dendrocopos nuttallii</u>
17. Western Kingbird .....	<u>Tyrannus verticalis</u>
18. Ash-throated Flycatcher .....	<u>Myiarchus cinerascens</u>
19. Black Phoebe .....	<u>Sayornis nigricans</u>
20. Traill's Flycatcher .....	<u>Empidonax traillii</u>
21. Western Flycatcher .....	<u>Empidonax difficilis</u>
22. Western Wood Pewee .....	<u>Contopus sordidulus</u>
23. Tree Swallow .....	<u>Iridoprocne bicolor</u>



Table 1. Continued

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24. Scrub Jay .....	<u>Amphelocoma</u> <u>coerulescens</u>
25. Yellow-billed Magpie .....	<u>Pica</u> <u>nuttalli</u>
26. Common Crow .....	<u>Corvus</u> <u>brachyrhynchos</u>
27. Plain Titmouse .....	<u>Parus</u> <u>inornatus</u>
28. Common Bushtit .....	<u>Psaltiriparus</u> <u>minimus</u>
29. White-breasted Nuthatch .....	<u>Sitta</u> <u>carolinensis</u>
30. Mockingbird .....	<u>Mimus</u> <u>polyglottos</u>
31. Bewick's Wren .....	<u>Thryomanes</u> <u>bewickii</u>
32. Robin .....	<u>Turdus</u> <u>migratorius</u>
33. Western Bluebird .....	<u>Sialia</u> <u>mexicana</u>
34. Starling .....	<u>Sturnus</u> <u>vulgaris</u>
35. Warbling Vireo .....	<u>Vireo</u> <u>gilvus</u>
36. Nashville Warbler .....	<u>Vermivora</u> <u>ruficapilla</u>
37. Black-throated Gray Warbler .	<u>Dendroica</u> <u>nigrescens</u>
38. Hermit Warbler .....	<u>Dendroica</u> <u>occidentalis</u>
39. MacGillivray's Warbler .....	<u>Oporornis</u> <u>tolmiei</u>
40. Wilson's Warbler .....	<u>Wilsonia</u> <u>pusilla</u>
41. Bullock's Oriole .....	<u>Icterus</u> <u>bullockii</u>
42. Brewer's Blackbird .....	<u>Euphagus</u> <u>cyanocephalus</u>
43. Western Tanager .....	<u>Piranga</u> <u>ludoviciana</u>
44. Black-headed Grosbeak .....	<u>Phœticus</u> <u>melanocephalus</u>
45. House Finch .....	<u>Carpodacus</u> <u>mexicanus</u>
46. Rufous-sided Tohee .....	<u>Pipilo</u> <u>erythrophthalmus</u>
47. Brown Tohee .....	<u>Pipilo</u> <u>fuscus</u>

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Table 2. Listing of predominant woody vegetation encountered  
in study areas. Nomenclature after A California Flora  
(Munz, 1970).

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<u>Common Name</u>	<u>Scientific Name</u>
Blackberry .....	<u>Rubus spp.</u>
Black Walnut .....	<u>Juglans hindsii</u>
Box Elder .....	<u>Acer negundo</u>
Cottonwood .....	<u>Populus fremonti</u>
Coyote Bush .....	<u>Baccharis pilularis</u>
Elderberry .....	<u>Sambucus caerulea</u>
Wild Grape .....	<u>Vitis californica</u>
Locust .....	<u>Robinia pseudo-acacia</u>
Oregon Ash .....	<u>Fraxinus latifolia</u>
Poison Oak .....	<u>Rhus diversiloba</u>
Rose .....	<u>Rosa sp.</u>
Valley Oak .....	<u>Quercus lobata</u>
Willow .....	<u>Salix spp.</u>

Table 3. Listing of mammals sighted in study areas.

<u>Study Area</u>	<u>Date</u>	<u>Mammals and Numbers</u>
I	6	Black-tailed Deer.. 1 Western Gray Squirrel ..1
	19	Black-tailed Deer..3
	27	Black-tailed Deer..2 Western Gray Squirrel..2
	29	Black-tailed Deer..1 Western Gray Squirrel..1
V	20	Beaver..1
VI	23	Beaver..2
IX	8	Jack Rabbit..2
	19	Jack Rabbit..3
	28	Jack Rabbit..1
	29	Jack Rabbit..6
	30	Jack Rabbit..8

Table 4. Summary of study data.

Area	Size (acres)	Number of Species	Mean Birds/Acre	Density Limits
I	3.4	26	9.6	8.6 - 11.2
II	3.0	25	12.4	4.8 - 19.2
III	4.7	28	12.0	8.1 - 15.9
IV	1.5	18	14.1	0.0 - 35.2
V	2.5	21	14.1	6.3 - 21.9
VI	1.5	18	13.6	5.6 - 21.6
VII	3.1	22	8.6	4.3 - 12.8
VIII	1.9	2	2.0	-----
IX	3.0	14	7.0	5.1 - 8.9

Table 5. Bar graph representation of limits of possible true mean for bird densities of wooded areas.

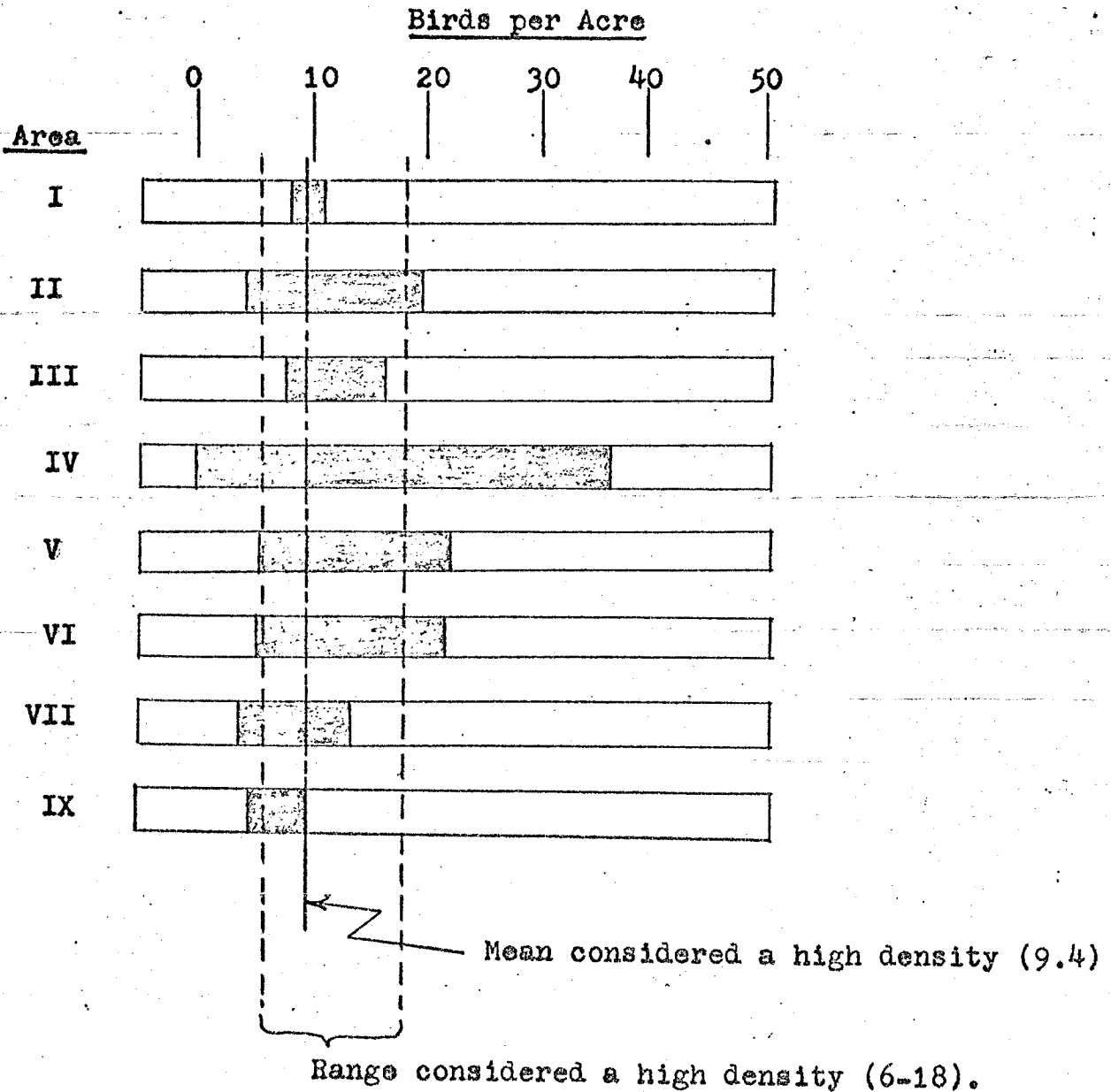


Table 6. Census data for study area I.

Species	Date Time	6	16	19	27	29
		0610	0800	1000	0900	0700
Unidentified		5	3	6	6	4
Turkey Vulture					1	
Cooper's Hawk				1	1	
California Quail		8	2			
Yellow-billed Cuckoo		1	2	1		2
Barn Owl			1			1
Red-shafted Flicker		1		4		
Downy Woodpecker		2		2	2	
Nuttall's Woodpecker			1		2	3
Ash-throated Flycatcher				1		1
Western Wood Pewee			1	2	2	1
Tree Swallow				3		
Scrub Jay		2	7	1	1	2
Plain Titmouse				1	2	4
Common Bushtit			6	1		
Bewick's Wren			4	4	4	2
Starling					1	1
Warbling Vireo				1		1
Nashville Warbler				3		2
Black-throated Gray Warbler				1		
Wilson's Warbler			5			
Bullock's Oriole		3			1	1
Western Tanager			2	1		2
Black-headed Grosbeak			1		5	2
House Finch		1				2
Rufous-sided Tohee		3	3		2	2
Brown Tohee		3				
Totals		29	38	33	30	33

Table 7. Census data for study area II.

Species	Date	6	7	15	16	23
	Time	0820	0920	1030	1015	1010
Unidentified		7	7	11	5	3
Great Blue Heron				1		
Turkey Vulture				2		
Mourning Dove				1	1	
Red-shafted Flicker		1			1	
Downy Woodpecker			1		2	1
Nuttall's Woodpecker		2	1	1		1
Black Phoebe				2	2	1
Western Wood Pewee		2	3	4	1	1
Tree Swallow				5		2
Scrub Jay		4	1	2	4	3
Yellow-billed Magpie				4		
Plain Titmouse		1	2		2	2
Common Bushtit		3	9	30		5
White-breasted Nuthatch				1	1	1
Bewick's Wren		2	2	1	2	2
Robin		1		3		
Starling			2			
Nashville Warbler			1			
Black-throated Gray Warbler			1			
Wilson's Warbler		1		2		
Bullock's Oriole		1				
Western Tanager			2			
Black-headed Grosbeak					3	
Rufous-sided Tohee		2	1	3	1	1
Brown Tohee				1	2	2
Totals		27	32	69	33	25

Table 8. Census data for study area III.

Species	Date	7	9	15	20	23
	Time	0630	0800	0830	0900	0810
Unidentified		10	9	16	6	6
California Quail		4	2			3
Ring-necked Pheasant		1				
Mourning Dove		3	3	7		
Red-shafted Flicker		2	2	4	1	4
Downy Woodpecker			1		2	2
Nuttall's Woodpecker			2	1	3	1
Common Bushtit			12		4	
Traill's Flycatcher			1			
Western Wood Pewee			2	4	3	1
Tree Swallow		6				4
Scrub Jay		5	4	5	3	7
Plain Titmouse		1		8		
White-breasted Nuthatch				2	1	
Bewick's Wren			2	9	2	
Robin		3	2	5	2	
Western Bluebird					1	
Nashville Warbler		1		3	6	11
Black-throated Gray Warbler						2
Hermit Warbler			1			
MacGillivray's Warbler			6			
Wilson's Warbler		1	4	3	4	4
Bullock's Oriole				5		
Brewer's Blackbird		4				
Western Tanager		1		3		1
Black-headed Grosbeak		1	4	4	4	2
House Finch				3	2	
Rufous-sided Towhee		3	1	2		
Brown Towhee		1			2	2
Totals		47	58	81	46	50



Table 9. Census data for study area IV.

Species	Date	6	9	15	20	23
	Time	0940	0715	0715	0740	0720
Unidentified		4	3	2	1	4
California Quail		48				
Acorn Woodpecker		1			1	
Downy Woodpecker						1
Nuttall's Woodpecker						
Western Kingbird		1				
Scrub Jay		4			1	
Yellow-billed Magpie		8				
Plain Titmouse				2		
Common Bushtit		2				
Bewick's Wren			1	2	1	2
Starling				1	1	
Wilson's Warbler						3
Brewer's Blackbird					2	
Western Tanager						4
Black-headed Grosbeak					2	
Rufous-sided Tohee		3	2		1	1
Brown Tohee					2	
Totals		66	6	7	12	15

Table 10. Census data for study area V.

Species	Date	7	16	20	27	28
	Time	0800	0625	0640	0730	0945
Unidentified		2	3	2	4	4
Sparrow Hawk						1
California Quail			3	2		
Red-shafted Flicker					1	
Downy Woodpecker			2			2
Nuttall's Woodpecker		1			2	
Ash-throated Flycatcher		1				
Western Flycatcher						1
Scrub Jay		1	2	3	4	7
Yellow-billed Magpie		2	16	8	1	4
Common Bushtit				3		23
Bewick's Wren		1	1		2	
Robin			1			
Western Bluebird			7			3
Nashville Warbler					1	2
Wilson's Warbler			2			
Brewer's Blackbird		25		4	2	
Western Tanager					1	1
Black-headed Grosbeak			2		1	3
House Finch			1		1	9
Brown Tohee			1		3	
Totals		33	41	22	23	60

Table 11. Census data for study area VI.

Species	Date	6	9	15	23	27
	Time	1020	0620	0630	0640	0700
Unidentified		2	2	4	2.	2
California Quail				7		2
Killdeer			1			
Mourning Dove		21	1	4	1	3
Belted Kingfisher				2		
Red-Shafted Flicker			3	1		1
Downy Woodpecker			1		1	1
Western Kingbird			1			
Scrub Jay			9	9	5	5
Plain Titmouse			1	2		
Bewick's Wren				1		
Mockingbird			1			
Starling			3	1	4	
Wilson's Warbler				1		
Brewer's Blackbird		2				
Western Tanager		1				
House Finch		4				
Rufous-sided Tohee		1			1	
Brown Tohee			2	2		3
Totals		12	25	34	14	17

Table 12. Census data for study area VII.

Species	Date	7	8	19	28	29
	Time	0900	0700	0740	0810	0630
Unidentified		1	1	2	4	3
Red-tailed Hawk		1			2	
Sparrow Hawk			2	.		
California Quail						12
Ring-necked Pheasant		1				3
Mourning Dove				1		6
Belted Kingfisher					2	
Red-shafted Flicker			2		1	3
Downy Woodpecker		1				
Nuttall's Woodpecker			1	3		
Western Wood Pewee					1	
Tree Swallow		1				
Scrub Jay		3	2	6	5	4
Yellow-billed Magpie		2	1	12	3	5
Plain Titmouse			3		1	2
White-breasted Nuthatch			1			
Bewick's Wren					2	1
Starling			6	3	5	
Black-throated Gray Warbler					2	
Wilson's Warbler			2		2	
Western Tanager					1	
Rufous-sided Tohee			1	1		
Brown Tohee		2				
Totals		12	22	28	31	40

Table 13. Census data for study area VIII.

Species	Date	7	8	19	28	29
	Time	1030	0645	0830	0750	0800
California Quail						7
Mourning Dove					4	8
Scrub Jay					1	
Totals		0	0	0.	5	15

Table 14. Census data for study area IX.

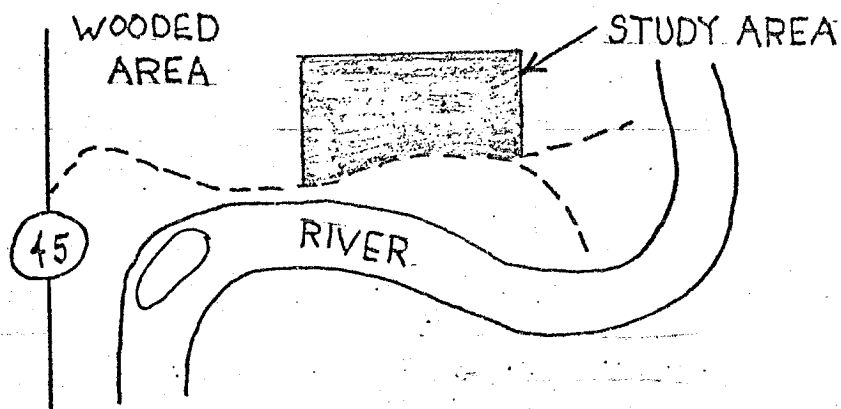
Species	Date Time	8	19	28	29	30
		0625	0630	0700	1000	0900
Unidentified		1	1	4	2	2
Red-tailed Hawk				1		
Ring-necked Pheasant			2	6		4
California Quail			2			
Mourning Dove		3	2	3	2	7
Belted Kingfisher			1			
Red-shafted Flicker		4	2	2	4	3
Nuttall's Woodpecker				2	3	7
Traill's Flycatcher				2		1
Scrub Jay		1	5	2	5	2
Yellow-billed Magpie		7			1	
Common Crow			1			
Bewick's Wren			2	1		1
Nashville Warbler			1	2		
Brown Towhee		2		2	1	
Totals		18	21	28	17	20

Figure 1. Physical and plant data for area I.

Location: West bank of river, 1.75 miles North of Princeton  
(T18N, R1W, Sec. 8)

Bank-berm configuration: There is no bank involved, this area was part of a wide flood plain.

Study Area:



Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	27	92	35	154
Box Elder	31	6	35	72
Poison Oak	31	<1	15	46
Black Walnut	12	1	15	28

#### Visual Description

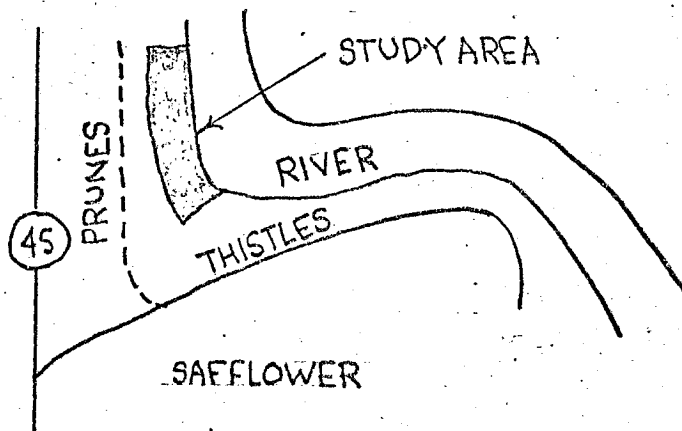
A very dense area, mature cottonwoods and box elders predominate with a few walnut trees. There is much poison oak, a few elderberry bushes, and in certain locations dense tangles of blackberry and grape vines.

Figure 2. Physical and plant data for area II.

Location: West bank of river, 0.75 miles West of Cachil Dehe Rancheria (T17N, R2W, Sec. 25)

Bank-berm configuration: A 15 foot wide bank area, rocked quite some time ago. Study area is part of a wide flood plain.

Study Area:



Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	13	77	23	113
Rose	30	<1	14	44
Poison Oak	20	<1	18	38
Valley Oak	6	15	14	35
Elderberry	17	<1	9	26
Willow	4	6	9	19
Box Elder	4	<1	9	9
Black Walnut	2	<1	5	7
Oregon Ash	2	<1	5	7

#### Visual description

A relatively open woodland of mature cottonwoods with few other trees present. Understory is heavily wild rose in one section, poison oak throughout and very few grape vines.

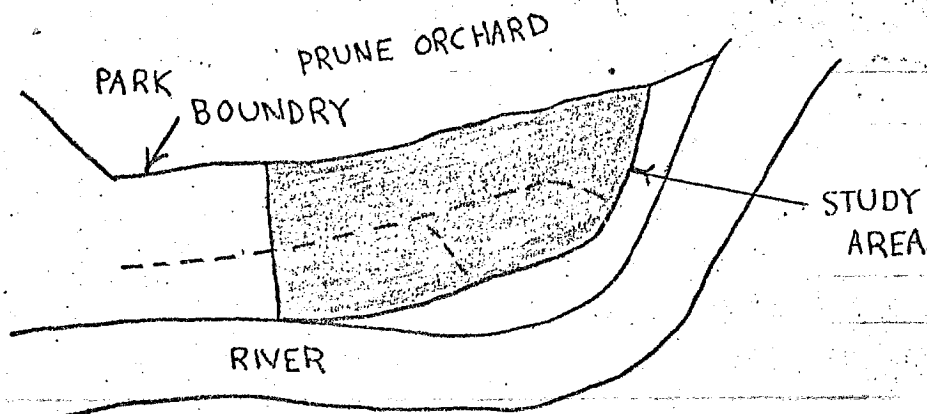


Figure 3. Physical and plant data for area III.

Location: Within borders of Colusa-Sacramento River State Park (T16N, R1W, Sec. 19).

Bank-berm configuration: Study area was part of a wide flood plain, no bank was involved.

Study Area:



Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	25	85	33	143
Box Elder	42	4	40	86
Willow	25	10	20	55
Black Walnut	8	1	7	16

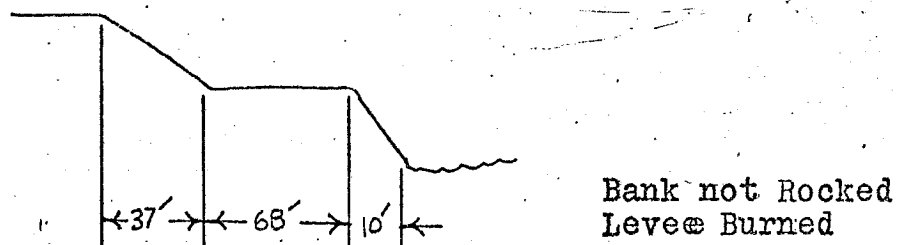
#### Visual Description

This is essentially an open woodland dominated by mature cottonwoods. Indispersed are very few walnuts, few willows and a large amount of box elders. Understory is herbs, grasses, a few grapevines and very little poison oak.

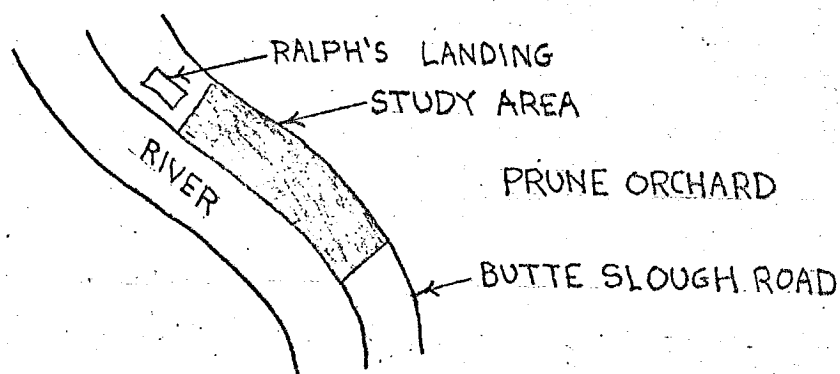
Figure 4. Physical and plant data for area IV.

Location: East bank of river, 1.0 miles South of Colusa (T16N, R1W, Sec 28-29).

Bank-berm configuration:



Study Area:



Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	26	83	36	145
Willow	40	16	36	96
Poison Oak	20	<1	9	29
Black Walnut	6	<1	9	15
Box Elder	6	<1	9	15

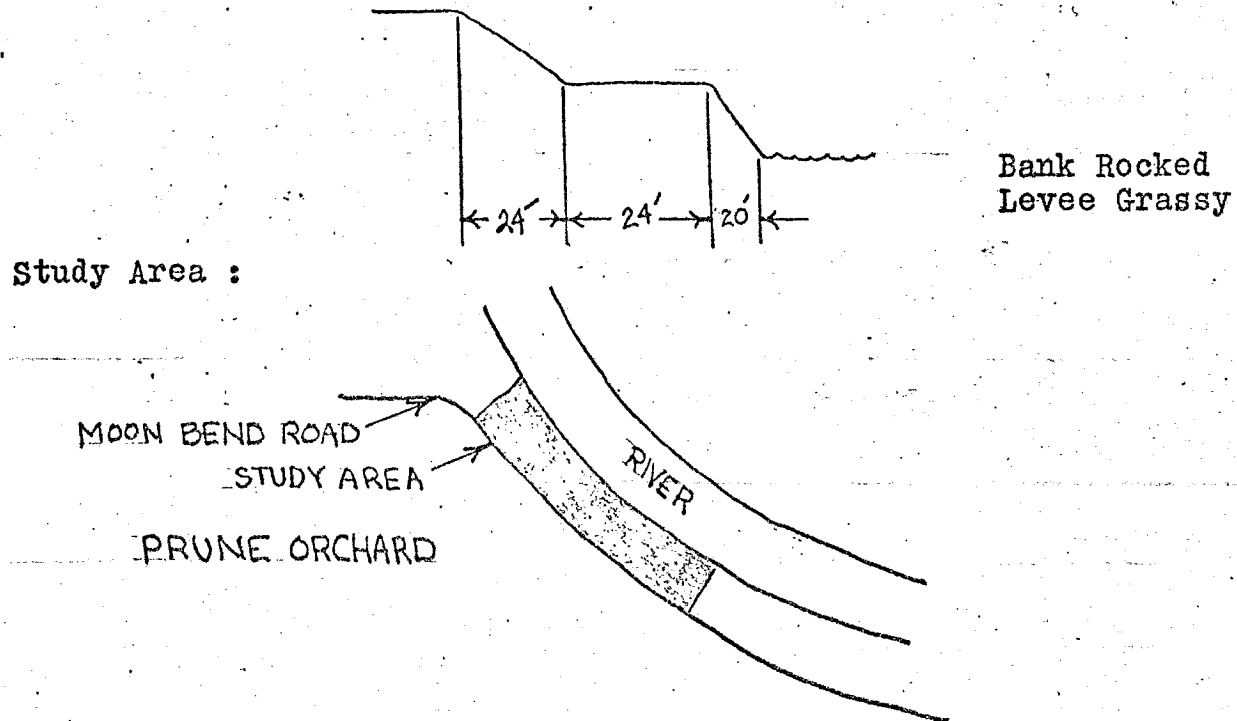
#### Visual Description

A relatively open area of mature cottonwoods and willow trees. Understory is shrubs of poison oak, elderberry and a few blackberries.

Figure 5. Physical and plant data for area V.

Location : On West bank of river along Moon Bend Road (T16N, R1W, Sec. 32-33)

Bank -berm configuration ;



Vegetation :

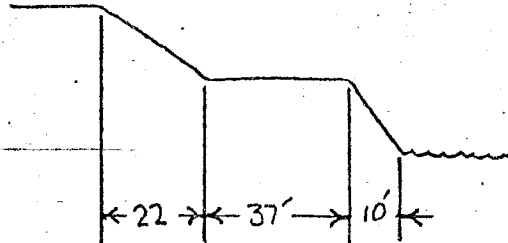
#### Visual Description

This area is essentially 100% cottonwoods of an even age class. All vegetation is in a narrow band along the junction of the bank and berm. There are a few grape vines, coyote bushes, poison oaks and young willows.

Figure 6. Physical and plant data for area VI.

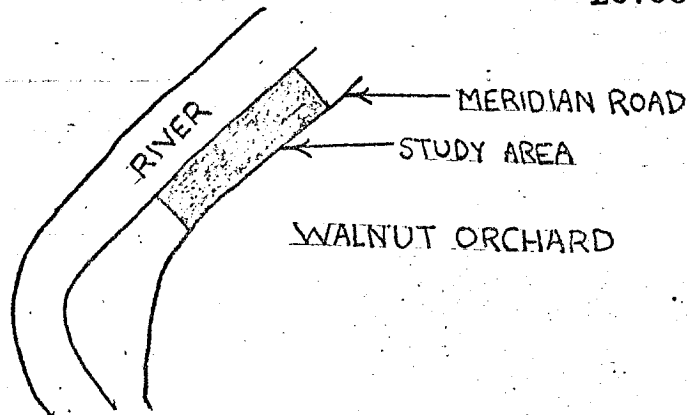
Location: East bank of river, 3.5 miles North of Meridian, along Meridian Road (T15N, R1W, Sec. 2).

Bank-berm configuration:



Natural Bank  
Levee Burned

Study Area:



Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	6	59	11	76
Elderberry	47	2	22	71
Willow	13	8	22	43
Locust	9	23	11	43
Oregon Ash	9	<1	17	26
Sycamore	9	7	6	22
Box Elder	6	<1	11	17

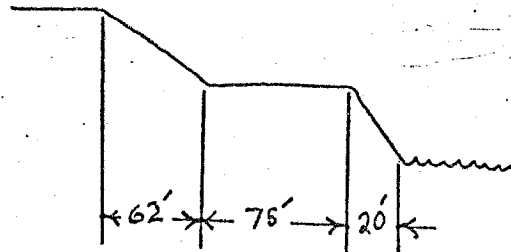
#### Visual Description

This area is overgrown with elderberry and grape vines. There are mature willows along the bank and a few mature cottonwoods on the berm. A number of mature sycamore and locust trees are dispersed along the berm.

Figure 7. Physical and plant data for area VII.

Location: South bank of river, 0.75 miles East of Grand Island  
(T14N, R1E, Sec. 15)

Bank-berm configuration:



Bank Rocked  
Levee Burned

Study Area: See Figure 10

Vegetation:

#### Woody Vegetational Analysis

Species	Relative Density	Relative Dominance	Relative Frequency	Importance Value
Cottonwood	29	99	37	165
Poison Oak	21	<1	11	32
Willow	11	<1	16	27
Oregon Ash	15	<1	11	26
BoxElder	8	<1	16	24
Coyote Bush	13	<1	5	18

#### Visual Description

A relatively open woodland of young cottonwoods. Shrub understory mostly poison oak, coyote bush, and a few blackberries and grapes.

Figure 8. Physical and plant data for area VIII.

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Location: South bank of river, 0.8 miles East of Grand Island  
(T14N, R1E, Sec. 15)

Bank-berm configuration: Same as area VII (See Figure 7.)

Study Area: See Figure 10.

Vegetation:

Visual Description

This area is devoid of all woody vegetation, having been cleared during a bank repair project. A few very small willows and cottonwoods are starting up through the rocky area and the berm is sparsely covered with herbs and grasses. A re-planting of Atriplex sp. had been attempted, but were burned during regular levee burning procedures.

Figure 9. Physical and plant data for area IX.

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Location: South bank of river, 0.85 miles East of Grand Island  
(T14N, R1E, Sec. 15).

Bank-berm configuration: Same as area VII (See Figure 7). Only  
difference is that this area has not  
been rocked.

Study Area: See Figure 10.

Vegetation:

Visual Description

This is essentially an even age stand of three quarter  
grown cottonwoods with no under story. There are very few  
willows along the bank.

Figure 10. Map of study areas VII, VIII, and IX.

