

NESTING BIRDS OF THE WILLOW-COTTONWOOD  
COMMUNITY IN CALIFORNIA

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THE location of this study area is along Dry Creek immediately east of the Kern-Friant Canal, northeast of Clovis in the eastern San Joaquin Valley, California. According to Munz and Keck (1949) it lies within the Valley Grassland Community of the Californian Biotic Province.

The purpose of the investigation was to make a quantitative study of birds on the area in the 1949 nesting season. As far as is known, no such study has been made of this community in western United States. The original nature of biotic communities is rapidly changing in this part of California because greater areas are undergoing irrigation and because of the rapid increase in rural population. It therefore seems desirable to survey the relatively undisturbed natural areas while they still exist, especially in regions where change in the immediate future is imminent.

Thirty-three acres of woodland lying on both sides of Dry Creek and having an elevation between 450 and 475 feet were selected for the study. The woods are composed of but three kinds of trees, practically all over six inches in diameter. A count of all of the trees gave: 787 willows, *Salix sp.*; 170 Fremont Cottonwoods, *Populus fremonti*; and five valley oaks, *Quercus lobata*. The oaks ranged from two to eight feet in diameter and up to 110 feet high. The cottonwoods ranged from six inches to five feet in diameter and up to 90 feet high. The willows ranged up to two feet in diameter and 30 feet in height. The area is less than 200 yards wide and is bisected its entire length (about 0.6 mile) by the meandering sandy stream bed which averages about 50 feet wide (Plate 10). The stream carries various amounts of water in the winter months, but dries entirely by the middle of May. The area has never been flooded in the past 13 years. The only permanent water on the tract is provided by the overflow from a cattle trough at the extreme eastern end. The area is bordered on both sides by the Valley Grassland Community on which native grasses have largely been replaced by: foxtail, *Hordeum murinum*; rip-gut grass, *Bromus rigidus*; and Bermuda grass, *Cynodon dactylon*. Among the trees there are many open irregular spaces which are covered with tall grasses (Plate 10). These spaces, the sinuose stream bed with its 1.4 miles of edge, and the 1.6 miles of perimeter of the tract effectively make this area a "forest edge" or



(Upper) DRY SANDY CREEK BED LINED WITH WILLOWS AND TALL GRASSES, SAN JOAQUIN VALLEY, CALIF. (Lower) OPEN SPACE IN WOODS SHOWING HEAVY GROWTH OF GRASSES.

"forest-grassland ecotone" type (Kendeigh, 1944). All of the species nesting here use both the woods and the open areas and thus fit the definition of a "forest edge" species (Johnston, 1947). Suggestions by Hickey (1943) and Kendeigh (1944) for making a population study were followed. The area was visited every Friday morning beginning at daylight between February 1 and July 1, 1949. Three to eight hours were spent during each visit, making a total of 107 hours. During May and June there were two observers using seven-power binoculars. Procedure was to walk slowly along an irregular route in the woods on one side of the stream bed and return on the other. All birds observed were recorded. Those indicating breeding activity and all nests were recorded with respect to some landmark. No attempt was made to map the areas of various territories.

Within the study tract, grasses grew lush and remained green fully six weeks longer (until the middle of June) than the same species growing on the surrounding open grassland. The open spaces and edges of the woods thus not only provided better cover for ground-nesting species but also more insects and seeds for food than adjacent areas.

Besides the birds of prey, other predators were known to occur on the area. There were frequently signs of: opossums, *Didelphis virginiana*; raccoons, *Procyon lotor*; and coyotes, *Canis latrans*; striped skunks, *Mephitis mephitis*, were often seen hunting in the deep grass. A survey showed from 12 to 20 pocket gophers, *Thomomys bottae*, per acre in the spring and fall, respectively, on the surrounding grassland. Lizards, *Sceloporus occidentalis*, were plentiful on the fallen trees. No snakes were observed. The entire area is pastured each spring.

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#### OBSERVATIONS ON NESTING

Twenty species are known to have nested within the study area. The following list gives the species in order of abundance of nesting pairs.

Brewer's Blackbird, <i>Euphagus cyanocephalus</i> . . . . .	8
Western Kingbird, <i>Tyrannus verticalis</i> . . . . .	7
Red-shafted Flicker, <i>Colaptes cafer</i> . . . . .	6
Bullock's Oriole, <i>Icterus bullockii</i> . . . . .	6
Ash-throated Flycatcher, <i>Myiarchus cinerascens</i> . . . . .	5
Mourning Dove, <i>Zenaidura macroura</i> . . . . .	4
California Jay, <i>Aphelocoma californica</i> . . . . .	4
Nuttall's Woodpecker, <i>Dryobates nuttallii</i> . . . . .	3
Red-tailed Hawk, <i>Buteo jamaicensis</i> . . . . .	2

Sparrow Hawk, <i>Falco sparverius</i> . . . . .	2
Bush-tit, <i>Psaltriparus minimus</i> . . . . .	2
Western Meadowlark, <i>Sturnella neglecta</i> . . . . .	2
English Sparrow, <i>Passer domesticus</i> . . . . .	2
California Quail, <i>Lophortyx californica</i> . . . . .	1
Killdeer, <i>Charadrius vociferus</i> . . . . .	1
Horned Owl, <i>Bubo virginianus</i> . . . . .	1
California Woodpecker, <i>Balanosphyra formicivora</i> . . . . .	1
Tree Swallow, <i>Iridoprocne bicolor</i> . . . . .	1
House Wren, <i>Troglodytes aëdon</i> . . . . .	1
Western Bluebird, <i>Sialia mexicana</i> . . . . .	1
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<i>Total number of nests found</i> . . . . .	60

*Ground nesters.*—Three species built their nests on the ground. These were the Killdeer, California Quail, and Western Meadowlark. Four nesting pairs of these birds were observed, and all were successful in hatching their eggs. The California Quail nested in the tall grasses. They were always found about 400 yards from permanent water. The Killdeer nested on an open gravel bar near the water trough. They fed on insects, mostly on the dry stream bed. Both nests of the Western Meadowlarks were in the tall, green grass in the woods. They caught nymphs of grasshoppers for their young on the adjacent grassland.

*Tree-hole nesters.*—Eight of the 20 nesting species used holes in trees for their nests. These were the Sparrow Hawk, Red-shafted Flicker, California Woodpecker, Nuttall's Woodpecker, Ash-throated Flycatcher, Tree Swallow, House Wren, and Western Bluebird. Twenty nests of these species were counted. Sparrow Hawks were observed carrying lizards, meadow mice, and grasshoppers to their nests. Most of their foraging was done over the grassland area. The six Red-shafted Flickers selected cottonwood trees for their nests, 15 to 40 feet from the ground. They were observed to feed on ants on fallen trees and on the ground in the open grassland. One pair of California Woodpeckers nested in a dead limb on a living cottonwood 30 feet from the ground. They caught insects flying over the dry stream bed and grasshoppers on the ground. Numerous thimble-sized holes drilled in dead limbs of the oaks indicate considerable acorn storage in favorable years. Three pairs of Nuttall's Woodpeckers nested on the tract. One nest was in a dead willow 20 feet from the ground, two nests were in dead cottonwood limbs 32 and 40 feet from the ground, respectively. The birds foraged chiefly on insects under the bark on the smaller dead branches. Of five Ash-throated Flycatchers, three had nests in willows 15 feet above the

ground, and two in cottonwoods 30 and 35 feet from the ground. These flycatchers ate grasshopper nymphs and caught large flying insects in the woods. One pair of Tree Swallows had a nest 30 feet up in a dead snag of a living cottonwood. The birds generally foraged on small insects flying over the crowns of the trees over the stream bed. One pair of House Wrens succeeded in raising five young in a hole 20 feet above the ground in a dead limb on a living cottonwood. They foraged for insects near the ground and under fallen trees. One pair of Western Bluebirds raised four young in a nest 20 feet up in a dead limb of a cottonwood. They foraged on the ground at the edge of the woods and out on to the grassland for insects. In early spring the bluebirds fed on mistletoe berries.

*Branch and foliage nesters.*—Nine of the 20 nesting species constructed their nests on the branches and in the foliage of trees. These were Red-tailed Hawk, Mourning Dove, Horned Owl, Western Kingbird, California Jay, Bush-tit, Bullock's Oriole, Brewer's Blackbird, and English Sparrow. The two Red-tailed Hawks' nests were 50 and 60 feet above the ground in cottonwood trees about 300 yards apart. They foraged far out on the surrounding grasslands. One was seen returning with a pocket gopher. The young did not leave the nest until the last part of June. Four nests of Mourning Doves were located from six to 20 feet up in willows. They were observed feeding on seeds on the dry stream bed and far out on the grassland areas. A pair of Horned Owls had a nest 30 feet up in a cottonwood. Three young owls left the nest on the twentieth day of May. Presumably in this area they feed chiefly on pocket gophers. One of the nests of the Western Kingbird was built 80 feet above the ground on a cross arm of a steel power tower. The other six nests were equally divided between cottonwoods and oaks and were from 50 to 80 feet above the ground. These birds generally foraged on large insects flying above the crowns of the trees but also on grasshoppers. Three of the four nests of the California Jay were located from eight to 20 feet above the ground in willows, the other was 50 feet above the ground in a cottonwood tree. They foraged both in and out of the woods for insects. The two nests of the Bush-tit were eight and 30 feet up in willow and cottonwood trees, respectively. They foraged chiefly for small insects on the ends of the small twigs and leaves of willows. Seven young Bush-tits left one nest on June 15. The six nests of the Bullock's Oriole were located as follows: one in a willow at 20 feet above the ground; two in cottonwoods at 70 feet and 80 feet; and three in oaks at 30, 40, and 50 feet. The birds foraged for larvae of insects chiefly among the foliage of the willows. All of the eight nests of the

Brewer's Blackbird were in the same oak tree from eight to 20 feet above the ground. The Brewer's Blackbirds generally foraged in shallow water and along the moist edges of the stream. They also caught insects in the tall grasses near the edge of the woods. Two pairs of English Sparrows nested in cottonwoods in close proximity to the nests of the Red-tailed Hawks. One nest was three feet over one of the hawk nests (55 feet above the ground), and the other was built in the floor of the other hawk nest. These birds may possibly secure protection from California Jays and other predaceous species by their close proximity to the hawk nests. English Sparrows were observed to feed on grasshopper nymphs caught near the edge of the woods, and also on insects caught in the willows.

*Tree Preference.*—The following table shows the kinds of trees and the tree preferences of birds expressed in percentages.

	PER CENT OF ALL TREES—FOLIAGE NESTERS—HOLE NESTERS—ALL TREE NESTERS			
	(962 trees)	(35 nests)	(20 nests)	(55 nests)
Willow	81.8	25.7	20.0	23.6
Cottonwood	17.6	34.2	80.0	50.9
Oak	0.5	40.0	0.0	25.4

#### PROBABLE NESTERS

Other pairs of the nesting species that were regularly observed during the breeding season, but for which no nests or eggs were found are: two Western Meadowlarks, one Mourning Dove, one California Quail, and one California Jay. Because these pairs were always seen on a particular area, they were believed to have nests. None of the other birds occurred regularly enough during their breeding season to be listed as probable nesters.

#### TOTAL POPULATION

There were 60 nests actually found on the 33 acres. If to these 120 birds are added the ten probable nesters, the total number of birds nesting on the area is 130, or expressed in the standard form, this would be 394 adults (197 pairs) per hundred acres.

#### OTHER IRREGULAR AND NON-NESTING SPECIES

Fifty-one species did not nest on the tract. A few of these were irregularly observed on the area during their breeding season. Most of them, however, were migrants and either left the study area or passed through it before their breeding season began. The number included in the parentheses indicates the number of weekly trips (total of 18) on which these birds were observed. The list of the irregular and non-nesting species follows:

Great Blue Heron, *Ardea herodias*, 1; Turkey Vulture, *Cathartes aura*, 7; Cooper's Hawk, *Accipiter cooperii*, 1; Sharp-shinned Hawk, *Accipiter striatus*, 2; Marsh Hawk, *Circus cyaneus*, 1; Band-tailed Pigeon, *Columba fasciata*, 5; Nighthawk, *Chordeiles acutipennis*, 3; Lewis's Woodpecker, *Asyndesmus lewis*, 4; Downy Woodpecker, *Dendrocopos pubescens*, 1; Black Phoebe, *Sayornis nigricans*, 3; Say's Phoebe, *Sayornis saya*, 1; Traill's Flycatcher, *Empidonax traillii*, 5; Wood Pewee, *Contopus richardsonii*, 3; Violet-green Swallow, *Tachycineta thalassina*, 3; Cliff Swallow, *Petrochelidon albifrons*, 2; American Crow, *Corvus brachyrhynchos*, 1; Plain Titmouse, *Parus inornatus*, 4; White-breasted Nuthatch, *Sitta carolinensis*, 3; Brown Creeper, *Certhia familiaris*, 1; Mockingbird, *Mimus polyglottos*, 6; Robin, *Turdus migratorius*, 6; Varied Thrush, *Ixoreus naevius*, 2; Hermit Thrush, *Hylocichla guttata*, 5; Thrush, *Hylocichla ustulata*, 4; Ruby-crowned Kinglet, *Regulus calendula*, 5; Cedar Waxwing, *Bombycilla cedrorum*, 1; Phainopepla, *Phainopepla nitens*, 8; Solitary Vireo, *Vireo solitarius*, 1; Warbling Vireo, *Vireo gilvus*, 3; Orange-crowned Warbler, *Vermivora celata*, 3; Audubon's Warbler, *Dendroica auduboni*, 9; Black-throated Gray Warbler, *Dendroica nigrescens*, 3; Townsend's Warbler, *Dendroica townsendi*, 1; Macgillivray's Warbler, *Oporornis tolmiei*, 1; Pileolated Warbler, *Wilsonia pusilla*, 5; Red-winged Blackbird, *Agelaius phoeniceus*, 6; Tricolor Blackbird, *Agelaius tricolor*, 1; Brown-headed Cowbird, *Molothrus ater*, 7; Western Tanager, *Piranga ludoviciana*, 3; Black-headed Grosbeak, *Pheucticus melanocephalus*, 2; Blue Grosbeak, *Guiraca caerulea*, 11; Evening Grosbeak, *Hesperiphona vespertina*, 1; House Finch, *Carpodacus mexicanus*, 6; American Goldfinch, *Spinus tristis*, 2; Spotted Towhee, *Pipilo maculatus*, 3; Savannah Sparrow, *Passerculus sandwichensis*, 4; Lark Sparrow, *Chondestes grammacus*, 5; Oregon Junco, *Junco oreganus*, 7; White-crowned Sparrow, *Zonotrichia leucophrys*, 10; Fox Sparrow, *Passerella iliaca*, 1; and Lincoln's Sparrow, *Melospiza lincolni*, 5.

#### DISCUSSION

The desirability of expressing population as number per kilometer or mile has been pointed out by Kendeigh (1944). When only the perimeter is regarded as the edge of this area the population is 50 birds per kilometer or 81 per mile, which is higher than the 73 and 62.5 birds per mile found by Johnston (1947) for two oak-maple edge communities in Illinois. When the banks of the dry sandy stream bed of this area are also included as edge the population is 27 birds per kilometer and 43 per mile. The nesting density here of 394 birds (197 pairs) per hundred acres (40 hectares) is higher than that reported by Hering (1948) as 232 birds (116 pairs) for a ponderosa pine forest in Colorado, but lower than those reported by Kendeigh (1944) as 442 (221 pairs) and by Stewart and Aldrich (1949) as 650 (325 pairs) for climax spruce-hardwood forests in eastern United States. The population is also higher than Snyder (1950) found for three plant communities in Colorado which is given as 204 (102 pairs) for Douglas fir, and ponderosa pine, 188 (94 pairs) for Englemann spruce and subalpine fir, and 118 (59 pairs) for lodgepole pine.

Hickey (1943) in his summary of breeding bird habitats listed the results of a study by J. D. Graham and E. A. Stoner of, "A wooded

canyon with a small mountain stream in California," as having 45 adult birds per ten acres which is a higher density than recorded here. Hutchinsons (1946) reported a density of 753 for a stand of mature live oaks, *Quercus agrifolia*, along a canyon creek near Santa Barbara, California. These canyon studies must necessarily be ecotonal and show a very considerable edge effect in the populations.

Seventy-one species were recorded on the area during the study period. The 20 species nesting on the area compare closely with 18 species reported by Cooke (1916), 20 species by Hering (1948), and 22 species by Hardy (1945) for the open types of western coniferous forests.

Nearly all of the nesting species exhibit certain specific differences with respect to food and food-getting, and to nests and nesting behavior.

Cottonwood trees contained half of all the tree nests, but the five oaks had more nests in the foliage than all of the cottonwoods, which indicates high preference for oaks by Brewer's Blackbirds, Western Kingbirds, and Bullock's Orioles. However, only one oak had nests of all three of these species which indicates that other factors also enter into the selection of a nest site. Cottonwoods were also much more important for hole-nesters than other trees.

#### SUMMARY

A survey of the 1949 nesting population in a Willow-Cottonwood Community in central California was made by taking a census on a 33-acre tract for a period of five months.

The bird community is essentially an "edge" or ecotone type and supports a nesting density of 394 birds (197 pairs) per 100 acres (40 hectares) or 50 birds per kilometer of edge. Twenty species nested on the area but 71 were recorded there during the study. Each nesting species showed differences in feeding and nesting behavior. Fremont Cottonwoods were preferred by hole-nesters and Valley Oaks were preferred by foliage-nesters.

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