

IMPORTANCE OF SYCAMORES TO RIPARIAN BIRDS IN SOUTHEASTERN ARIZONA

BY CARL E. BOCK AND JANE H. BOCK

Southwestern riparian woodlands are major centers of avian diversity and abundance (Carothers et al. 1974, Stevens et al. 1977, Wauer 1977, Stamp 1978, Szaro 1981). Cottonwood (*Populus fremontii*) communities in lowland river valleys have been well-studied, and the importance of these large trees to riparian birds is striking (Carothers et al. 1974, Anderson and Ohmart 1977, Ohmart et al. 1977). Riparian woodlands at higher elevations in the Southwest include a greater variety of deciduous trees (Pase and Layser 1977), but their bird populations have not been as thoroughly examined (Szaro 1980).

Intermittent and perennial streams associated with oak (*Quercus*) woodlands of southeastern Arizona support riparian communities dominated by Arizona sycamore (*Platanus wrightii*), Arizona ash (*Fraxinus velutina*), and Arizona black walnut (*Juglans major*; Lowe 1964). Because these streams are lined with nearly continuous stands of oak, it is not clear that large riparian trees would be as important to birds here as they are in lowland desert situations.

Among the mid-elevation riparian trees, sycamores are of potential value to birds because of their large size and substantial dead wood. They also appear to be one of the most threatened tree species. Sexual reproduction seems limited or lacking in sycamore populations throughout the region (Glinsky 1977, pers. obs.). Livestock grazing, drying of formerly perennial streams, and/or flash flooding all appear to play a role in causing this reproductive failure. The Appleton-Whittell Research Ranch is a 3160 ha sanctuary of the National Audubon Society, at about 1500 m elevation in Santa Cruz County, southeastern Arizona. The site has been protected from livestock and other disturbance since 1968. Seedlings and saplings of ash and walnut were common in 1982-83 along intermittent rocky streams on the sanctuary, but there were only three sycamore saplings and no seedlings on the entire property.

STUDY AREAS AND METHODS

As part of a study of the ecology of *Platanus wrightii*, we counted summer and winter birds along 2 drainages on the Research Ranch—Lyle Creek, with mature sycamores and O'Donnell Creek, lacking sycamores but otherwise comparable in terms of adjacent upland vegetation, streambed configuration, and other riparian plants. Our objectives were to describe the avifaunas of these riparian ecosystems, and to assess the importance of sycamores to the birds associated with them.

Each site included 1.8 km of streambed, with an average floodplain width between adjacent oak stands of about 50 m. Numbers of mature riparian trees ≥ 30 cm diameter-breast-height were as follows: Lyle Creek—47 sycamores, 2 cottonwoods, 12 ash, 6 walnut; O'Donnell

Creek—0 sycamores, 2 cottonwoods, 13 ash, 3 walnut. Each creek was lined with comparable stands of two oak species, *Quercus emoryi* and *Q. arizonica*. Scattered shrubs and small trees common to both sites included desert willow (*Chilopsis linearis*), seep willow (*Baccharis glutinosa*), and groundsel (*Senecio douglasii*). Major floodplain grasses were sacaton (*Sporobolus wrightii*), vine mesquite (*Panicum obtusum*), blue grama (*Bouteloua gracilis*), and sideoats grama (*B. curtipendula*). Both streams were dry during the summer census period, and both were flowing in winter.

We walked the length of each study site, counting all birds seen or heard in the floodplains or in the fringe of oaks immediately adjacent. We noted whether or not birds actually were in sycamores when counted, and recorded activities for all species. Counts were used as measures of relative rather than absolute abundance (Dawson 1981). Possible bias caused by missing some birds in the sycamore foliage would have minimized rather than exaggerated our estimates of the differences in abundance of the arboreal species between the canyons with and without sycamores. Counts were conducted in the mornings of clear and relatively calm days. Each count required about 2 h, and no site was counted more than once per day. Summer counts ($n = 7$ per stream) were made between 20 June and 15 July 1982; winter counts (8 per stream) occurred between 19 December 1982 and 6 January 1983. *F*-ratios were calculated comparing sample variances, and *t* or approximate *t*-tests applied accordingly to test for differences between mean counts per site (Sokal and Rohlf 1981).

RESULTS AND DISCUSSION

Despite the general similarity of our two study sites, several species which never occurred in sycamores differed significantly between canyons (Table 1). These included a variety of emberizine sparrows which were more abundant in the area without sycamores—Brown Towhee, Rufous-crowned, Botteri's, and Lincoln's sparrows. Absence of sycamores may have improved habitat for these ground or shrub nesting and foraging species, a relationship outside the scope of the present study which deserves further attention.

We considered bird species to be positively affected by sycamores if their numbers were significantly greater in the riparian site with the trees, and if this difference was lost or substantially reduced when individuals actually counted in sycamores were eliminated from the data (Table 1). By these criteria, 12 summer species were dependent upon sycamores in riparian habitat: White-winged Dove, Mourning Dove, Western Wood Pewee, Ash-throated Flycatcher, Cassin's and Western kingbirds, Bridled Titmouse, White-breasted Nuthatch, American Robin, Lucy's Warbler, Summer Tanager, Lark Sparrow, and Northern Oriole. Winter birds showing a similar dependence upon sycamores included the Ladder-backed Woodpecker, Northern Flicker, Bridled Titmouse, White-breasted Nuthatch, Ruby-crowned Kinglet, Yellow-

TABLE 1. Birds counted in 1.8 km strips of riparian habitat with and without sycamores. For species which used sycamore trees, the second column of numbers = individuals not actually in sycamores when they were counted. N = 7 counts/site in summer, 8 in winter.

Species	Birds per count			
	Sycamores present		Sycamores absent	
	All birds \bar{x} (SD)	Not in sycamores \bar{x} (SD)	\bar{x} (SD)	(SD)
A. Summer				
Montezuma Quail (<i>Cyrtonyx montezumae</i>)	0.86 (1.57)		0.29 (0.76)	
White-winged Dove (<i>Zenaida asiatica</i>)	4.00 (2.45)**	2.71 (2.29)*	0.14 (0.38)	
Mourning Dove (<i>Z. macroura</i>)	3.29 (2.69)*	1.43 (1.40)	0.14 (0.38)	
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	0.29 (0.49)		0.29 (0.76)	
Roadrunner (<i>Geococcyx californianus</i>)	0.14 (0.38)		0	
Black-chinned Hummingbird (<i>Archilocus alexandri</i>)	0.71 (0.76)		0.71 (0.76)	
Acorn Woodpecker (<i>Melanerpes formicivorus</i>)	3.71 (1.11)	0.86 (0.69)***	4.57 (0.79)	
Ladder-backed Woodpecker (<i>Picoides scalaris</i>)	0.89 (0.96)		1.43 (0.79)	
Strickland's Woodpecker (<i>P. stricklandi</i>)	0.57 (0.79)		0	
Northern Flicker (<i>Colaptes auratus</i>)	1.71 (1.50)	1.43 (1.27)	0.86 (1.22)	
Western Wood Pewee (<i>Contopus sordidulus</i>)	5.14 (1.22)***	2.29 (1.89)*	0	
Say's Phoebe (<i>Sayornis saya</i>)	0		0.14 (0.38)	
Vermillion Flycatcher (<i>Pyrocephalus rubinus</i>)	0.43 (0.79)	0.29 (0.49)	0	
Dusky-capped Flycatcher (<i>Myiarchus tuberculifer</i>)	0.29 (0.49)	0.14 (0.38)	0.29 (0.49)	
Ash-throated Flycatcher (<i>M. cinerascens</i>)	8.00 (3.37)*	5.71 (3.25)	4.57 (0.98)	
Cassin's Kingbird (<i>Tyrannus vociferans</i>)	11.43 (2.44)***	6.71 (3.04)*	3.43 (1.90)	
Western Kingbird (<i>T. verticalis</i>)	1.42 (1.27)*	1.14 (1.68)	0	
Barn Swallow (<i>Hirundo rustica</i>)	0.29 (0.49)		0	
Gray-breasted Jay (<i>Aphelocoma ultramarina</i>)	5.43 (3.95)	4.14 (2.85)*	8.29 (2.63)	
Bridled Titmouse (<i>Parus wollweberi</i>)	4.00 (2.08)*	2.00 (1.73)	2.00 (1.00)	
Bushtit (<i>Psaltriparus minimus</i>)	4.00 (5.26)	3.71 (5.28)	1.14 (1.68)	
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	2.00 (1.15)*	1.14 (1.22)	0.85 (0.69)	

TABLE 1. Continued.

Species	Birds per count		
	Sycamores present		Sycamores absent
	All birds \bar{x} (SD)	Not in sycamores \bar{x} (SD)	
Rock Wren (<i>Salpinctes obsoletus</i>)	0.29 (0.49)*		1.86 (1.07)
Bewick's Wren (<i>Thyomanes bewickii</i>)	9.29 (1.80)	8.57 (1.90)	8.14 (2.12)
Eastern Bluebird (<i>Sialia sialis</i>)	1.00 (1.00)	0.71 (0.95)	1.29 (1.25)
American Robin (<i>Turdus migratorius</i>)	1.00 (1.00)*	0.71 (1.11)	0
Mockingbird (<i>Mimus polyglottos</i>)	2.00 (0.82)***	1.57 (0.53)***	0
Lucy's Warbler (<i>Vermivora luciae</i>)	2.71 (1.60)**	1.85 (1.07)**	0.14 (0.38)
Common Yellowthroat (<i>Geothlypis trichas</i>)	0.29 (0.49)		0.14 (0.38)
Summer Tanager (<i>Piranga rubra</i>)	1.43 (1.13)*	0.85 (0.90)	0.29 (0.49)
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)	0.43 (0.53)	0.29 (0.49)	0.57 (0.53)
Blue Grosbeak (<i>Guiraca caerulea</i>)	2.00 (1.15)	1.71 (1.25)	3.86 (2.61)
Brown Towhee (<i>Pipilo fuscus</i>)	1.03 (1.52)*		3.29 (2.29)
Rufous-crowned Sparrow (<i>Aimophila ruficeps</i>)	1.43 (1.51)	1.14 (1.07)**	2.86 (0.69)
Botteri's Sparrow (<i>A. botteri</i>)	0.43 (0.53)*		1.57 (1.13)
Lark Sparrow (<i>Chondestes grammacus</i>)	1.57 (0.98)**	0.71 (0.76)	0.29 (0.49)
Brown-headed Cowbird (<i>Molothrus ater</i>)	4.57 (2.51)	2.43 (1.27)	3.29 (2.43)
Northern Oriole (<i>Icterus galbula</i>)	1.86 (1.35)*	0.28 (0.49)	0.14 (0.38)
Scott's Oriole (<i>I. parisorum</i>)	0.29 (0.76)		0
House Finch (<i>Carpodacus mexicanus</i>)	2.29 (2.43)	0.14 (0.38)*	1.71 (1.38)
Total birds	92.74 (8.44)**	60.68 (5.73)	58.86 (4.22)
B. Winter			
Montezuma Quail	2.38 (4.41)		0
Killdeer (<i>Charadrius vociferus</i>)	0.88 (0.64)		0
Mourning Dove	3.75 (3.37)		1.75 (1.75)
Acorn Woodpecker	0		0.38 (0.52)
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	1.00 (1.41)		0.13 (0.35)
Ladder-backed Woodpecker	0.88 (0.64)*	0.13 (0.35)	0.25 (0.46)
Northern Flicker	1.50 (1.50)*	1.25 (1.39)	0.13 (0.35)

TABLE 1. Continued.

Species	Birds per count		
	Sycamores present		Sycamores absent
	All birds \bar{x} (SD)	Not in sycamores \bar{x} (SD)	\bar{x} (SD)
Black Phoebe (<i>Sayornis nigricans</i>)	2.25 (0.89)***		0.25 (0.46)
Say's Phoebe	0.50 (0.53)	0.38 (0.52)	0.38 (0.74)
Gray-breasted Jay	5.38 (2.77)		3.38 (3.16)
Bridled Titmouse	3.38 (2.56)*	2.13 (2.64)	0.25 (0.46)
Bushtit	0.63 (1.77)		0
White-breasted Nuthatch	2.00 (1.07)*	1.00 (1.07)	0.75 (0.46)
Rock Wren	0.63 (0.74)		0.13 (0.35)
Bewick's Wren	2.38 (1.06)*		1.13 (1.13)
Ruby-crowned Kinglet (<i>Regulus calendula</i>)	2.75 (1.83)**	1.63 (1.51)*	0
Yellow-rumped Warbler (<i>Dendroica coronata</i>)	5.13 (3.40)**	3.38 (3.78)*	0
Brown Towhee	0.63 (0.74)*		1.88 (0.83)
Rufous-crowned Sparrow	0.13 (0.35)**		1.75 (1.17)
Chipping Sparrow (<i>Spizella passerina</i>)	21.00 (22.32)		30.00 (25.11)
Vesper Sparrow (<i>Poocetes gramineus</i>)	2.00 (3.02)		2.88 (2.42)
Song Sparrow (<i>Melospiza melodia</i>)	0		0.38 (0.74)
Lincoln's Sparrow (<i>M. lincolni</i>)	0*		2.25 (1.98)
White-crowned Sparrow (<i>Zonotrichia leucophrys</i>)	0.38 (0.74)		0.63 (1.19)
Dark-eyed Junco (<i>Junco hyemalis</i>)	0		2.87 (5.08)
House Finch	1.38 (2.07)	0.88 (1.25)	0
Pine Siskin (<i>Carduelis pinus</i>)	2.00 (4.57)	0.25 (0.71)	0.13 (0.35)
American Goldfinch (<i>C. tristis</i>)	3.63 (4.07)*	0.13 (0.35)	0
Total birds	66.60 (28.94)	54.71 (26.63)	51.65 (25.71)

* Significantly different from area lacking sycamores ($P < .05$).

** As above ($P < .01$).

*** As above ($P < .001$).

rumped Warbler, and American Goldfinch. Three summer birds frequently used sycamores when they were present, but did not differ in abundance between sites. These facultative users were the Acorn Woodpecker, Gray-breasted Jay, and House Finch. Total numbers of summer birds were significantly higher in the riparian strip with sycamores, a difference which disappeared when birds counted in sycamores were eliminated from the comparison (Table 1). Total numbers of winter

birds were not significantly different between the two drainages (Table 1).

Sycamores presented a variety of resources to birds. Only American Goldfinches were seen feeding on seed balls in the trees. Species obviously gleaning or excavating for insects included the Ladder-backed Woodpecker, Bridled Titmouse, White-breasted Nuthatch, Ruby-crowned Kinglet, Lucy's Warbler, and Yellow-rumped Warbler. The various flycatchers (all except phoebes) regularly foraged in or sallied from sycamores. Cavity-dwellers we found nesting or roosting in sycamores included the woodpeckers, Ash-throated Flycatcher, Bridled Titmouse, and White-breasted Nuthatch. The Ladder-backed Woodpecker and Northern Flicker apparently used sycamores as winter roosts more than as nesting sites (Table 1). Species which built nests in sycamores but foraged elsewhere included the doves, American Robin, Northern Mockingbird, Summer Tanager, and Lark Sparrow.

We conclude that Arizona sycamore is a critical component of riparian habitat for many birds in the mid-elevation oak communities of southeastern Arizona. The oaks bordering these watercourses probably do not reach sufficient size or contain the amounts of decayed wood to provide such a reliable source of roost/nest sites, or possibly food resources. Protection and propagation of Arizona sycamore in these habitats appears vital.

ACKNOWLEDGMENTS

This study was supported by a grant from Joe and Helen Taylor, by The National Audubon Society, and by Earthwatch and the Center for Field Research. We thank Vernon Hawthorne, William Kenney, Maureen Stone, and 15 Earthwatch volunteers for assistance in collecting vegetation data.

LITERATURE CITED

- ANDERSON, B. W., AND R. D. OHMART. 1977. Vegetation structure and bird use in the Lower Colorado River Valley. Pp. 23-34, *in* Importance, Preservation, and Management of Riparian Habitat: a Symposium, R. R. Johnson and D. A. Jones, eds. USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.
- CAROTHERS, S. W., R. R. JOHNSON, AND S. W. AITCHISON. 1974. Population structure and social organization of Southwestern riparian birds. *Am. Zool.* 14:97-108.
- DAWSON, D. G. 1981. Counting birds for a relative measure (index) of density. Pp. 12-16, *in* Estimating Numbers of Terrestrial Birds, C. J. Ralph and J. M. Scott, eds., *Stud. Avian Biol.* 6.
- GLINSKY, R. L. 1977. Regeneration and distribution of sycamore and cottonwood trees along Sonoita Creek, Santa Cruz County, Arizona. Pp. 116-123, *in* Importance, Preservation, and Management of Riparian Habitat: a Symposium, R. R. Johnson and D. A. Jones, eds., USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.
- LOWE, C. H. 1964. Arizona's natural environment. Univ. Arizona Press, Tucson.
- OHMART, R. D., W. O. DEASON, AND C. BURKE. 1977. A riparian case history: the Colorado River. Pp. 35-47, *in* Importance, Preservation, and Management of Riparian Habitat:

- a Symposium, R. R. Johnson and D. A. Jones, eds., USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.
- PASE, C. P., AND E. F. LAYSER. 1977. Classification of riparian habitat in the Southwest. Pp. 5-9, in *Importance, Preservation, and Management of Riparian Habitat: a Symposium*, R. R. Johnson and D. A. Jones, eds., USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.
- SOKAL, R. R., AND F. J. ROHLF. 1981. *Biometry* (2nd ed.). W. H. Freeman and Co., San Francisco, California.
- STAMP, N. E. 1978. Breeding birds of riparian woodland in south-central Arizona. *Condor* 80:64-71.
- STEVENS, L., B. T. BROWN, J. M. SIMPSON, AND R. R. JOHNSON. 1977. The importance of riparian habitat to migrating birds. Pp. 156-164, in *Importance, Preservation, and Management of Riparian Habitat: a Symposium*, R. R. Johnson and D. A. Jones, eds., USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.
- SZARO, R. C. 1980. Factors influencing bird populations in southwestern riparian forests. Pp. 403-418, in *Management of Western Forests and Grasslands for Nongame Birds*, R. M. DeGraff (tech. coord.). USDA For. Serv. Gen. Tech. Rep. INT-86. U.S. Forest Service, Ogden, Utah.
- . 1981. Bird population responses to converting chaparral to grassland and riparian habitats. *Southwest. Nat.* 26:251-256.
- WAUER, R. H. 1977. Significance of Rio Grande riparian systems upon the avifauna. Pp. 165-174, in *Importance, Preservation, and Management of Riparian Habitat: a Symposium*. USDA For. Serv. Gen. Tech. Rep. RM-43. Rocky Mt. Forest and Range Experiment Station, Fort Collins, Colorado.

Appleton-Whittell Research Ranch, P.O. Box 44, Elgin, Arizona 85611, and Department of Environmental, Population, and Organismic Biology, University of Colorado, Boulder, Colorado 80309. Received 10 Mar. 1983; accepted 24 Aug. 1983.