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GEOGRAPHIC ORIGIN OF RED-WINGED BLACKBIRDS RELATIVE TO RICE CULTURE IN SOUTHWESTERN AND SOUTHCENTRAL LOUISIANA

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Abstract.—The 62-year (1924–1985) U.S. Fish & Wildlife Service Bird Banding Laboratory recovery-retrieval file for 12,020 Red-winged Blackbirds (*Agelaius phoeniceus*) was summarized to identify the geographic origin of birds in southwestern and southcentral Louisiana in relation to the rice-growing cycle. Of 58 recoveries not at banding stations, 38 (66%) were in winter and 13 of these (34%) were local Louisiana birds. Resident birds constituted 16 of 20 nonbanding station recoveries from spring planting season to autumn second harvest. Analyses that included recoveries made at banding stations yielded substantial increases in number of resident birds present during planting and second harvest, suggesting that local birds are responsible for most crop damage by redwings during those phases of rice culture. However, a bias toward resident redwings was evident in the banding station recoveries. Efforts to band or mass-mark Red-winged Blackbirds in winter should be increased substantially to provide an expanded data base for evaluating the relationship of migration and rice damage in the gulf coastal region.

PROCEDENCIA DE INDIVIDUOS DE *AGELAIUS PHOENICEUS* ASOCIADOS A LOS CULTIVOS DE ARROZ EN LA PARTE SURCENTRAL Y SUROESTE DE LOUISIANA

Sinopsis.—El archivo del Laboratorio de Anillamiento de Aves del Servicio de Pesca y Vida Silvestre Federal de los E.U.A. correspondiente a las recapturas de 12,020 individuos de *Agelaius phoeniceus* entre 1924–1985 (62 años) fue empleado para determinar la procedencia de poblaciones de estas aves asociadas al ciclo de cultivos de arroz en la parte surcentral y suroeste de Louisiana. De 58 recapturas registradas fuera de las estaciones de anillamiento, 38 (66%) ocurrieron durante el invierno, y las 20 restantes durante la época de siembra en primavera y la segunda cosecha de agosto. Trece de las aves recapturadas resultaron ser aves locales. El análisis que incluyó las recapturas ocurridas en las estaciones de anillamiento indica un aumento sustancial en el número de aves residentes presentes durante la época de siembra y la segunda cosecha. Esto sugiere que las poblaciones residentes de estas aves son las responsables de la mayoría del daño causado al arroz durante estas fases de su cultivo. Sin embargo, fue evidente un prejuicio hacia las poblaciones residentes durante su recaptura en las estaciones de anillamiento. Es necesario anillar masivamente para expandir la base de datos y poder evaluar más objetivamente la relación que existe entre las migraciones de esta especie y el daño que causan a las cosechas de arroz en la región costanera del golfo.

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Losses of rice to blackbirds occur from planting to harvest in southwestern Louisiana (Kalmbach 1937, Meanley 1971, Wilson 1986) where 75% of the state's rice is produced (Louisiana State University 1988). Large flocks, comprised primarily of Red-winged Blackbirds (*Agelaius phoeniceus*) with some Brown-headed Cowbirds (*Molothrus ater*) and Great-tailed Grackles (*Quiscalus mexicanus*), feed in rice fields, causing severe local damage. Scare devices, repellents, and toxicants can reduce numbers of birds in rice fields temporarily; however, a long-term solution is desired. Development of practical, biologically sensible, and cost-effective techniques to reduce rice damage by birds will require identification of the component of the population responsible for damage. Banding studies may contribute the needed information.

Previous studies of banding data suggest that the source of birds responsible for crop damage in fall is easier to identify than in spring. Meanley et al. (1966) found that most redwings recovered in Louisiana during planting and harvest were of local origin. Dolbeer (1978, 1982) provided substantial corroborative evidence for the identification of birds causing damage at harvest by showing that redwings do not range far from breeding sites in late summer and early fall. However, he found that redwings remain, on average, several hundred km from breeding sites in March, an early rice planting month. Hence, the birds responsible for damage to ripening rice might be of local origin, whereas birds that damage planted rice might be a mixture of northern migrants and local birds.

Current information suggests that local redwings cause most damage to planted rice in spring. The geographic origin of redwings in southwestern Louisiana was estimated by Wilson (1986) by means of discriminant analysis of morphological data from birds collected during spring in Acadia Parish and data from Power (1970) for birds collected in central North America. Wilson (1986) found that the proportion of large-bodied redwings (presumed to be migrants) declined from approximately 80% in January to 22% in March and 4% in April. In combination with data from road surveys for flock composition and distribution, he concluded that local female redwings were responsible for most seed losses in newly planted rice fields (Wilson 1986).

Our objectives were to (1) define source populations of banded redwings in southwestern Louisiana by ascertaining the geographic origin of birds found in the region during all culture phases of the rice crop, (2) compare results with those obtained by Meanley et al. (1966) for the entire state, and (3) evaluate the available banding data as a source of information relevant to problems of blackbird damage to the rice crop in southwestern Louisiana.

METHODS

A copy of the recovery-retrieval file for Red-winged Blackbirds, current through 1985, was provided by the U.S. Fish & Wildlife Service Bird Banding Laboratory. A standard software package (SPSS-x 1985) was

used for sorting and analyses. We report data from normal, wild-caught birds, only.

Louisiana data base.—Annual tabulations were compiled of birds (1) banded in Louisiana and recovered anywhere in North America or (2) recovered in Louisiana and banded anywhere in North America.

Southwestern and southcentral Louisiana.—Encounters reported from areas bounded by 29° and 31°N latitude and 91° and 94°W longitude were selected.

Recoveries not at banding stations.—Cases were summarized for birds banded during breeding and postbreeding seasons (1 May to 30 Sep.) anywhere in North America and recovered away from banding stations in the southwestern and southcentral Louisiana rice belt during each of six rice culture periods: winter (16 Nov. to 29 Feb.); planting (1 Mar. to 30 Apr.); growth (1 May to 15 Jul.); first harvest (16 Jul. to 31 Aug.); ratoon growth (1 to 30 Sep.); and second harvest (1 Oct. to 15 Nov.). Definitions of rice culture periods are based on current practices (Louisiana State University Agricultural Center 1987) and differ from Meanley et al. (1966) because of the increasing use of rapidly maturing rice varieties, unavailable in the early 1960s. Cases that were obtained by any means related to banding stations (banding mortality, or previously banded bird trapped and released during banding operation in different or same 10′ block where originally banded) were excluded from the analysis to obtain recoveries unbiased by locations and/or timing of banding operations.

Recoveries from banding stations.—A second summary was executed to include recoveries at banding stations to augment the small sample size yielded by the analysis of nonbanding station encounters.

RESULTS

The recovery-retrieval file, compiled from January 1924 to December 1985, included 12,020 cases for Red-winged Blackbirds recovered in North and Central America. Of these, 11,031 were normal, wild birds; 1751 (15.9%) were not identified to sex; 7535 (68.3%) were males; and 1745 (15.8%) were females. Only 4632 (42%) of normal, wild birds were recovered away from banding stations.

Louisiana data base.—The data base for Louisiana consisted of 610 redwings banded in-state and recovered anywhere, and 655 birds recovered in-state and banded anywhere. Of these, 597 were both banded and recovered in-state, yielding a file of 668 records of redwings processed in Louisiana between 1924 and 1985. Most redwings banded (85%) or recovered (81%) in Louisiana were processed prior to 1945.

Southwestern and southcentral Louisiana recoveries not at banding stations.—Of 655 in-state recoveries, 58 were banded between 1 May and 30 Sep. and recovered away from banding stations in southwestern and southcentral Louisiana. The small sample size precluded analyses by sex and age classes. Thirteen of 38 (34%) banded redwings wintering in the Louisiana rice belt originated from within the state; eight (21%) were

TABLE 1. State of origin of Red-winged Blackbirds banded in North America from 1 May to 30 Sep. and recovered in southwestern Louisiana during six rice culture periods. Recoveries obtained at banding stations are excluded.

State where banded	Season of recovery: Winter (16 Nov.–29 Feb.)	Plant (1 Mar.–30 Apr.)	Growth (1 May–15 Jul.)	Harvest 1 (16 Jul.–31 Aug.)	Ratoon (1 Sep.–30 Sep.)	Harvest 2 (1 Oct.–15 Nov.)	Total
Arkansas	8						8
Illinois	2						2
Iowa	2						2
Louisiana	13	4	2	1	2	7	29
Michigan	1	1					2
Minnesota	3						3
Missouri	1						1
New York	1						1
North Dakota	4						4
South Dakota	3					1	4
Texas		1				1	2
Total	38	6	2	1	2	9	58

banded in Arkansas (Table 1). The remainder of winter recoveries (17, or 45%) were banded as far northwest as the Dakotas and as far northeast as New York.

Twenty redwings were recovered during spring, summer, and fall. Of six birds recovered during spring planting months four were local, one was from Michigan, and one was from Texas. The five recoveries made during the periods of rice growth, first harvest, and ratoon growth (1 May to 30 Sep.) were local birds. Seven local birds, one from South Dakota, and one from Texas were recovered during the second harvest period.

Southwestern and southcentral Louisiana recoveries, including those from banding stations.—If encounters at banding stations are included, 162 birds banded between 1 May and 30 Sep. were recovered in southwest and southcentral Louisiana. All 104 additional recoveries, beyond the 58 nonbanding station recoveries, were Louisiana residents (Table 2).

DISCUSSION

Recoveries in the 62-year recovery-retrieval file for Red-winged Blackbirds suggested a permanent resident population in Louisiana, with an influx of migrant birds from neighboring and northern states during the period from October (second harvest) through April (planting). Forty-five percent of the birds recovered in southwestern and southcentral Louisiana away from banding stations during the winter period (16 Nov. to 29 Feb.) were from northern states; these nonresident redwings wintering in Louisiana originated in summer resident populations from the Dakotas to New York. Unfortunately, the small sample size ($n = 58$) of recoveries

TABLE 2. State of origin of Red-winged Blackbirds banded in North America from 1 May to 30 Sep. and recovered in southwestern Louisiana during six rice culture periods. Recoveries obtained at banding stations are included.

State where banded	Season of recovery: Winter (16 Nov.–29 Feb.)	Plant (1 Mar.–30 Apr.)	Growth (1 May–15 Jul.)	Harvest 1 (16 Jul.–31 Aug.)	Ratoon (1 Sep.–30 Sep.)	Harvest 2 (1 Oct.–15 Nov.)	Total
Arkansas	8						8
Illinois	2						2
Iowa	2						2
Louisiana	37	31	11	7	16	31	133
Michigan	1	1					2
Minnesota	3						3
Missouri	1						1
New York	1						1
North Dakota	4						4
South Dakota	3				1		4
Texas		1				1	2
Total	62	33	11	7	17	32	162

made away from banding operations precluded detailed analyses of movement patterns by sex and age classes or by time intervals that might be appropriate to problems of bird damage to rice.

By grouping all recoveries, whether or not they were made at banding stations, a year-around abundance of resident Louisiana birds is demonstrated, particularly in rice planting and harvesting periods when crop damage is most severe. This finding corroborates prior findings that resident Red-winged Blackbirds are an important component of the blackbird population responsible for damage to rice crops. However, it is likely that a bias toward residents is introduced to these summaries because 100% of the 104 recoveries at banding stations were resident birds, whereas only 50% of the 58 recoveries made away from banding stations were Louisiana residents. Perhaps resident birds are more likely to be recovered at banding stations than nonresidents, if trapping is used to obtain birds, because of an age-bias in trapping (Weatherhead and Greenwood 1981) and/or familiarity with traps. If resident hatching-year birds were trapped for the first time just after fledging, but prior to 30 Sep., they might be more familiar with the location of the traps than nonresidents and return to the traps readily in the subsequent winter or spring. Such bias exaggerates the role of resident redwings in periods of rice damage.

Our results for southwestern and southcental Louisiana were similar to those obtained by Meanley et al. (1966) for 88 cases of redwings recovered in the entire state of Louisiana as of July 1962 (Table 3). First, redwings recovered in Louisiana during planting and harvest were mostly local birds. Second, only local birds were recovered between 1 May and

TABLE 3. State of origin of 88 Red-winged Blackbirds banded in North America between 15 Apr. and 30 Nov. and recovered in Louisiana between January 1924 and July 1962 (after Meanley et al. 1966). Recoveries are allocated to five rice culture periods, defined for the single annual crop produced during those years.

State where banded	Rice culture periods					Total
	Winter (1 Nov.–29 Feb.)	Planting (1 Mar.–30 Apr.)	Growth (1 May–30 Jun.)	Ripening (1 Jul.–14 Aug.)	Harvest (15 Aug.–31 Oct.)	
Arkansas	6					6
Indiana	1					1
Illinois	1					1
Louisiana	2	20	7	9	33	71
Michigan	2	1				3
Minnesota	2	1				3
New York	1					1
Ohio	0				1	1
South Dakota	1					1
Total	16	22	7	9	34	88

14 Aug., or during growth and ripening of the single rice crop that was produced annually at that time. Third, migrant redwings identified by Meanley et al. (1966) were present principally between November and February.

The Louisiana data base for bandings and recoveries of Red-winged Blackbirds is weak. The sample size obtained for all recoveries in southwestern and southcentral Louisiana ($n = 162$) is marginal for the amount of partitioning we attempted. Our analysis is a useful preliminary study, but more banding effort is needed to address properly the management questions of the movement patterns and population dynamics of Red-winged Blackbirds in Louisiana in relation to rice culture. Winter banding or mass-marking efforts (Otis et al. 1986, Knittle et al. 1987) should be increased in Louisiana, especially along gulf coastal marshes where many large roosts form (Meanley 1971), and in rice-growing regions of the state where seasonal grain losses are serious.

A 10-fold increase in the number of recoveries of banded Red-winged Blackbirds over a compressed time span (e.g., 5 yr) would facilitate the evaluation of age- and sex-related movement patterns on a refined temporal scale. Assuming a recovery rate of approximately 1.5% in blackbirds (Meanley et al. 1966, Klimkiewicz and Futcher 1987), the banding of 60,000 birds, or 12,000 birds/winter would be required; preferably the banding effort should be distributed equally among the winter months, November to February, when migrants are most abundant. Alternatively, a smaller-scale banding study designed to examine migration patterns of female redwings wintering in Louisiana would be of value because female redwings are implicated in spring rice damage (Wilson 1986, Holler et

al. 1987, Brugger 1988) and little is known of their movement patterns (Dolbeer 1978).

A recently developed mass-marking technique for birds whereby fluorescent pigments are applied aerially over blackbird roosts (Otis et al. 1986, Knittle et al. 1987) could provide useful data on population dynamics, patterns of roost exchange or turnover, and daily movements of blackbirds in the Louisiana rice belt. Repeated markings of birds at roosts would enable detailed analyses of movement patterns by sex and age classes during time intervals appropriate to problems of bird damage in rice. Combined data from expanded banding efforts and mass-marking would provide a strong foundation for developing long-term population management strategies to reduce losses of rice to blackbirds in Louisiana.

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