GENERAL NOTES

Red-winged and Yellow-headed Blackbird Nesting Habitat in a Wisconsin Marsh.—Competitive interactions between Red-winged (*Agelaius phoeniceus*) and Yellow-headed blackbirds (*Xanthocephalus xanthocephalus*) have been reported by a number of workers (e.g., Orians and Willson 1964, Willson 1966, Miller 1968). Most studies concerned with both species occurring together have been conducted in western regions of North America; however, see Weller and Spatcher (1965), Burt (1970), and Voights (1973) for accounts of the two species in Iowa marshes. Mayr (1966) has suggested the importance of looking for the existence of differences "between the central and peripheral parts of the species range with respect to competition." The western edge of Lake Michigan marks part of the eastern boundary of the range of Yellow-headed Blackbirds (Orians 1980). Collins Marsh, Manitowoc County, Wisconsin, supports breeding populations of both species. Since it is close to the eastern boundary of the range of Yellow-heads we decided to compare the competitive situation here with that which has been reported for the two species elsewhere.

Previous studies indicate that in marsh situations both species nest in emergent vegetation over standing water. However, in marshes where both species occur together, interspecific territorial behavior leads to exclusion of Red-wings from some of this habitat. Thus, where they "co-exist," Yellow-heads build their nests exclusively in emergent vegetation over water and Red-wings are forced to the periphery of the marsh.

We made observations from shore during visits to the marsh in 1973, 1974, and 1977. During 1979 and 1980 more intensive work was conducted in the southwest corner of the marsh. This included thorough nest searches in 1980.

Our observations appear similar to the findings of others. At Collins Marsh, Red-wing males arrive on the breeding grounds before Yellow-head males. They were present in both 1979 and 1980 by 21 March. Yellow-head males were present by 11 April 1979 and by 23 April 1980. Females of each species arrived after males. Female Red-wings were present by 18 April 1979 and by 30 April 1980. Female Yellow-heads were present by 4 May 1979 and by 7 May 1980. Male Red-wings initiated their territorial displays before Yellow-heads arrived. Yellow-head males were later able to evict Red-wing males from areas of the marsh in which both competed for territories. This is at least partially a result of aggressive interactions. (We saw male Yellow-heads chase or supplant male Red-wings 15 times in 8 days during April/May 1979/1980.) Ultimately, all Yellow-head nests were on territories in emergent vegetation over standing open water, whereas the majority of Red-wing nests occurred on territories in a variety of marsh edge habitats. Our data on nest locations reflect this situation (Table 1).

Although 11 of 30 Red-wing nests were in cattails over water, these occurred in kinds of situations different from those used by Yellow-heads (i.e., in a narrow shoreline fringe of cattails next to open water or on the shoreward, shallow edge of more extensive cattail stands occupied by Yellow-heads). The mean water depth under these 11 nests was 17 cm compared to 37 cm for Yellow-heads. This difference is significant ($P < .001$, Mann-Whitney Test). Red-wing territories in these two situations also included adjacent old field habitat, and some nests were found in these upland areas. Red-wing nests were also found in a sedge-covered flood plain across a dike from the marsh proper.

In spite of dominance in obtaining their preferred habitat, Yellow-heads were not always dominant over Red-wings in aggressive encounters. Orians and Willson (1966) also noted this. For example, after territories were established in 1980 we saw male Red-wings on 5 occasions chase male Yellow-heads that were flying over Red-wing territories, and once in May 1980 a male Red-wing chased a male Yellow-head off an upland Red-wing territory back into adjacent cattails.

We conclude that the pattern of habitat partitioning by Red-wings and Yellow-heads on common breeding grounds in eastern Wisconsin is similar to what has been reported elsewhere. The situation at El Dorado Marsh, Fond du Lac Co., Wisconsin, appears similar to what we have found at Collins Marsh (Ronald Barrett, pers. comm.).

Mayr (1966) suggested that shifts into new niches are frequent in peripherally isolated

TABLE 1. Red-winged and Yellow-headed blackbird nest site characteristics at Collins Marsh, Wisconsin, 1980.

	On land	Over water and water depth[a] (cm)	Nest support vegetation
Yellow-heads			
Number of nests[b]	0	25	Cattails (*Typha* sp.)
Mean depth		37	
Range		16–76	
Red-wings			
Number of nests[b]	12	18	Annuals (not identified) (3) Reed Canary Grass (*Phalaris arundinacea*) (7) Other Grass (Gramineae) (1) Cattails (*Typha* sp.) (11) Dogwood (*Cornus* sp.) (1) Sedge (*Carex* sp.) (6) Willow (*Salix* sp.) (1)
Mean depth		21	
Range		11–54	
Significance level[c]		<.01	

[a] When nest first found.

[b] Totals include some different nests on the same territories due to polgyny or replacement nests.

[c] Mann-Whitney test, one-tailed (Siegel 1956).

populations because of reduced competition with other species. We found no evidence of such a shift by Yellow-heads in this peripheral part of their range. However, in this particular case competition with other species appears to be as severe as in more central parts of the range. That is, Red-wings were numerous, Marsh Wrens (*Cistothorus palustris*), another possible competitor (Orians and Willson 1966), were present, and there may have been some competition with Common Grackles (*Quiscalus quiscula*) (Minock 1980). On the other hand, populations of Yellow-heads at Collins may occasionally be low enough to allow Red-wings to occupy habitat suitable for Yellow-head breeding activities. For example, a Red-wing nest in 1979 was located in an area that was part of a Yellow-head territory in 1980. On a larger scale McCabe and Hale (1960) pointed out the presence of apparently suitable Yellow-head nesting habitat in a Wisconsin marsh altogether devoid of nesting Yellow-heads. The question as to if or why suitable habitat goes unused by Yellow-heads in Wisconsin requires further study.

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A New Attachment Method for Patagial Tags.—In 1976 and 1977, as a part of an ecological study of the Common Raven (*Corvus corax*) in southeastern Oregon (Stiehl 1978), I needed a tag that would: (1) allow identification of individual birds up to a distance of 400 m; (2) be durable in the event that follow-up study of the population was desired; and (3) have a method of attachment which did not require special materials. To meet these needs, I developed a method of attachment which proved to be quite satisfactory for ravens, and used readily available materials.

Tag design.—Plastic-coated nylon fabric (trademarks "Saflag," Safety Flag Co. of America, Pawtucket, RI, and "Herculite," Herculite Protective Fabrics Corp., Newark, NJ) was cut into a dumbbell shape approximately 20 × 10 cm after Southern (1971). Two reinforcement eyelets (Textron Inc., New York, NY) crimped to the fabric 5 cm apart reduced tearing of the tag.

Attachment.—I attached tags as an assistant held a bird and extended its wing. The patagium was pierced with a small bore leather punch about 2 cm behind the webcord (similar to the "slit" described by Hester (1963)). The tag was wrapped around the leading edge of the wing. Reinforcement eyelets were aligned with the hole in the patagium and the tag attached with a 3 mm diameter × 19 mm aluminum "pop rivet" with a pair of 3 mm aluminum "back-up plates" (USM Corp.) (Fig. 1). A 19 mm "pop rivet" has a minimum compressed length of about 8 mm, which is greater than the thickness of the patagium. The tissue, therefore, is not damaged when the rivet is compressed. The total weight of one patagial tag and rivet was 7.36 g. Both patagia could be marked, and the bird banded with a U.S. Fish and Wildlife Service leg band in 2 or 3 min. Using various color combinations, birds were marked for individual identification by marking either one or both wings. The tags allowed identification of both flying and perched birds up to 400 m with a spotting scope (Fig. 2). I found the use of easily available materials such as "pop rivets" to be a great advantage in this field investigation, as a supply of rivets was generally available, even in a remote location.

Effects of marking on birds and tag durability.—I marked 266 adult, nestling, or fledgling Common Ravens during 1976 and 1977 and observed no apparent behavioral or physical stress in the marked birds. In two birds, a small blood vessel was severed during tag attachment, but bleeding was slight and stopped within 1 min. Adults flew readily and without observable difficulty immediately after being tagged. Birds usually stretched and preened the marked wing when they first perched. Nestlings (30 to 35 days post-hatching) likewise appeared unaffected by the marking. Repeated observations of both marked and unmarked nestlings revealed no difference in fledging age or typical behaviors.

Not only was immediate flight unimpaired, but the tags did not appear to affect long distance flight capability. One bird was seen 100 km from the study area 3 days after