Yellow-headed Blackbirds in Illinois

2000 Annual Report

Illinois Department of Natural Resources

Wildlife Preservation Fund

Division of Natural Heritage

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Yellow-headed Blackbirds are a marsh-nesting species of west central North America with a range that extends from California and Washington to Michigan (Price et. al 1995; Twedt and Crawford 1995; Figure 1). While this species was never as common in the East as it is in the West, the population in the southern Great Lakes was "abundant" at the beginning of this century (Cory 1909; Ford 1934). In Illinois the species' range has been significantly reduced and now consists of just 15 colonies in northeastern Illinois and a single colony in extreme western Illinois. This range reduction is the result of the loss of 89% of Illinois' pre-settlement wetlands due to agricultural expansion and urbanization (Illinois Department of Natural Resources (IDNR) 1994). The Yellow-headed Blackbird was designated State endangered in Illinois in 1977, however, in spite of this protection the northeastern Illinois population has continued to decline over the past 20 years (IDNR unpublished data).

As is often the case with populations of endangered species, a lack of basic information about the species' biology is a major impediment to the Yellow-headed Blackbird conservation and restoration efforts in the state. The need for information is made even more critical given the rapid rate of development in northeastern Illinois. If habitat essential to this species' survival in Illinois is not identified it may soon disappear.

In 1998, we began research on the population dynamics, reproductive success, and life history of the Yellow-headed Blackbird in Illinois. During the first three years of the project we monitored 252 nests and banded 418 birds, approximately 67% of Yellow-headed Blackbirds in Illinois were marked in 2000.

2000 Objectives

1. To determine habitat requirements for the Yellow-headed Blackbird in Illinois (e.g. territory size, individual home range size, vegetation and water preferences).

2. To establish the basic life history traits of the Illinois population (e.g. clutch size, mating system or harem size, age at first reproduction, average reproductive success, settlement patterns, and dispersal patterns).

3. To gain a better understanding of the population dynamics of the Yellow-headed Blackbird in Illinois (e.g., whether there is a constant influx of new birds from the West

which maintains the Illinois population, or whether the Illinois population can be self sustaining).

Results

In 2000, we banded 81 adults and 60 nestling birds. We monitored 96 nests and searched all but 3 of the active colonies in Illinois for color-marked birds. Our surveys revealed that there were 19% fewer Yellow-headed Blackbirds in 2000 than in 1999 (307 in 1998, 298 in 1999, and 242 in 2000). The number of wetlands with active Yellow-headed Blackbird colonies has declined from 24 in 1998 to 19 in 1999 and finally only 16 remained in 2000.

Return Rates

Return rates to the Illinois population have been consistent (Figure 1). Over the last two years 55% of all males returned. Thirty five percent of females returned in 1999 and 45% returned in 2000. Analysis of unsuccessful individual reveals that 36% of males and 53% of females returned. Sixty percent of males which were non-territorial "floaters" returned in 2000. As in 1999 successful birds returned at a higher rate of 68% of males and 73% of females. In 2000, 12% of nestlings returned up from 1999 when only five percent returned.

Reproductive Success

Yellow-headed Blackbirds in northeastern Illinois have relatively high reproductive success (Table 1). Using Mayfield corrected nest survival values in 1998, 51% of nests were successful (fledging at least one young) in 1999, 32% of the nests were successful, and in 2000, 62% of nests were successful. The daily predation rate for 1998, 1999, and 2000 were .02, .03, and .017. Daily predation rate, which is the number of predation event divided by the number of days in which a predation event could occur (exposure days), ranges on average in Illinois from .04 to .06 (pers. com. J. Hoover and S. Robinson). The daily loss rate, which includes nest loss due to stochastic events, for 1998, 1999, and 2000 were .03, .05, and .02 (Table 1). The average number of fledglings produced per successful nest was 2.16 in 1998, 2.83 in 1999, and 2.41 in 2000. When reproductive success data for

all years was entered into Pulliam's (1988) source/sink threshold model, all years functioned as a source population.

Seasonal Movements

Both males and females occasionally moved long distances between marshes in the region during the breeding season. Adult males on territory were never observed moving between wetlands, but adult females were observed moving during the breeding season after the loss of a nest. Two females moved 41.8 and 40.7 km after a their nests were lost and one of these females successfully renested in another marsh. Several males without territories moved between wetlands during the breeding season. Several males were seen at other wetlands after all their young fledged, or nearly fledged. Over the three years we have recorded 35 movements between wetlands. In 2000, we observed 12 movements between wetlands. Currently no factor is most influential in causing an individual to move, future research will help to determine the primary factors for these movements.

Insect Emergence Data

In 2000, preliminary data indicates that insect emergence is variable both between sites and during the Yellow-headed Blackbird's breeding season (Table 3). Current sample size is not large enough to indicate much more than the general trend of more insects available later in the breeding season and that some sites produce more insects than other. We plan on continuing this research in 2001 in hopes of at least tripling our current sample size.

Conspecifc Attraction

In 2000, only 2 sites were used for the conspecific attraction study. For this study we placed Yellow-headed Blackbird models in the wetland and played Blackbird calls and songs the entire night. At both of these sites which historically contained Yellow-headed Blackbird populations, but at which no birds had nesting for the past 10+ years, birds settled. At one of the sites both males and females were observed setting up territories but no nests were found. At the other site a single male bird was seen but only for 2 days.

Discussion

Population Fidelity

Yellow-headed Blackbirds in northeastern Illinois return at a high rate when they successfully reproduce. The return rates of males compared with other published accounts suggest this population may be slightly more philopatric than other populations in the West, although different indices of return rates were used in the various studies. The correlation between return rate and reproductive success suggests that the population is open and that birds may base settlement decisions on previous experience (Gavin and Bollinger 1988). Birds banded as fledglings returned at a very low rate, but at a rate that is comparable to other accounts of natal philopatry in passerines (Greenwood and Harvey 1982).

Reproductive Success

Reproductive success of Yellow-headed Blackbirds in Illinois is high enough to replace adult mortality, and the population appears to be producing enough young to replace natural losses or act as a "source". The population is producing enough young to replace natural losses and produce a surplus. This suggests that poor reproductive success is not contributing to the continued population decline in the area.

In addition, predation does not appear to be a significant factor in the reproductive success of the Yellow-headed Blackbirds. Other studies have found that predation by Marsh Wrens (*Cistothorus palustris*) can have a large effect on Yellow-headed Blackbird populations. Picman and Isabelle (1995) found that 51% of Yellow-headed Blackbird nests failed due to Marsh Wren predation. Less than 15% of nests failed due to avian predation, and, although I do not know which bird species were responsible eyewitness accounts suggest many were predated by Common Grackles (*Quiscalus quiscula* ; M. Ward pers. obs.). 2000, proved to be the best year for reproduction thus far, we believe the reason for this is primarily the result of good water levels throughout the breeding season.

Seasonal Movements

Yellow-headed Blackbirds are able to move between wetlands up to 40 km apart. Our data on movements of birds throughout the area suggests that if poor habitat conditions occur at one site they can move to another without reduction in nesting success. This

ability to move may bode well for wetland restoration projects which might quickly attract Yellow-headed Blackbirds if habitat conditions were correct.

Insect Emergence Data

Given that Yellow-headed Blackbirds almost exclusively feed there young emerging odonates (damselflies and dragonflies) poor production of these could have a dramatic effect on the species. It has been hypothesized that female birds can gauge the level of future insect emergence. If this is true it may be that Yellow-headed Blackbirds are assessing wetlands in Illinois and determining that insect emergence is poor. Currently, we have a small sample size but with continued research we hope to elucidate whether insect emergence is having a large effect on Yellow-headed Blackbirds in Illinois.

Conspecifc Attraction

Yellow-headed Blackbirds could be characterized as semi-colonial and it may be that the presence of conspecifics is used in their settlement. Our data indicates that they might use conspecific attraction but more research is needed. If it is true that conspecific attraction is used the loss of a breeding colony may be more destructive that first believed. Conspecific attraction along with the species ability to move over 40 km during a breeding season may prove to be a valuable tool in the management of this species.

Continued Population Decline

The estimated 8-9% per year decline of this species over the last 20 years is surprising given the high reproductive success we have found thus far in our study. In addition, unpublished data suggest that Yellow-headed Blackbird reproductive success in the area has been high at least over the last 5 years (C. Paine per. com., IDNR unpublished data). High reproductive success suggests that habitat loss may be responsible for the population declines. However, over the last 10 years suitable habitat has remained relatively constant (Army Corp of Engineers per. com.). Alternatively, the isolation of this population could lead to poor recruitment into the population. Thus, this population with relatively high reproduction may be declining because few new breeding birds are finding and settling in the area.

The large population declines observed between 1999 and 2000 are primarily due to the loss of one large site, which is currently being developed. Most other sites had 2-5 fewer birds in 2000.

Future Research and Implications

We believe that our ability to color-mark and monitor at least 70%, of the individuals in Illinois provides us the opportunity to determine the population dynamics of this declining population with the resolution that is typically unattainable. This study will provide information on how a habitat sensitive species can coexist in the midst of urban and suburban development. We will also learn how the isolation of these individuals effects their population dynamics

Though the population is acting as a source in terms of reproduction, the population may continue to decline and may remain a source until local extinction. The conservation and restoration of habitat within northeastern Illinois may not be enough to effectively increase the population without large-scale restoration of habitat resulting in greater connectivity with the remainder of the population. More years of return rate data are needed to determine if the isolation is the major factor in the population decline.

The research begun in 2000 on insect emergence and conspecifc attraction may in the end provide a powerful management tool in the conservation of Yellow-headed Blackbirds in Illinois.

Figure 1. Eastern range of the Yellow-headed Blackbird

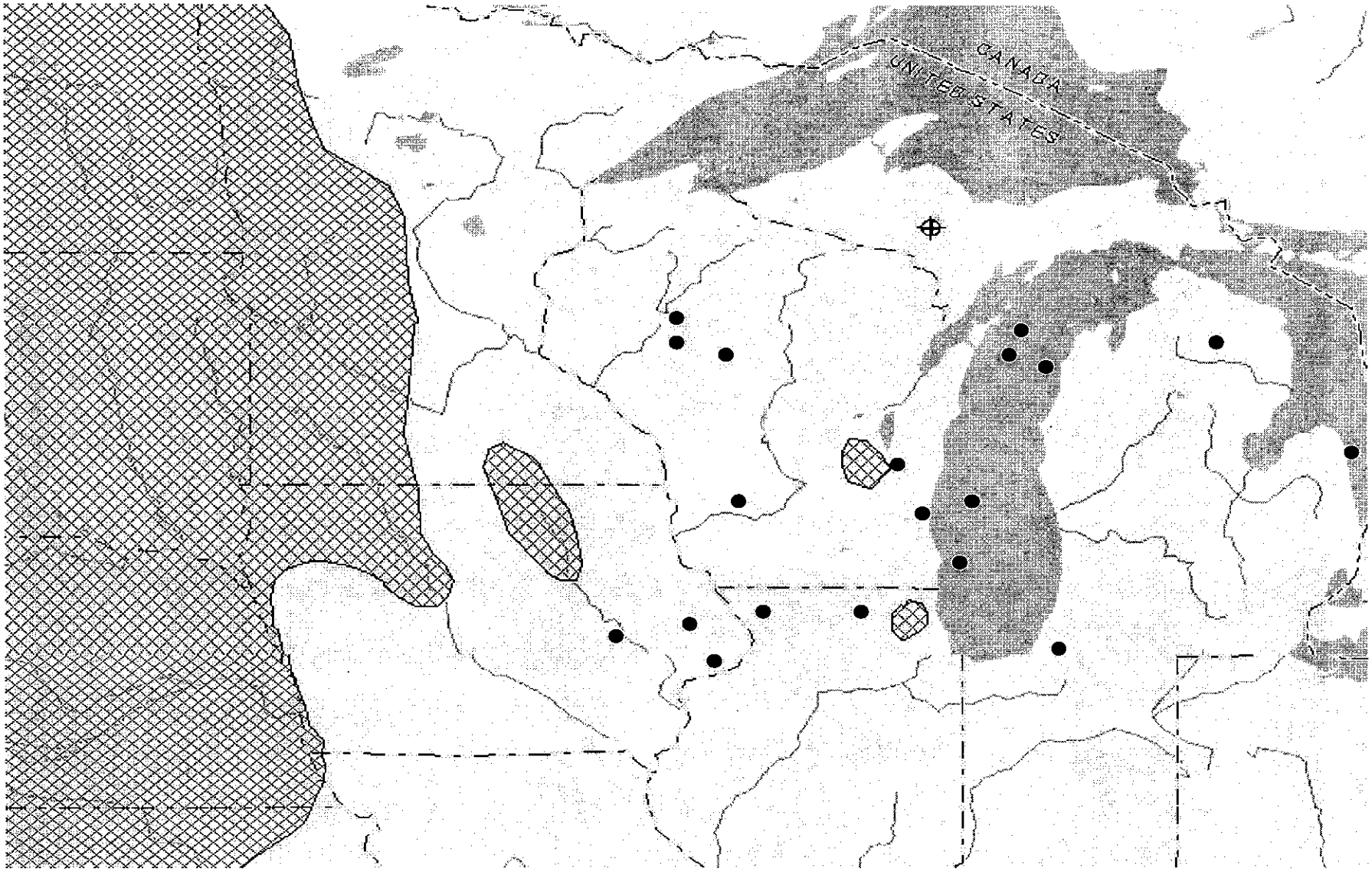

Figure 2. Return rates to Illinois.

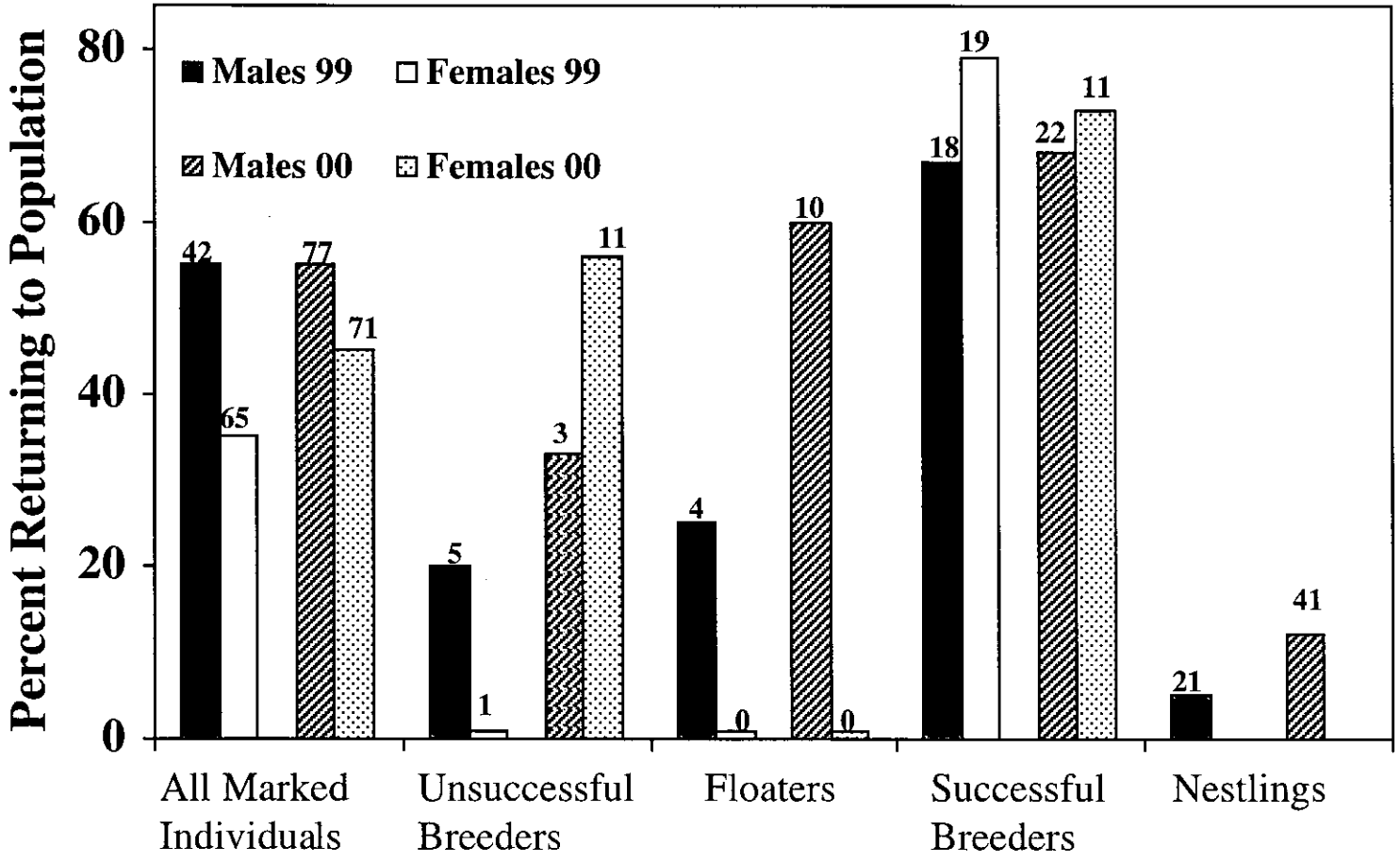

Table 1. Reproductive Success of Yellow-headed Blackbirds in Illinois

	1998	1999	2000
Daily Predation Rate	2%	3%	1.7%
Daily Loss Rate	3%	5%	2.0%
# of nests	59	98	95
Average # of Young per successful nest	2.16	2.83	2.41
Mayfield Survival	51%	32%	61%

Table 2. 2000 insect emergence data and Yellow-headed Blackbirds reproductive success.

	Dragonflies^	Damselflies^	Other Insects^	Yellow-headed Blackbird Reproductive success*
Black Crown Marsh (McHenry Co)	0.30	0.30	3.75	2.14
Black Tern Marsh (McHenry Co)	0.04	0.06	4.12	2.00
Wadsworth Marsh (Lake Co)	0.24	0.87	6.89	-- #
Broberg Marsh (Lake Co)	0.00	0.00	1.95	1.50
Hegewisch (Cook Co)	0.02	0.28	1.47	1.43
Eggers Woods (Cook Co)	0.00	0.08	1.01	1.00
Stickney Run (McHenry Co)	0.00	0.02	4.40	1.5
Burnidge Marsh (Kane Co)	0.17	0.03	0.03	2.67
Windacne Marsh (Lake Co)[1]	--	--	--	-- #
Deer Lake (Lake Co)	--	--	--	-- #
Wadley Marsh (McHenry Co)	--	--	--	2.33
Richardson Foundation (Lee Co)	--	--	--	-- #
Muirhead Marsh (Kane Co)	--	--	--	2.00

* Reproductive success is the number of young per successful nest

Windance, Deer Lake, and Richardson all had Yellow-headed Blackbirds settle but later these birds decided not to breed at the site

^ Values are the average number of insects collected per day per in a 30 cm x 30 cm trap

[1] Windance Marsh has water retention ponds to mitigate runoff from surrounding residential development

Literature Cited

Cory, C. B. 1909. Birds of Illinois and Wisconsin. Field Museum of Natural History. Zoo. Ser. 9

Ford, E. R. et. al., 1934. Birds of the Chicago Region. The Chicago Academy of Sciences. Vol. 5: 2-3

Gavin, T. A. and E. K. Bollinger. 1988. Reproductive Correlates of breeding-site fidelity in Bobolinks (*Dolichonyx oryzivorus*). Ecology. 69: 96-103

Greenwood, P. J. and P. H. Harvey. 1982. The Natal and Breeding Dispersal of Birds. Annual Review of Ecology and Systematics. 13: 1-21

Illinois Department of Natural Resources, 1994. The Changing Illinois Environment: Critical Trends, Technical Report of the Critical Trends Assessment Project. Volume 3

Picman, J. and A. Isabelle. 1995. Sources of nesting mortality and correlates of nesting success in Yellow-headed Blackbirds. Auk. 113 (3) 599-607.

Price, J. T., S. Droege, and A. Price. 1995. The summer atlas of North American birds. Academic Press, London

Pulliam, H. R. 1988. Sources, Sinks, and Population regulation. American Naturalist. 132: 652-661.

Twedt, D. J. and R. D. Crawford. 1995. Yellow-headed Blackbird (Xanthocephalus xanthocephalus). In The Birds of North America, No 192 (A. Poole and F. Gill eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologist Union, Washington D. C.

Willson, M. F. 1966. Breeding ecology of the Yellow-headed Blackbird. Ecol. Monographs. 36: 51-77.