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**Yellow-headed Blackbirds in Illinois**

**2001 Annual Report**

**Illinois Department of Natural Resources**

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Yellow-headed Blackbirds (YHBL; *Xanthocephalus xanthocephalus*) are a wetland 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). While this species was never as common in the East as it is in the West, the population in the southern Great Lakes was classified as "abundant" at the beginning of this century (Cory 1909; Ford 1934). In Illinois the species' range has been significantly reduced and as of 2001 just 14 colonies remain in northeastern Illinois and a single colony in extreme western Illinois. This range contraction is the result of the loss of 89% of Illinois' pre-settlement wetlands due to agriculture and urbanization [Illinois Department of Natural Resources (IDNR) 1994]. The YHBL was designated State endangered in Illinois in 1977, however, in spite of this protection the Illinois population has continued to decline (IDNR unpublished data). As is often the case with populations of endangered species, a lack of basic information about YHBL's biology is a major impediment to 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.

In 2001, Kane County had no breeding YHBLs for the first time in the last 20 years. Dupage County has only one breeding colony and Cook County only two breeding colonies. The current decline suggests that within the next decade the only counties in Illinois with YHBLs will be Lake and McHenry Counties.

In 1998, we began research to determine why the population was declining, we have been collecting data on the population dynamics, reproductive success, and the life history of YHBLs in Illinois. During the last four years we have monitored over 300 nests and banded over 450 YHBLs, approximately 67% of YHBLs in Illinois were captured and color-marked in 2001.

## Results

In 2001, we banded 80 adults and 51 nestling YHBLs. We monitored 103 nests and searched all but three of the active breeding colonies in Illinois for color-marked birds. Our surveys revealed that there were 5% fewer YHBLs in 2001 than in 2000. The number of

wetlands with active YHBL colonies has declined from 24 in 1998 to 15 in 2001, and the population has decreased from 305 in 1998 to 241 in 2001 (-21%).

### **Site Fidelity**

The number of YHBLs returning to Illinois in subsequent years is higher than most published accounts. Over the last three years 53% of all males and 43% of all females returned. YHBLs which nested successfully returned at a rate of 71% and 77% for males and females respectively. Over the last four years 7% of nestling males and 7% of nestling females returned (Table 1).

### **Reproductive Success**

Yellow-headed Blackbirds in northeastern Illinois have relatively high reproductive success (Table 2). The daily loss rate (% of nests destroyed per day, including storms and depredation events) for 1998, 1999, 2000, and 2001 were 3%, 5%, 2%, and 1.7% (Table 2). The average number of fledglings produced per nest was 2.08 in 1998, 2.34 in 1999, 1.86 in 2000, and 1.88 in 2001. When reproductive success data ( $\beta$ ) for all years was entered into Pulliam's (1988) source/sink threshold model ( $\lambda = P_A + P_J\beta$ ), all years functioned as a source population, assuming a moderate level of adult ( $P_A$ ) and juvenile survival ( $P_J$ ).

### **Insect Emergence Data**

Insect emergence data in 2001 was similar to the emergence in 2000. The data is variable but in both years the peak emergence of odonates (i.e. dragonflies and damselflies) is during the time when the majority of YHBL young fledge (Figure 1). We found no significant correlation between the number of young produced, YHBL occupancy, or location of wetland and the level of odonate emergence.

## Discussion

### Population Fidelity / Return Rates

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. 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 (Weatherhead and Forbes 1994).

### Reproductive Success

Reproductive success of YHBLs 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 not only producing enough young to replace natural losses but it is also producing a surplus. This suggests that reproductive success is not contributing to the continued population decline in the area. The main sources of nest loss were large storms that destroy the nests, depredation of nests accounted for only a small fraction of nest losses.

### Insect Emergence Data

Yellow-headed Blackbirds almost exclusively feed their young emerging odonates (damselflies and dragonflies). Poor odonate emergence could have a dramatic effect on the species. It has been hypothesized that female YHBLs can gauge the level of future insect emergence (Orians and Whittenberg 1991). If this is true it may be that YHBLs are assessing wetlands in Illinois and determining that insect emergence is poor. Currently, data suggests that odonate emergence though it is variable does not effect reproductive success or occupancy. In 2002, we will conduct research to determine the amount of time spent foraging and investigate whether individuals at sites with lower rate of odonate emergence spend more time foraging.

### **Continued Population Decline**

The drastic decline of this species over the last 20 years is surprising given the high reproductive success we have found thus far in our study. The five percent decline in 2001 might seem encouraging but this decline does not reflect the addition of a previously unknown site which may have been present in 2000 but was not included in the 2000 population estimate. Thus, the probable 2001 decline was 8-10%.

Most studies investigating the decline of an avian population attribute the decline to poor reproductive success. This 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 most plausible reason for the population decline may be the isolation of this population at the periphery of the species' range. This isolation may be resulting in poor recruitment into the population. The population may be declining because few new birds are locating and settling in the area. This is consistent with the observed age structure which is skewed old due to the fact that very few first-year birds are being recruited into the population (Table 3).

### **Management Recommendation / Habitat Requirements**

The YHBL is an obligate deep-water species that in Illinois only nests at sites where the water level is on average deeper than one meter. As described in other parts of the species' range the wetland must have a mixture of open water and vegetation (usually cattails) which is referred to as a hemi-marsh (Weller 1966). We have measured eight different characteristics of the wetlands with and without breeding YHBL colonies (e.g. water depth, amount of vegetation, distance to urban/suburban area, distance to roads, amount of open water, size of wetland, density of vegetation, and distance of nest sites to open water) none of the characteristics proved to be significantly correlated with YHBL reproductive success or site fidelity. Given that the wetland is over one meter deep and has roughly equal amounts of vegetation and open water there is no difference in occupancy. In fact, there are several sites in Illinois which appear suitable for YHBLs yet lack this species. We have found that YHBLs often move between sites during the breeding season. We have had birds move as far as 60 km during the breeding season within a one to two

day period. This suggests to us that the individuals in Illinois know where most of the appropriate habitat is located.

Thus the Illinois population of YHBLs presents some interesting problems for managers and conservationists. The standard techniques used to increase either survival or reproduction may help the population but individuals in the population are surviving well and reproducing exceptionally well. As mentioned before recruitment into the population appears to be the reason of the decline. The population is separated from the core of the YHBL population in western Iowa by ~ 680 km. We believe that recruitment would be increased by improving the migration corridor between western Iowa and northeastern Illinois. The restoration of habitat throughout the corridor may be impossible but it may be possible to restore important sites along the migration corridor to facilitate migration to northeastern Illinois.

Management of current sites as hemi-marsh, which is a stage in the succession of a wetland, is needed to keep wetlands from succeeding to the next stage which is either a complete open water habitat or a completely vegetated habitat. Both of these habitats are unsuitable for YHBLs and many sites have been lost due to natural. The most appropriate way to accomplish maintaining a hemi-marsh is by infrequent draw-downs of the water level in late summer. This allows for the establishment of vegetation and the deposition of nutrients into the soils of the wetland. Muskrats (*Ondatra zibethicus*) also play an important role in maintaining sites and on occasion draw-downs will reduce muskrat numbers. Muskrats are needed to maintain the hemi-marsh but an over abundance can remove significant amounts of vegetation.

It may be that the Illinois population of YHBLs represents the odd situation where the destruction of the habitat on the large scale is such that there is no way of conserving the isolated populations. Fragmentation of habitat has often been found to result in the decline of populations through reduced reproductive success and survival but fragmentation of a species' range may have the same result but through reduced emigration into a population. Further research of new management techniques maybe needed if we hope to conserve this species in Illinois.

### **Future Research and Implications**

We believe that our ability to color-mark and monitor at least 67% 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 affects their population dynamics and genetic structure. The blood samples for the analysis of genetic structure have been collected from Illinois, South Dakota, and Michigan, but analysis has not been conducted due to the lack of genetic primers needed to obtain the resolution needed to observe genetic differences between populations of the same species.

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. In 2002, we will begin to explore novel management techniques such as conspecific attraction as a possible way to improve recruitment into the Illinois population.

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