

Final Report

Restoration of Wetland Bird Communities along the Illinois River

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Over the last decade restoration of wetland habitats along the central portion of the Illinois River valley has resulted in the addition of thousands of acres of high-quality wetland habitat. With this creation of habitat there have been increases in the populations of many wetland birds. Although most restorations have been successful in establishing a diverse, native plant community, there are several species of birds that have yet to establish breeding populations at these sites (Hobson et al 2003). The reason certain restored wetlands along the Illinois River are missing species, such as Marsh Wren (*Cistothorus palustris*), King Rail (*Rallus elagans*), Black Rail (*Laterallus jamaicensis*), Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*), and Common Moorhen (*Gallinula chloropus*), even though these species migrant through the area, may be that the sites lack the social cues (presence of territorial conspecifics) birds are looking for when selecting a breeding site. This study investigated the cues used by wetland birds when selecting a wetland in which to breed.

There are several reasons to believe that wetland birds use the presence of conspecifics when locating and determining a site in which to breed. First, an unusual behavior exhibited by many wetland species is that they vocalize at night. Although rails, bitterns, and wrens are diurnal species, they vocalize at night, and in some cases they vocalize more at night than during the day. The reasoning behind this is unknown. However, one possible explanation is that, because most wetland birds migrate at night, males vocalize at night to attract females as they migrate over at night. Given the patchy distribution of wetland habitat, as wetland birds migrate through Illinois the detection of a vocalizing conspecific, at least, signifies the location of suitable habitat. Because wetland birds vocalize at night, the most obvious cue to mimic, in order to attract birds to

a site, are vocalizations, however, for certain species visual cues (plastic-resin models) may also be needed. Once birds settle at a site additional vocalizations may facilitate birds establishing territories and breeding at a site (Ward & Schlossberg 2004).

As wetlands are being restored along the Illinois River valley certain species may not establish populations without the cues suggestive of the presence of conspecifics. By providing these cues the birds may attempt to breed, but it is also important to know if individuals successfully produce young at a site. Attracting birds to a site only provides conservation value if the birds successfully reproduce.

The objectives of this study are:

- 1) Can wetland birds be attracted to a site via artificial social cues (conspecific vocalizations and models).
- 2) If wetland birds settle at a site will they establish a territory and breed.
- 3) What is the reproductive success of wetland birds at these restored sites.

Methods

This research was conducted at Spunky Bottoms (Brown County), Big Lake (Brown County), and Emiquon (Fulton County). We attempted to conduct research at Meredosia National Wildlife Refuge and Beardstown Marsh, however the water levels were such that the habitat was either unsuitable or access to the site was restricted. We played vocalizations of Pied-billed Grebe (*Podilymbus podiceps*), Common Moorhen, King Rail, Yellow Rail (*Coturnicops noveboracensis*), Black Rail, Black Tern (*Chlidonias niger*), Virginia Rail (*Rallus limicola*), Sora (*Porzana carolina*), Yellow-headed Blackbird, American Bittern (*Botaurus lentiginosus*), Least Bittern (*Ixobrychus*

exilis), and Marsh Wren. We used conspecific models of Yellow-headed Blackbird. We also constructed and deployed floating nesting platforms for Black Terns (Jablonski et al 2006).

At both Spunky Bottoms and Emiquon we divided the site up into two areas; an experimental area and a control area, where no vocalizations would be played. We monitored the sites using three different methods. First we used playbacks associated with point counts every two weeks. This is the traditional method for sampling wetland birds. However, due to the cryptic nature of wetland birds we also deployed microphones attached to computers to record all vocalizations in a certain area. This technique worked well given power supplies were reliable. Although we had hoped to have greater than 60 days of vocalizations (both diurnal and nocturnal), due to intermittent power supplies, which greatly affected the reliability of the computers, we ended up with only about 12 days of vocalizations. For this report we have only analyzed the nocturnal vocalizations (1hr after sunset to 1 hr before sunrise). We then used Adobe Audition to visually and aurally examine the recording for the presence of the birds of interest. We also did some nocturnal song counts to determine which species were singing at night. These counts were completed in early May, between 2:00 - 4:00 AM, and subsequently probably over-represented certain species that were migrating through the area as opposed to species breeding at the sites. At each point we spent 10 minutes and efforts were made to return to the same location, however high water levels prevented this on several occasions.

Determining the reproductive success of many wetland birds is very difficult. Therefore, we used an indirect means to determine nesting success. If adults were

observed carrying food or young birds were detected it was assumed the birds were successful.

Results

The results of this study are not as “clean cut” as was expected. It appears from this and other research on wetland birds throughout Illinois that certain wetland birds use a variety of both habitat and social cues when deciding on where to breed. Below I outline the results of the conspecific attraction study investigating which species appear to respond to conspecific vocalizations, the night song study investigating which species sing at night, the monitoring effort to determine which species were present at a site, and the nesting success investigation. I summarized the data for each species, and in the discussion I further outline future research and how this study helps to better understand the habitat selection process used by wetland birds.

Black Tern

Although Black Tern vocalizations were broadcasted and floating platforms were deployed, no Black Terns bred at our study sites. Although historically, the species bred in the Illinois River valley and Black Terns were observed at all of our study sites in migration none bred at the sites. None were detected vocalizing at night. Currently our study areas within the Illinois River Valley are 260 km from the nearest known breeding colony which may be part of the reason it may be difficult to attract a population to this area.

Marsh Wren

Marsh Wrens were one of the few species that responded to conspecific vocalizations. This species was not present at Spunky Bottoms until 2003 when two were observed, then again in 2005 a single bird was observed, and in 2007 there were at least seven birds observed at the site. These birds appeared to cluster around the “call boxes” thus suggesting they were responding to conspecific vocalizations (Figure 1). Male Marsh Wrens often create dummy nests that are later selected by females. We located three dummy nests, however we are unsure if any successful breeding occurred. The microphone recorded one vocalization that we attributed to Marsh Wrens and one vocalization that could have possibly been a Marsh Wren. On one occasion during our nocturnal point counts we heard a Marsh Wren, however when conspecific vocalizations were played to elicit responses no responses were detected. This population of Marsh Wrens at Spunky Bottoms is one of the southern most populations in Illinois (Kleen et al 2004).

American Bittern

No American Bitterns were detected breeding at our sites, and therefore, we assume that the species did not respond to conspecific attraction. Although no birds appeared to breed at the site, several birds were detected in migration and some even lingered into early June. Additionally, although the bird is known to sing at night (BNA account) we never recorded the species via our microphone. Only once during our nocturnal point counts did we elicit a response (a call) from an American Bittern after playing the song of the species.

Least Bittern

Least Bittern along with Marsh Wrens were the only two species that appear to readily respond to the conspecific vocalization when determining where to breed. Least Bitterns had been present, and presumably breeding at Spunky Bottoms for several years. Furthermore, in 2007 we detected at least 8 Least Bitterns (some of these were probably late migrants) and while Marsh Wrens which were primarily detected near call boxes, some Least Bitterns were several 100 m from call boxes. However, their distribution suggests they were responding to the call boxes (Figure 1). Interestingly, in late May of 2007 four individuals were flushed while repairing one of the call boxes. Because we never located a nest, or small young birds, it is impossible to know whether these birds were breeding at the site. Least Bitterns were detected twice on the microphone recordings and on one occasion were detected without playback on the nocturnal point counts while on another occasion they were detected via conspecific playback.

Yellow-headed Blackbird

The Illinois River valley was historically part of this species breeding range in Illinois, but currently the only breeding within the valley is at Hennepin-Hopper wetland in the northern portion of the river valley. Although on two occasions, Yellow-headed Blackbirds were detected at Spunky Bottoms, no breeding occurred at the site. On one occasion two males were observed in the vicinity of a call box, therefore, the conspecific vocalizations may have caused them to use the site during migration. The species was never detected vocalizing at night.

Pied-billed Grebe

Because Pied-billed Grebes were found throughout the study sites there is no evidence that the species responds to conspecific vocalizations. However, the species is very vocal at night, with the microphone detecting more than 3 calls per hour at night. Also, the species was common on nocturnal point counts, and it was obvious that once one individual called it elicited the call of other individuals. We observed three active nests at Spunky Bottoms and young birds were observed at Spunky Bottoms, Emiquon, and Big Lake.

Sora

Soras also appear to be a prime candidate to use conspecific vocalizations to select breeding sites because they often sing at night, however although many Soras were detected in migration we found no evidence of Soras breeding at any of our sites. It is possible they bred at these sites, but the sites are located at the southern edge of the species' range and it appears that if they are breeding it is at a low density. Soras were the most common bird detected at night via the microphones (over 5 calls per hour), also, the species was the most commonly detected species on nocturnal point counts. The species would call without vocalizations being played, but once a vocalization was played up to 15 individuals would respond in early May, however by late May no vocalizations were detected.

Virginia Rail

Virginia Rails are very cryptic, but we did detect them at Spunky Bottoms and they may have been nesting. Although, it is not known if they responded to the call boxes, because the individual that we detected was 250-350m from the call box. This species also calls at night, although at a much lower frequency than Soras. Furthermore, on nocturnal point counts the species was only detected via playbacks.

King Rail

King Rails were detected at both Spunky Bottoms and Big Lake. We detected up to three pairs, two of which were breeding, and at least one produced young. Again in this case it is difficult to know if the presence of call boxes effected settlement patterns. All three birds were several hundred meters from call boxes. The species was detected via microphones (primarily because one of the territories was near the microphone) and were detected on nocturnal point counts both passively and via playbacks.

Black and Yellow Rail

Neither of these species were detected at our sites. For Yellow Rail the location is hundreds of km out of its range. The habitat is better for Black Rails but given their rarity it is not surprising none were detected.

Common Moorhen

Common Moorhen were detected at Spunky Bottoms and T. Hobson confirmed breeding at the site. It does not appear they responded to conspecific vocalizations,

however it is possible. Because in migration, and during the breeding season, many American Coots call at night, and their vocalization can be difficult to distinguish from Common Moorhen, it is difficult to quantify vocal activity. However, via playback on nocturnal point counts at least one occasion provided a Moorhen detection.

Discussion

This research along with other research on wetland birds in Illinois illustrates the complex patterns of occupancy in wetland birds. Investigating habitat selection processes is further complicated, at least in central Illinois, by the lack of wetlands and therefore control sites. In this study we attempted to partition wetlands into an experimental and control area. However, our lack on understanding of how once a site is selected a breeding territory is established preclude us from knowing if species were using conspecific vocalization when selecting a site. For example, the King Rails may have selected Spunky Bottoms because they detected the conspecific vocalizations, but once at the site they established a breeding territory several hundred meters from the call box in order to reduce competition from the “other” King Rails.

It does appear that at least Marsh Wrens and Least Bitterns respond to conspecifics, however for other species additional habitat, or social cues, may be needed. Yellow-headed Blackbirds, for example, have been shown to use the number of young produced per nest at a site the previous year to determine where to disperse to (Ward 2006). Obviously more complex cues are lacking when just models and songs are used.

Future Research

Because this research has highlighted the species-specific differences in habitat selection we have begun a meta-analysis with other data to investigate if certain wetland birds respond similarly. We are using data from the Northeast Illinois Wetland Birds Survey (NEWS) to supplement data from this study and data from the Illinois Chapter of The Nature Conservancy to conduct occupancy modeling. To this point the occupancy modeling appears to suggest that species that regularly sing at night also may be the first to colonize wetlands. Whereas, the species that do not sing at night are slow to colonize a site, but once colonized may remain at the site for several years. This suggests that the species that quickly colonize a site may use habitat cues and simple presence / absence of conspecifics, whereas the other species may use more complex social cues such as the reproductive success of conspecifics. This meta-analysis will be completed before January of 2009 and has tentatively been accepted in a special section of the journal *Condor* addressing habitat selection in birds.

Conclusion

Understanding the habitat selection process of wetland birds could help examine the population dynamics of many wetland birds that are declining in Illinois. It appears that certain species may use simple cues such as the presence of conspecifics, but that other species may need more complex cues associated with the behavior, or reproductive success of conspecifics. Additionally, no research has addressed how the presence or absence of heterospecifics affects settlement. Current management recommendation would be continue to acquire and manage wetlands for emergent wetlands. It also may

be important to maintain some level of connectivity between wetlands. If certain wetland birds are using complex social cues it may require individuals visiting several sites throughout the breeding season. If this is the case it is imperative that wetlands be relatively close to one another in order for the cost of visiting these sites not to be too much, and for birds to locate these sites. More research is needed to determine the ideal juxtaposition of wetlands for different wetland birds.

Literature Cited

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Spatial arrangement of Least Bitterns and Marsh Wrens

- Marsh Wrens
- Least Bitterns
- Call Box
- Microphone

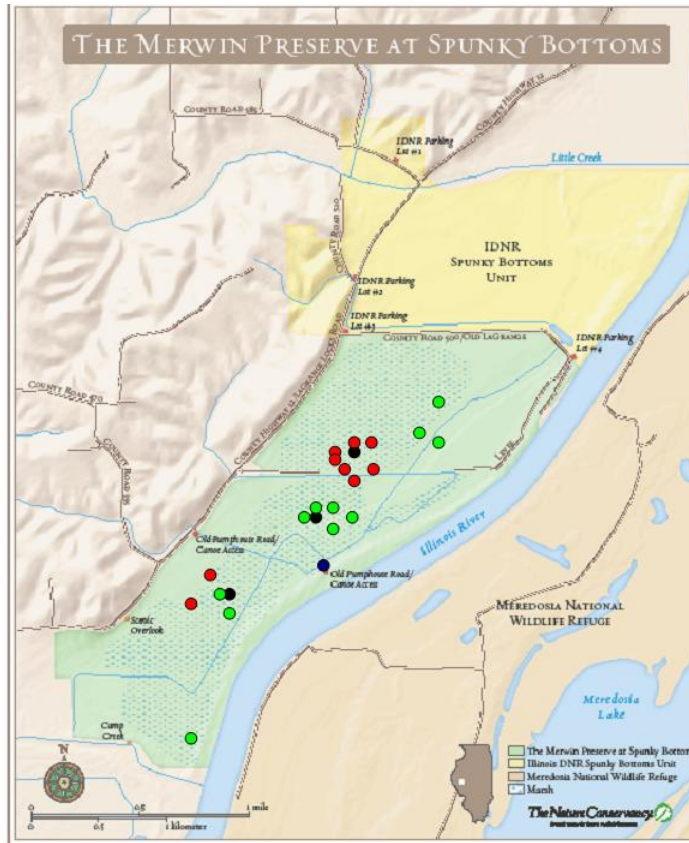


Figure 1. The map illustrates the spatial distribution of Marsh Wrens and Least Bitterns in relation to the call boxes. The blue dot is the location of the microphone.