



# MDC Resource Science

## Linking Wetland Management Decisions To Least Bittern Nest Selection and Breeding Success

Science Notes



Least Bittern



King Rail

# Linking Wetland Management Decisions to Least Bittern Nest Selection and Breeding Success on Public Wetlands in Missouri

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**Background Information:** Several secretive marsh bird (SMB) species are both migrants and breeders in Missouri. The degree to which individual birds stay to nest in Missouri versus continuing north to breed is unknown and has resulted in uncertainty regarding the role of Missouri's wetlands for this group of birds. One key uncertainty identified by many Department wetland managers is whether their management actions are emulating wetland processes that enable SMBs to fulfill their life history requirements while in Missouri. For managers to ensure successful outcomes for individuals that use Missouri either as a stopover location or a nesting destination, they must know not only the key wetland conditions required by the birds but also the timing of when these resources are needed. Our objective was to determine the effects of hydrologic management and habitat characteristics on SMB nest site selection and daily nest survival at two spatial scales: the individual wetland and the nest point (area within 50 m of nest).

**Methods and Results:** We conducted a two year occupancy study (2013-2014) that included six rounds of repeated call-back surveys to detect the presence of five SMB species (Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), King rail (*R. elegans*), least bittern (*Ixobrychus exilis*) and American bittern (*Botaurus lentiginosus*)) during spring and summer (April-July) on 107 wetland units across 8 Conservation Areas and 4 National Wildlife Refuges throughout Missouri. We also collected habitat measurements at study wetlands, surveyed wetlands for nesting activity and monitored nests for survival. Wetlands selected for nest searches where those 1) in which least bittern or King rail were detected at least once during call-back surveys and 2) that were inundated during the final round of occupancy surveys. Analyses only involved least bittern because no King rail nests were found. See [Hill \(2015\)](#) for more details on study methods, results and discussion.

- Over the 2 year study period, we searched 34 wetlands for signs of King rail or least bittern nesting activity and monitored 71 least bittern nests located in 8 wetlands. All least bittern nests were located in persistent emergent vegetation (cattail or bulrush) and 65% of nests fledged at least one chick.
- Least bittern selected wetlands with an average water depth of  $\geq 50$  cm (Figure 1.top) and  $>50\%$  emergent vegetation coverage to establish nests. Within a wetland, nests were generally located along or near the interface between tall, emergent vegetation and open water with average water depth of  $\geq 50$  cm.
- Least bittern daily nest survival was positively associated with water depth at the nest site, with water depths of 50-80 cm generally predicting nest survival (Figure 1bottom).

**Management Implications:** This project demonstrated that least bitterns are nesting in some of Missouri's public wetlands and identified important habitat characteristics.

- Least bitterns selected wetlands and nest sites that included habitat characteristics positively associated with nest success: water depth and emergent vegetation (both height and coverage). Thus, providing water depths of 50-80 cm in wetlands with  $>50\%$  emergent vegetation through the duration of least bittern nesting period (mid-July) will likely maximize least bittern nesting efforts and overall nest success.
- Considerable uncertainty remains as to why least bitterns choose to nest in Missouri or migrate northward; additional investigation to determine specific factors (e.g., role of wetland food resources, role of wetlands on private land) that may influence these choices would further inform management decisions targeted toward SMBs.

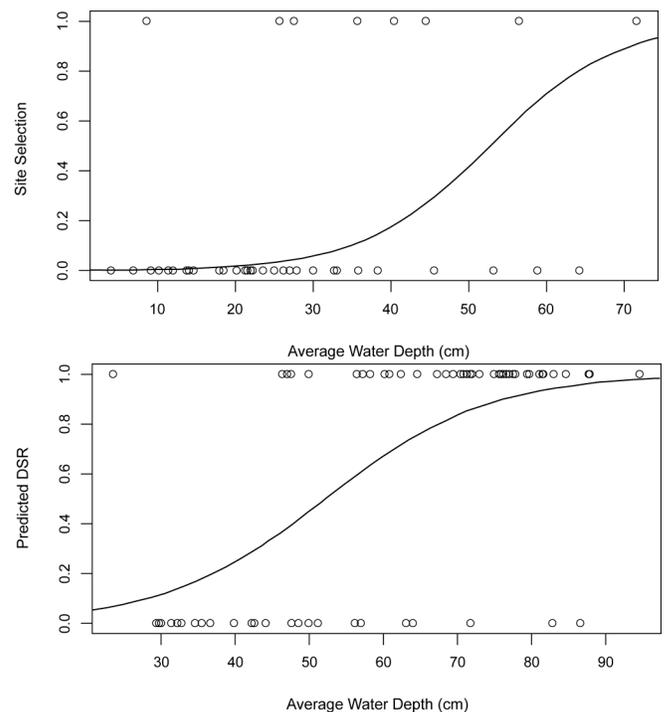


Figure 1. Relationship between average wetland water depth and probability a wetland is selected for least bittern nesting (top) and average water depth within 50 m of a least bittern nest and daily nest survival (DSR) probability (bottom). Water depths of 50-80 cm generally predicted nest survival.

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