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Use of Moist Soil Units at Carlyle Lake Wildlife Management Area by Least Bitterns and Other Threatened Birds During the Breeding Season

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ABSTRACT

The least bittern (*Ixobrychus exilis*), an Illinois-threatened species, is a small, secretive heron found in dense, emergent wetland vegetation. Seven least bittern nests were located in a moist-soil management unit at Carlyle Lake Wildlife Management Area during 2000. All nests successfully hatched young. Five other state-threatened or -endangered wetland birds were also documented at this site during the breeding season, including successfully nesting pied-billed grebes (*Podilymbus podiceps*). Moist-soil management is an effective method for providing critical breeding season habitat for state-threatened and -endangered wetland birds.

INTRODUCTION

The least bittern (*Ixobrychus exilis*) is a small, secretive heron that feeds on fish and other prey in shallow water, and nests in dense, emergent vegetation (Gibbs et al. 1992). Unlike the several species of herons that nest colonially, least bitterns are typically solitary-nesters. However, dense, semi-colonial aggregations of least bittern nests have been reported in a few cases where food is particularly abundant (Weller 1961, Kushlan 1973). Due to habitat destruction, known populations of least bitterns in Illinois are sparse, and the species is listed as state-threatened (Illinois Endangered Species Protection Board 1999). However, least bitterns have been shown to adapt to several human-modified habitats, including impoundments (Gibbs and Melvin 1992) and wetlands formed by strip-mining (Horstman 1994).

Traditional management of wetland impoundments for migratory and wintering waterfowl typically includes spring drainage ("drawdowns"), the planting of corn (*Zea mays*) or milo (*Sorghum bicolor*) in drier sites and aerial seeding of Japanese millet (*Echinochloa frumentacea*) and buckwheat (*Fagopyrum esculentum*) to wetter areas, and then

reflooding in the fall (Bowyer 2001). This management scenario provides food and habitat for dabbling ducks and other wetland birds.

Alternatively, hydrologic patterns in impoundments can be manipulated for the production of natural foods for wetland wildlife. This technique, known as moist-soil management, was developed in the Illinois River Valley (Bellrose et al. 1979), and is increasingly gaining acceptance. Results of moist-soil management vary considerably between years and among sites because of differences in successional stages, weather, soils, topography, and the timing, speed and duration of drawdowns (Fredrickson and Reid 1986, Bowyer 2001). Nevertheless, the documented use of moist-soil units by waterfowl and other waterbirds indicates that this is a valuable wildlife management technique.

We documented an aggregation of nesting least bitterns in a moist-soil unit (MSU) at Carlyle Lake Wildlife Management Area (CLWMA) in 2000. We also confirmed the use of this site by a number of other state-threatened and -endangered species. Our results further support the multiple benefits of moist-soil management to a number of species besides migratory waterfowl.

STUDY AREA & METHODS

The study site was an 80-ha MSU, one of four MSUs located within CLWMA. CLWMA is a 7,600-ha area, managed by the Illinois Department of Natural Resources (IDNR) primarily for migratory waterfowl, located at the north end of Carlyle Lake in Fayette County, Illinois. The study site was bound by levees and could be flooded or drained by a series of water control structures and ditches. Although this site was designated for a late drawdown during the summer of 2000, heavy rainfall did not allow the MSU to be completely drained. As a result, a 14.4-ha hemi-marsh (a 50:50 mix of emergent vegetation and open water, Fredrickson and Reid 1988) was created. Cover classes within the hemi-marsh were measured using the methods of Daubenmire (1959) as modified by Bailey and Poulton (1968). Open water covered just over half of this area (52.6%), intermixed with a variety of plant species including duckweed (*Lemna spp.*; 30.4%), longleaf pondweed (*Potamogeton nodosus*; 7.8%), water smartweed (*Polygonom amphibium*; 5.0%), and buttonbush (*Cephalanthus occidentalis*; 2.1%)(Bowyer 2001).

Weekly ground counts were conducted from 28 February 2000 to 1 July 2000 to document use of MSUs by migratory and nesting waterbirds. Observers used binoculars and spotting scopes to inventory birds from vehicles driven along the levees of the MSUs. The numbers and locations of birds were recorded during identification. Additionally, taped recordings of marsh bird vocalizations were played to elicit responses from species that were secretive and difficult-to-observe (Bowyer 2001). Nest searches were conducted when individual least bitterns consistently responded to the taped calls. Once nests were located, they were marked at a distance with flagging tape, and their proximity to levees and other least bittern nests were recorded. Nest locations were plotted on a map, and monitored at approximately 10-day intervals until 5 August 2000. We recorded the number of eggs or nestlings present at each visit.

RESULTS

We located and monitored 7 least bittern nests within one MSU at CLWMA. Six nests were located on 28 June, the other on 1 July 2000. Mean clutch size of the 6 nests found prior to hatching was 4.5 eggs/nest (range 4-5 eggs). Each nest hatched at least 1 young ($\bar{x}$ = 3.4 young/nest; range 1-4; n = 7). Although fed by adults until 3-4 weeks of age, young least bitterns are semi-altricial; they are physically capable of leaving the nest within 6 days of hatching to seek cover or begin foraging on their own (Gibbs et al.1992). Therefore, we could not determine the number of young fledged from each nest.

Six of the 7 (86%) least bittern nests hatched after 1 July, and all hatched prior to 23 July. Based on a 20-day incubation period (Ehrlich et al. 1988) and a laying rate of 1 egg/day, most nests were initiated between 10 and 30 June. Five of the 7 nests were built in water smartweed, and two nests were built in buttonbush. Six nests showed a clumped distribution ($\bar{x}$ nearest-neighbor nest = 26.6 m, range 7.7-38.8 m). The remaining nest was 167.4 m from its nearest neighbor. Water depth at nest sites ranged from 60 to 80 cm.

Five other state-threatened or endangered species of wetland birds were observed within the MSUs when their migration was unlikely (1 June-1 July; Table 1). The state-threatened pied-billed grebe (*Podilymbus podiceps*) was confirmed nesting at the study site, when an adult and a brood of four young were observed on 1 July 2000.

DISCUSSION

The conditions within the MSU at this site were excellent for breeding least bitterns. The excess summer rainfall made it impossible to completely drain the unit, which resulted in a shallow, hemi-marsh habitat. Fredrickson and Reid (1986) reported nesting of least bitterns in similar habitats within MSUs in Missouri. In those sites, least bitterns were associated with shallow water (0-50 cm) and patches of dense emergent vegetation interspersed with open water. Weller (1961) found water depths ranged from 7.5 – 95.0 cm at the nest sites he reviewed in Iowa. He also found that nests were usually located near patches of open water.

When habitat conditions are favorable, least bitterns occasionally nest semi-colonially, rather than solitarily. In Florida, Kushlan (1973) found 11 active nests in a 260 m^2 area of vegetation (423 nests/ha). During a year of exceptional conditions in Iowa, 62 nests were located in a 33.6 ha marsh (1.8 nests/ha); however, not all of these nests were active at the same time (Weller 1961). We located 6 nests within 0.25 ha (24 nests/ha). Throughout the 14.4-ha hemi-marsh that formed within our study site, the density of least bittern nests was 0.49 nests/ha. This habitat was not only attractive to nesting birds, but likely facilitated population recruitment as each of the seven nests survived to hatching. The observed clutch size (4.5 eggs/nest) was typical of least bitterns (Gibbs et al. 1992). In Illinois, Graber et al. (1978) reported least bitterns initiated nests from late-May to late-June, with the peak occurring in early June. Our sample of nests indicated a similar temporal pattern of nest initiation.

Five other state-threatened or -endangered species of wetland birds were observed using the 4 MSUs at the CLWMA, including nesting pied-billed grebes (Table 1). Bowyer

(2001) observed 122 species of birds in the MSUs at CLWMA from 26 October 1999 to 1 July 2000, including use by over 10,000 migrant waterfowl during fall 1999. Similarly, Fredrickson and Reid (1986) reported 153 avian species from MSUs in Missouri. Management of several moist-soil units as a wetland complex is a highly effective technique for providing habitat for a diversity of waterbirds (Havera and Bellrose 1985, Fredrickson and Reid 1986, Bowyer 2001). This includes leaving water in some units throughout the summer months to provide breeding season habitat for some wetland birds. Our results underscore the value of moist-soil management by documenting successful reproduction of state-listed species.

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Table 1. Illinois-threatened and -endangered wetland birds observed in the moist-soil units of Carlyle Lake Wildlife Management Area in south-central Illinois, 1 June – 1 July 2000.

Species	Status[A]	Peak Number	Date Observed
Pied-billed grebe, *Podilymbus podiceps*	Threatened	3 [B]	1 July
Least bittern, *Ixobrychus exilis*	Threatened	12 [B]	28 June
Snowy egret, *Egretta thula*[c]	Endangered	5	1 July
Little blue heron, *Egretta caerulea*[c]	Endangered	305	1 July
Black-crowned night-heron, *Nycticorax nycticorax*[c]	Endangered	6	21 June
Yellow-crowned night-heron, *Nyctanassa violacea*[c]	Endangered	22	7 June

[A] Source: Illinois Endangered Species Protection Board 1999.

[B] Peak numbers exclude juveniles.

[C] Although these species might not be expected to nest within the MSUs, they could be nesting in the forested floodplain that surrounds the study site.