Nest Site Characteristics of Great Blue Herons (*Ardea herodias*) in Northeast Ohio[1]

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Abstract. Seventeen Great Blue Heronries were surveyed in nine counties of northeast Ohio during the 1993 breeding season to determine nest site characteristics. Herons nested in 15 species of deciduous trees, selecting the taller trees at each site. Crown integrity was not a requisite for tree usage; repaired (reoccupied) nests and new colonies were established in dead trees as well as in healthy ones.

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INTRODUCTION

Great Blue Herons (*Ardea herodias*) occur in Ohio as migratory summer residents, where they return each year to breed in colonies. In northeastern Ohio, these heronries are scattered inland, away from the developed Lake Erie shoreline; this pattern differs from northwestern Ohio, where extensive coastal marshes still support large breeding colonies.

Studies of Great Blue Herons in Ohio have involved feeding sites and diet (Hoffman 1978, Parris and Grau 1979), the breeding biology of selected colonies (Edford 1976, Burkholder and Smith 1991), and the monitoring of nests at single sites (Chasar 1990, Burkholder and Smith 1991, Hauser, unpubl.). Regional studies are lacking, particularly in the assessment of nest site characteristics that would influence the management of heronries and the conservation of potential nesting sites for wading birds.

In the present study, 17 Great Blue Heronries in northeast Ohio were monitored; from the data collected, information is presented regarding the types of nest sites utilized, species of nest trees selected, and relative condition of the nest trees (i.e., canopy integrity). The inclusion of multiple sites serves to establish a regional, rather than local, database for Great Blue Heronries.

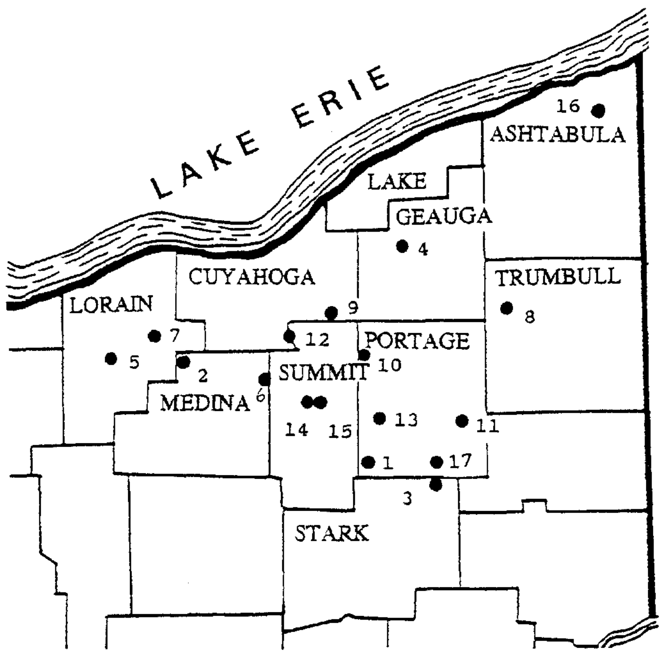

Figure 1. Map of northeastern Ohio counties, showing the distribution of Great Blue Heron colonies included in the present study.

MATERIALS AND METHODS

Site Description

Twenty-two Great Blue Heronries were located in nine counties of northeastern Ohio using ground and aerial surveys, and the assistance of state and county wildlife managers and local guides. Of those located, 17 heronries (Fig. 1) were accessible for study during the 1993 breeding season (approximately 15 February to 15 July).

Northeastern Ohio is a mosaic of urban areas, suburban developments, rural farming areas, and patches of undeveloped land. The heronries included in this study were located in farm woodlots (3), swamps (3), upland woods (5), riparian zones (2), and beaver impoundments (4). All were near stream systems and the potential feeding sites associated with those drainage basins; numerous ponds and artificial reservoirs in this region provide abundant littoral foraging area.

Data Collection

Nest counts were performed at each site during late March; nests were considered to be active if occupied or tended by herons. Fledgling counts were done in late June, just before young herons were observed leaving their nests to feed with adults; at this time, young herons were viewed standing on nests and adjacent branches.

Each nest tree was identified taxonomically and categorized according to the relative condition of the crown: 1) full crown (little or no apparent damage); 2) some twig or branch damage; 3) major branches bare or broken; 4) few living branches remaining; 5) crown dead. A similar classification scheme was employed by Gibbs et al. (1987), but they included only three classes.

Vegetation point transects were performed at each site in order to determine the relative frequency (availability) of tree species, and to characterize the site as upland or wetland in character.

Duncan's pairwise comparison test was used to determine significant differences in fledgling counts between colonies in different nest site types.

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RESULTS

A total of 1,148 nests were counted in 17 Great Blue Heronries, distributed among sites situated in farm woodlots (18.5%), swamps (15.1%), upland woods (46.5%), riparian zones (9.8%) and beaver impoundments (10.1%) (Table 1). Duncan's Pairwise Comparison showed no significant differences in the fledgling counts for heronries of different nest site types. All located heronries were situated within 1.0 km of stream systems, but only nine (53%) were in the immediate vicinity of bodies of water.

TABLE 1

Great Blue Heronry sites in northeast Ohio, showing type of nest site, number of nests (1993), and average number of young fledged per nest in each heronry.

Heronry	Nest Site Type	No. Active Nests 1993	Average No. Fledged ± SD
1. Wingfoot Lake	Swampy woods	38	2.06 ± 0.66
2. Hardscrabble	Farm woodlot	178	2.22 ± 0.72
3. Walborn Res.	Farm woodlot	23	2.13 ± 0.54
4. Geauga Parks	Upland woods	185	2.28 ± 0.78
5. Pittsfield	Riparian woods	74	2.54 ± 0.71
6. Hinckley Res.	Upland woods	26	1.50 ± 0.63
7. Durkee Road	Swamp	54	2.21 ± 0.63
8. Pukkerbrush	Beaver pond	5	2.60 ± 0.55
9. Solon	Upland woods	46	1.23 ± 0.81
10. Tinkers Creek	Beaver pond	101	2.45 ± 0.67
11. Ravenna Arsenal	Beaver pond	5	1.60 ± 0.65
12. Pinery Narrows	Swamp	81	2.22 ± 0.67
13. Breakneck Creek	Beaver pond	5	2.50 ± 0.89
14. Bath Road #1	Riparian	39	2.50 ± 0.62
15. Bath Road #2	Upland woods	31	2.50 ± 0.52
16. Ashtabula	Upland woods	246	2.30 ± 0.70
17. Atwater	Farm woodlot	11	2.11 ± 0.60

In the colonies studied, herons utilized 15 species of deciduous trees for nest construction (Table 2). In every heronry, the nest tree species most frequently used also represented the tallest trees at the site. Measurements were not made of individual trees; nests were clearly visible in tree tops above the main canopy at each site.

Crown condition (and canopy integrity) varied widely among heronries (Table 3). Large, older (long-occupied) sites showed a gradient of crown conditions, with the original, central nest trees typically dead and perimeter nest trees with minimal crown damage. New and reused nests, as well as new heronries (e.g., Tinkers Creek), were established in dead trees. Nest trees with minimal crown damage (condition classes 1 and 2) supported 63.1% of all heron nests, while trees sustaining moderate to severe limb damage (classes 3 to 5) supported 36.9% of all nests.

TABLE 2

Data for species of nest trees used by nesting Great Blue Herons at 17 sites in northeast Ohio, showing the relative frequency of nests found constructed in each species of tree.

Site	Tree Species (See Appendix I)	Rel. Frequency on Site (%)	Rel. Frequency of Nests (%)
1.	AmElm*	15	58
	SMaple	12	42
2.	RMaple*	11	75
	SWO	37	13
	AmElm	1	12
3.	Beech*	31	74
	RMaple	15	17
	SMaple	17	9
4.	Beech*	56	83
	SMaple	37	14
	YBirch	0	1
	CW	0	1
	Syc	0	1
5.	Syc*	63	96
	CW	16	3
	RMaple	0	1
6.	Beech*	31	65
	ROak	57	35
7.	PinOak	49	50
	RMaple*	11	50
8.	ALL DEAD	–	–
9.	Beech*	54	54
	Tulip*	5	41
	SMaple	36	2
	WAsh	8	2
10.	ALL DEAD	–	–
11.	ALL DEAD	–	–
12.	Syc*	44	83
	CW	19	17
13.	SWO	23	40
	unknown	–	60
14.	Syc*	33	97
	CW	20	3
15.	Syc*	15	45
	BlkLoc	13	45
	Elm	11	10
16.	RMaple	46	20
	WOak*	43	34
	Syc	1	14
	ROak*	7	23
	SBH	1	8
	Tulip	0	1
17.	Beech*	25	36
	SMaple*	24	64

* Denotes tallest trees.

TABLE 3

Condition of nest trees in northeast Ohio heronries, showing number of trees utilized and number of nests (parentheses) constructed in each condition category. Refer to text for category descriptions.

Site	1	2	3	4	5
1.	6 (19)	2 (19)	0 (0)	0 (0)	0 (0)
2.	12 (38)	26 (68)	12 (57)	3 (15)	0 (0)
3.	2 (3)	4 (15)	1 (5)	0 (0)	0 (0)
4.	12 (33)	18 (67)	11 (43)	3 (15)	0 (0)
5.	9 (38)	9 (33)	1 (3)	0 (0)	0 (0)
6.	1 (1)	1 (9)	1 (16)	0 (0)	0 (0)
7.	2 (16)	5 (33)	2 (5)	0 (0)	0 (0)
8.	0 (0)	0 (0)	0 (0)	0 (0)	2 (5)
9.	8 (13)	4 (22)	2 (11)	0 (0)	0 (0)
10.	0 (0)	0 (0)	0 (0)	0 (0)	39 (101)
11.	0 (0)	0 (0)	0 (0)	0 (0)	5 (5)
12.	1 (1)	8 (41)	9 (24)	3 (14)	1 (1)
13.	1 (2)	1 (3)	0 (0)	0 (0)	0 (0)
14.	0 (0)	4 (20)	1 (19)	0 (0)	0 (0)
15.	4 (7)	1 (16)	1 (8)	0 (0)	0 (0)
16.	34 (93)	34 (104)	9 (42)	1 (4)	1 (3)
17.	2 (7)	1 (4)	0 (0)	0 (0)	0 (0)
Totals	94 (271)	118 (454)	41 (233)	10 (48)	56 (142)
% Freq.	29.5 (23.6)	37.0 (39.5)	12.9 (20.3)	3.1 (4.2)	17.6 (12.4)

DISCUSSION

All heronries in northeast Ohio included in the present study were located within 1.0 km of stream systems and the potential foraging areas (wetlands, tributary streams) associated with them. Gibbs et al. (1987), Miller (1944), Vermeer (1969), and many others have shown adequate feeding habitat to be a key determinant of nest site selection in Great Blue Herons. Inland sites included in their studies were associated with major rivers, estuaries, and lakes; proximity to water was thought to provide some protection from ground predators in addition to nearby feeding opportunities.

In northeast Ohio, however, eight of 17 heronries were not immediately bordered by water, suggesting that avoidance of ground predation was not a major factor in site selection. The possibility of ground predation may also suggest that management of heronries should include the monitoring of probable nest predators, such as raccoons, where such species have become locally abundant.

Great Blue Heron nests have been documented in a wide array of trees and shrubs, and on the ground. Vermeer (1969), Gray et al. (1980), Henny and Bethers (1971), Gibbs et al. (1987), and others concluded that relative height and suitable limb structure was more important than species, although Kelsall and Simpson (1980) showed fidelity to certain tree species, within colonies, between years.

In northeast Ohio, herons nested in 15 deciduous tree species, choosing the tallest trees at each site (Table 2). At Durkee Road, for example, only two large red maple trees were found among pin oaks and small elms. More than half the nests in this colony were constructed in these two maples, with the remainder built in the tallest of the surrounding pin oaks. At Ashtabula, where red maples are abundant, most nests were constructed in the taller red and white oaks that reached above the main canopy layer. Gibbs et al. (1987) found similar patterns in coastal Maine, where herons demonstrated no requisite for specific tree species or tree height between colonies, but selected the tallest trees within colonies.

The importance of crown condition, or canopy integrity, in the selection of nest trees is questionable. Some authors (Bent 1964, Hopkins and Dopson 1967, Kerns and Howe 1967, Henny and Bethers 1971) have found a preference for living trees, while others (Gibbs et al. 1987, Burkholder and Smith 1991, McAloney 1973) found herons nesting in dead or damaged trees.

In the present study, new nests and entire colonies were found established in dead trees. Herons are known to damage nest trees chemically and mechanically (Kerns and Howe 1967). However, in this study they were found to reuse damaged trees until the trees fall or no longer support nests. In each of the larger colonies (e.g., Ashtabula, Geauga Parks, and Hardscrabble), the upland woods or farm woodlot hosting the colony was characterized by intact canopy except in the nesting area. Herons chose to nest in dead, central trees even though many healthy, tall trees were available nearby.

Crown condition of the nest tree did not appear to influence breeding success. Tinkers Creek had a fledgling count of 2.45 per nest—above our latitudinal average of 1.91 (Henny and Bethers 1971). This heronry is of particular interest because it was established in dead trees. Duda (1995) found that fledging rates between nests in healthy and dead crowns at Ashtabula were not significantly different.

In this region of northeast Ohio, herons nest in a variety of habitat types, in a considerable number of tree species and in both living and dead trees. Proximity to food sources appears to be the common determinant of site selection, rather than vegetative characteristics of the nesting area itself. Further studies of local predation pressures and the possible effects of human disturbance are desirable.

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Appendix I

Key to species of nest tree species utilized by Great Blue Herons in northeast Ohio.

Beech:	American Beech (*Fagus grandifolia*)
RMaple:	Red Maple (*Acer rubrum*)
SMaple:	Sugar Maple (*Acer saccharum*)
Syc:	American Sycamore (*Platanus occidentalis*)
ROak:	Red Oak (*Quercus rubra*)
WOak:	White Oak (*Quercus alba*)
POak:	Pin Oak (*Quercus palustris*)
SWO:	Swamp White Oak (*Quercus bicolor*)
Tulip:	Tulip tree (*Liriodendron tulipifera*)
AmElm:	American or Red Elm (*Quercus americana* or *Quercus rubra*)
CW:	Eastern Cottonwood (*Populus deltoides*)
YBirch:	Yellow Birch (*Betula allegheniensis*)
WAsh:	White Ash (*Fraxinus americana*)
SBH:	Shagbark Hickory (*Carya ovata*)
BlLoc:	Black Locust (*Robinia pseudoacacia*)

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