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Some Aspects of the Breeding Ecology of the Great Blue Heron at Heyburn State Park

Abstract

Reproductive information was gathered on the Great Blue Heron (*Ardea herodias*) at Heyburn State Park. Onset of the breeding season was 1 March 1977 and 25 February 1978; breeding terminated in the first half of August each year.

Fledglings were counted in 109 nests in 1977 and 148 in 1978; 2.14 and 2.20 were produced per successful nest. The 1.95 young per nesting pair in 1978 is believed adequate to maintain stable population. Nestling mortality was highest during the two to four weeks after hatching in 1977 and four to six weeks in 1978. Overall, nestling mortality was 18 percent in 1977 and 19 percent in 1978; starvation of young was the chief mortality factor.

Introduction

In northern Idaho, productivity and distributional information on the Great Blue Heron is not available. Heronries at Cocalalla Lake (estimate 200 individuals), Swan Lake (28 nest structures, 1972), Heyburn State Park (69-106 active nests, 1970-72) (Dr. Donald R. Johnson, University of Idaho, pers. comm.), and Mica Bay (15 active nests, pers. obs., 1978) have received only brief investigation.

Information is presented here on the breeding ecology of the Great Blue Heron at the Heyburn State Park Heronry, Benewah County, Idaho.

Study Area and Methods

The heronry was located on a mountain ridge about 640 m above sea level in the eastern portion of Heyburn State Park (Fig. 1), and occupied an area of approximately 11,000 m². The St. Joe River and Benewah Lake, about 0.4 km and 0.7 km away, respectively, were the nearest feeding grounds. Nests were built in *Pinus ponderosa* (69 percent), *Abies grandis* (14 percent), and *Larix occidentalis* (17 percent). Nest height ranged from 20-40 m.

The field work was conducted from February to August of 1977 and 1978. All trees with visible active nests were marked with numbered plywood plates and then plotted on a chart. In addition, one nest was arbitrarily assigned to each tree in which nests were not visible but nesting activity was evident (sound, whitewash, egg shells on the ground). Nesting success is reported as the mean number of young per nesting pair and as the mean number of young per successful nest at nine weeks of age. Pratt (1970) reported that nestlings abandoned nests as early as 64 days after hatching. Whenever possible, nests were observed from the ground or from heights of about 30 m in nearby trees. Counts of visible young were made once a week after hatching

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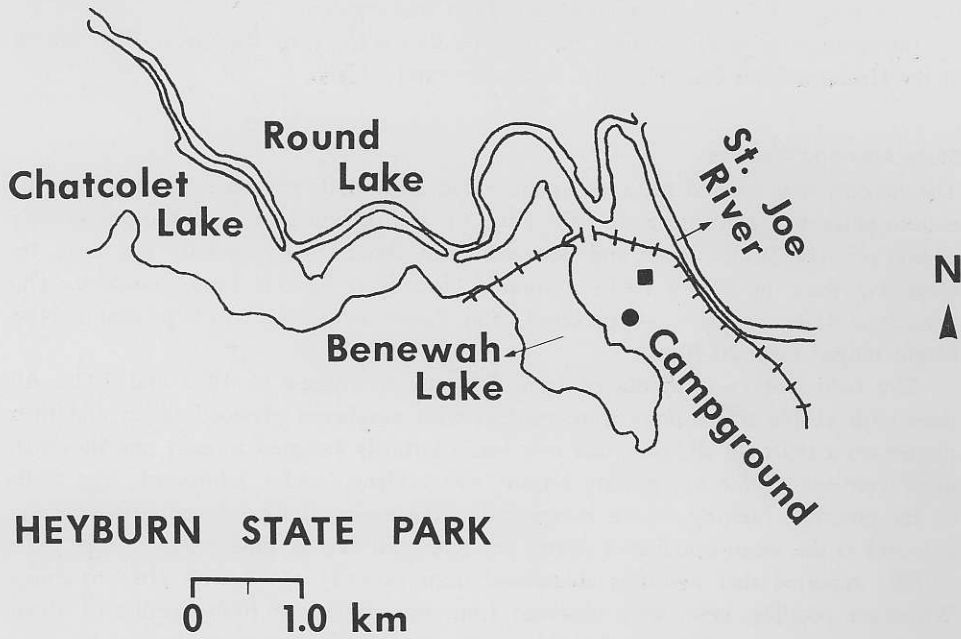
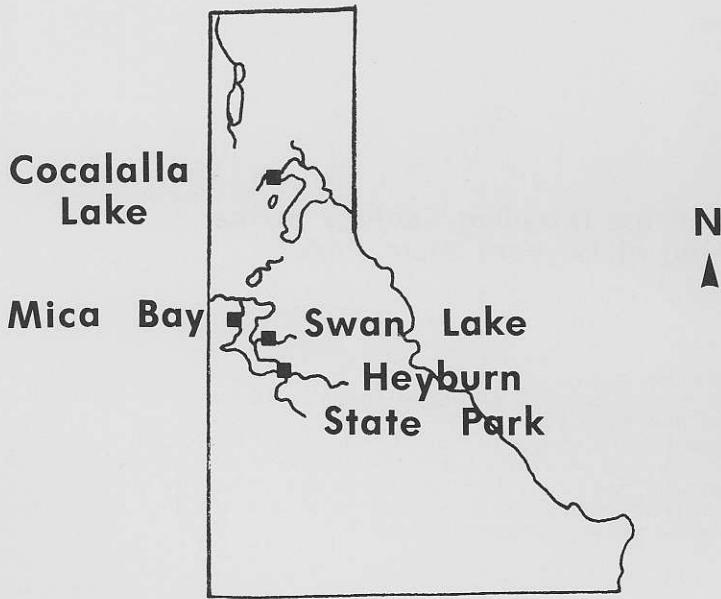


Figure 1. Distribution of Great Blue Heron heronries in northern Idaho and Heyburn State Park heronry location. ■ = heronry.

for both seasons. Dead nestlings were examined to ascertain possible causes of mortality and approximate age at death.

Results and Discussion

Hérons were first observed at the heronry on 1 March 1977 and 25 February 1978. The first egg shells from hatched eggs were found on 23 April 1977 and 18 April 1978. Incubation, which commences after the first or second egg has been laid (producing asynchronous hatching), lasts 25-29 days (Pratt, 1970). Thus, the first eggs were probably laid during the week of March 20th in both years. The last nestlings fledged in the first half of August each year.

Fledglings were counted in 109 nests in 1977 and 148 in 1978 (Table 1). Fledging number was two (mode) both years and there was no significant difference between years in the distribution of number of nests fledging one to four nestlings ($X^2 = 0.0550$; $P > 0.05$). Miller (1943), Vermeer (1969), and Pratt (1970, 1972) reported similar fledging rates. This heronry produced 1.95 young per nesting pair in 1978; this number is above the production believed necessary to maintain a stable population in the northern United States (Henny, 1972). The mean number of young fledged per successful nest was 2.14 in 1977 and 2.20 in 1978. An estimated 12 pairs in 1977 and 8 in 1978 from trees with non-visible nests were presumed to have been successful; assuming that each pair fledged two young, the mean number of young per successful nest would have been 2.12 in 1977 and 2.18 in 1978. Productivity rates in this paper compare closely to other values in the Pacific Northwest (Table 2).

A total of 51 (18 percent) nestlings in 1977 and 76 (19 percent) in 1978 were found dead on the ground. Since the initial brood size could not be determined for either season, these values must be considered conservative. Some nestlings may have been lost to predators or remained unseen due to the dense foliage in some nestling trees. The proportion of successful nests fledging only one nestling (24 and 23 per-

TABLE 1. Fledging success of Great Blue Herons at Heyburn State Park, northern Idaho.

No. fledgling per active nest	No. of nests	
	1977	1978
0	—	19
1	26	34
2	48	64
3	29	39
4	6	9
5	0	2
Total nestlings	233	325

TABLE 2. Summary of reproductive success for the Great Blue Heron in the Pacific Northwest.

Location	Year	No. young fledged per successful nest	No. young fledged per nesting pair	Source
Western Oregon	1970	2.61	2.04	Henny & Bethers (1971)
Western Oregon	1974	2.18-2.70	—	Werschkul et al. (1977)
Northwestern Oregon	1975	2.32	1.96	English (1978)
Northern Idaho	1977	2.14	—	This study
Northern Idaho	1978	2.20	1.95	This study

cent) seems high because clutch size in the Great Blue Heron is typically four (Henny, 1972); this figure may be the result of high egg loss, hatching failure, or early death of nestlings. Werschkul *et al.* (1977) attributed low fledging success to human disturbance in Oregon. Although no evidence of nestling mortality due to disturbance from trains or the numerous visits by vacationers and field parties was found in this heronry, it is possible that such disturbances might have had detrimental effects during the pre-hatching period (i.e., lower clutch size) similar to those reported on other aquatic birds (Schreiber, 1979; Robert and Ralph, 1975). It is also possible that an unusually high number of young, inexperienced pairs occurred in this colony.

Approximate age at death was recorded for 29 nestlings in 1977 and 60 in 1978. The highest mortality occurred during the two to four week period after hatching in 1977 and during the four to six week period in 1978 (Table 3). I found starvation of the young to be the greatest cause of mortality in this heronry. Pratt (1970, 1972) and Kushlan (1978) reported that the greatest cause of mortality was starvation of the younger, smaller chicks due to their inability to compete for food with older siblings.

TABLE 3. Nestling mortality relative to age.

Weeks	No. Dead	
	1977	1978
0-2	8	7
2-4	12	17
4-6	6	19
6-8	2	8
8-10	1	7
10-	0	2

Other causes of mortality were an irregular piece of fish bone obstructing the esophagus of nestlings, nestlings falling while struggling for food, and nest structures falling from trees. Altogether, accidental deaths killed five nestlings (10 percent) in 1977 and nine (12 percent) in 1978. Seven of the nine nestlings found dead in 1978 occurred four to six weeks post-hatch. Avian predation was not observed, although young and adults were harassed by Ospreys (*Pandion haliaetus*) on four occasions.

Additional work is needed in this heronry to determine percent egg and hatching failure and early nestling mortality. A survey of heronry locations throughout northern Idaho would be valuable. Heronries of various sizes would provide an adequate sample size to test the suspected relationship between colony fledging success and several important factors defined by Werschkul *et al.* (1977). In addition, these heronries could provide additional information regarding the "Information Center" hypothesis (Krebs, 1974).

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