

**GREAT BLUE HERON NESTING POPULATION ON IRONSIDES
ISLAND
IN THE ST. LAWRENCE RIVER FROM 1964 - 1998**

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ABSTRACT

Numbers of Great Blue Herons (*Ardea herodias*) active nests have been counted during 30 breeding seasons from 1964 through 1998 on Ironsides Island (St. Lawrence River), Jefferson Co., NY. The lowest nest count occurred in 1966 with 85 active nests and the highest count was in 1990 with 1040 active nests. Nest numbers have declined to 506 active nests during the 1998 breeding season. Heron nesting populations are lower because of the loss of the nest support trees probably due to high nitrate levels from the bird's excrement. The island's ownership and natural history are also discussed.

INTRODUCTION

Ironsides Island (a.k.a. Brown's Island or Berkshire Island) is an 8 ha (20 acre) island located in the St. Lawrence River on the Jefferson - St. Lawrence Co. line in New York State and just one km from the Leeds Co., Ontario, Canada boundary. In New York, surveys have been performed to locate Great Blue Heron colonies in NY (Andrle *et al.* 1988; McCrimmon 1981, 1982; Benning 1968, 1969; Watson 1991), but there are limited data on changes in colony size over an extended period of time. Ironsides Island is ideal for long term studies, because the island is a protected reserve owned by The Nature Conservancy and therefore has little or no human disturbance. The study was initiated in 1964 by Benning (1969) and continued by the authors in 1968 for 30 breeding seasons in a 35 year time span. The authors believe it is important to document the heron population as well as the natural history of Ironsides Island as a benchmark for future studies on this island. See Figs. 1 - 2 for aerial view and nesting habitat.

HISTORY

The island was conveyed by deed from Maurice Teich to William E. Browning III on 25 Jan 1965 and recorded in the Jefferson Co. Clerk's Office 27 Jan 1965 in Liber 763 of Deeds on page 246. William Browning conveyed the island by deed to The Nature Conservancy on 28 May 1965 and recorded in the Jefferson Co. Clerk's Office 13 Jul 1965 in Liber 770 of Deeds on page 194. Since 1965 Ironsides Island has been managed by the Central / Western New York Chapter of The Nature Conservancy. In 1967 Ironsides Island was designated by the U.S. Dept. of the Interior's National Park Service as the 56th site in their Registered Natural Landmark program. A bronze plaque indicating the Natural Landmark status is mounted on a granite boulder on the island's south-east side.

GEOLOGY, SOILS AND WETLANDS

Ironsides Island is a part of the Grenville Province, which consists of highly deformed rocks of Precambrian age. The island is composed of Alaskitic gneisses and granite with minor amounts of other metamorphic rocks. During the Pleistocene, two directions of glacier movement occurred during the late Wisconsin glaciation to produce the present topography. The glaciers eroded the island surface into smooth elongate ridges with pronounced grooves, two of which can be traced the entire length of the island. Deposition of glacial till was limited and rarely exceeds 60 cm (two feet) in thickness. The soil cover is very thin with large areas being exposed bedrock. The perimeter of the island consists of steep sides between 3 and 10 meters (10 and 32 feet) high. (Schneider in Maxwell *et al.* 1975)

The soil complex is made of Hollis soils, which are shallow, excessively drained, moderately coarse textured, acidic and formed in a thin mantle of glacial till that is from 10 to 50 cm (4 to 20 inches) thick over rock. Two small fresh water wetland areas were found at each end of the island, with water levels being determined by rainfall and the river's water level, which is controlled by hydroelectric dams downriver. (McDowell in Maxwell *et al.* 1975). Soil chemistry was determined on 20 May 1974 at sites under nests and at non-nest sites. There were differences in soil nitrate nitrogen and phosphorus between the two sites. In the nest site area nitrate levels were 45 kg/ ha (40 lbs/acre) and in the non-nest site area it was less than 11 kg/ha (10 lbs/acre). Phosphorus in the nest site area was 224 kg/ha (200 lbs/acre) and the non-nest site area was 168 kg/ha (150 lbs/acre). Soil acidity varied from a pH of 4.2 in the soils under nests to 5.8 in non-nest site areas. (Schneider in Maxwell *et al.* 1975).

Water chemistry and biology at the two wetland sites was determined from samples taken on 20 May 1974. The north wetland was located under trees

supporting heron nests and the south wetland was located under trees with no heron nests. In the wetlands under nests the nitrate level was 1.88 ppm¹, while in the wetland without heron nests was 0.66 ppm. The sulfate levels were 30 ppm in the wetland with nests and 7 ppm in the non-nest wetland. Conductivity was 132 umhos² @ 18o C in the nest areas and 52 umhos@ 18o C in the nest free area. Invertebrates in the wetland under the heron nests were the Isopoda - *Asellus militaris*, Nematoda - *Dorylaimus* sp., Cladocera - *Daphnia* sp., Ostracoda - *Limnocythera* sp., Copepoda - *Cyclops* sp. and Diptera - *Aedes vexans*, *Aedes riparius* (Shearer in Maxwell et al., 1975).

PLANT ANALYSIS

The vegetation on Ironsides Island was sampled by D. Cox in May, 1974 (see Table 1) and by P. Ruta in July, 1978 (see Table 2). These two reports are combined here to give an overview of the island's botany. The studies utilized the 1/40 acre circular quadrats³ and the dbh⁴ of each tree within the quadrat was measured. The data were used to calculate the relative frequency, relative density, and the importance value index. Ruta (1978) compiled a species list of plants for Ironsides Island as part of a St. Lawrence River winter navigation environmental impact study (Geis *et al.* 1977). The botanical nomenclature follows Gleason *et al.* (1963) and Fernald (1950).

Ironsides Island was so named because of the presence of rust colored rocks on the steep rock sides of the island. It was assumed the color came from iron deposits in the rock. However, Martha Sherwood, a graduate student at the herbarium of Cornell University discovered that the color was due to the rust colored lichen (*Xanthoria paratina*). Two other lichens were also present on the rocks, the green-tufted lichen (*Ramalina intermedia*) and the leathery white and black lichen (*Umbilicaria vellea*) (Killian, 1974).

VERTEBRATE ANALYSIS (EXCEPT BIRDS)

A survey of vertebrates was conducted in May, 1974. The lack of a vertebrate population of any size is due to the islands isolation from the mainland, except in winter when travel across the ice is possible. The only amphibian noted was an unidentified frog in the tadpole stage located in the pool at the south end

¹ ppm- parts per million

² umhos -micromho-measure of electrical conductivity, reciprocal of the ohm

³ quadrat - measured plots used to count species in an area

⁴ dbh - diameter of trunk at breast height

of the island. Reptiles were found near the central part of the island and along the shoreline. One garter snake (*Thamnophis sirtalis*) and two water snakes (*Natrix sipedon*) were observed.

A total of 110 Sherman small mammal traps was set at eight different sites on the island and baited with rolled oats. The catch from this overnight trapping session yielded one meadow vole (*Microtus pennsylvanicus*). There were no deer mice (*Peromyscus* sp.), which is surprising since they are common on the mainland (Lackey in Maxwell *et al.*, 1975). Evidence of the presence of beaver (*Castor canadensis*) and a white-tailed deer (*Odocoileus virginianus*) doe and fawn have been seen on at least two trips in the mid-1990's.

BIRD POPULATIONS

During the St. Lawrence River winter navigation environmental impact study in 1978, a breeding bird study was completed on the island (Maxwell *et al.*, 1979). No other studies on the bird's breeding populations have been completed, except for the heron population. This breeding bird survey recorded 383 territorial males of 39 species (Table 3). Other birds observed on the island but not nesting were the Common Loon, Green Heron, Wood Duck, Mallard, Sharp-shinned Hawk, Ruffed Grouse, Killdeer, Ring-billed Gull, Herring Gull, Common Tern, Rock Dove, Mourning Dove, Great Horned Owl, Chimney Swift, E. Phoebe, E. Kingbird, American Crow, Red-breasted Nuthatch, Brown Creeper, Cedar Waxwing, Scarlet Tanager and Chipping Sparrow.

The main avian attraction on Ironsides Island is the Great Blue Heron colony. The authors have been studying the herons since 1968 and the main purpose of this paper is to summarize the population change in the heron colony over the past 35 years. The Great Blue Heron's 10 - 20 meter (33 to 66 feet) high nests were difficult to reach, so a formula was derived to estimate the number of active nests. A count of all nests that looked complete and not degraded by winter storms was made and 25% of those were estimated to be non-active and so subtracted from the total nest count. These data in this paper reflect that correction. See Fig. 3 and Table 4.

The change in nesting population size from the low count of 85 active nests in 1966 to the high count of 1040 active nests in 1990, followed by a gradual decline to the present implies a slow but steady change in colony size and therefore some stability in the colony over time. The authors were very sensitive to the possibility of losing the colony due to investigator disturbance. The senior author lost a Black-crowned Night-Heron colony on N. Bass Island in Lake Erie in 1963 while studying their behavior (Maxwell *et al.*, 1968). The Ironsides

Island colony has been protected by New York State Environmental Conservation Laws, which prohibits entry on the island from April 1 to August 1.

The increase in the heron colony from 1964 to 1990 was due to the utilization of trees for nest sites located on the central and south end of the island as the colony expanded from the original nest trees at the north end of the island. The increasing numbers of adult herons and their nestlings contributed to the high nitrate levels in the soil with their excrement. The trees and shrubs could not tolerate the new soil conditions and many of them died. In March 1991 and in January 1998, ice storms in the region damaged the trees and contributed to the die-off. The loss of suitable nesting trees has resulted in a gradual decline in the number of herons nesting on the island.

The only other major environmental disruption during the study period that might have affected the heron population was a 308,000 gallon oil spill from a tanker carrying number 6 crude oil on 23 Jun 1976. The oil slick traveled downriver for more than 60 miles and Ironsides Island was in the path of the oil slick. The island itself suffered little damage, except for some oil coatings on the shoreline rocks. The heron's feeding areas in nearby marshes did suffer extensive damage and reduced the food supply for the young herons that were in the nests or on the ground at the time of the oil spill. It was estimated that there was a loss of 40 adult herons and 15 young herons. The loss of young would have been greater had not the NYS Department of Environmental Conservation brought small fish to Ironsides for the herons to eat. The Nature Conservancy received \$4000 as settlement of a suit brought by The Nature Conservancy against the Oswego Barge Company for damages to the island and the herons. The heron nesting population did increase in the years following the oil spill in 1976 and the long-term damage to the number of nesting herons was apparently minimal (Table 4).

The future changes in the Great Blue Heron population on the island are hard to predict. We suspect that the population will continue to decline as the nesting trees die. It is hoped that a small colony will remain on the island and reforestation will eventually permit the heron colony to increase in size again. We encourage the continued study of the vegetational and bird population changes on Ironsides Island into the next century.

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Table 1. Canopy vegetation of Ironsides Island, Jefferson Co., NY in May, 1974

Species	Relative Frequency	Relative Density	Importance Value Index
White Pine <i>Pinus strobus</i>	15.9	21.3	57.5
Red & White Oak <i>Quercus rubra & alba</i>	11.6	12.5	51.5
Red Maple <i>Acer rubrum</i>	13.0	11.3	37.3
White Ash <i>Fraxinus americana</i>	11.6	13.8	31.6
Basswood <i>Tilia americana</i>	7.2	6.3	30.2
Ironwood <i>Ostrya virginiana</i>	8.7	8.8	20.1
Sugar Maple <i>Acer saccharum</i>	8.7	5.0	19.6
Serviceberry <i>Amelanchier arborea</i>	8.7	8.8	19.1
N. White Cedar <i>Thuja occidentalis</i>	7.2	9.4	19.0
Red Pine <i>Pinus resinosa</i>	2.9	1.2	7.3
Hickory <i>Carya</i> sp.	2.9	1.2	4.2
Gray Birch <i>Betula populifolia</i>	1.4	0.6	2.5



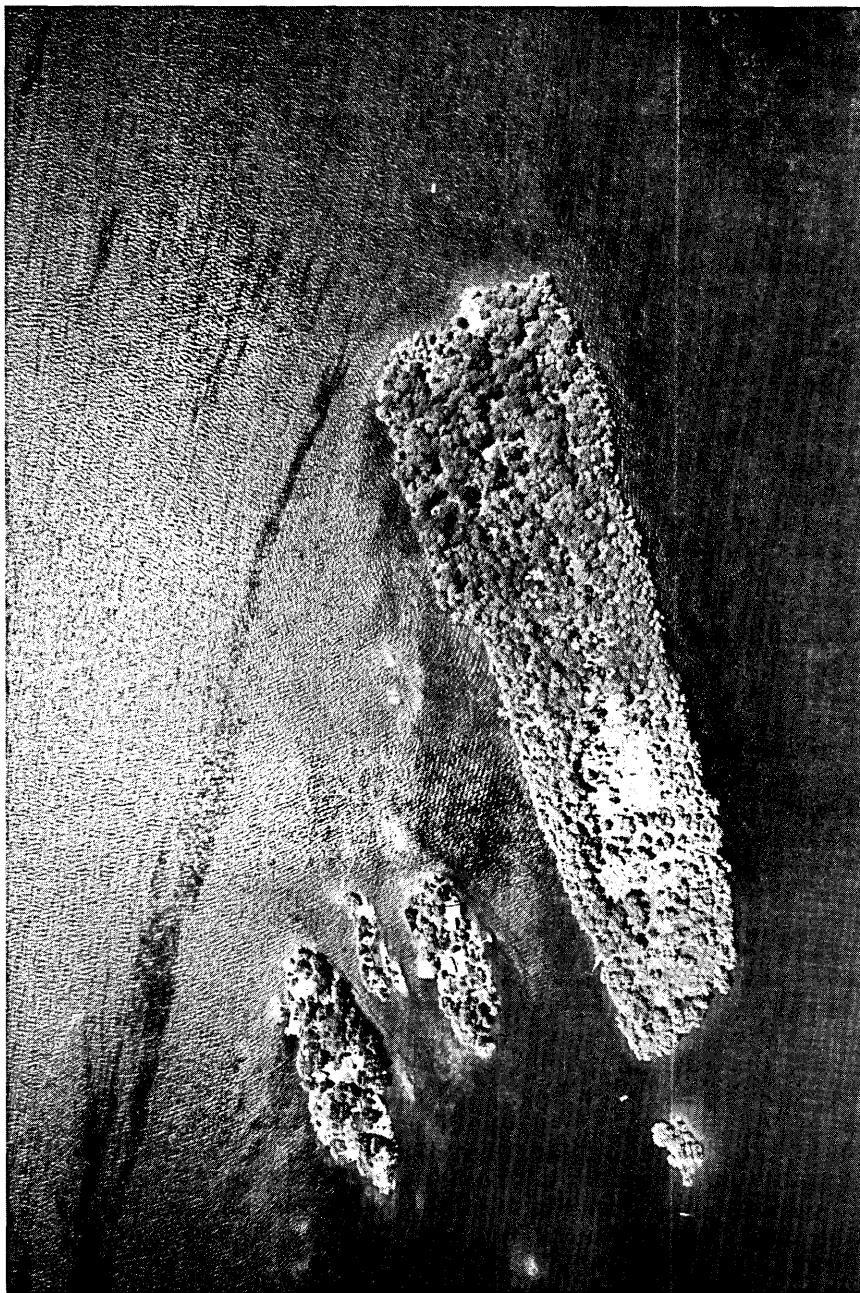


Fig. 1 Aerial view of Ironsides Island, St. Lawrence River, NY



Fig 2 Nesting habitat on Ironsides Island, St. Lawrence River, NY 18 June 1997

Fig 3. Great Blue Heron active nests on Ironsides Island, NY - 1964-98.

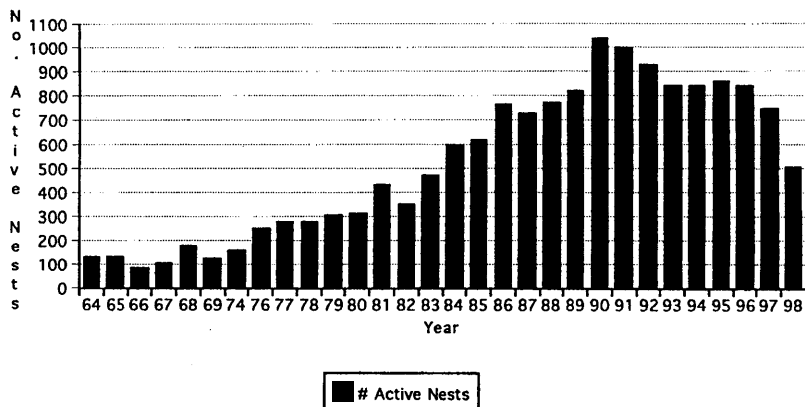


Table 2. Plant species list for Ironsides Island, Jefferson Co., NY compiled in July, 1978.

<i>Dryopteris marginalis</i> - marginal shield fern	Polypodiaceae	<i>Polypodium virginianum</i> - rock polypody
<i>Dryopteris spinulosa</i> - spinulose wood fern		<i>Pteridium aquilinum</i> - bracken fern
<i>Onoclea sensibilis</i> - sensitive fern		
<i>Taxus canadensis</i> - Canada yew	Taxaceae	
<i>Juniperus communis</i> - common juniper	Pinaceae	<i>Thuja occidentalis</i> - white cedar
<i>Pinus resinosa</i> - red pine		<i>Tsuga canadensis</i> - eastern hemlock
<i>Pinus strobus</i> - white pine		
<i>Maianthemum canadense</i> - Canada mayflower	Liliaceae	<i>Smilacina racemosa</i> - false solomon's seal
<i>Polygonatum biflorum</i> - Solomon's seal		
<i>Populus grandidentata</i> - bigtooth aspen	Salicaceae	
<i>Carya cordiformis</i> - bitternut hickory	Juglandaceae	<i>Carya ovata</i> - shagbark hickory
<i>Betula lutea</i> - yellow birch	Corylaceae	<i>Carpinus caroliniana</i> - hornbeam
<i>Betula papyrifera</i> - paper birch		<i>Ostrya virginiana</i> - hop hornbeam
<i>Quercus alba</i> - white oak	Fagaceae	<i>Quercus rubra</i> - red oak
<i>Ulmus americana</i> - American elm	Ulmaceae	
<i>Urtica dioica</i> - stinging nettle	Urticaceae	
<i>Polygonum</i> spp. - knotweed	Polygonaceae	
<i>Chenopodium gigantospermum</i> - goosefoot	Chenopodiaceae	
<i>Phytolacca americana</i> - pokeweed	Phytolaccaceae	
<i>Ribes glandulosum</i> - skunk currant	Saxifragaceae	
<i>Amelanchier arborea</i> - juneberry	Rosaceae	<i>Rubus allegheniensis</i> - blackberry
<i>Prunus serotina</i> - black cherry		<i>Rubus idaeus</i> - red raspberry
<i>Pyrus melanocarpa</i> - black chokeberry		<i>Rubus odoratus</i> - flowering raspberry
<i>Geranium robertianum</i> - herb robert	Geraniaceae	
<i>Rhus typhina</i> - staghorn sumac	Anacardiaceae	
<i>Ilex verticillata</i> - winterberry	Aquifoliaceae	
<i>Acer pensylvanicum</i> - striped maple	Aceraceae	<i>Acer saccharum</i> - sugar maple
<i>Acer rubrum</i> - red maple		
<i>Impatiens capensis</i> - jewelweed	Balsaminaceae	
<i>Parthenocissus quinquefolia</i> - Virginia creeper	Vitaceae	
<i>Tilia americana</i> - basswood	Tiliaceae	
<i>Cornus amomum</i> - silky dogwood	Cornaceae	
<i>Gaylussacia buccata</i> - huckleberry	Ericaceae	
<i>Fraxinus americana</i> - white ash	Oleaceae	
<i>Convolvulus</i> spp. - bindweed	Convolvulaceae	
<i>Solanum dulcamara</i> - bittersweet nightshade	Solanaceae	
<i>Scrophularia lanceolata</i> - figwort	Scrophulariaceae	
<i>Cephalanthus occidentalis</i> - buttonbush	Rubiaceae	
<i>Lonicera</i> spp. - honeysuckle	Caprifoliaceae	
<i>Aster</i> spp. - aster	Compositae	<i>Solidago</i> spp. - goldenrod
<i>Lactuca canadensis</i> - lettuce		

Table 3. Ground counts of breeding birds on 8 hectare (20 acres) Ironsides Island, Jefferson Co. NY during May - June, 1978. The species are listed in order of abundance.

Species	No. territorial males/ 8 ha	Species	No. territorial males/ 8 ha
Great Blue Heron	280	Blue Jay	2
American Robin	7	Black-capped Chickadee	2
House Wren	6	White-breasted Nuthatch	2
Song Sparrow	6	Yellow-rumped Warbler	2
Starling	5	Pine Warbler	2
Eastern Wood-Pewee	4	Common Yellowthroat	2
Tree Swallow	4	Red-winged Blackbird	2
Rough-winged Swallow	4	Northern Cardinal	2
Wood Thrush	4	Eastern Towhee	2
Red-eyed Vireo	4	American Woodcock	1
Yellow Warbler	4	Northern Flicker	1
Baltimore Oriole	4	Pileated Woodpecker	1
Common Grackle	4	Hairy Woodpecker	1
Great Crested Flycatcher	3	Veery	1
Gray Catbird	3	Solitary Vireo	1
Warbling Vireo	3	Black-and-white Warbler	1
American Redstart	3	Nashville Warbler	1
Rose-breasted Grosbeak	3	Ovenbird	1
Downy Woodpecker	2	White-throated Sparrow	1
Least Flycatcher	2		

Table 4. Ground counts of Great Blue Heron active nests on 8 hectare (20 acres) Ironsides Island, Jefferson Co., NY from 1964 - 1998.

Date	No. active nests	Source	Date	No. active nests	Source
07 - 09 - 64	135	Benning (1965)	06 - 19 - 84	601	Authors
00 - 00 - 65	135	Benning (1966)	06 - 18 - 85	620	Authors
00 - 00 - 66	85	Benning (1967)	06 - 18 - 86	766	Authors
07 - 01 - 67	110	Benning (1968)	07 - 01 - 87	725	Authors
06 - 00 - 68	180	Parker (1969)	06 - 17 - 88	774	Authors
06 - 00 - 69	130	McAllister (1971)	06 - 14 - 89	817	Authors
05 - 20 - 74	160	Authors	06 - 13 - 90	1040	Authors
06 - 09 - 76	256	Authors	06 - 06 - 91	1001	Authors
05 - 24 - 77	279	Authors	06 - 10 - 92	930	Authors
05 - 23 - 78	280	Authors	06 - 16 - 93	838	Authors
05 - 22 - 79	306	Authors	06 - 09 - 94	839	Authors
06 - 25 - 80	312	Authors	06 - 09 - 95	860	Authors
06 - 12 - 81	432	Authors	06 - 13 - 96	837	Authors
05 - 24 - 82	352	Authors	06 - 18 - 97	750	Authors
06 - 07 - 83	472	Authors	07 - 10 - 98	506	Authors

LITERATURE CITED

- Andrle, R.F. and J. Carroll, eds. 1988. *The Atlas of Breeding Birds in New York State*. University Press, Ithaca, NY. 551 pp.
- Benning, W.E. 1965. Survey of heronries in upstate New York, 1964. *Kingbird* 15:92-93
- 1966. 1965 heronry report. *Kingbird* 16:79-80.
- 1967. 1966 heronry report. *Kingbird* 17:80-81.
- 1968. 1967 Great Blue heronry survey. *Kingbird* 18:82-84.
- 1969. Survey of Great Blue Heron heronries, 1964-68. *Kingbird* 19:85-90
- Fernald, M.L. 1950. *Gray's Manual of Botany*. American Book Co. NY 1632 pp.
- Geis, J.W., N. Hyduke, B. Gilman, P. Ruta, and M. Faust. 1977. Plant communities along the St. Lawrence River shoreline in New York State in *Preliminary Report: Biological characteristics of the St. Lawrence River*, SUNY College of Environ. Sci. & Forestry. Syracuse. 231 pp.
- Gleason, H.A. and A. Cronquist. 1963. *Manual of vascular plants of northeastern United States and adjacent Canada*. The New York Botanical Garden, NY. 800 pp.
- Killian, R. 1974. Personal correspondence in Maxwell *et al.*, 1975.
- Maxwell, G.R. and L. Putnam. 1968. The maintenance behavior of the Black-crowned Night-Heron. *Wilson Bulletin* 80:467-478.
- Maxwell, G.R., D. Cox, J. Lackey, L. McDowell, J. Parker, R. Schneider, and R. Shearer. 1975. Preserve management master plan for Ironsides Island in St. Lawrence River, Town of Alexandria, Jefferson Co., NY. Unpublished manuscript deposited with the Central / Western New York Chapter, The Nature Conservancy, Rochester, NY. 53 pp.
- Maxwell, G.R. and G. Smith. 1979. Breeding bird study: Red Oak - White Pine Island. *American Birds* 33 (1):69.

McAllister, J.R. and G. Maxwell. 1971. Locomotion, maintenance and feeding behavior of the Great Blue Heron in northern New York. *Kingbird* 21:183-203.

McCrimmon, D.A., Jr. 1981. The status and distribution of the Great Blue Heron (*Ardea herodias*) in New York State: Results of a two year census effort. *Colonial Waterbirds* 4:85-90.

———1982. Populations of the Great Blue Heron (*Ardea herodias*) in New York State from 1964-1981. *Colonial Waterbirds* 5:87-95.

Parker, J.E. and G. Maxwell. 1969. Selected maintenance behavior in a Great Blue Heron colony on Ironsides Island. *Kingbird* 19:192-199.

Ruta, P. 1978. Preliminary plant species list for Ironsides Island. Personal correspondence deposited in Maxwell et al., 1975.

Watson, W.W. 1990. Early nesting records in late winter. *Prothonotary* 57:47-48.

