Progress Notes 3610416G **Canadian Wildlife Service**

Progress Notes contain *interim* data and conclusions and are presented as a service to other wildlife biologists and agencies.

Aussi disponible en français

No. 93, February 1979

First tour of inspection of Quebec heronries, 1977

by J.-L. DesGranges[1], P. Laporte[1], and G. Chapdelaine[1]

Abstract

During the first tour of inspection, we visited 38 active Quebec heronries to count the number of nests they contained. Twenty of those colonies had been the subject of a previous count. We discovered that the number of platforms had decreased in the majority of Quebec heronries in recent years. It is suggested that a 10-year study be conducted to determine the exact causes of this probable decline in the populations of the Great Blue Heron, and to make recommendations for the protection of those populations.

Introduction

The size and quality of aquatic habitats in Quebec have considerably diminished during the past 25 years. The draining of marshes, damming of rivers, and water pollution have become so common as to threaten the survival of several populations of aquatic birds.

Ecological data collected so far deal almost exclusively with the abundance of various species, and scarcely touch the environmental factors which are responsible for the observed decreases. In order to assess more precisely the effects of the deterioration of the aquatic environment on bird species living in these areas, we propose a systematic study incorporating both types of data. This will enable us to dissociate population decreases due to a deterioration in aquatic habitats from those due to other causes. We have chosen to focus our efforts on a detailed study of a single species whose behaviour and distribution in Quebec satisfy the following requirements:

(1) the species should be populous in both salt-water and fresh-water areas, and nest throughout southern Quebec;
(2) the species should be piscivorous, because an organism situated at the top of the food chain reacts most quickly and strongly to deterioration in its habitat (Peakall 1970). Toxic products accumulate in increasing amounts in organisms as they are passed from one predator to another through the food chain, with the result that these products may reach concentrations at the top of the chain that are a thousand times higher than at the original source (Woodwell 1967);
(3) finally, the species should nest in colonies, thus making it easier to collect data on reproductive success and the level of contamination in eggs and young.

In Quebec, the Great Blue Heron (*Ardea herodias*) satisfies these requirements, and therefore we have chosen it for this study.

This monitoring program began in 1977 and will last 10 years. Each year, we will select a new sample of about 20 heronries, in order to cover each of the regions of southern Quebec, and will make it the subject of a tour of inspection. We plan to ask volunteer observers to help us by collecting data in the regions we will not be able to visit.

First tour of inspection

In 1977, the inspection included 38 active heronries along a route extending from Gatineau to Gaspé, passing through the Montreal region, the Laurentians and the Saint Lawrence estuary (DesGranges 1978). The data collected enable us to present here the results of the first tour of inspection of Quebec heronries.

Methodology

The selected heronries are visited twice; that is, around the third week in May, after the eggs have been laid, and at the beginning of July, approximately two weeks before the young herons leave their nests. During the first visit, we count the numbers of occupied and vacant nests and, where possible, collect one egg from each nest. During the second visit we make a count of occupied nests and of the young herons in each. We also gather eggshell fragments and any heron carcasses that may be on the ground.

Each of these inspections usually lasts less than one hour. The herons regularly desert the colony when the investigators arrive, but usually return shortly after they have left (DesGranges, pers. obs.).

We count the number of platforms while methodically covering the heronry, taking care to mark the position of every tree with nests on a rough map of the site, as well as the number of nests they support. Whenever there is no adult on a nest, we consider the nest to be occupied if it is in good condition and covered with excrement, or if we find eggshells, droppings or the remains of food on the ground directly below the nest. There is occasionally some doubt as to whether a nest is occupied. We count such uncertain nests and consider one half of them to be actually used (see Nicholson 1929, Burton 1955). The length and width of eggs collected and the thickness of their shells are measured. Since it is easier to obtain eggshell fragments than whole eggs, we establish a mathematical relation between the thickness of the fragments and that of the unbroken eggshells measured in the normal way. We thus obtain a satisfactory sampling which enables us to compare the different colonies (see Laporte and DesGranges, in prep.). The contents of the egg are analyzed to determine the amount of contaminants present. Finally, we perform autopsies on the heron carcasses and analyze several tissue samples to determine their content of toxic substances.

In 1977, 25 heronries were surveyed in a helicopter, 28 were visited on foot, and 15 were studied by both methods, for a total of 38 colonies (Table 1). The overflights enabled

[1]CWS, Quebec, Que. G1V 4H5.

Environment Canada Wildlife Service | Environnement Canada Service de la Faune

us to make a count of nests and the young occupying them some 10 days before they left their nests. We flew at a height of about 35 m, which prompted the adults to fly away and thus enabled us to count the young herons with ease and without unduly frightening them. These inspections never lasted longer than 10 minutes.

Results

In recent years, the number of platforms has decreased in 74% of the heronries inspected (Table 1; sign test, $P<0.02$). The number of occupied nests has also declined in 57% of the colonies for which we have appropriate data. However, in this case our sampling is too small to permit a statistical study. The greatest decreases occurred along the Saint Lawrence River. In the southwest of the province, the number of occupied nests and platforms had decreased in three of the four heronries studied. The most dramatic decline was noted on Île-aux-Hérons where the number of platforms decreased from 200 to 26 in 12 years (Table 1). The estuary region has suffered equally significant losses, resulting in reduction in number of platforms in four of the five colonies studied. The desertion has been almost total on Île Blanche, where the number of platforms has fallen from 180 to 4 in 11 years.

At present, the average number of young herons produced per successful brood is approximately 2.15 in Quebec ($S\bar{x}$ = 0.10) (Table 1). We obtained this figure by counting the young in several occupied nests of 26 Quebec colonies less than 10 days before they left them. Elsewhere in North America, the numbers observed range from 1.90 (Pratt 1972) to 3.09 young per successful brood (McAloney 1973). The brood success rate cannot be calculated because we do not know the average number of eggs laid in the nests in 1977.

Henny (1972) calculated that the average survival rate of Great Blue Heron broods living in the northern United States should remain at approximately 1.91 young per active nest if the population is to remain stable. Our figure of 2.15 referred only to successful broods. If we had know the number of nests used in 1977, and how many had not produced any young, we might have calculated an average survival rate for hatched clutches even lower than the basic figure of 1.91. This could be part of the reason why colonies have become smaller in recent years. In 1978, we expect to collect the data needed to clarify this point.

The relation between thin eggshells and concentrations of organochlorides, especially DDE, in the flesh and eggs of contaminated birds is now well established (Peakall 1970). Nevertheless, fragility of eggshells does not appear to be a significant cause of mortality in Quebec heronries. There is very little difference between the thickness of the eggshell fragments we found *under* the nests and that of fragments of old shells collected before 1947, the year when organochlorides were introduced into the environment (Laporte and DesGranges, in prep.). For information purposes, we provide in Table 1 data regarding the thickness of eggshell fragments collected in 1977. These data will be compared in the next report with those for 1978.

Conclusion

Though the information we have regarding the size of Quebec heronries in the past is scanty and sometimes of doubtful quality, this study has established that several colonies have become smaller in recent years. At this stage of our study we cannot rule out the possibility that losses suffered by the old colonies might have contributed to the creation of new heronries. If this is the case, Quebec populations of Great Blue Heron could have remained stable or increased despite the decrease in the size of the colonies. We consider this very unlikely, however, since very few new colonies were noted in 1977.

The proposed 10-year study would enable us to obtain systematic data which we would be able to compare with those presented here. We would then be able to determine the exact causes of the probable decline in Great Blue Heron populations, and make recommendations for the protection of these populations, as well as those of several other species of aquatic birds.

Acknowledgments

We are particularly grateful to Parks Canada for providing part of the funding for our on-site research. We also thank Transport Canada for placing a helicopter at our disposal in the Saint Lawrence estuary. Finally, we owe sincere thanks to the many people who provided invaluable assistance: M. Bureau, B. Coulombe, Y. Desjardins, G. Godet, S. Hamill, J. Hébert, C. Lacroix, P. Lane, G. Larouche, M. Laverdière, J.P. Lebel, J. Legris, S. Lemieux, P. Mousseau, H. Ouellet, I.M. Price, D. Rajote, A. Reed, G.E.J. Smith, J. Tremblay, G. Tremblay, and O. White.

References

Bulletin ornithologique. Organe du Club des ornithologues du Québec. 1956 à 1978.

Burton, J.F. 1956. Report on the national census of heronries, 1954. Bird Study 3:42–73.

Centre de recherches écologiques de Montréal. 1977. Impact des populations d'oiseaux marins nichant aux Îles-de-la-Madeleine sur la faune marine environnante, incluant les poissons et les crustacés de valeur commerciale. Pêches et Environnement. Rap. int.

DesGranges, J.-L. 1977. Les héronnières de la région de Montréal. SCF. Rap. int. 7 pp.

DesGranges, J.-L. 1978. Les Grands Hérons du Parc national Forillon, SCF et Parcs Canada. Rap. tech. v + 80 pp.

FNOQ. Fichier de nidification des oiseaux du Québec. Musée nat. des sc. nat. et SCF.

Gauthier, Y.; Lepage, M. 1976. Utilisation des berges de la région de Montréal par les goélands et les échassiers. Ser. de l'am. de la faune du Québec. 62 pp.

Henny, C.J. 1972. An analysis of the population dynamics of selected avian species: with special reference to changes during the modern pesticide era. Wildl. Res. Rep. 1. U.S. Fish Wildl. Serv. 99 pp.

Leboeuf, R. 1972. La héronnière de St-Timothée, Québec, Chasse et Pêche 2(12):38–39.

McAloney, K. 1973. The breeding biology of the Great Blue Heron on Tobacco Island, Nova Scotia, Canada. Can. Field Nat. 87:137–140.

McNeil, R.; Mousseau, P. 1974. Zonage écologique de la région du Parc de la Gatineau. CCN. Rap. int. Cahier 4:124–125.

Mulligan, E.B.W. 1977. A blue heron heronry near Ottawa. Ottawa Trail and Landscape 11:92–93.

Nicholson, E.M. 1929. Report on the "British Birds" census of heronries, 1928. Br. Birds 22:269–323, 333–372.

Ouellet, H. 1974. Les oiseaux des collines montérégiennes et de la région de Montréal, Québec, Canada. Musée Nat. Can. Publ. Zool. 5:1–167.

Peakall, D.B. 1970. Pesticides and the reproduction of birds. Sci. Am. 222:73–78.

Pearce, P.A.; Hughson, W.B.; Smith, A.D. 1972. Magdalen Islands notes, June 20-24, 1972. Can. Wildl. Serv. Int. Rep. 7 pp.

P.Q.S.P.B. Annual Report of the Province of Quebec Society for the Protection of Birds (includes Tchebec). 1937 to 1976.

Pratt, H.M. 1972. Nesting success of Great Blue Herons and Common Egrets at Audubon Canyon Ranch in 1971. Am. Birds. 26:699–702.

Reed, A. 1975. Les colonies d'oiseaux aquatiques dans l'estuaire du Saint-Laurent. Serv. Faune Québec. Bull. 19:1–76.

Robitaille, J. 1973*a*. Dénombrement des nids de deux héronnières du district d'aménagement de la Mauricie, été 1971. Serv. Faune Québec. Rap. 7:41–63.

Robitaille, J. 1973*b*. Une héronnière. Carnets de Zoologie 33:4–9.

Woodwell, G.M. 1967. Toxic substances and ecological cycles. Sci. Am. 216:24–31.

Table 1
Characteristics of heronries inspected in 1977

Location of colony	Position	Nests occupied* at next to last visit and year of count	Platforms at next to last visit and year of count	Nests occupied in 1977	Platforms in 1977	Av. survival successful broods in 1977† (No. young/nest)	Av. thickness shell fragments in 1977 (10^{-3} cm)‡	Source
Outaouais								
Thornlake	45°42′N.,76°22′W.	14 (1976)	30 (1976)	16	16	1.8 (0.2)#	41.2 (0.3)#	DesGranges, pers. obs. 1977; Mulligan 1977
Lac Usborne	46°14′N.,76°37′W.	16 (1975)	16 (1975)	3	3	–	–	DesGranges, pers. obs. 1977; FNOQ 1975
Lac Dumont	46°04′N.,76°27′W.	?"	50 (1974)	36	36	2.8 (0.2)	36.3 (0.4)	DesGranges, pers. obs. 1977; G. Larouche, pers. comm.
Glynn Lake	45°38′N.,76°14′W.	?	?.	16	27	1.8 (0.1)	–	DesGranges, pers. obs. 1977; FNOQ 1976, 1977
Power Line Lake	45°36′N.,76°07′W.	12 (1974)	12 (1974)	15	18	1.9 (0.2)	–	DesGranges, pers. obs. 1977; McNeil et Mousseau 1974
Long Lake	45°36′N.,75°57′W.	4 (1976)	4 (1976)	13	13	2.2 (0.2)	–	DesGranges, pers. obs. 1977; FNOQ 1976, 1977
Rivière du Plomb	45°54′N.,75°52′W.	–	–	2	2	–	–	P. Mousseau, pers. comm.
Ruisseau sans nom	45°32′N.,75°51′W.	–	–	1	1	1.0	–	P. Mousseau, pers. comm.
Lac Tucker	45°56′N.,75°48′W.	–	–	8	8	–	–	P. Mousseau, pers. comm.
Lac du Cardinal	45°52′N.,75°47′W.	–	–	6	6	–	–	P. Mousseau, pers. comm.
Point Comfort	46°05′N.,75°51′W.	?	46 (1974)	12	30	–	–	G. Larouche, pers. comm. FNOQ 1977
Laurentians								
Lac Bleu	46°16′N.,74°38′W.	?	50 (1974)	5	11	–	–	DesGranges, pers. obs. 1977; FNOQ 1974
Lac St-Bernard	46°32′N.,73°18′W.	?	67 (1971)	35	44	2.4 (0.2)	–	DesGranges, pers. obs. 1977; Robitaille 1973a, b
Ste-Catherine	46°52′N.,71°36′W.	?	?	29	31	–	39.2 (0.3)	DesGranges, pers. obs. 1977
Southwestern Quebec								
Île Carillon	45°31′N.,74°17′W.	?	135 (1975)	135	150	2.8 (0.1)	34.2 (1.2)	DesGranges 1977; Gauthier et Lepage 1976
Baie d'Oka	45°25′N.,74°03′W.	?	88 (1976)	50	66	2.7 (0.2)	–	DesGranges 1977; M. Bureau, pers. comm.; FNOQ 1977
Île Villemonble	45°17′N.,74°03′W.	36 (1968)	16 (1975)	11	14	2.6 (0.4)	–	DesGranges 1977; Leboeuf 1972; Gauthier et Lepage 1976
Île aux Hérons	45°28′N.,73°35′W.	150 (1970)	200 (1965)	26	26	3.4 (0.3)	–	DesGranges 1977; Ouellet 1974
Sabrevois	45°12′N.,73°14′W.	?	?	4	6	–	–	DesGranges 1977; G. Tremblay pers. comm.
Eastern Townships								
Cowansville	45°11′N.,72°44′W.	?	38 (1959)	20	20	–	–	PQSPB 1959, FNOQ 1977
Grande Île	46°07′N.,72°59′W.	?	20 (1975)	60	60	–	–	FNOQ 1975, 1977
Estuary								
Île à deux Têtes	47°04′N.,70°37′W.	few (1971)	few (1971)	21	21	2. (0.1)	34.6 (0.7)	DesGranges, pers. obs. 1977; Reed 1975
Île Brûlée	47°37′N.,69°52′W.	?	32 (1975)	15	31	1.9 (0.3)	–	DesGranges, pers. obs. 1977; J. Tremblay, pers. comm.
Grande Île	47°38′N.,69°51′W.	–	–	19	19	2.5 (0.2)	–	DesGranges, pers. obs. 1977
Île le Long Pélerin	47°43′N.,69°43′W.	–	–	1	2	2.0	–	DesGranges, pers. obs. 1977
Île le Gros Pélerin	47°44′N.,69°41′W.	?	47 (1975)	50	66	1.9 (0.2)	–	DesGranges, pers. obs. 1977; J. Tremblay, pers. comm. FNOQ 1977
Île du Pot-à-l'Eau-de-Vie	47°52′N.,69°41′W.	–	–	2	3	1.0	–	DesGranges, pers. obs. 1977
Île Blanche	47°56′N.,69°41′W.	?	180 (1967)	2	4	2.0	–	DesGranges, pers. obs. 1977; Reed 1975
Île du Chafaud aux Basques	47°57′N.,69°48′W.	–	–	9	9	1.7 (0.2)	–	DesGranges, pers. obs. 1977;
Île aux Basques	48°08′N.,69°15′W.	?	10 (1976)	20	28	2.3 (0.2)	38.2 (0.9)	DesGranges, pers. obs. 1977; Bull. ornith. 21:68
Île du Bic	48°24′N.,68°52′W.	–	–	24	26	2.3 (0.1)	42.6 (0.5)	DesGranges, pers. obs. 1977
Île St-Barnabé	48°26′N.,68°37′W.	?	90 (1971)	55	62	2.7 (0.1)	38.2 (0.3)	DesGranges, pers. obs. 1977; Reed 1975
Gaspé								
Lac Matapédia	48°35′N.,67°37′W.	–	–	20	22	–	33.7 (0.6)	DesGranges, pers. obs. 1977
Miguasha	48°04′N.,66°14′W.	–	–	60	71	2.1 (0.2)	33.1 (0.2)	DesGranges, pers. obs. 1977
Maria	48°13′N.,65°58′W.	–	–	55	70	2.0 (0.3)	35.4 (0.8)	DesGranges, pers. obs. 1977
Bonaventure	48°06′N.,65°30′W.	–	–	24	28	2.0 (0.4)	–	DesGranges, pers. obs. 1977
Ruisseau Beaudry	48°51′N.,64°27′W.	–	–	8	20	2.6 (0.4)	36.2 (0.6)	DesGranges, pers. obs. 1977
Magdalen Islands								
Île-aux-Loups-Marins	47°38′N.,61°29′W.	35 (1976)	37 (1976)	24	?	–	–	Pearce *et al.* 1972; CREM 1977

*Nest considered occupied if certain it was used by a couple during nesting season, even if no young produced.
†Brood considered successful if at least one young heron alive in nest less than 10 days before first young herons leave colony.
‡Measurements of fragments of all parts of eggs collected and not necessarily measurements of fragments of belt area, as in conventional method.
"Question mark indicates heronry active but its number of nests not known. Dash indicates no information available.
#Average standard deviation.