WINTERING WATERBIRDS OF WABAMUN LAKE, ALBERTA

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When winter arrives on the Prairies, much of our wildlife escapes either by migrating or by entering a state of dormancy. For those species and individuals that choose to face our harsh winters, life can be difficult; food is buried beneath a blanket of snow or locked under ice just at a time when the cold increases the demand for food and the shorter days reduce the time during which it can be found. The numbers of waterbirds, for example, are limited by the availability of open water.

Before the arrival of white settlers on the Prairies, permanently open water was restricted to rapids or springs. At rapids water is kept open kinetically, while at springs it is kept open thermally because the emerging groundwater is at or above the freezing point. With settlement and subsequent industrialization of the Prairie Provinces, the opportunities for wintering waterbirds have dramatically increased. Most of the opportunities are provided by hydroelectric or thermoelectric power plants. Hydroelectric plants produce open-water kinetically and thermoelectric plants produce it thermally; they are the man-made analogues of rapids and springs.

Thermoelectric plants require large amounts of water to recondense the steam which is used to turn the turbines that produce electricity. Some of the heat from the steam is passed on to the water which is returned to its source where it is replaced by cooler water. If the power plant is on a river as is the case in Saskatoon or Edmonton, water is discharged downstream and is replaced by upstream water. But if the plant is on a lake (Wascana Lake, Wabamun Lake) the discharged water must be cooled before reuse. This can be accomplished by separating the water intake and outlet so that the water is cooled by mixing with the surrounding water and by contact with the air.

Two of the largest thermoelectric power plants on the Prairies are located near Wabamun Lake, 65 km west of Edmonton, Alberta. These are the Wabamun Steam Electric Plant and the Sundance Steam Electric Plant; both are owned and operated by Calgary Power Limited. The Wabamun Plant (Fig. 1) was established on the north shore of Wabamun Lake, near the town of Wabamun in 1956. This plant uses water taken directly from the lake. The area kept open in the winter varies considerably depending on weather conditions. Under average winter temperatures (approximately $-10°C$) an area of approximately 140 hectares (stippled area Fig. 1) is kept open. During warmer weather the open water expands to include the area between Point Alison and the intake canal. During a cold spell it contracts to the area between Point Alison and the Pier. The intake and outlet canals are always open.

The Sundance Plant (Fig. 2) formerly used water from Wabamun

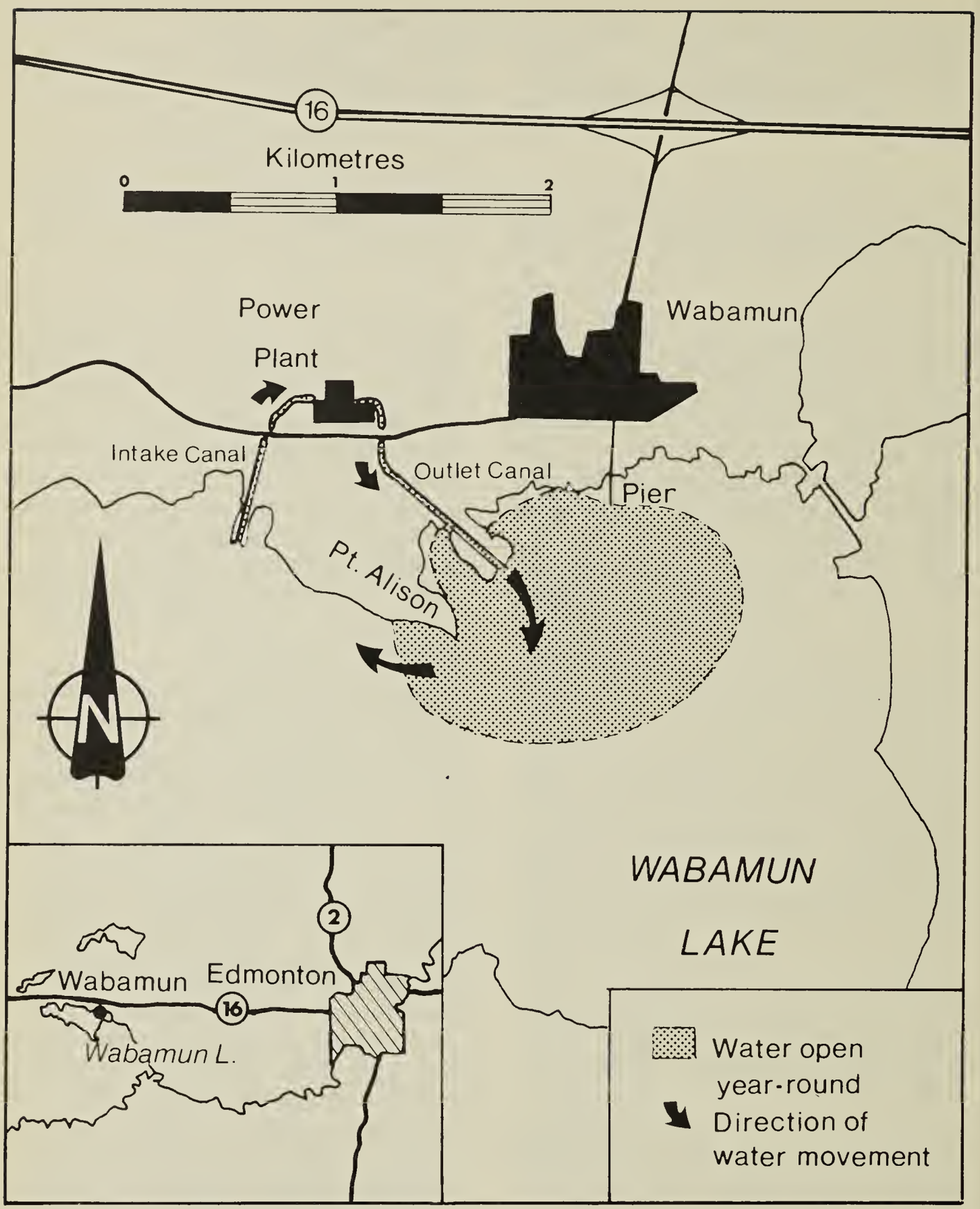

Figure 1: The Wabanum Steam Electric Plant.

Lake as well, but in 1976, six years after its opening, the plant became independent of the lake for its cooling water. In that year a 450-hectare cooling pond was created out of the southern end of Wabamun Lake's Goosequill Bay and an adjacent boggy area. Water is taken from the northern end of the pond, diverted through the ring canal, used in cooling and returned to the pond via a short outlet canal. A median dike ex-

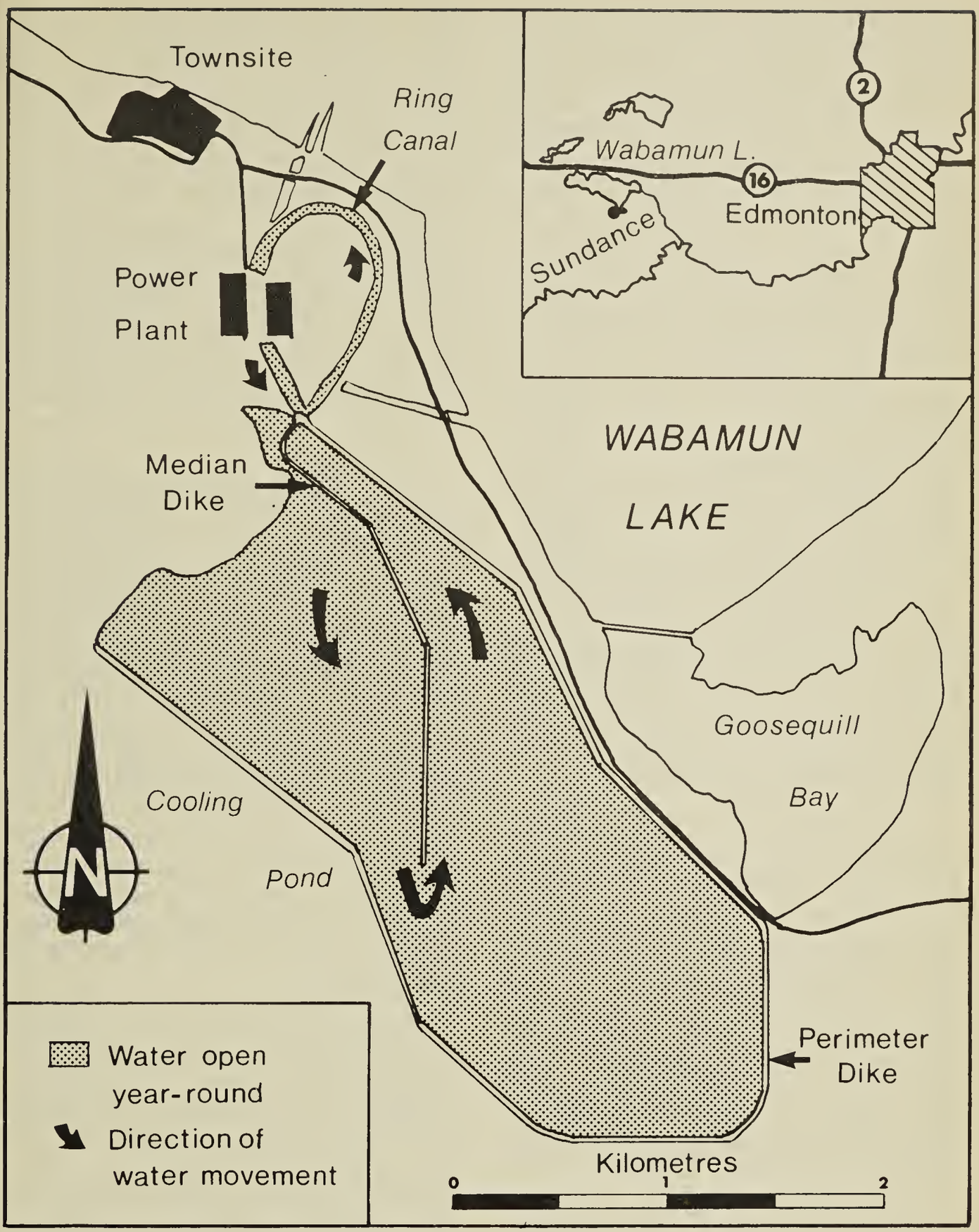

Figure 2: The Sundance Steam Electric Plant.

tends down the middle of the pond to separate the warmer water coming from the plant from the cooler water entering the plant. The cooling pond and ring canal remain entirely open year-round except during extremely cold weather when the area east of the median dike freezes over.

Each winter the open-water areas created by the Wabamun and Sundance Plants attract a large number and good variety of waterbirds.

Although sporadic observations have been made at these sites since the winter of 1956-57, comprehensive counts did not begin until the winter of 1976-77. Since that time annual counts have been conducted by the Canadian Wildlife Service, International Environmental Consultants and members of the Edmonton Natural History Society.[2 3 5 6] The results of these counts are presented in Table 1. The period covered is 1 December to 15 March in order to exclude late fall or early spring migrants. During these winters an annual average of 1,184 individuals of 15 species has occurred on the lake while an average of 1,658 individuals of 13 species has occurred on the cooling pond. Almost all of the locally breeding grebes and ducks occurred at either area during at least one winter. The exceptions, the Horned Grebe and White-winged Scoter, occurred on the lake in winters previous to the study (files Alberta Provincial Museum).

The vast majority of the birds were waterfowl — more than 98% at each site. Other waterbirds (including those raptors which were apparently dependent on wintering waterbirds) made up the remainder. Most of the birds were successful in their attempts to winter; individuals observed in early December were usually seen in late February and there were no drastic declines in overall numbers during these winters.

Based on maximum counts, Mallards made up 88% of waterfowl on the cooling pond and 70% on the lake; many more of them used the pond. Of the other regular dabbling ducks, both Gadwall and Wigeon were more common on the lake. Common Goldeneye comprised 10% of the pond's waterfowl and 24% of those on the lake; it was almost twice as abundant on the lake. Among other regular diving ducks, Lesser Scaup and Bufflehead were also more common on the lake while Redhead and Ruddy were largely restricted to the pond. Except for the American Coot which showed a definite preference for the lake, the numbers of the other species of waterbirds were too small to make an assessment of their preferences. The dissimilarities were probably related to differences in food availability or habitat, or due to different species establishing wintering traditions in each area.

The majority of the Mallards (and hence the majority of wintering waterfowl) were not dependent on the cooling pond and lake for sustenance. Although Mallards used these areas for loafing, roosting and some feeding, the overwintering population was largely dependent on the amount and availability of unharvested and waste grain in the surrounding agricultural areas. This in turn was a function of the weather during the fall and winter.[4] For example a wet fall may have prevented a complete harvest of grain, while a winter with low snowfall permitted a greater access to unharvested or waste grain.

Except for Mallards and perhaps the few Pintails, the other species of waterbirds were completely dependent on the open-water areas for food. Their numbers however were small and if this is taken into account the total number of birds completely dependent on the open-water areas was small. The average population of waterbirds (excluding Mallards) at Wabamun Lake was 355 individuals (2.5 birds/ha), and at the Cooling Pond it was 206 individuals (0.5 birds/ha). These are minimum estimates of the carrying capacity since these areas were undoubtedly capable of supporting a small but unknown number of Mallards as well.

TABLE 1: Maximum counts of waterbirds and raptors recorded at the Sundance Cooling Pond and Wabamun Lake, 1 December and 15 March, 1976-77 through 1979-80.

	Sundance Cooling Pond					Wabamun Lake				
	1976 -77	1977 -78	1978 -79	1979 -80	Average	1976 -77	1977 -78	1978 -79	1979 -80	Average
Common Loon	—	—	—	—	—	—	—	1	1	0.50
Red-n. Grebe	—	—	—	1	0.25	—	—	1	—	0.25
Horned Grebe	—	1	1[a]	—	0.50	—	—	—	—	—
West. Grebe	—	—	1	4	1.25	—	—	—	1	0.25
Pied-b. Grebe	—	—	—	—	—	—	—	—	1	0.25
Mallard	2681	142	2145	833	1450.25	1008	550	450	1300	827.00
Gadwall	1	3	—	37	10.25	5	4	15	54	19.50
Pintail	—	—	—	1	0.25	5	1	2	2	2.50
Green-w. Teal	—	—	—	—	—	3	—	—	—	0.75
Blue-w. Teal	—	—	—	—	—	—	1	2	—	0.75
Am. Wigeon	—	—	—	2	0.50	19	35	31	6	22.75
Nrn. Shoveler	—	—	—	2	0.50	1	—	2	—	0.75
Redhead	8	—	6	20	8.50	1	1	—	—	0.50
Ring-n. Duck	2	1	—	2	1.25	—	—	—	7	1.75
Canvasback	3	—	1	1	1.25	1	—	—	—	0.25
Lesser Scaup	6	—	5	1	3.00	15	2	—	10	6.75
Cmn. Goldeneye	191	230	133	82	159.00	400	250	173	285	277.00
Barrow's Goldeneye	—	—	1	—	0.25	—	—	2	1	0.75
Bufflehead	20	2	7	2	7.75	14	5	16	7	10.50
Ruddy Duck	21	—	5	2	7.00	—	—	1	4	1.25
Hood. Merganser	—	—	2	6	2.00	—	—	—	—	—
Cmn. Merganser	—	—	1	—	0.25	2	2	—	—	1.00
Red-breasted Merganser	—	2	—	—	0.50	—	1	—	—	0.25
Red-t. Hawk	1	—	—	—	0.25	—	—	—	—	—
Bald Eagle	1	1	1	2	1.25	3	2	1	2	2.00
Gyrfalcon	—	—	1	—	0.25	—	—	—	1	0.25
Am. Coot	—	—	1	4	1.25	28	8	6	14	14.00
Killdeer	1	—	—	—	0.25	—	—	—	2	0.50
Gull sp.	—	—	—	—	—	1	1[b]	—	2	1.00
Individuals	2936	382	2311	1002	1657.75	1506	863	703	1700	1193.00
Species	12	8	15	17	13.00	15	14	14	18	15.25
Counts	6	2	4	7	4.75	6	5	5	5	5.25

[a]Horned or Eared Grebe.
[b]Glaucous Gull.

At present the number of wintering waterbirds on the Prairies is not large on a continental scale. For example, the total wintering population of Mallards in the Prairies, which we estimate to be less than 10,000 in most years, represents only about 0.1 percent of the total continental population of 10,000,000.[1] The percent is similar for Common Goldeneye (about 1,000 winter on the Prairies out of a continental population of

Canvasback drake. *Fred W. Lahrman*

1,000,000[1]) but is much lower for all other species. However, if the industrialization of the Prairies continues at the present rate, the numbers of Mallards, Common Goldeneye and other waterbirds remaining throughout the winter could become significant.

We would like to thank Calgary Power Limited for permitting us access to the Sundance Cooling Pond and John Faragher and the Alberta Provincial Museum for allowing us to use their unpublished records.

[1]BELROSE, F. C. 1976. Ducks, geese and swans of North America. Stackpole Books, Harrisburg, Pa. 544 pp.

[2]EBEL, G. R. A. 1979. The Wabamun Lake Christmas Bird Count: 1978. Edmonton Naturalist 7(1):12-15.

[3]FANNING, M. L. 1978. 1977 Report on the Environmental Management Planning Program for the Sundance Cooling Pond. International Environmental Consultants Ltd., Richmond, B.C. 21 pp.

[4]PRACH, R. W., and D. C. SURRENDI. 1978. Migratory bird management and industrial cooling in northern climates. Can. Water Resour. J. 3(3):111-120.

[5]SMITH, A. R. and G. R. A. EBEL. 1978. The Wabamun Lake Christmas Bird Count: 1977. Edmonton Naturalist 6(2):11-14.

[6]WESELOH, D. V. 1977. The Wabamun Lake Christmas Bird Count: 1976. Edmonton Naturalist 5(2):33-37.