

SURVEYS OF WATER-ASSOCIATED BIRDS ON THE PEACE RIVER DOWNSTREAM OF THE W. A. C. BENNETT DAM

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Abstract -- Systematic aerial surveys for aquatic birds were conducted in February 1996 and August 1999 with supplemental ground surveys in 1999 to determine species composition, habitat use, and the potential role of river regulation on use patterns following changes in flow of the Peace River by the W. A. C. Bennett Dam since 1967.

Winter surveys indicated that open water, restricted to the river mainstem, attracted a small population of water-associated birds and raptors. Approximately 84% of the 366 birds observed were Common Mergansers, 45% of which were concentrated within 3 km. of the dam. Nineteen (63%) of the 31 Bald Eagles recorded in this survey were also recorded here.

The late August surveys coincided with the late breeding season of most of the river-using species expected in this area, the waterfowl moulting period, and the early and middle phases of post-breeding dispersal and fall migration. Twenty-six species were recorded, 20 of water birds and six of raptors. Of the total of 3,482 individuals recorded during aerial surveys, 51% were Canada Geese (905) and Mallards (885). Gulls comprised 24% and other fairly common species were Green-winged Teal (240) and Spotted Sandpipers (154). Bald Eagles (25) were by far the most common raptors observed. While birds were distributed along the entire length of the river, 60% of the birds were observed between Cache Creek and the Pine River (27% of the linear area). The major concentrations of geese, dabbling ducks and gulls in this area may have been influenced by the proximity of Fort St. John and food sources associated with its garbage dump, sewage lagoons, agriculture, and grain processing industry. While most species occurred in greatest numbers in non-mainstem (oxbow, back channel) habitats, certain numerous species (Canada Geese, gull sp.) and characteristic riverine species (Common Merganser, Spotted Sandpiper) were found predominantly in or beside the river mainstem.

Open water conditions provide increased winter habitat for Common Mergansers, their winter numbers being seven times that of late summer. Regular water level fluctuations, though small, appear to have a greater potential effect on non-mainstem compared to mainstem habitats. These quiescent, unscoured backchannel habitats, internally regulated in many areas by beaver dams, provide in the short term a productive and stable environment for waterfowl.

Key words: Bald Eagle, Common Merganser, dam effects, *Haliaeetus leucocephalus*, *Mergus merganser*, Peace River, waterfowl.

Since flows have been regulated on the Peace River via the W. A. C. Bennett Dam starting in 1967, river discharge patterns downstream have changed substantially. Regulated flows reduced the freshet, and seasonal discharge became relatively uniform with regular fluctuations reflecting the contribution of downstream tributaries. In winter, an extensive area of open water now extends downstream from the W. A. C. Bennett Dam at least as far as Taylor, B.C.

Interest in the aquatic avifauna was triggered by the limited information on this community, and specifically by two phenomena. The first was the newly available open water in winter and the possibility that this had created habitat, and second was the vulnerability of poorly documented floodplain birds which might be affected by short-term river fluctuations associated with power generation demands. These led to two survey programs: in February 1996 and August 1999. The August 1999 surveys, while focused on a broad array of wildlife, included an emphasis on shorebird use of floodplain habitats, and this in part influenced study timing. These programs were documented in two technical reports to B. C. Hydro (Robertson

et al. 1996; Robertson and Hawkes 2000). This paper summarizes the main findings from these reports as part of a series on the wildlife use of hydro-altered habitats in British Columbia.

STUDY AREA

Downstream of the W. A. C. Bennett Dam, the Peace River can be defined by one reservoir and seven downstream reaches (Figure 1). The 1996 program included the run-of-the-river reservoir (Dinosaur Reservoir) between the W. A. C. Bennett Dam and the Peace Canyon Dam. The 1999 program did not. The downstream reaches are separated by the confluences with key tributaries, and these were used to segregate survey results.

Structurally the river at cross-sections is relatively complex. The river mainstem describes where the bulk of the river flow is located and where most of the river's energy resides. Its banks and substrate, a combination of boulders, cobbles and relatively coarse sand, reflect this high energy environment. The river

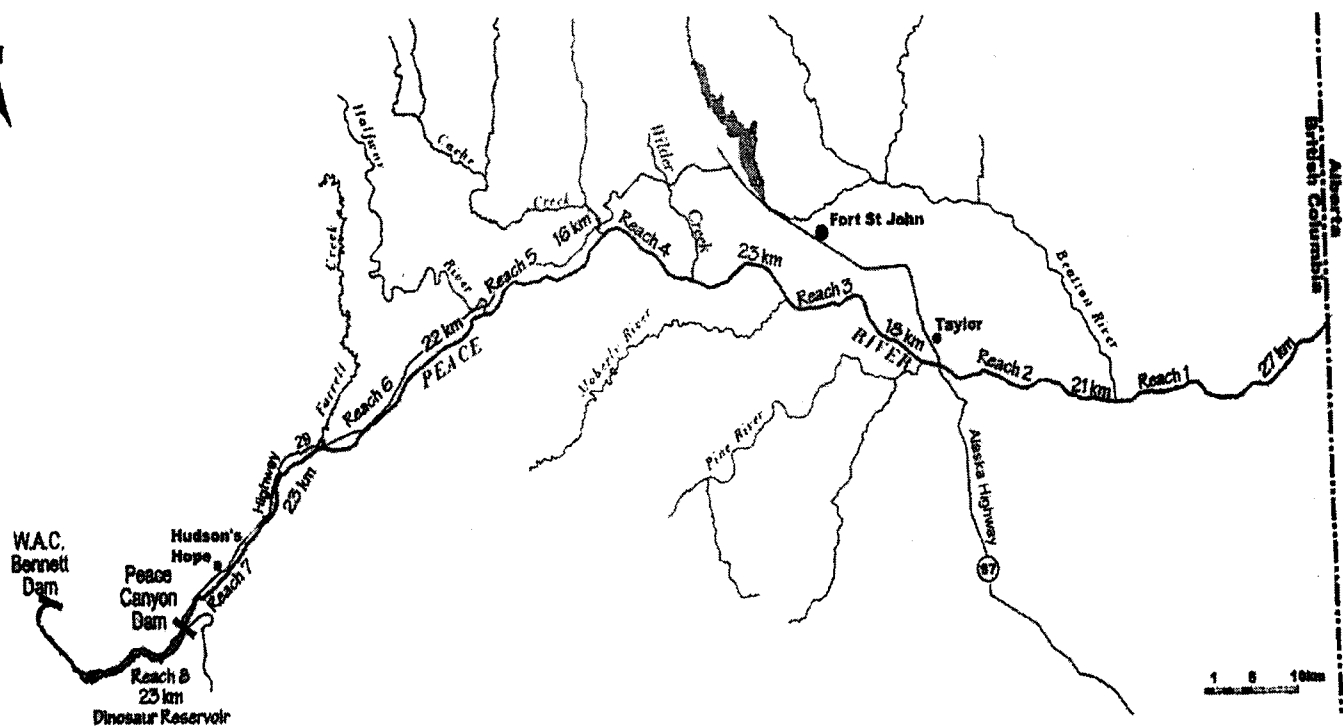


Figure 1: The Peace River showing the eight reaches used to stratify data collection during water-associated bird surveys in February 1996 and August 1999.

cross-section in many parts of the Peace River also includes back channels, as well as separate wetlands and oxbows. The latter are flooded (i.e., directly connected to the river) at varying frequencies, depending on river stage. These distinctions represent separate aquatic habitats that influence the distribution of aquatic birds.

STUDY METHODS

Survey information was derived from both aerial and ground surveys. The design of the aerial survey component followed the discussion of suitable approaches recommended initially by the B. C. Resources Inventory Committee (Beasley 1995) and revised in final form in 1999 (Resources Inventory Committee 1999). Surveys were conducted from a helicopter (Bell 206 Jet Ranger), which is superior for accuracy compared to fix-wing aircraft, and has several other important capabilities: slower speed, greater maneuverability, superior visibility, and variable flight heights (Resources Inventory Committee 1999). Since our goal was to survey all the floodplain wetlands, and in August 1999 several of these comprised groups of parallel wetlands across a given river cross-section, a maneuverable aircraft was a

necessity. Further, we frequently broke off our linear flight line to circle a concentration of aquatic birds. This allowed the observers to estimate numbers better and determine species composition more accurately.

Conditions during both aerial surveys were favourable, with negligible winds, and temperatures varying from -3°C . to $+3^{\circ}\text{C}$. on 15 February 1996, and 16°C . to 22°C . on 20 August 1999. Observers (two) were seated in the front left and rear left of the helicopter, observing birds with the naked eye, occasionally assisted with 9×35 binoculars. Information recorded on tape comprised time, location, species or species group, numbers, and habitat. For certain species, such as Bald Eagles (*Haliaeetus leucocephalus*), we differentiated between adult and juvenile plumages. Birds observed were also recorded as either swimming, flying, standing on shore or on the ice, or perching. Though we were prepared to record feeding behaviour, the presence of the helicopter probably interrupted this activity, and we obtained no reliable results.

Though local conditions required some variance in the survey protocol from time to time, the following survey regimen was followed in both 1996 and 1999:

- survey height was 50 m.
- survey speed was 120 km./hr. (65 knots).
- survey track was 50 m. from shore, except to cover back channels, oxbows and floodplain wetlands.

Surveys covered the same route in both 1996 and 1999 except that the Dinosaur Reservoir was covered only in 1996. The survey started at the confluence of the Moberly and Peace rivers, and from there proceeded westward to the upstream terminus (W.A.C. Bennett Dam in 1996; Peace Canyon Dam in 1999). From there it continued downstream to the Alberta border, then returned westward to the starting location. River conditions between surveys were different in one major respect: in February 1996 only the river mainstem was ice-free, eliminating the need to cover non-mainstem habitats.

In August 1999, ground and boat surveys were used to gather further information on aquatic birds and raptors of the Peace River floodplain. These comprised 27 transects at eight separate survey locations on or adjacent to the Peace River between 21 and 24 August 1999.

FEBRUARY 1996 SURVEY

Abundance and Distribution

In total, 366 water-associated birds were observed on the Peace River between the W. A. C. Bennett Dam and the Alberta/B.C. border (Table 1). The greatest concentrations were recorded in the following locations:

i) the Peace River Canyon below the W. A. C. Bennett Dam (Reach 8), where there were three substantial flocks of Common Mergansers (*Mergus merganser*) amounting to an estimated 140 individuals, and two groups of Bald Eagles totalling an estimated 19 individuals;

ii) Reach 7, particularly the downstream portion between the Peace Canyon Dam and Hudson's Hope.

Numbers in these two areas amounted to 258 of the 366 birds observed.

Species Composition

Five species were observed during our surveys, plus "unidentified diving ducks" (Table 1). Common Merganser was by far the most numerous of the species observed, representing 83.6% of all birds (Table 1). The second most numerous species, Bald Eagle, represented 8.5% of the birds observed. Bald Eagles are conspicuous and, as such are hard to miss; on the other hand, our search patterns were directed primarily at the open water and some eagles perched beside the river and at the height of our aircraft could have been missed.

A small number of Common Goldeneyes (*Bucephala clangula*) and Mallards (*Anas platyrhynchos*) were observed, plus one American Dipper (*Cinclus mexicanus*). The additional sightings of unidentified diving ducks were probably female goldeneyes, female mergansers, or possibly grebes.

Not all wintering waterfowl concentrate on the river. John Elliott (B.C. Ministry of Water, Land and Air Protection, Fort St. John, personal communication) pointed out that Canada Geese (*Branta canadensis*) winter in the area. They were reported in winter 1996 in the Lynx Creek area, and during most winters are

TABLE 1

WATER-ASSOCIATED BIRDS OBSERVED ON REACHES OF THE PEACE RIVER FROM THE ALBERTA/B.C. BORDER UPSTREAM TO THE W. A. C. BENNETT DAM, 15 FEBRUARY 1996

REACH	COMMON MALLARD	COMMON GOLDENEYE	COMMON MERGANSER	UNIDENTIFIED DIVING DUCK	BALD EAGLE	AMERICAN DIPPER	TOTAL
1			ICE COVERED				0
2	0	0	0	0	2	0	2
3	0	0	14	0	2	0	16
4	3	4	17	3	0	0	27
5	1	2	17	1	0	0	21
6	0	2	34	1	6	0	42
7	0	2	84	9	3	1	99
8	0	0	140	0	19	0	159
Total	4	10	306	14	31	1	366

seen frequently around barns and feed lots. They were missed during our surveys. He also indicated that Mallards frequently congregate in the same areas. This suggests that the four Mallards observed by us along the river are only a small proportion of the Mallards wintering in the area.

Of the 268 Common Mergansers for which gender was recorded, 169 (63%) were male. Females are less conspicuous, and although we frequently circled larger flocks to confirm numbers, we suspect that more females than males were missed. Thus, the 37% of total Common Mergansers estimated to be female is probably an underestimate.

Behaviour and Habitat Use

Birds observed were recorded as either swimming, flying, standing on shore or on the ice, or perching. By far the greatest proportion were swimming (Table 2), though the results vary from species to species.

Most Common Mergansers (94%) and Common Goldeneyes (80%) were observed swimming. Few dove at our approach, and few flew. The behaviour that appears under represented, particularly with Common Mergansers, is the low number of those resting or standing on shore or at the ice edge. This is a species which is observed frequently roosting in small or large groups on rocks bordering rivers. It may be that heat loss associated with winter conditions is reduced by swimming, the water usually being warmer.

Most Bald Eagles were flying, but a significant minority were perching on branches of large shoreline trees, or in the case of the flock downstream of the W. A. C. Bennett Dam standing near the mouth of a creek approximately 2 km. downstream of the dam.

As indicated, virtually all birds except Bald Eagles were associated with open water habitat. Where, in a few cases,

mergansers were observed on the shoreline or on the ice, they were immediately beside open water. The habitat association between Bald Eagles and open water could not be confirmed by the brief pass of a helicopter survey, but it is likely to be considerable. The Peace River is probably their main source of winter food, as suggested by the large concentration of eagles immediately below the W. A. C. Bennett Dam. Accidental passage through the dam by fish would leave many damaged or stunned and vulnerable to predators, such as mergansers and eagles.

AUGUST 1999 SURVEY

Abundance and Distribution

In total 3482 birds were observed, of which 2094 (60%) were found between the Pine River and Cache Creek (Reaches 3 and 4), 27% of the linear study area. This coincides with major gull roosts and substantial numbers of Canada Geese and Mallards (Table 3).

Though Reaches 3 and 4 contained the greatest numbers, significant numbers occurred throughout the 150 km. of the August 1999 study area. The concentration in Reaches 3 and 4 is based in part on flocks of gulls and waterfowl recorded both upstream and downstream of the Moberly River confluence. Within this area were two concentrations of gulls in excess of 300 individuals resting on gravel bars. The close proximity of Fort St. John with its garbage dump, sewage lagoons and other food sources could have influenced this distribution.

Whereas anthropogenic factors influenced the late summer distribution of gulls, Canada Geese and Mallards, different patterns were exhibited by other species. Among species recorded along all reaches, Bald Eagles and Spotted Sandpipers (*Actitis macularia*) were unique in being relatively evenly distributed. The numbers of most other species were too low to draw any conclusions about distribution patterns.

TABLE 2
BEHAVIOUR OF WATER-ASSOCIATED BIRDS OBSERVED DURING WINTER SURVEYS
OF THE PEACE RIVER, 15 FEBRUARY 1996

SPECIES	STANDING ON ICE			
	SWIMMING	FLYING	OR SHORE	PERCHING
Mallard	0	4	0	0
Common Goldeneye	8	2	0	0
Common Merganser	287	2	17	0
Unidentified diving duck	7	7	0	0
Bald Eagle	0	19	5	7
American Dipper	0	1	0	0

TABLE 3

BIRDS OBSERVED DURING AERIAL SURVEY OF THE PEACE RIVER DOWNSTREAM OF THE PEACE CANYON DAM AS FAR AS THE B.C./ALBERTA BORDER 20 AUGUST 1999

SPECIES	RIVER REACH							TOTAL
	1	2	3	4	5	6	7	
Great Blue Heron	0	0	0	1	0	0	0	1
Canada Goose	35	150	115	324	113	56	112	905
swan sp.	0	0	0	13	0	0	0	13
American Wigeon	2	18	0	30	5	18	0	73
Mallard	70	56	373	224	6	135	21	885
Northern Shoveler	0	0	0	0	0	20	0	20
Northern Pintail	0	0	11	30	0	6	0	47
Green-winged Teal	47	24	55	10	22	80	2	240
Common Merganser	0	28	4	5	0	1	2	40
duck species	0	0	0	0	0	2	0	2
Bald Eagle	3	5	1	4	4	5	3	25
Northern Goshawk	1	0	0	0	0	0	0	1
Red-tailed Hawk	0	0	1	0	0	0	0	1
American Kestrel	1	0	0	0	0	0	0	1
falcon sp.	0	0	0	0	0	0	1	1
Killdeer	0	0	1	0	9	0	4	14
yellowlegs sp.	0	1	0	1	0	0	2	4
Spotted Sandpiper	32	13	14	23	19	28	23	152
sandpiper sp.	17	11	6	5	28	15	24	106
Bonaparte's Gull	0	0	0	60	22	0	0	82
gull sp.	20	4	395	387	32	26	0	864
Belted Kingfisher	0	3	0	1	0	1	0	5
Total	228	313	976	1118	260	392	195	3482

Species Composition

Of the total of 3482 birds observed, 2225 were waterfowl (63.9%), 946 gulls (27.2%), 276 shorebirds (7.9%) and 29 raptors (0.8%). Among the waterfowl, the most numerous were Canada Geese (905) and Mallards (885), which comprised 26% and 25.4% respectively of all the birds observed from the air (Table 3). The other waterfowl were primarily dabbling ducks: Green-winged Teal (*Anas crecca*) (240), American Wigeon (*A. americana*) (73), Northern Pintails (*A. acuta*) (47), Northern Shovelers (*A. clypeata*) (20) and unidentified swans (13). In addition to these observations, ground observations by Glenn Ryder in 1975 confirmed Trumpeter Swan (*Cygnus buccinator*) in floodplain habitats, as well as Cinnamon Teal (*Anas cyanoptera*) and Gadwall (*A. strepera*) (Ryder 1975).

The only diving ducks confirmed from the air were Common Mergansers (40). The number observed is much fewer than the 166 recorded on comparable reaches in February 1996. Common Goldeneye was observed in back channel habitat during the associated ground surveys.

Gulls, particularly in late summer, are difficult to distinguish to species and even more so during aerial surveys. From the air most gulls were classified as gull species. From a vessel we were able to confirm a significant proportion of these as Ring-billed (*Larus delawarensis*) and Herring (*L. argentatus*) gulls. Bonaparte's Gulls (*L. philadelphia*) were also observed.

Most (55%) of the shorebirds observed were identified as Spotted Sandpipers (152). Killdeer (*Charadrius vociferus*) was also confirmed from the air. The 106 birds classified as sandpiper sp. probably comprised a significant proportion of Greater Yellowlegs (*Tringa melanoleuca*), Lesser Yellowlegs (*T. flavipes*) and Solitary Sandpipers (*T. solitaria*), species we confirmed during ground surveys.

Raptor surveys were dominated by Bald Eagles. From the air we detected 26: ten adults, 16 immatures, plus four nests. We also observed individual Red-tailed Hawk (*Buteo jamaicensis*), Northern Goshawk (*Accipiter gentilis*) and American Kestrel (*Falco sparverius*) from the air. On the ground, we recorded three Merlins (*F. columbarius*) and one Great Horned Owl (*Bubo virginianus*).

