

**Robert W. Butler  
Brian G. Stushnoff  
Edward McMackin**

# **The birds of the Creston Valley and southeastern British Columbia**

**Occasional Paper  
Number 58  
Canadian Wildlife Service**

COPIES OF THIS REPORT ARE AVAILABLE FREE OF CHARGE FROM:

**CANADIAN WILDLIFE SERVICE**

**Environment Canada,**

**Ottawa, Ontario**

**K1A 0E7**



Environment  
Canada

Environnement  
Canada

Canadian Wildlife  
Service

Service canadien  
de la faune

**Robert W. Butler\***  
**Brian G. Stushnoff †**  
**Edward McMackin‡**

# **The birds of the Creston Valley and southeastern British Columbia**

**Occasional Paper**  
**Number 58**  
**Canadian Wildlife Service**

Également disponible en français

\*CWS, Box 340, Delta, BC V4K 3Y3

†Creston Valley Wildlife  
Management Authority,  
Box 640, Creston, BC V0B 1G0

‡Formerly with CWS  
Now c/o Creston Field Naturalists,  
Box 1502, Creston, BC V0B 1G0



Issued under the authority of the  
Minister of Environment  
Canadian Wildlife Service

©Minister of Supply and Services Canada 1986  
Catalogue No. CW69-1/58E  
ISBN 0-662-14427-9  
ISSN 0576-6370

Design: Rolf Harder & Assoc.

#### **Dedication**

This report is dedicated to the memory of J.A. Munro.

# Contents

4	Acknowledgements
4	<b>Abstract</b>
5	<b>Introduction</b>
7	<b>Study area</b>
12	<b>Methods</b>
12	<b>The Creston Valley — changes since 1950</b>
15	<b>Comparisons with other locations in western North America</b>
15	1. Breeding birds
17	2. Migrating and wintering birds
19	3. The need for ecological control areas
20	<b>Annotated list of the birds of the Creston Valley</b>
20	1. Treatment, terms, and references
20	2. The birds
32	<b>Literature cited</b>

	<b>List of tables</b>
13	Table 1. Changes in area of open water, emergent vegetation, grass-sedge, and trees and shrubs on the non-agricultural portions of the CVWMA before (1959) and after (1983) water stabilization in 1975
13	Table 2. Changes in status of summer waterbirds of the Creston Valley since Munro's (1950) study. Only species occurring annually are included
13	Table 3. Changes in status of "land" birds in the Creston Valley since Munro's (1950) study. Only species occurring annually are included
14	Table 4. Mean number of passerine birds counted on each of our breeding bird surveys in the Creston Valley in 1983–84
15	Table 5. Species composition (percent of duck broods) on the CVWMA, 1966–84
15	Table 6. Species composition of breeding ducks in the CVWMA, the Cariboo, and the Columbia Valley, BC
16	Table 7. Relative abundance (percent of biomass) of fish in seine- and gill-net catches in Duck Lake in 1982 and 1983 (from Forbes 1985c)
17	Table 8. Waterfowl harvest by species (birds bagged) on the CVWMA. No data available for 1978

	<b>List of figures</b>
5	Figure 1. The Kootenay and Columbia river drainage in southeastern British Columbia
6	Figure 2. Major habitats and place names in the Creston Valley. Trees and shrubs lined most watercourses
7	Figure 3. Mean temperature and precipitation in Creston, 1951–80 (Environment Canada 1982a)
8	Figure 4. Six-mile Slough in June 1985
8	Figure 5. Duck Lake Nesting Area where Forster's Terns and large numbers of Yellow-headed Blackbirds nested
9	Figure 6. Leach Lake, a shallow marsh, in June 1985
9	Figure 7. Corn Creek Marsh in June 1985 one year after drawdown
10	Figure 8. Dale Marsh at the south end of the Creston Valley
10	Figure 9. Cultivated fields on Kootenay Flats west of Wynndel in June 1985
11	Figure 10. Terrace near Lister in June 1985
11	Figure 11. Mountain-slope habitat near Lakeview in June 1985
17	Figure 12. Maximum number of migrant ducks, geese, swans, and coots counted on the CVWMA, 1969–84
18	Figure 13. Location of recoveries of waterfowl banded in the Creston Valley (banded from 23 August 1948 to 3 July 1975, recovered from 1 October 1948 to 11 January 1976)
19	Figure 14. Peak counts of Tundra Swans in the Creston Valley, 1969–84

	<b>List of appendices</b>
34	Appendix 1. Numbers of nesting pairs of waterfowl using person-made nest sites on the CVWMA
34	Appendix 2. Total length (mm) of Black bullhead, Pumpkinseed sunfish, and Yellow perch caught with a dipnet at drainage sites during the drawdown of Corn Creek Marsh, 1 March 1984
35	Appendix 3. Reproductive parameters of Tree Swallows in bird boxes around Corn Creek Marsh, CVWMA, in 1983 and 1984
35	Appendix 4. Morphological data of Tree, Cliff, and Barn Swallows at CVWMA

## Acknowledgements

Reports such as this are invariably a compilation of information from many people. Over the years, many naturalists, students, and biologists have contributed to our knowledge of the birds in the Creston Valley. Prominent among those contributors were D.D. Moore and the staff of the Creston Valley Wildlife Management Authority. Others who have contributed to the report were the naturalists of the Creston Valley Wildlife Interpretation Centre formerly run by the Canadian Wildlife Service (CWS). They include I. and R. Askevold, D. Atherton, R. Brade, N. Buck, C. Campbell, S. Carlisle, P. Goossen, K. Haskell, C. Hoar, B. Keating, P. Mitchell-Banks, G. and K. Moyle, J. Sirois, T. Sullivan, and R. Westendorp. B.-A. Chapman, L.S. Forbes, D. Gray, and J. Ohanjanian gratefully provided us with information on certain species. The following people contributed their observations: E. Abbey, E. Arlt, M. Brook, W. and J. Burgess, S. Butler, A. Cober, G. Davidson, T. Fitz-Harris, L. Halverson, G. and D. Hartland, D. Laishey, D. Leighton, P. Newbery, W. Merilees, S. Roberts, D. Stirling, J. and H. Street, L. Van Damme, D. Wood, and R. Wood. R.W. Campbell and R.J. Cannings provided access to all historical records and specimens of the BC Provincial Museum and Cowan Vertebrate Museum, respectively. G. Kaiser allowed us to use his data on the Columbia Valley, L.S. Forbes took the photographs in the figures, S. Garnham typed the manuscript, and P.M. Whitehead drew the figures. H. Boyd and R.Y. Edwards reviewed the manuscript. We thank all of you.

The Creston Valley Wildlife Management Area, established in 1968, is one of the most important waterbird habitats in British Columbia. Populations of at least 31 species of waterbirds have increased since 1950; waterfowl broods have increased about fivefold since 1966. The valley supports large populations of Pied-billed, Red-necked, and Western Grebes; Great Blue Herons; Wood Ducks; Ospreys; Soras; Coots; and Black Terns. Forster's Terns breed nowhere else in British Columbia.

Counts indicate that land birds have increased in the Creston Valley since 1950. The American Kestrel, Killdeer, Spotted Sandpiper, Mourning Dove, Barn and Cliff Swallows, European Starling, Common Yellowthroat, Vesper Sparrow, Red-winged and Yellow-headed Blackbirds, and Western Meadowlark were either rare or not reported 35 years ago: they are now widespread. The only bird species known to have declined in Creston is the Tundra Swan, perhaps due to changes in agricultural practices.

During migration, thousands of waterfowl rest and feed in the Creston Valley on their way to and from breeding areas in Alberta and wintering grounds in California. Land birds fly up the valleys of British Columbia to the interior; however, this migration is less spectacular in the Creston Valley than in other valleys, presumably due to topography.

Diking has improved the Creston Valley Wildlife Management Area. Fish and insects have increased in ponds and provide food for many birds. Ground nests are no longer flooded during the spring runoff, and former riverine marshes, now farmland, provide habitat for many new species.

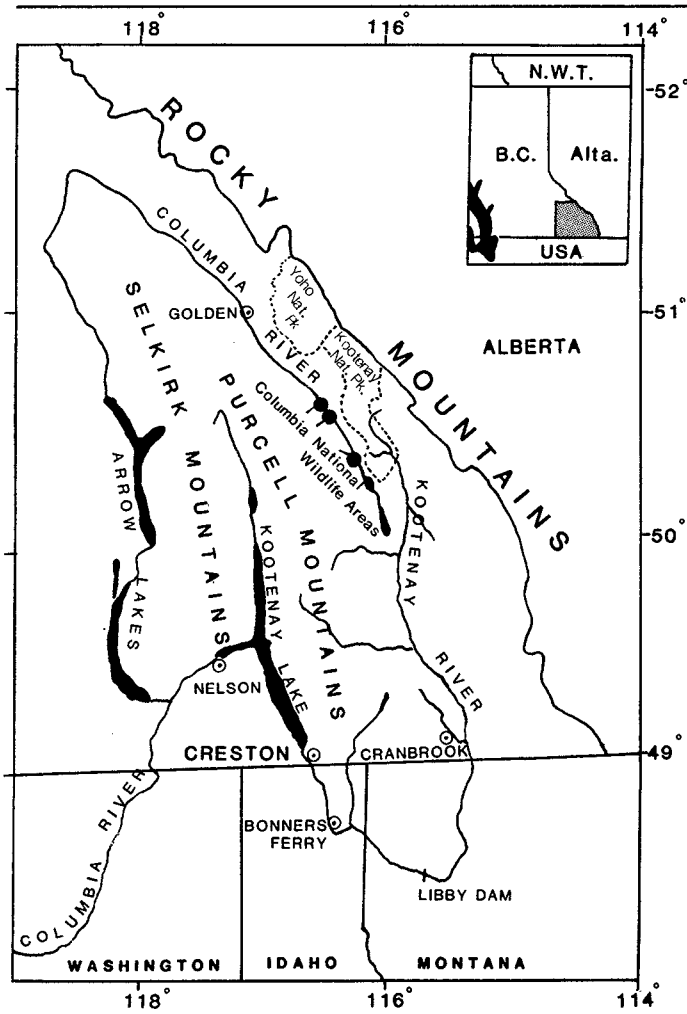
In contrast, the avifauna in the pristine marshes in the upper Columbia River valley has changed little since 1950. Although the changes in the Creston Valley have been successful, portions of the Columbia River marshes should remain in pristine condition as "ecological control" areas. Those areas would serve as a baseline for measurements of both natural and artificial changes to riverine marshes in western Canada.

# Introduction

*"It is my considered opinion that the unreclaimed portions of the Kootenay Flats constitute the largest and most important resting and feeding ground for waterfowl in the interior of British Columbia."* J.A. Munro, 1947

The Kootenay and Columbia Rivers tumble down the western slope of the Rocky Mountains and wind through British Columbia and the western United States (Fig. 1). Both rivers pass through extensive marshes, scarce in the mountains of western Canada. The valleys and marshes running north-south in the Columbia and Kootenay river systems are

**Figure 1**  
The Kootenay and Columbia river drainage in southeastern British Columbia



important corridors for migrating birds. The Canadian Wildlife Service (CWS) has secured four national wildlife area units in the Columbia marshes and has funded the management of marshes and uplands in the Creston Valley with the British Columbia Wildlife Branch and private sources.

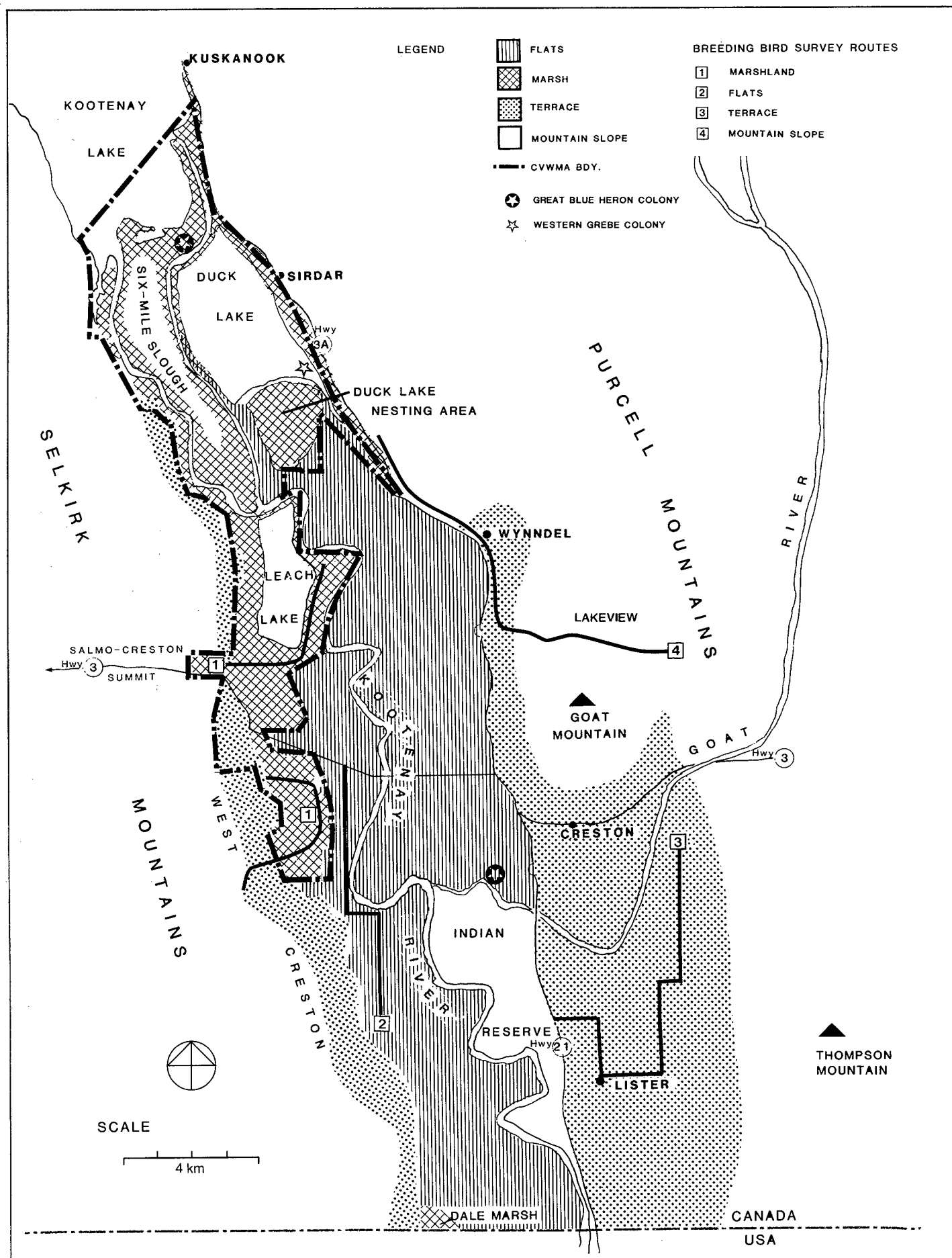
The marshland in the Creston Valley was developed into the Creston Valley Wildlife Management Area (CVWMA) under a provincial Order-in-Council in 1968 (Province of British Columbia 1974). According to that Order the purpose of the CVWMA is "wildlife conservation, management, and development, ... in particular as a waterfowl management area."

The Creston Valley floodplain has been completely diked and the water levels of the Kootenay River have been controlled by the Libby Dam in Montana since 1974. The valley bottom has been greatly altered by cultivation. In contrast, the marshes in the upper Columbia River valley are in a nearly pristine state although farther downstream near Golden, a portion of the marsh has been flooded behind the Mica Dam.

Munro (1950, 1957) and Johnstone (1949) first reported on the birds of the Creston and Columbia Valleys, respectively. Munro and Cowan (1944) reported on the birds of Kootenay National Park. Hubbard (1969) studied the *Dendroica coronata* - *D. auduboni* complex, Kemper and Eastman (1970) reported on Ospreys, Wilson *et al.* (1972) updated the status of birds in the Dry Biotic Zone of Johnstone (1949), and Schwab (1979) assessed the upland birds in the Columbia Valley. In addition, there are numerous unpublished reports on the area filed in the CWS library in Delta, BC.

Because the upper Columbia River valley has changed little since Johnstone's (1949) work there, it provides a control area for this assessment. This paper documents changes to the avifauna in the Creston Valley since Munro's (1950, 1957) studies, and compares the breeding, migration, and winter species composition, to those of birds in the less altered Columbia River valley and other sites in western North America.

**Figure 2**  
Major habitats and place names in the Creston Valley. Trees and shrubs lined most watercourses



## Study area

The Creston Valley is one of few wide, flat valleys in British Columbia. The valley floor extends to Bonner's Ferry in Idaho. This study was conducted in the Canadian portion known as Kootenay Flats, bounded by the Canada-US border in the south, Kootenay Lake in the north, Selkirk Mountains on the west, and Purcell Mountains on the east (Fig. 2). The floor of the Creston Valley is mostly marshland on the west and diked, agricultural fields to the east (Fig. 2). The adjacent river terraces and slopes are cultivated and forested. The elevation of the valley bottom is about 530 m and the Selkirk and Purcell Mountains rise about 2000 m above sea level. The Kootenay River winds north through the valley joined by numerous watercourses. The area is in transition between the Interior Douglas Fir, Ponderosa Pine Bunchgrass, and Interior Western Hemlock Biogeoclimatic Zones (Krajina 1965).

The Creston Valley has an average of 160 frost-free days: the mean dates of last and first frost are 20 April and 7 October, respectively (Environment Canada 1982a). Summers are warm and winters cold with snow occurring from October to April (Fig. 3). In contrast, the Columbia River valley has 110 frost-free days (26 May – 14 September) and snow occurs from September to April (Environment Canada 1982a).

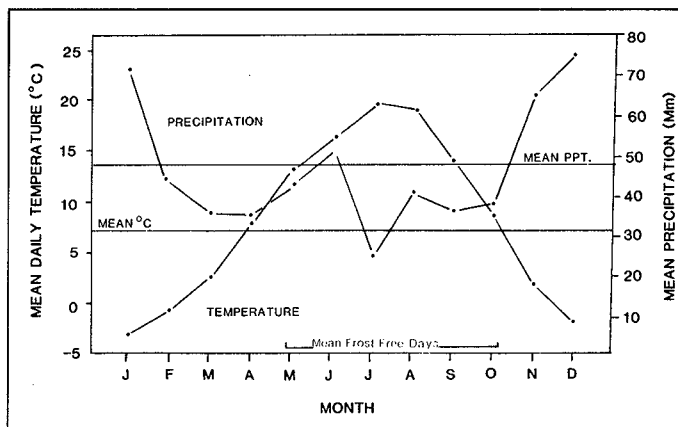
We identified five habitat units in the Creston Valley. The four main units are 6764 ha of marshland, 9170 ha of cultivated land on Kootenay Flats (hereafter, Creston Flats), 8550 ha of river terraces (hereafter, terrace), and mountain-slopes that extend beyond the valley. The other habitat unit occurs within the marshland and consists of a total of 506 ha of deciduous growth around the marsh areas (hereafter, trees and shrubs).

**Marshland** — Nearly all (83%) of the flooded portion of the valley is contained behind dikes within the CVWMA. There are six major wetlands in the CVWMA that are managed mostly for waterfowl. Most of these "management units" are flooded with less than 1 m of water, which has been enough to change their vegetative composition. The largest units are Six-mile Slough, Duck Lake, Duck Lake Nesting Area, Leach Lake, Corn Creek Marsh, and Dale Marsh (Figs. 4–8). The marshland in the Indian Reserve is mostly bulrush (*Scirpus acutus*).

**Trees and shrubs** — Extensive deciduous trees and shrubs outline the flooded reaches of all the management units. Willow (*Salix* spp.), black cottonwood (*Populus trichocarpa*), and red-osier dogwood (*Cornus stolonifera*) create dank woodlands throughout the CVWMA. This type of habitat is less extensive outside the CVWMA.

**Creston Flats** — The Creston Flats are in grain, forage, or fruit crops (Fig. 9). During our study the crops along the Breeding

**Figure 3**  
Mean temperature and precipitation in Creston, 1951–80 (Environment Canada 1982a)



Bird Survey route were wheat, timothy, barley, corn, strawberries, and alfalfa.

**Terraces** — Small terraces on the west side of the valley are mostly forested unlike the wider areas surveyed in the Lister area south of Creston. Much of the eastern terrace is cultivated in crops and orchards (Fig. 10). During our study, terrace vegetation included pasture, alfalfa, and hedgerows (mostly snowberry [*Symphoricarpus alba*], wild rose [*Rosa* sp.], willow, and cottonwood). Small (<10 ha) woodlots of Douglas fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and ponderosa pine (*P. ponderosa*) dotted the area.

**Mountain-slope** — The hillsides below about 1700 m are clothed in mostly second growth Douglas fir and western larch (*Larix occidentalis*), mixed with willows, domestic apple (*Malus* sp.), and trembling aspen (*Populus tremuloides*) (Fig. 11). In wetter areas, western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*) form dense stands, and ponderosa pine prevail in dry areas. Many south-facing slopes are bare of trees and covered in grasses, fragrant mock-orange bushes (*Philadelphus lewisii*), willows, and eye-catching wild flowers.



**Figure 4**  
Six-mile Slough in June 1985



**Figure 5**  
Duck Lake Nesting Area where Forster's Terns and large numbers of Yellow-headed Blackbirds nested





**Figure 6**  
Leach Lake, a shallow marsh, in June 1985

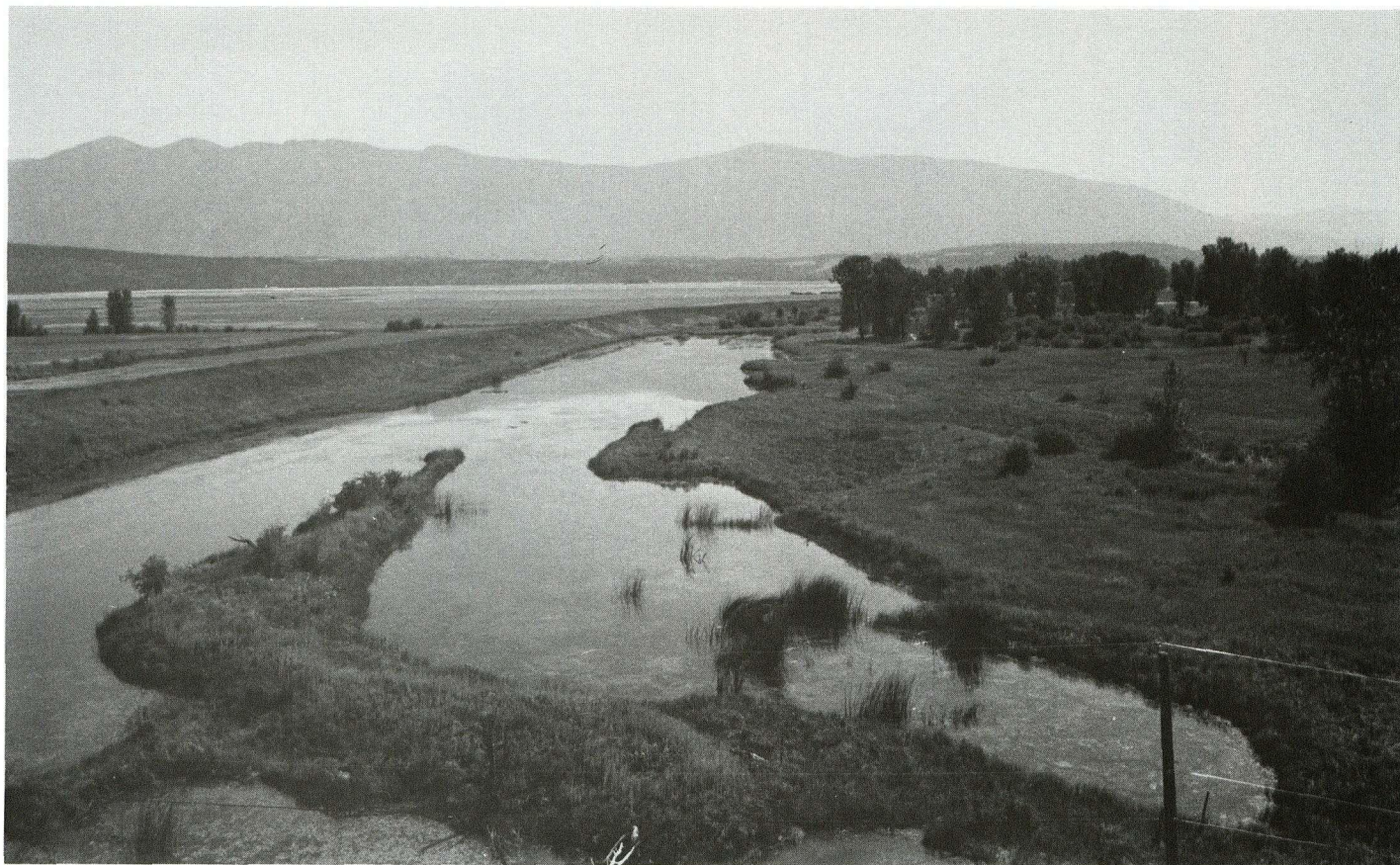


**Figure 7**  
Corn Creek Marsh in June 1985 one year after drawdown





**Figure 8**  
Dale Marsh at the south end of the Creston Valley



**Figure 9**  
Cultivated fields on Kootenay Flats west of Wynndel in June 1985





**Figure 10**  
Terrace near Lister in June 1985



**Figure 11**  
Mountain-slope habitat near Lakeview in June 1985





We photographed the marshland from a Piper Cub airplane flown at 2000 m above ground level (AGL) and marked the boundaries of the flooded portions on a topographical map (1:50 000). We traced all habitats using a computerized "graphics tablet" or planimeter to determine their area.

We counted birds in a variety of ways. We censused ducks, geese, swans, and coots from a Piper Cub airplane at 50–100 m AGL during peak migration. To count waterfowl broods, we travelled by airboat along one transect in Leach Lake, Duck Lake Nesting Area, Six-mile Slough, and Corn Creek on three occasions each year (1974–84) between 27 May and 7 August, and recorded all broods seen. We extrapolated the total number of marshland waterfowl broods in the CVWMA by multiplying the mean broods counted per transect area by the area of each management unit. Birds in the trees and shrubs, on the Creston Flats, on the terraces, and on the forested mountain slopes were surveyed using a modified Breeding Bird Survey (BBS) (Robbins and VanVelzen 1967, Erskine 1970). A 10-km route in each of those four habitats units was surveyed seven times between 17 May and 29 June in 1983 or 1984. Each route consisted of 20 stops spaced at 0.5-km intervals. We surveyed the trees and shrubs, Creston flats, and mountain-slope between 06:00 and 08:30 MST and the terraces between 08:30 and 11:00 MST. We recorded all birds heard or seen within 0.4 km for 3 min per stop.

In addition to the BBS and published reports, we have used the records contributed by naturalists and local observers at the Creston Valley Wildlife Interpretation Centre (CVWIC) since 1974, unpublished CWS and CVWMA reports, Munro's (1950, 1957) reports, and the BC Provincial Museum's Wildlife Records File (BCWRS) to compile the annotated list. That list encompasses the entire Creston Valley from the Canada–US border to the south end of Kootenay Lake and the ridge top of the Selkirk and Purcell Mountains. We counted Great Blue Heron and Osprey nests from an airplane in early spring before the trees leafed and from the ground in summer.

Scientific names of birds not in the text appear in the annotated list.

## The Creston Valley – changes since 1950

Most of the changes to the avifauna in the Creston Valley were presumably a result of stabilized water levels and plant succession. Prior to diking, the Kootenay River meandered across the Kootenay Flats. Maillard (1932) said that flood waters in 1928 forced him off the Kootenay Flats for six or more weeks and, although much of the valley was diked when Munro (1950) first visited, record run-off flooded the valley in 1948. Duck Lake water levels fluctuated up to 3.7 m (Munro 1957). About 1500 ha of the CVWMA flooded each year prior to the completion of the dikes in 1975 (Table 1).

Duck Lake was diked in 1950 although water levels still fluctuated up to 2 m from local run-off. However, the borders of Duck Lake and most of Leach Lake, Six-mile Slough, and all of Corn Creek still became dry by late July. Higher water temperature and lower turbidity in Duck Lake promoted the growth of aquatic macrophytes such as *Myriophyllum* sp., *Utricularia* sp., *Polygonum* sp., and *Ranunculus* sp. The construction of diked impoundments with pumps that controlled water levels on the CVWMA began in the mid-1960s. Duck Lake and the Duck Lake Nesting Area were separated by a cross dike in 1971, and diking was completed around Leach Lake in 1973, Six-mile Slough in 1974, and Corn Creek Marsh in 1975. In addition to construction on the CVWMA, the Libby Dam in Montana was built upstream of the Creston Valley in 1972 to reduce June flooding along the Kootenay River. Giant cottonwoods lined many of the watercourses in 1928 (Maillard 1932) and during Munro's (1950) study. Today, cottonwoods and dense willow (*Salix* sp.), red-osier dogwood (*Cornus stolonifera*), and trembling aspen (*Populus tremuloides*) have invaded along the edge of many water impoundments on the CVWMA.

The terraces appear to have changed little since Munro's (1950, 1957) visit although the human population has increased. Between 1928 and 1948, the mountain-slopes were logged. Now they are well covered by second-growth forest.

How have these changes affected the status of avifauna in the Creston Valley?

Our baseline data come from Munro (1950, 1957) who visited the Creston Valley for short periods in spring, summer, and fall: 12–23 May, 1 August – 18 September, 12–13 November 1947; 6–24 May, 24 July – 25 September 1948; 18–23 August, 31 August – 5 September 1949; 19 July – 16 August 1951; 1–12 September 1952; 6 May – 27 July 1956. Our own records spanned the entire year. Munro's findings were reported in the form of an annotated list which made quantified comparisons difficult for some species. In Tables 2 and 3 we list only species known to have changed in abundance since Munro's (1950) study and which occur annually in the Creston Valley. All of the waterbirds that breed in the Creston Valley (Table 2) have increased their

populations, 28 presumably as a result of stabilized water levels. The remaining species were tree nesters that likely benefited by the maturation of cottonwoods, although stabilized water levels undoubtedly assisted them too.

The numbers of migrating Tundra Swans have declined in the Creston Valley in recent years. Munro (1950, 1957) counted 300+ swans in 1949 and 2005 in 1957. Large fluctuations have occurred in the Pacific Flyway mid-winter counts, although the numbers have generally increased over many years (Bartonek *et al.* 1980). The decline in the Creston Valley population might be due to the replacement of root crops, a favoured food of Tundra Swans, by grain and forage.

**Table 1**

Changes in area of open water, emergent vegetation, grass-sedge, and trees and shrubs on the non-agricultural portions of the CVWMA before (1959) and after (1983) water stabilization in 1975

Water level	Mgmt. unit*	Area, ha			
		Open water	Emergent veg.	Grass-sedge	Trees and shrubs
<b>1959</b>					
High	All CVWMA	2936	0	227	834
Low	All CVWMA	1486	30	1647	834
<b>1983</b>					
Stable	Duck L. nesting area	374	187	54	0
	Six-mile Slough	635	208	264	237
	Leach Lake	725	276	166	147
	Corn Creek Marsh	274	128	200	122
	Total	2008	799	684	506

\*Duck Lake and Dale Marsh are not included: Duck Lake because its water level is controlled by the International Joint Commission and Dale Marsh because it is not contiguous.

The Great Blue Heron nesting population increased after Munro's (1950) study but has declined in recent years. Munro (1950) estimated there were 40 pairs of herons in the Creston Valley in 1947–48. There were 66 pairs north of Duck Lake in 1966 and 122 nests in 1975. However, between 1975 and 1982 the colony declined to 55 pairs. The decline might be a result of flooding the impoundments in the CVWMA, because herons require shallows for feeding (L.S. Forbes, pers. commun.).

Changes to recorded numbers of upland species were not as pronounced as among the waterbirds and many of the changes were undoubtedly a result of more observers over a

**Table 3**

Changes in status of summer "land" birds in the Creston Valley since Munro's (1950) study. Only species occurring annually are included

Species	Status	
	Munro (1950)	Present
Northern Harrier	not reported	1–2 pairs since 1975
American Kestrel	2 in May, 2 in July	59 pairs 1977
Gray Partridge	"occasionally seen"	extirpated 1966
Wild Turkey	not reported	first nested 1972
California Quail	not reported	rare 1980
Mountain Quail	not reported	rare 1980–81
Sandhill Crane	not reported	rare each year
Killdeer	small numbers	widespread each year
Long-billed Curlew	not reported	1–2 pairs nest/year
Rock Dove	not reported	widespread, nests each year
Mourning Dove	migrant	widespread, nests each year
Barred Owl	not reported	first nested 1975
Barn Swallow	probably nested	widespread, nests each year
Cliff Swallow	probably nested	widespread, nests each year
Marsh Wren	not reported	small no. nest each year
European Starling	not reported	widespread, nests each year
Townsend's Warbler	not reported	frequent at high elevations
Common Yellowthroat	migrant	widespread, on Flats
Vesper Sparrow	one record	widespread, on terraces
Savannah Sparrow	migrant	widespread, nests each year
Red-winged Blackbird	6 pairs	hundreds nest each year
Yellow-headed Blackbird	migrant	hundreds nest each year
Western Meadowlark	none nested	widespread, nests each year

**Table 2**

Changes in status of summer waterbirds of the Creston Valley since Munro's (1950) study. Only species occurring annually are included

Species	Munro's (1950) data	Recent data		
		Number of pairs	Year	Reference
Pied-billed Grebe	suspected breeder	50–100+	1983	I. Ohanianian (pers. commun.)
Red-necked Grebe	"transient — 1 record"	81*	1982	I. Ohanianian (pers. commun.)
Eared Grebe	3 adults seen	12*	1982	Forbes (1985a)
Western Grebe	6–150+ seen in migration	90*	1982	Forbes (1985b)
Great Blue Heron	about 40 pairs	100+	1984	L.S. Forbes (pers. commun.)
American Bittern	None seen in summer	75*†	1983	this study
Canada Goose	None nested on flats	117*†	1983	this study
Wood Duck	40–50 pairs	120*	1980	this study
Mallard	est. 40 pairs	244*†	1980	this study
Pintail	no nest records	5*	1979	this study
Blue-winged Teal	no nests, but flying young }	240*†	1982	this study
Cinnamon Teal	no nest records			
Northern Shoveler	no nest records	23*†	1976	this study
Gadwall	1 seen in August	11*†	1982	this study
American Wigeon	no nest records	5*	1979	this study
Canvasback	1 seen in August	3*	1981	this study
Redhead	no nest records	104*†	1979	this study
Lesser Scaup	no nest records	21*†	1979	this study
Ring-necked Duck	no nest records	105*†	1979	this study
Common Goldeneye	1 brood seen	131*†	1978	this study
Bufflehead	no nest records	1*	1975	this study
Hooded Merganser	no nest records	25*	1974	this study
Common Merganser	no nest records	25*	1974	this study
Ruddy Duck	1 seen in August	20*†	1982	this study
Osprey	7+ nests	60*	1984	L.S. Forbes (pers. commun.)
Sora	no nest records	widespread, nests found	1981	this study
American Coot	mostly transient	478*†	1983	this study
Common Snipe	1 or more heard in May only	widespread, nests found	1982	this study
Spotted Sandpiper	presumed transients	widespread, nests found	1977	this study
Forster's Tern	not recorded	7*	1981	Goossen <i>et al.</i>
Black Tern	no nest records	450†	1981	B. Chapman, (pers. commun.)

\*Data from the CVWMA which encompasses 83% of the marshland in the Creston Valley.

†Estimate.

longer period of time. In addition, Munro's hearing was failing during his visits to the Creston Valley (A.J. Erskine, pers. commun.) so some species, such as Townsend's Warbler, might have been overlooked. Table 3 lists only annually occurring species known to have changed in number since Munro's (1950, 1957) studies. Range expansions in some species, such as the Barred Owl, have occurred throughout BC (Grant 1966) and local increases probably do not reflect habitat changes. Most upland species have presumably benefited from agricultural activities on the Creston Flats.

No naturally occurring species appears to have declined in number except for the Tundra Swan. Several gallinaceous birds were introduced into the valley, but only the Ring-necked Pheasant and Wild Turkey seem to have maintained their population levels. Pheasants were introduced in the late 1800s and early 1900s. Turkeys were released in Washington and Montana in 1962 and 1964, respectively (Merilees 1971) and were first seen in the Creston Valley in about 1970. The first turkey nest was found about 1972 (D. Gray, pers. commun.). The California Quail, Mountain Quail, and Gray Partridge were extirpated or occurred in very low numbers (see Annotated List). The European Starling and Rock Dove arrived recently in Creston Valley (see Annotated List).

In our BBS, two ubiquitous birds in the trees and shrubs, on the flats, on terraces, and on mountain-slope were the Common Crow and American Robin (Table 4). The Red-winged Blackbird was the most abundant bird in any single habitat. The most spectacular increase has been by the European Starling which arrived in the Creston Valley in 1955 (Myres 1958) and was the most abundant species overall in the trees and shrubs, Creston Flats, and terrace habitats (Table 4).

Some of the 32 species counted on the BBS were mostly confined to one habitat type (Table 4). The Eastern Kingbird was found nearly exclusively in the trees and shrubs whereas the Western Kingbird, Brewer's Blackbird, and House Sparrow were most abundant on the dry terraces on the east side of the valley. Red-winged and Yellow-headed Blackbirds were only recorded feeding on the flats although they nested in large numbers in nearby cattails. Ten species were more or less confined to the mountain-slope: the Black-capped Chickadee, Rufous-sided Towhee, Swainson's Thrush, Townsend's Warbler, Western Tanager, Violet-green Swallow, Nashville Warbler, Golden-crowned Kinglet, Red-breasted Nuthatch, and Varied Thrush.

**Table 4**

Mean number of passerine birds counted on each of our breeding bird surveys (see Methods) in the Creston Valley in 1983–84. Standard deviation appears in parentheses. Species with fewer than two individuals per count were excluded

Species	Trees and shrubs	Kootenay Flats	Terrace	Mtn.-slope
Red-winged Blackbird	0	26.3(10.2)	0	0
European Starling	1.6(3.2)	23.7(14.6)	23.8(19.8)	0
Common Crow	2.4(2.7)	19.7(14.9)	14.0 (3.6)	4.9(3.8)
Barn Swallow	1.4(0.8)	14.6(10.1)	16.1 (4.9)	4.9(1.9)
Savannah Sparrow	<1	10.3 (5.1)	19.7 (8.9)	0
Yellow-headed Blackbird	0	9.1 (7.5)	0	0
Western Meadowlark	<1	7.2 (5.6)	11.2 (2.3)	0
Tree Swallow	7.6(3.7)	6.4 (7.6)	1.3 (1.1)	0
Bobolink	6.1(4.9)	6.1 (5.0)	0	0
American Robin	5.2(2.5)	5.6 (2.4)	15.9 (4.9)	21.2(4.6)
Brewer's Blackbird	<1	<1	14.6 (8.7)	0
House Sparrow	0	0	6.3 (2.4)	<1
Chipping Sparrow	<1	1.4 (3.4)	5.6 (2.4)	3.0(2.6)
Brown-headed Cowbird	5.2(2.8)	1.0 (1.4)	5.0 (2.5)	16.4(2.4)
Yellow Warbler	14.9(4.8)	3.3 (3.2)	2.0 (1.5)	12.0(2.9)
Song Sparrow	8.3(2.4)	3.9 (3.1)	4.3 (1.7)	3.3(2.2)
Black-capped Chickadee	0.9(1.0)	1.7 (2.6)	2.3 (2.0)	11.0(9.1)
Rufous-sided Towhee	0	0	1.0 (1.2)	8.1(3.8)
Swainson's Thrush	1.2(2.0)	0.4 (0.8)	1.4 (1.5)	8.1(7.0)
Dark-eyed Junco	1.7(0.8)	0	4.1 (2.1)	8.1(2.6)
Townsend's Warbler	<1	0	0	7.9(3.1)
Western Tanager	<1	0.3 (0.4)	1.9 (1.7)	7.4(3.8)
Violet-green Swallow	<1	1.6 (1.9)	1.4 (1.9)	7.3(3.3)
Nashville Warbler	<1	<1	1.0 (1.0)	6.4(3.2)
Golden-crowned Kinglet	<1	0	0.4 (0.8)	6.0(3.7)
Red-breasted Nuthatch	1.1(1.4)	<1	1.3 (1.5)	5.0(0.8)
Varied Thrush	0.7(1.5)	0	0	5.0(2.3)
Western Kingbird	<1	<1	2.3 (1.3)	0
Common Yellowthroat	3.9(2.3)	2.9 (2.7)	<1	0
Red-eyed Vireo	3.3(3.6)	1.3 (2.4)	3.0 (2.7)	2.1(2.5)
Eastern Kingbird	7.7(5.4)	0.9 (1.2)	0.4 (0.8)	0
Vesper Sparrow	0	0	1.2 (1.0)	0
Total no. species	27	25	27	20

# Comparisons with other locations in western North America

## 1. Breeding birds

The Columbia River marshes between Golden and Canal Flats are in a near pristine state, probably much like the Creston marshes prior to diking. In contrast, the Creston Valley on the Kootenay River is diked and the Libby Dam in Montana regulates the water flow. In the Creston Valley, ice melts in early to mid-April when the discharge is lowest (0.04 m/s) but, assisted by melting snow on the mountains, the Kootenay River pours nearly 800 times as much water (30.7 m/s) through the valley 2 months later (Environment Canada 1982b). The major difference between the two valleys is that the Columbia becomes flooded and the Creston does not.

All species of waterfowl whose breeding ranges overlap the Creston Valley have nested within the CVWMA since water levels were stabilized (Table 5). Two to three species of hole-nesters have nested in the CVWMA since 1966. Ground-nesting species have increased from three in 1966 to 15 in 1980–83 (Table 5). Some of those changes are due to the construction of nesting islands and boxes (App. 1).

Waterfowl in British Columbia nest in large numbers in the Cariboo, about 560 km northwest of the Creston Valley. The species composition of the Creston Valley waterfowl population differs from that of the Cariboo (Table 6); it is more like that of wetland populations to the south. Mallard, Blue-winged Teal, and Cinnamon Teal are abundant in both

**Table 6**

Species composition of breeding ducks in the CVWMA, the Cariboo, and the Columbia Valley, BC

Species	Species composition of dabblers and divers, %		
	CVWMA	Cariboo*	Columbia†
<b>Dabblers</b>			
Mallard	44	26	100
Teal‡	30	35	0
Wood Duck	20	0	0
Northern Shoveller	2	9	0
Gadwall	3	9	0
Pintail	1	8	0
American Wigeon	0	13	0
<b>Divers</b>			
Goldeneye§	32	26	65
Redhead	32	6	0
Ring-necked Duck	25	2	0
Ruddy Duck	7	14	0
Scaup spp.¶	4	32	0
Canvasback	0	3	0
Bufflehead	0	17	15
Hooded Merganser	0	0	18
Common Merganser	0	0	2

\*Data from Savard (1981).

†Data from Smith (1978).

‡Identification of broods was uncertain. However Cinnamon and Blue-winged Teal mated pairs were most commonly seen.

§Identification of broods was uncertain; however, Common Goldeneye pairs were most commonly seen in CVWMA and Columbia, and Barrow's Goldeneye in the Cariboo.

¶Identification of broods was uncertain. Mostly Lesser Scaup mated pairs were observed in both CVWMA and the Cariboo.

**Table 5**

Species composition (percent of duck broods, see Methods) on the CVWMA, 1966–84

	pre'66	Year												
		66	68	74	75	76	77	78	79	80	81	82	83	84
Wood Duck	*	25	27	9	12	16	9	18	12	14	14	10	17	18
Mallard	*	25	13	31	33	24	25	26	26	30	26	28	19	7
Northern Pintail	—	0	0	0	0	0	0	0	1	0	0	0	1	1
Blue-winged and Cinnamon Teal	*	4	1	12	12	23	36	18	18	20	22	29	19	20
Green-winged Teal	—	0	0	0	0	0	0	0	0	0	0	0	3	0
Northern Shoveller	—	0	1	3	3	5	3	1	2	1	3	3	4	0
Gadwall	—	0	0	0	1	0	0	1	1	<1	2	2	1	4
American Wigeon	—	0	0	0	0	0	0	0	0	0	0	0	<1	1
Canvasback	—	0	0	0	0	0	0	0	<1	0	1	0	0	0
Redhead	—	4	0	5	7	6	6	7	11	10	7	9	11	29
Lesser Scaup	—	0	0	0	1	0	0	0	3	<1	1	1	1	0
Ring-necked Duck	—	0	0	0	0	1	2	4	10	7	5	7	4	11
Common Goldeneye	*	23	46	31	23	19	16	25	13	15	18	9	17	8
Bufflehead	*	0	0	0	1	0	0	0	0	0	1	0	0	0
Hooded Merganser	*	19	9	4	4	3	1	1	1	1	1	0	1	0
Common Merganser	—	0	2	3	2	0	0	0	<1	<1	0	0	0	0
Ruddy Duck	—	0	0	1	1	2	1	0	1	0	0	2	1	1
No. of broods seen	ND†	48	95	181	165	143	164	140	268	223	119	204	135	84
No. of species	6	6	7	9	12	9	9	9	14	11	12	10	14	10

\*Present.

†No data.

areas. Pintail and Wigeon are common nesting species in the Cariboo but not in the Creston Valley. In contrast, Wood Ducks are absent in the Cariboo but common in the Creston Valley. Among the diving ducks, the Redhead and Ring-necked Duck are most abundant in the Creston Valley, whereas the closely related scaups are most abundant in the Cariboo. Bufflehead breed in large numbers in the Cariboo (Erskine 1971) but only rarely in the Creston Valley. Barrow's Goldeneye breed in large numbers in the Cariboo (J.-P. Savard, pers. commun.) but are replaced by Common Goldeneye in the Creston Valley. In contrast, Barrow's Goldeneye and Bufflehead are abundant upland breeding birds in the Columbia Valley about 150 km to the east and the Mallard was the only common dabbling that nested there (Table 6). Munro found mostly hole-nesting waterfowl in the Creston Valley with a few Mallards confined to the terraces above the floodwaters, similar to the situation in the Columbia River valley today.

Four warm-water fishes, Black bullhead (*Ictalurus melas*), Yellow perch (*Perca flavescens*), Pumpkinseed (*Lepomis gibbosus*), and Largemouth bass (*Micropterus salmoides*), were introduced into the Columbia River system near the turn of the century (Carl *et al.* 1967). They are now abundant in the Creston Valley (Flook and Forbes 1983, Forbes and Flook 1985, Table 7, App. 2) and support many fish-eating birds.

The Creston Valley is the location of the second largest breeding colony of Western Grebes in British Columbia (Forbes 1985b) and the second largest Great Blue Heron colony in the province east of the Coast Range (Forbes *et al.* 1985). In addition, the densest population of Ospreys in Canada nests there (L.S. Forbes, pers. commun.). Within BC, Forster's Terns nest only in the CVWMA (Goossen *et al.* 1982). Among insectivorous birds, the Black Tern colony in the Creston Valley is the province's largest (BCWRS). All of these species were absent or occurred in lower numbers during Munro's (1950) study.

Fish-eating birds in the Columbia River valley are mostly tree-nesters. Four of seven heronries were active in 1980–81 and held 11–35 nests each (Forbes *et al.* 1985). Only 44% ( $N = 43$ ) of the Osprey nests in the Columbia River valley were active in 1969 (Kemper and Eastman 1970). In the Creston Valley, there were at least 60 active Osprey nests in 1984 (L.S. Forbes, pers. commun.) — an increase of nearly ninefold since Munro's (1950) study. The Osprey is increasing its population in Montana too (Klaver *et al.* 1982). Bald Eagles were abundant in the Creston Valley and the Columbia River valley; 4 and 13 active nests, respectively (Forbes and Kaiser 1984).

Several species of fish-eating birds have occurred regularly in the Creston Valley but have not bred. American White Pelicans and Double-crested Cormorants might breed if suitable nesting sites were provided. Cattle Egrets were first

seen in 1980. They are expanding their range throughout North America and will probably eventually nest in the Creston Valley. Suitable habitat appears to exist for Green-backed Herons and Black-crowned Night-herons but they have seldom been seen.

Unlike the wetland birds, many of the species in the mountain-slope habitat are also abundant to the west and north. Buckner *et al.* (1975) described the bird community of the Coastal Western Hemlock Biogeoclimatic Zone (Krajina 1965). This zone is similar to the Interior Western Hemlock Biogeoclimatic Zone (Krajina 1965) which occurs in the Creston Valley. Quantified comparisons between results from the Census Plot method used by Buckner *et al.* (1975) and the Breeding Bird Survey method are unwise because the latter is biased toward edge-habitats and conspicuous birds (Robbins and Van Velzen 1967). Nevertheless, the following species were common to the coastal forest and the mountain-slope in the Creston Valley: American Robin, Varied Thrush, Swainson's Thrush, Golden-crowned Kinglet, Townsend's Warbler, and Dark-eyed Junco. Western Flycatcher and Chestnut-backed Chickadee were common on the coast but less so in the Creston Valley. The most notable difference that we observed was the abundance of Yellow Warblers and scarcity of Orange-crowned Warblers in the Creston Valley with the opposite occurring on the coast. The Yellow Warbler was the most recorded passerine in riparian trees and shrubs in the Creston Valley (Table 4). To the north, in the montane environments of Banff and Jasper National Parks, the Nashville Warbler has been recorded only on four occasions (Holroyd and Van Tighem 1983) but it is often recorded in the Creston Valley (Table 4). Wilson's Warblers are common in those parks and uncommon in the Creston Valley. The Rufous-sided Towhee was the fourth most often recorded species in the forests around the Creston Valley but was very rare in Banff and Jasper (Holroyd and Van Tighem 1983). The Mountain Chickadee (*Parus gambeli*), White-breasted Nuthatch (*Sitta carolinensis*), and Cassin's Finch were common species in the open ponderosa pine and Douglas fir forests in the Columbia Valley (Schwab 1979) but the two former were absent in the Creston Valley. The Clay-colored Sparrow (*Spizella pallida*) was common in scrub in the Columbia River valley (Schwab 1979) but absent in the Creston Valley.

Characteristic birds in the boreal forest of northern British Columbia include Least Flycatcher, Dusky Flycatcher, Western Wood Pewee, Black-capped Chickadee, American Robin, Swainson's Thrush, Red-eyed Vireo, Warbling Vireo, Orange-crowned Warbler, MacGillivray's Warbler, and American Redstart (Erskine 1977). All of those species occur in the Creston Valley. However, the flycatchers and the three warblers were either not recorded, or occurred in low numbers on our BBS. The Western Wood Pewee is a common species in West Creston, but began singing in July after we completed our surveys. The remaining species were not abundant in the Creston Valley. In addition, the Creston Valley has large numbers of Brown-headed Cowbirds, Yellow Warblers, Rufous-sided Towhees, Dark-eyed Juncos, Western Tanagers, Townsend's Warblers, Violet-green Swallows, Nashville Warblers, Golden-crowned Kinglets, and Varied Thrushes. Many of those are edge species attracted to the openings in the second-growth forests and dry, open ridges.

Forest birds of eastern origin were less abundant, presumably because of the barrier to dispersal created by the Rocky Mountains, although eastern migrants occurred occasionally (see Annotated list). Grassland species show mostly southern affinities.

**Table 7**

Relative abundance (percent of biomass) of fish in seine- and gill-net catches in Duck Lake in 1982 and 1983 (from Forbes 1985c)

Species	Seine-net	Gill-net
Yellow Perch ( <i>Perca flavescens</i> )	28.7	28.9
Pumpkinseed ( <i>Lepomis gibbosus</i> )	64.8	24.5
Largemouth Bass ( <i>Micropterus salmoides</i> )	3.9	22.1
Black Bullhead ( <i>Ictalurus melas</i> )	2.6	21.3
Northern Squawfish ( <i>Ptychocheilus oregonensis</i> )	0	1.3
Redside Shiner ( <i>Richardsonius balteatus</i> )	≤1.0	0
Largescale Sucker ( <i>Catostomus macrocheilus</i> )	0	1.0
Longnose Sucker ( <i>Catostomus catostomus</i> )	0	0.8
Mountain Whitefish ( <i>Prosopium williamsoni</i> )	0	≤1.0
Dolly Varden ( <i>Salvelinus malma</i> )	*	*
Total catch (kg)	120.6	206.3

\*Observed in Duck Lake but not caught.

## 2. Migrating and wintering birds

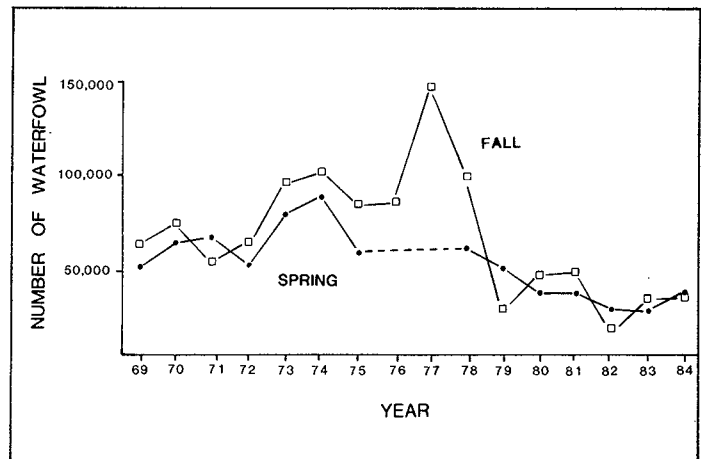
The Creston Valley is an island of wetland and agricultural habitat surrounded by mountains. The northern shores of Kootenay Lake are steep-sided so that in spring wetland migrants must fly about 160 km to the next wetland, which is on the Columbia River. We believe this "boxed-in" effect of the Creston Valley greatly restricts the migration of land birds. (Waterfowl may be less affected by topographical features: Erskine [1964] suggested that waterfowl habitually migrate over the Coast Mountains rather than follow valleys.) In contrast, land and wetland migrants in the Columbia River valley to the east can follow a series of oxbow marshes, sloughs, and ponds for nearly 200 km, that leads them nearly halfway into the heart of British Columbia. And west of the Creston and Columbia Valleys the wide Okanagan is a much drier valley, but low mountains at its north end provide migrants easier passage into the extensive central plateau of British Columbia (R.J. Cannings, pers. commun.).

From 1969 to the mid-1970s the maximum number of waterfowl counted in spring and fall migration was more or less stable. By about 1978 the populations began to decline (Fig. 12). Many recoveries of waterfowl banded in the Creston Valley occurred between Alberta and California (Fig. 13). That decline supports Cooch and Boyd's (1984) concern that the "net export" of Mallards from western Canada has been declining since 1976. Earlier, the same men (Boyd and Cooch 1983) attributed most of the decline in Alberta waterfowl population to unfavourable habitat conditions exacerbated by local hunting. Tundra Swans in the Creston Valley have declined over the years (Fig. 14) but increased in the flyway (Bartonek *et al.* 1980).

The same species occur in fall hunter kills of waterfowl as in spring migration (Tables 6 and 8). The number of birds bagged by hunters has fluctuated widely between years (Table 8) with a mean over 13 years (1972–77, 1979–84) of 3309 birds (SD = 1151.4). Smith (1956) estimated 44 400 waterbirds on Duck Lake on 28 October 1956, most of which were American Wigeons, Northern Pintails, Mallards, and Coots. The number of ducks, geese, swans, and coots counted in fall migration in 1969–84 was about 1.3 times that of spring migration.

**Figure 12**

Maximum number of migrant ducks, geese, swans, and coots counted on the CVWMA, 1969–84



Many raptors are year-round residents in the Creston Valley, but the Turkey Vulture, Osprey, and Merlin migrate south for the winter. Presumably, the Creston Ospreys spend the winter with the northern Idaho population in Central America (Melquist *et al.* 1978, Melquist and Johnson, 1984). The Rough-legged Hawk is the most commonly seen raptor in the Creston Valley in winter but departs to the north for the summer.

Shorebirds pass through the Creston Valley in small but constant numbers. Those species include Least Sandpiper, Solitary Sandpiper, Lesser Yellowlegs, Baird's Sandpiper, Pectoral Sandpiper, and Dowitcher. The proportion of Long-billed and Short-billed Dowitchers is unknown.

Ring-billed and California Gulls are commonly seen in the Creston Valley in early spring migrating to the breeding grounds in the Canadian Prairies. Vermeer (1970) and Houston (1977) banded those species in Alberta and recovered them from the southern BC coast in autumn and California in winter. There are no fall records of California Gulls in the Creston Valley but we suspect they were overlooked among Ring-bills. White terns seen in spring might be Com-

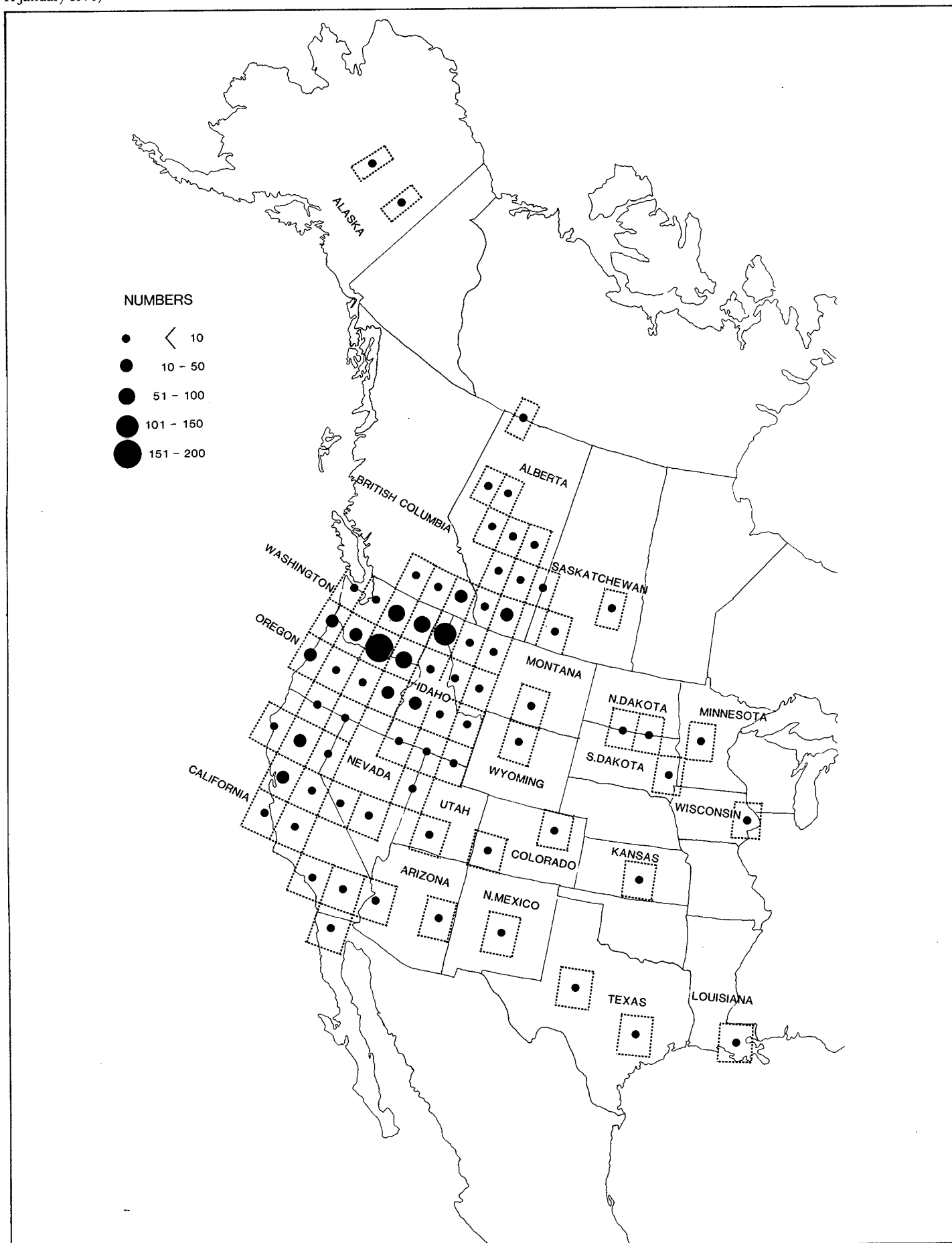
**Table 8**

Total waterfowl harvest by species (birds bagged) on the CVWMA. No data available for 1978. Data from CVWMA files

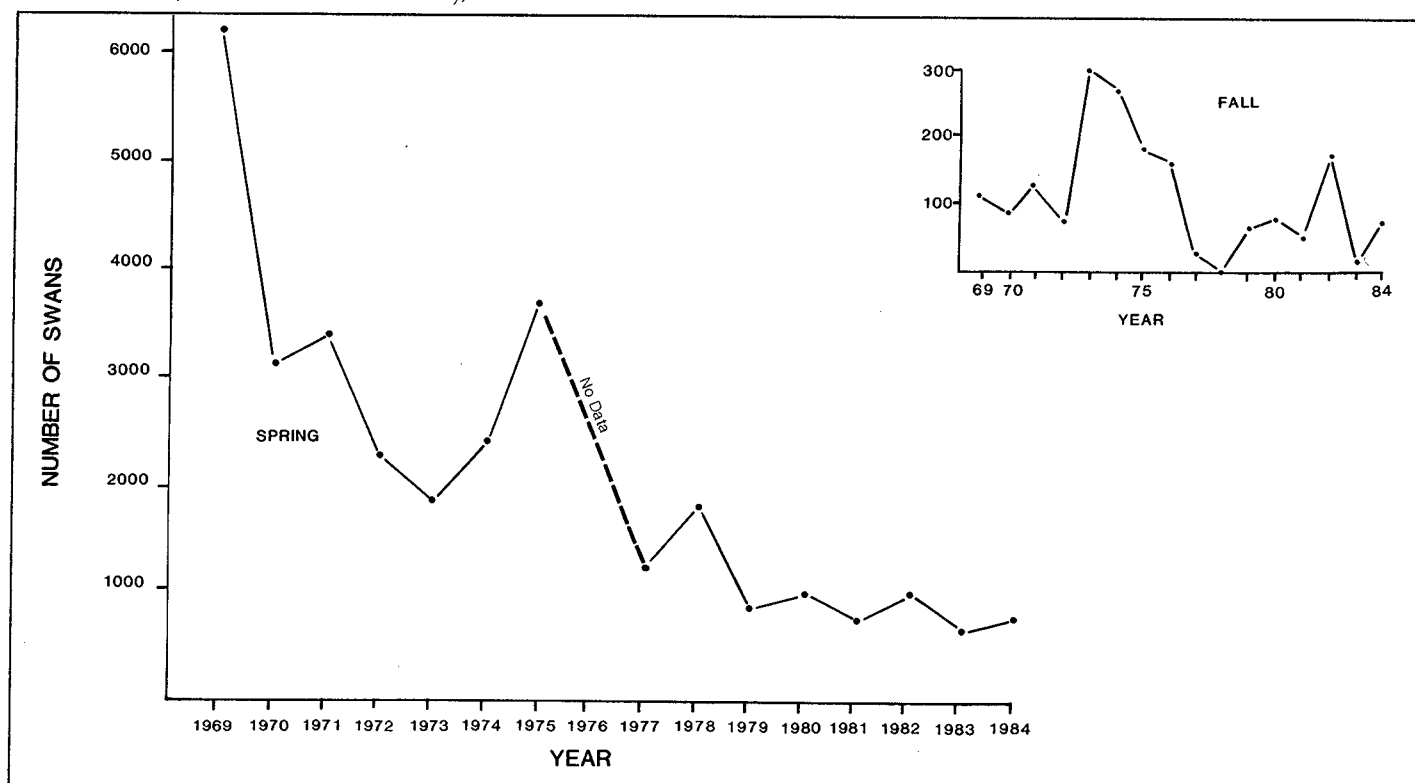
Species	Year												Total	%
	72	73	74	75	76	77	79	80	81	82	83	84		
Mallard	678	745	736	2013	897	1676	1623	3018	470	417	1332	650	14 255	34.8
Northern Pintail	362	340	237	386	344	496	271	789	55	90	227	117	3 714	9.1
Northern Shoveler	299	45	69	76	72	135	87	84	175	66	75	140	1 323	3.2
American Wigeon	1216	958	1255	1175	897	685	531	562	235	320	397	315	8 546	20.9
Gadwall	0	96	28	24	30	45	71	10	47	32	144	203	730	1.8
Blue-winged Teal	176	120	69	248	434	347	211	10	457	128	66	106	2 372	5.8
Green-winged Teal	485	536	509	386	676	915	358	227	60	115	101	425	4 793	11.7
Wood Duck	46	0	0	24	0	14	109	0	0	9	9	0	211	0.5
Redhead	214	326	306	233	574	22	369	177	66	41	60	28	2 416	5.9
Canvasback	0	17	45	0	0	9	0	0	8	9	9	0	97	0.2
Lesser Scaup	0	51	27	33	60	9	0	10	26	0	66	0	282	0.7
Greater Scaup	0	17	34	10	9	0	0	0	34	4	17	0	125	0.3
Bufflehead	0	34	17	0	21	9	0	10	40	46	35	15	227	0.6
Goldeneye	0	0	27	14	22	36	38	24	40	32	26	15	274	0.7
Ring-necked Duck	0	0	0	24	89	36	86	0	47	32	0	24	338	0.8
Common Merganser	0	0	0	14	30	13	0	0	0	4	43	0	104	0.3
Hooded Merganser	0	0	0	71	26	9	0	0	26	4	17	4	157	0.4
Ruddy Duck	0	0	0	0	0	0	0	0	26	0	0	19	45	0.1
American Coot	0	69	62	15	51	36	0	0	21	41	118	24	437	1.1
Canada Goose	39	69	17	14	21	14	11	10	40	69	135	73	512	1.2
White-footed Goose	0	10	0	0	0	0	0	0	8	9	0	0	27	0.1
Total bagged	3515	3433	3438	4760	4253	4506	3765	4931	1881	1468	2877	2158	40 985	
Percent of grand total	8.6	8.4	8.4	11.6	10.4	11.0	9.2	12.0	4.6	3.6	7.0	5.3		



**Figure 13**  
 Location of recoveries of waterfowl banded in the Creston Valley (banded  
 from 23 August 1948 to 3 July 1975, recovered from 1 October 1948 to  
 11 January 1976)



**Figure 14**  
Peak counts of Tundra Swans in the Creston Valley, 1969–84



mon or Forster's Terns. The latter species breeds in the Creston Valley (Goossen *et al.* 1982). In August, adult and immature Common Terns have been identified by their calls and plumage characteristics on Duck Lake.

Songbird migration is less spectacular than in other BC valleys. For example, White-crowned Sparrows move in large numbers through the Okanagan Valley in April and early May (R.J. Cannings, pers. commun.) but not in the Creston Valley. Presumably, songbirds move north and south through valleys and the relatively closed valley in Creston limits their migration. The first passerine migrant in spring is the Tree Swallow, which arrives in the first week of March often with Violet-green Swallows. About one month later, in mid-April, the Mountain Bluebird migrates through the valley followed by the Ruby-crowned Kinglet at month's end. However, most insectivores arrive in early to mid-May. Kingbirds arrive in mid to late May, and the Common Nighthawk is the last migrant to arrive, in early June.

The winter climate is moderated by Kootenay Lake and supports many species that depart from most parts of the province. For example, the Creston Field Naturalists listed 84 species of birds that can be seen in the Creston Valley in December and January (McMackin 1983). Included are Pied-billed Grebe, Northern Harrier, American Kestrel, Killdeer, Common Snipe, Mourning Dove, Short-eared Owl, Red-breasted Nuthatch, Brown Creeper, Marsh Wren, American Robin, Yellow-headed Blackbird, and American Goldfinch.

Of 81 breeding species of passerines, only 35 remain all winter and most occur in small numbers. Several species appear to move down the mountains in winter and return to higher elevations in spring. Those include the Steller's Jay, Clark's Nutcracker, Dipper, Dark-eyed Junco, Pine Grosbeak, Red Crossbill, and Evening Grosbeak — all boreal forest species. The Blue Grouse is an anomaly: it migrates up the mountains in autumn and down in spring.

### 3. The need for ecological control areas

The habitat management activities of the CVWMA appear to have greatly benefited 31 species of waterbirds. There are more species and larger breeding populations now than 35 years ago. In contrast the marshes in the Columbia Valley have remained in a nearly pristine state and the waterbird populations have changed little in the past 35 years.

Although this suggests that similar manipulations would be beneficial to waterbirds in the Columbia, we recommend that the Columbia marshes remain untouched for the following reasons. Conservation has many facets, the more important ones being 1) the maintenance of genetic diversity, 2) the preservation of rare species and habitats, 3) the understanding of how ecosystems work, and 4) the provision of something useful for the future which we do not yet appreciate (Sinclair 1983). We have emphasized the first two and neglected the remainder. Sinclair (1983) pointed out, with examples, that without "ecological baseline areas" which serve as controls for our influences, we may be able to detect changes to the environment but not know whether they are due to human action or climatic change. Secondly, Holling (1973) suggested that ecosystems might have "resilience" to a certain point beyond which irreversible change results. Control areas should remain relatively undisturbed and be monitored to detect changes. Only careful studies will reveal the agent of environmental change in manipulated and control areas.

In this study we fortunately had earlier reports of the birds at the Creston Valley and the Columbia Valley (Munro 1950, 1957; Johnstone 1949) as well as untouched marshes in the Columbia Valley for comparison. Without the Columbia marshes it would have been difficult to have judged that the waterfowl populations in the Creston Valley benefited from the costly engineering manipulations and would not have occurred otherwise.

# Annotated list of the birds of the Creston Valley

This list includes 250 species recorded up to 28 February 1985 in the Creston Valley, from the Canada–US border in the south, north to and including the south shore of Kootenay Lake and the Kootenay River drainage basin from east to west. There are 147 species that are highly suspected or known to breed in the Creston Valley. The occurrence of six additional species is unconfirmed.

## 1. Treatment, terms, and references

The common and scientific names of each species follow the American Ornithologists' Union check-list (1983) and Monroe (1985). Records of species outside of their normal range without an accurate written description, photograph, or specimen were considered unconfirmed. We used the following frequency standards, which apply to the appropriate season in which each species occurs.

### Terms and abbreviations

Common	Seen almost daily
Frequent	Seen about once per week to once per month
Rare	Seen less than once per month but more often than once every 20 years
Casual	Seen less than once every 20 years
Accidental	Outside its normal range and unlikely to be seen again in next 20 years
Unconfirmed	Insufficient information to assess accuracy of observation
Introduced	Released to the wild
BCPM	British Columbia Provincial Museum, Victoria
BCWRS	British Columbia Wildlife Record Scheme housed at BCPM
CVM	Cowan Vertebrate Museum, University of British Columbia
CVWIC	Creston Valley Wildlife Interpretation Centre
CVWMA	Creston Valley Wildlife Management Area
ROM	Royal Ontario Museum
WFVZC	Western Foundation of Vertebrate Zoology, California

## 2. The birds

### Common Loon (*Gavia immer*)

Rare.

Most arrive in May; first sighting is 10 May. One record of an adult with young on 12 July 1983 at confluence of Kootenay River with Kootenay Lake. Majority of sightings have been on Kootenay Lake and to the north. A juvenile-plumaged (1-year-old) loon was seen in summer 1983. Latest sighting in the Creston Valley was 26 October. There are winter sightings for Kootenay Lake.

### Pied-billed Grebe (*Podilymbus podiceps*)

Common.

Most sighting records are for Duck Lake and Corn Creek Marsh. Most arrive in late March. Nests early May to early August. Most leave by 14 November; however, individuals have been sighted throughout the winter.

### Horned Grebe (*Podiceps auritus*)

Frequent.

Most summer sightings are for Duck Lake and Corn Creek Marsh. Earliest sighting in the Creston Valley 22 April in Corn Creek Marsh. Only nesting record is for two pairs 31 May 1979 at Duck Lake and 27 May 1983 at Duck Lake amongst 12 Eared Grebes. Latest Creston Valley sighting is 17 August. January and February sightings for Kootenay Lake.

### Red-necked Grebe (*Podiceps grisegena*)

Common.

Most sightings are for Duck Lake and Corn Creek Marsh. Arrives by 30 March. One pair was observed sitting on a nest on 8 April, however nesting generally begins in early May to early June. Latest sighting recorded is 18 August. No winter records.

### Eared Grebe (*Podiceps nigricollis*)

Rare.

Most records are for May, June, and August at Duck Lake. Earliest sighting was 2 March. First nest seen 29 May 1981 and 12 active nests in 1982 had mean clutches of 2.2 eggs ( $SD = 0.7$ ) (Forbes 1985a). Twenty-one nests with eggs were found in 1982 by Forbes (1985a). Nests in late May to early August. Latest sighting is 20 October. One winter sighting on 24 February on Kootenay Lake. Most of BC population nest in Thompson–Okanagan Valleys and Central Plateau (BCWRS).

**Western Grebe (*Aechmophorus occidentalis*)**

Common.

Nests in Duck Lake and south end of Kootenay Lake. Arrives mid-late April, courting occurs until mid-June, eggs laid in early June and hatch late June to early July. Mean clutch = 3.4 (SD = 1.1, *N* = 139). From 75 to 90 pairs nested in 1981–83 (Forbes 1985b). Mean dimensions (mm) of 106 eggs: length = 58.0 (SD = 2.3), width = 38.7 (SD = 1.6) (Forbes 1985b). Latest sighting is 14 November, although 26 were seen on Duck Lake 1 January 1981 near Sirdar. Feeding ecology reported in Forbes (1985c)

**Clark's Grebe (*Aechmophorus clarkii*)**

Rare.

L.S. Forbes (pers. commun.) saw a chick accompanied by a female Clark's Grebe with a male Western Grebe on Duck Lake in July 1983.

**American White Pelican (*Pelecanus erythrorhynchos*)**

Rare.

Most sightings have been at Duck Lake. Earliest sightings are 26 April and continue through 30 May. Most birds are in breeding plumage. Numbers vary from 3 to 33. No sightings for June–August. Latest sightings on 4 November. No winter sightings. Pelicans breed in southern Idaho (Findholt and Trost 1981).

**Double-crested Cormorant (*Phalacrocorax auritus*)**

Rare.

Most sightings have been in the Duck Lake – Kootenay River vicinity. Earliest sighting was 13 May, latest on 25 September.

**American Bittern (*Botaurus lentiginosus*)**

Frequent.

Most sightings are for Corn Creek Marsh during May and June. Arrives by 24 April. Nests in May. Latest sighting is 27 October. No winter records.

**Great Blue Heron (*Ardea herodias*)**

Common.

Most sightings are in May to August in Corn Creek Marsh. Most arrive in March. Nests in April in two separate colonies and birds are seen throughout summer and fall. Numbers of occupied nests at the Duck Lake colony were 90 in 1971, 95–1972, 114–1973, 122–1975, 93–1977, 70–1981, and 66–1983. Fledging success in successful nests was 1.68 young in 1981, 3.25 in 1982, and 3.21 in 1983 (Forbes *et al.* 1985). There were 25 and 33 occupied nests in 1982 and 1984 at the Goat River colony (Forbes *et al.* 1985). Up to 30 herons sighted during winter months on any one day and restricted feeding sites might prevent more from staying through the year (Forbes and McMackin 1984).

**Cattle Egret (*Bubulcus ibis*)**

Casual.

A bird in breeding plumage 16 May 1980 2 km west of Creston. It nests in Idaho (Findholt and Trost 1982).

**Green-backed Heron (*Butorides striatus*)**

Casual.

One seen flying over Duck Lake area 28 May 1973. One seen in Okanagan Valley in July 1971 and another near Wardner in the Columbia Valley in October 1984 (BCWRS) are only records in interior BC.

**Black-crowned Night-heron (*Nycticorax nycticorax*)**

Casual.

One seen 27 June 1973 at Duck Lake Nesting Area and one August 1982 at Leach Lake. This species nests in southeastern Idaho (Findholt and Trost 1982).

**Tundra Swan (*Cygnus columbianus*)**

Common.

Most sightings on Leach Lake. Individuals occasionally stay in summer but don't nest. Migrates in mid-March to April and October to November. Figure 14 shows peak migration numbers from 1969–84. Regular winter sightings at the confluence of Kootenay River with Kootenay Lake (mean = 68 since 1976, highest number = 122 in 1978).

**Trumpeter Swan (*Cygnus buccinator*)**

Casual.

Twenty-two were seen in winter 1947–48 and 15 on 6–7 May 1948 (Munro 1950). This species is increasing in coastal British Columbia (R. McKelvey, pers. commun.), but there are no recent records for Creston Valley.

**Greater White-fronted Goose (*Anser albifrons*)**

Frequent.

Most sightings of 50–250 between 5 September and 26 October and 4 March and 28 April on marshes in the area known as West Creston.

**Snow Goose (*Chen caerulescens*)**

Rare.

Most sightings are for Duck Lake and Corn Creek Marsh, earliest 4 March and latest 16 October. No nest records and no winter sightings.

**Ross' Goose (*Chen rossii*)**

Casual.

One sighted on Duck Lake in fall 1967, and one at Corn Creek Marsh in August 1982. Migrates through southeastern Oregon to winter in California (Roberson 1980).

**Brant (*Branta bernicla*)**

Accidental.

One sighting on 22 March 1978 in West Creston.

**Canada Goose (*Branta canadensis*)**

Common.

Most sightings for Leach Lake and Corn Creek Marsh. Arrives on 8 March and begins nesting in late March and April. Some nest successfully in Osprey nests about 15 m above the ground. Moults in Duck Lake. Most depart on 14 November. There are sightings for geese December to February on the south end of Kootenay Lake. Numbers of nesting pairs have increased since 1977. (No. pairs/yr 1977–84 = 24, 50, 50, 47, 85, 82, 119, 91).

**Wood Duck (*Aix sponsa*)**

Frequent.

Arrives on 1 April. Most sightings are for May in Corn Creek Marsh and Duck Lake Channel. Eggs, May–June and young, June–July. Departs by 12 September.

**Green-winged Teal (*Anas crecca*)**

Frequent.

Arrives in early April. Most records for May in Corn Creek Marsh. Single sightings in June and August. Departs in mid-November.

**Mallard (*Anas platyrhynchos*)**

Common.

Arrives in mid-March. Nests in May. Majority of sightings for May and June. Last seen in early November.

**Northern Pintail (*Anas acuta*)**

Rare.

Arrives in mid-March. Most records for May and June in Corn Creek Marsh. First nest record is 22 May 1979. Nests in late April–May in small numbers. Departs in late October. Two individual sightings for January.

**Blue-winged Teal (*Anas discors*)**

Common.

Earliest record 24 February 1982 on Kootenay Lake. Most arrive in late April. Most sightings are in May at Corn Creek Marsh. Nests in early June. Departs in early September. One seen 10 October. This species was rare west of Rockies until the 1920s or early 1930s but has since increased dramatically (Connelly 1978).

**Cinnamon Teal (*Anas cyanoptera*)**

Common.

Arrives in early April. Most sightings are for May at Corn Creek Marsh. Nests early May to early June.

**Northern Shoveler (*Anas clypeata*)**

Frequent.

Most sightings in April. First nest record in 1966. Nests in small numbers. Last seen in late November.

**Gadwall (*Anas strepera*)**

Frequent.

Most sightings at Duck Lake. Earliest is 5 April, Corn Creek Marsh. First nest found 12 June 1975. Nests in small numbers. Birds depart in late November. No winter sightings.

**Eurasian Wigeon (*Anas penelope*)**

Rare.

Seen in spring 1976, 19 March and 15 April 1980, and 23 October 1981. There are several records for interior British Columbia (BCWRS).

**American Wigeon (*Anas americana*)**

Common.

Most sightings at Duck Lake and Corn Creek Marsh. Arrival is early April. Nests in small numbers. Many depart in mid-November but 20–50 recorded for each winter month.

**Canvasback (*Aythya valisineria*)**

Rare.

Majority of sightings in early spring at Leach and Duck Lakes. Arrives in mid-March. Rarely nests. First nest recorded 3 June 1979. Latest sightings in mid-August. Individual sightings for January and February.

**Redhead (*Aythya americana*)**

Common.

First sightings in early April. First nest recorded in 1966. Nests in May and June. Departs in late October.

**Ring-necked Duck (*Aythya collaris*)**

Frequent.

First migrants in mid-March. Most in May and June. First nest recorded 5 July 1976; now frequent nester. Most leave by early November. Six seen 19 February 1978 on Kootenay Lake.

**Greater Scaup (*Aythya marila*)**

Rare.

Four sightings of groups numbering 25–100 in February and March, although they occur in fall harvest counts (Table 7).

**Lesser Scaup (*Aythya affinis*)**

Rare.

Arrives mid-March. One sighting for May. Most sightings in winter and spring. First nest recorded 15 July 1975. Nests in May through July. Most depart in early November. Group sighting of 300 in January.

**Harlequin Duck (*Histrionicus histrionicus*)**

Rare.

Most sightings for May in Goat River east of Arrow Creek confluence. Munro (1950) reported one seen on Goat River 2 May 1947. No nest records but presumably nests.

**Oldsquaw (*Clangula hyemalis*)**

Rare.

Two sightings in October 1981 and 1983 at Duck Lake and Six-mile Slough on CVWMA.

**Surf Scoter (*Melanitta perspicillata*)**

Rare.

One seen in 1973 (no date given) and another on 17 June 1981 on Duck Lake.

**White-winged Scoter (*Melanitta fusca*)**

Rare.

Three sightings in late May and early June at Duck Lake, two involving pairs. No nest records. One seen in the fall. Fielder and Friesz (1982) suggested that a small migration occurs up the Columbia River into the interior of British Columbia, although 12 band recoveries suggest a more east–west migration (Houston and Brown 1983).

**Common Goldeneye (*Bucephala clangula*)**

Frequent.

Arrives in early March. Nests in mid-April. Most depart by late October. Winter sightings in late December to February.

**Barrow's Goldeneye (*Bucephala islandica*)**

Rare.

Most sightings in channels near Duck Lake during March and April. Munro (1950, 1957) has 50 records of broods but most of our recent records were *B. clangula*.

**Bufflehead (*Bucephala albeola*)**

Frequent.

Arrives in early March. A brood was seen on Duck Lake in 1983 (L.S. Forbes, pers. commun.). Most depart in late October and early November. Winter sightings for December to February.

**Hooded Merganser (*Lophodytes cucullatus*)**

Frequent.

Arrives in late March and April. Nests from early April to early May. Most depart in late October or early November. Winter sightings for December and January.

**Common Merganser (*Mergus merganser*)**

Frequent.

First sightings in early March. Most seen on Duck Lake and east channel of Kootenay River. First recorded nesting in 1966. Nests in April. Most depart by November. Seven winter records.

**Red-breasted Merganser (*Mergus serrator*)**

Rare.

Spring and summer sightings: 1 May, four at Corn Creek Marsh; 21 June, two males and two females on Duck Lake. No nest records. Three sightings in September and February.

**Ruddy Duck (*Oxyura jamaicensis*)**

Frequent.

Arrives in mid-April. First recorded nesting 10 July 1974. Nests in July. Two broods seen each with adult in early August. Departs in late October.

**Turkey Vulture (*Cathartes aura*)**

Frequent.

Arrives in mid-April. Immature birds seen in July and August. Latest sightings are in early November.

**Osprey (*Pandion haliaetus*)**

Common.

Arrives in early April. Nests in early May. Seventy-nine nests were found in 1981 but only 37 were occupied. Twenty-seven nests produced a mean of 1.5 fledglings (Flook and Forbes 1983). Sixty occupied in 1984. Latest sightings in early October. Northern Idaho populations migrate through Texas and spend the winter in the Pacific coastal areas of El Salvador, Honduras, Costa Rica, and possibly Panama (Melquist *et al.* 1978, Melquist and Johnson 1984).

**Bald Eagle (*Haliaeetus leucocephalus*)**

Frequent.

Most seen near Duck Lake. Nests in early April. Four nests in study area fledged 1.8 young/nest in 1982 (Forbes and Kaiser 1984). Winter sightings in January and February.

**Northern Harrier (*Circus cyaneus*)**

Frequent.

Most sightings in the area known as West Creston (Fig. 2). One or two pairs nest in early May. Winter sightings in December and January.

**Sharp-shinned Hawk (*Accipiter striatus*)**

Rare.

Most sightings in West Creston. Five summer sightings in May, July, and August. No nest records. There are three January sightings.

**Cooper's Hawk (*Accipiter cooperii*)**

Rare.

Two summer sightings in May and June. No nest records. Latest sighting is 7 September with one winter record in January.

**Northern Goshawk (*Accipiter gentilis*)**

Rare.

Earliest spring sighting is late March. Four sightings in April, May, and August. Young seen in August. No fall sightings but four in January and February.

**Swainson's Hawk (*Buteo swainsoni*)**

Rare.

Five sightings in the Creston Valley vicinity during May and August. No nest record. Nests in small numbers in Thompson–Okanagan valleys (BCWRS).

**Red-tailed Hawk (*Buteo jamaicensis*)**

Frequent.

Nests in late March through June. No fall sightings but seen in all winter months.

**Rough-legged Hawk (*Buteo lagopus*)**

Common.

Most sightings from late October to early April on the Creston Flats. One sighting in May.

**Golden Eagle (*Aquila chrysaetos*)**

Rare.

Three sightings; January, February, and March in West Creston. No nest record but seen flying over Duck Lake with branch in talons in March (L.S. Forbes, pers. commun.).

**American Kestrel (*Falco sparverius*)**

Common.

Most sightings on Creston Flats. Nests in early May. Number of nesting pairs in Wood Duck boxes/yr 1972–81 = 11, 13, 32, 36, 31, 59, 36, 46, 18, 15. Seen throughout the year. No pronounced seasonal migration.

**Merlin (*Falco columbarius*)**

Rare.

Ten sightings from May to August, earliest is 1 May and latest is 16 September. No nest records.

**Peregrine Falcon (*Falco peregrinus*)**

Rare.

Four sightings: May 1984; June 1981, 1984; and August 1979. No nest records.

**Prairie Falcon (*Falco mexicanus*)**

Rare.

One sighting 18 August 1978 and one on 7 December 1978 on the Flats. No nest record.

**Gray Partridge (*Perdix perdix*)**

Extirpated before 1966. No records since Munro's (1950) sightings.

**Chukar (*Alectoris chukar*)**

Introduced.

One sighting 5 February 1982. No nest record.

**Ring-necked Pheasant (*Phasianus colchicus*)**

Frequent.

First introduced in late 1800s (D. Moore, pers. commun.) and again in 1914 (E. Taylor, pers. commun.). Most sightings on lower Wynndel Rd. Nests in June.

**Spruce Grouse (*Dendragapus canadensis*)**

Frequent.

Observed spring–fall at 900–1500 m on slopes surrounding Creston Valley. Presumably present in winter.

**Blue Grouse (*Dendragapus obscurus*)**

Frequent.

Most sightings on west side of Leach Lake. First seen in mid-April. Nests in May. Migrates to higher elevations by late August.

**Ruffed Grouse (*Bonasa umbellus*)**

Frequent.

Widespread, seen year around. Nests in early May–June in lowlands such as around Summit Creek.

**Wild Turkey (*Meleagris gallopavo*)**

Rare.

First seen about 1970 and first nested in 1972 (D. Gray, pers. commun.). Most sightings on east side of Creston Valley. Nests in early May.

**Northern Bobwhite (*Colinus virginianus*)**

Introduced.

One sighting in June 1980 of female and chicks is only recent record.

**California Quail (*Callipepla californica*)**

Introduced.

Introduced several times. Most sightings in Creston–Lister area. Nests in mid-May. Sightings May–August and January. Population appears to crash in cold winters.

**Mountain Quail (*Oreortyx pictus*)**

Introduced.

Three sightings in March and August 1980 and 1981. No nest records.

**Virginia Rail (*Rallus limicola*)**

Rare.

Earliest sighting 23 May. Three nests with seven eggs each seen on 20, 23, 31 May 1980–81. Last seen mid-September.

**Yellow Rail (*Coturnicops noveboracensis*)**

Unconfirmed.

One was reportedly seen in Corn Creek Marsh near Lone Pine Hill on 9 August 1979. There are no records for British Columbia. One record in April 1969 between Cascade and Rocky Mountains (Furrer 1974).

**Sora (*Porzana carolina*)**

Common.

Most sightings in Corn Creek Marsh. Arrives in late April, nests in mid-May, and departs in late August.

**American Coot (*Fulica americana*)**

Common.

Most sightings at Duck Lake and Corn Creek Marsh. Arrives in early April. Nests in mid-May and early June. Hundreds raft on Duck Lake in late summer. Fall migration in late October and early November. Winter sightings of large groups in January and February at Duck Lake and on the southern end of Kootenay Lake.

**Sandhill Crane (*Grus canadensis*)**

Rare.

Earliest sighting is 17 April. Seen in May, July, September, and October. No nest records.

**Black-bellied Plover (*Pluvialis squatarola*)**

Casual.

One in May 1951 and two in September 1947 at Sirdar Lake (Duck Lake) by Munro (1950).

**Semipalmated Plover (*Charadrius semipalmatus*)**

Rare.

Three sightings in May at Duck Lake and Corn Creek Marsh, one (Munro 1950) in August at Leach Lake.

**Killdeer (*Charadrius vociferus*)**

Common.

Widespread. First sightings in late February and early March. Nests in late March through early June. Last sightings in late September. One sighting in November.

**Black-necked Stilt (*Himantopus mexicanus*)**

Casual.

One 10 May 1981 at Duck Lake. It is an uncommon, local resident in southern Idaho (Burleigh 1972), breeds in central Washington (Rohwer *et al.* 1979), and has been recorded throughout western Canada (Chapman *et al.* 1985).

**American Avocet (*Recurvirostra americana*)**

Rare.

First sighting is 11 April. One nest record (Campbell 1972). There are 16 records for British Columbia, four from the Kootenays since 1970 (Cooper 1983).

**Greater Yellowlegs (*Tringa melanoleuca*)**

Rare.

One recorded in July and August. Munro (1950) counted 51 in August 1947. No nest records. Breeds in central plateau, widespread migrant in British Columbia (BCWRS).

**Lesser Yellowlegs (*Tringa flavipes*)**

Common.

Recorded in July and August, mostly along Kootenay River. Munro (1950) counted 201 in August 1947. No nest records.

**Solitary Sandpiper (*Tringa solitaria*)**

Frequent.

Most sightings in Corn Creek Marsh. Earliest sighting is 11 May. No nest records. Seen in small numbers almost daily in August.

**Willet (*Catoptrophorus semipalmatus*)**

Casual.

One seen in the western Creston Valley during April 1979 by D. Moore. Only two other records for interior British Columbia in Okanagan Valley and Fort St. John (BCWRS).

**Spotted Sandpiper (*Actitis macularia*)**

Common.

Widespread. Earliest sightings in mid-May. Nests in late June. Last sighting 16 August. Three eggs collected by S.J. Darcus in 1923 (WVZC no. 263).

**Long-billed Curlew (*Numenius americanus*)**

Rare.

Most sightings on Reclamation Road west of the town of Creston. First sightings in early April, last 19 July. One or two pairs nest in May. Nests in Columbia, Thompson, and Okanagan Valleys, and on the central plateau (BCWRS).

**Sanderling (*Calidris alba*)**

Casual.

Two records: 150 in May 1956 by Munro (1957), 2 on 20 May 1984. Several records in interior BC (BCWRS).

**Semipalmated Sandpiper (*Calidris pusilla*)**

Casual.

One sighting: 14 May 1976 at Duck Lake. Most migrate along eastern seaboard (Morrison 1984).

**Western Sandpiper (*Calidris mauri*)**

Casual.

One seen 18 August 1978 at Duck Lake. Several records in interior BC (BCWRS).

**Least Sandpiper (*Calidris minutilla*)**

Rare.

Most sightings at Duck Lake, 30 April – 14 May.

**Baird's Sandpiper (*Calidris bairdii*)**

Rare.

Widespread in August. Jehl (1979) believes that most adults migrate through the prairies of North America but juveniles are more widely dispersed.

**Pectoral Sandpiper (*Calidris melanotos*)**

Rare.

Munro (1950) collected one on 25 August and saw 70 on 29 August 1947. Most sightings in mid-September in West Creston.

**Dunlin (*Calidris alpina*)**

Casual.

One in breeding plumage at Duck Lake on 14 June 1981, two seen there on 20 May 1984.

**Stilt Sandpiper (*Calidris himantopus*)**

Casual.

One seen on 27, and another on 30 July 1980 at Duck Lake by RWB and J.P. Goossen.

**Dowitcher spp. (*Limnodromus* spp.)**

Frequent.

Most sightings at Duck Lake and Corn Creek Marsh, early May and mid-August to late October. Verification needed on proportion of *L. scolopaceus* and *L. griseus*.

**Common Snipe (*Gallinago gallinago*)**

Frequent.

Most sightings in Corn Creek Marsh. First arrives in late March. Nests widespread in May–June. Last sightings in mid-October. Winter sightings late December to mid-January.

**Wilson's Phalarope (*Phalaropus tricolor*)**

Frequent.

Most sightings at Corn Creek Marsh and Duck Lake, mid-May and June. Nests in May–June.

**Red-necked Phalarope (*Phalaropus lobatus*)**

Rare.

Seen at Duck Lake from mid-May to late June.

No nest records.

**Red Phalarope (*Phalaropus fulicaria*)**

Casual.

Only record, one seen by Munro (1957) on 1 August 1951.

**Parasitic Jaeger (*Stercorarius parasiticus*)**

Casual.

One seen on Reclamation Road on 24 June 1981 by S. Roberts and two adults seen fishing at Duck Lake in September 1984 by Margaret Brook. This species has been recorded several times in the Okanagan (BCWRS) and twice in Idaho (Mendel *et al.* 1981).

**Franklin's Gull (*Larus pipixcan*)**

Casual.

One female collected 31 July 1951 by Munro (1957) (ROM no. 82392). "At least six seen" by D. Stirling in CVWMA 12 June 1971 (BCWRS).

**Bonaparte's Gull (*Larus philadelphia*)**

Rare.

One male collected 28 July 1951 by Munro (ROM no. 85210). Sightings from late April to mid-September, one in November. No nest records.

**Sabine's Gull (*Xema sabini*)**

Casual.

One collected 28 August 1947 by Munro (ROM no. 82116).

**California Gull (*Larus californicus*)**

Rare.

Only seen in March and April. Some Ring-billed Gulls recorded in summer might be this species. Specimens collected by J.E.H. Kelso in west Kootenays 1 October 1928 (ROM no. 33.1.1645) and 17 May 1931 (ROM no. 33.1.16144). Records throughout the year in the Kootenays (BCWRS).

**Ring-billed Gull (*Larus delawarensis*)**

Common.

Most sightings on Creston Flats and in Corn Creek Marsh. Arrives in early March. No nesting records. Leaves in late October. Most of our records are in the fall and probably represent gulls flying between the nesting ground in the Canadian prairies and the wintering area in California via the British Columbia coast (Vermeer 1970, Houston 1977). Winter sightings in November, January, and February.

**Herring Gull (*Larus argentatus*)**

Frequent.

Most sightings in Corn Creek Marsh and Duck Lake. No nest records. Winter sightings in January and February.

**Glaucous-winged Gull (*Larus glaucescens*)**

Casual.

One sighting in West Creston on 25 March 1979. Most disperse south along Pacific coast after nesting (Butler *et al.* 1980).



**Glaucous Gull (*Larus hyperboreus*)**

Casual.

One sighting of second-year juvenile seen on flats in West Creston on 16 March 1974. Several Okanagan records (BCWRS).

**Caspian Tern (*Sterna caspia*)**

Casual.

Sightings in May 1983 and June 1984 at Duck and Leach Lakes. No nest records. Caspian Terns are expanding their range in North America (Gill *et al.* 1983).

**Common Tern (*Sterna hirundo*)**

Frequent.

Most sightings at Duck Lake. Migrates in mid-May and late August. No nest records. May records might be Forster's Terns.

**Forster's Tern (*Sterna forsteri*)**

Frequent.

Most sightings at Duck Lake and Corn Creek Marsh. First recorded nesting in small numbers in 1980 (Goossen *et al.* 1982). Egg shell (no. 1982), two young chicks (no. 16721), and photograph of adult (no. 530) in BCPM. Lays eggs in late May and June (Goossen *et al.* 1982). Latest sightings in August. There are no other known colonies in British Columbia.

**Black Tern (*Chlidonias niger*)**

Common.

Breeding numbers in CVWMA ranged from 600 terns in 1981 to 200 in 1984, mean 450 individuals during 1–21 June (B.-A. Chapman Mosher, pers. commun.). Nests in Duck Lake, Six-mile Slough, Leach Lake, Corn Creek Marsh and Indian Reserve. Arrives in early May. Nests in late May and June. Latest sighting 1 September. Largest colony in British Columbia (BCWRS).

**Rock Dove (*Columba livia*)**

Common.

Sighted year-round. Nests in June. Munro (1950, 1957) did not report it.

**Band-tailed Pigeon (*Columba fasciata*)**

Rare.

Sightings in May and July. BGS photographed one in July 1980. No nest records. Schroeder and Melquist (1974) provide four records for Idaho.

**Mourning Dove (*Zenaida macroura*)**

Frequent.

Widespread year-round. Nests in mid-May.

**Black-billed Cuckoo (*Coccyzus erythrophthalmus*)**

Unconfirmed.

One call heard in West Creston 5 July 1980 by J.P. Goossen was believed to be this species. A specimen was found in East Kootenay near Fernie on 18 August 1984 (R.W. Campbell, pers. commun.). Three records for British Columbia, two in Kootenays, prior to 1980 (Roberson 1980).

**Common Barn-Owl (*Tyto alba*)**

Casual.

April (wing feather found by RWB) and July records in West Creston. Recorded in Lower Fraser, Okanagan, and Columbia Valleys (BCWRS).

**Great Horned Owl (*Bubo virginianus*)**

Frequent.

Most sightings in West Creston. Nests in March. Young fledged by May.

**Snowy Owl (*Nyctea scandiaca*)**

Casual.

One shot on Duck Lake in November 1969 (CVWMA collection) is only record.

**Northern Hawk-Owl (*Surnia ulula*)**

Rare.

One seen at Duck Lake in September 1968. Two young seen, one adult heard at headwaters of Moyie River in mature Engelmann spruce – subalpine fir a few kilometres east of study area on 7 July 1975 by A. Stepniewski (BCWRS). One seen repeatedly during January 1978 along Kootenay River on Nick's Island south and one seen along Kootenay River on Nick's Island north in February 1982.

**Northern Pygmy Owl (*Glaucidium gnoma*)**

Rare.

One sighting in summer: 20 May. No nest record. Most sightings September to April.

**Barred Owl (*Strix varia*)**

Rare.

Most sightings in Lakeview. First nest found 19 March 1975. Young fledge by June. Arrived in British Columbia in early 1960s (Grant 1966).

**Long-eared Owl (*Asio otus*)**

Rare.

Most sightings in West Creston. Eggs in May. Young in June.

**Short-eared Owl (*Asio flammeus*)**

Rare.

Most sightings at Duck Lake and in West Creston. Four young photographed by EM in August 1975, nest with four eggs and four young found 3 June 1979, all in West Creston.

**Northern Saw-whet Owl (*Aegolius acadicus*)**

Rare.

Seven records in winter, spring, and summer. No nest record.

**Common Nighthawk (*Chordeiles minor*)**

Common.

Most sightings in West Creston, arrives late May. Nests in late June and early July.

**Black Swift (*Cypseloides niger*)**

Rare.

Most sightings at Duck Lake. First sighting is 4 June. No nest records. Departs in late August.

**Vaux's Swift (*Chaetura vauxi*)**

Frequent.

Most sightings in West Creston. Arrives in early May. Probably nests in large cottonwoods but no records. Departs in late August.

**Black-chinned Hummingbird (*Archilochus alexandria*)**  
Rare.

Most sightings in West Creston. Arrives mid-May.  
Probably nests but no records. Latest sighting 27 June.

**Anna's Hummingbird (*Calypte anna*)**  
Casual.

One observed repeatedly in Goat River bottom at feeder during late January and early February 1975. Photographed by R. Westendorp. This species is seen regularly in winter on the BC coast.

**Calliope Hummingbird (*Stellula calliope*)**  
Common.

Most sightings in West Creston. Arrives early May.  
Nests late May and June. Latest sighting 15 July.

**Rufous Hummingbird (*Selasphorus rufus*)**  
Common.

Most sightings in town of Creston. Arrives early May.  
Nests in June. Last sighting 16 August.

**Belted Kingfisher (*Ceryle alcyon*)**  
Common.

Most sightings in Corn Creek Marsh, early May to late August. Nests in early July. Nests have been found in bank along Summit Creek and in a sawdust pile in Wynndel. Winter sightings.

**Lewis' Woodpecker (*Melanerpes lewis*)**  
Rare.

Most sightings on Creston Flats, 6 May to 26 August.  
No nest records.

**Yellow-bellied Sapsucker (*Sphyrapicus varius*)**  
Common.

Most sightings in Lakeview. Arrives in mid-April.  
Nests in April. Departs early September.

**Downy Woodpecker (*Picoides pubescens*)**  
Frequent.

Most sightings in West Creston. Probably nests but no records. Winter sightings.

**Hairy Woodpecker (*Picoides villosus*)**  
Frequent.

Widespread, 8 April to 19 September. Nests in June.  
Sightings in January and February.

**White-headed Woodpecker (*Picoides albolarvatus*)**  
Casual.

One observed foraging on larch in canyon at Goat River bridge 16 January 1981 by D. Wood.

**Three-toed Woodpecker (*Picoides tridactylus*)**  
Rare.

Most sightings in Lakeview, only in March.

**Black-backed Woodpecker (*Picoides arcticus*)**  
Rare.

Most sightings in Lakeview and Salmo-Creston Summit where it nests in early June.

**Northern Flicker (*Colaptes auratus*)**  
Common.

*Cafer* group widespread. Nests in May. *Auratus* intergrades are seen occasionally in summer.

**Pileated Woodpecker (*Dryocopus pileatus*)**  
Frequent.

Most sightings in West Creston. Nests in June.

**Olive-sided Flycatcher (*Contopus borealis*)**  
Rare.

Most sightings in West Creston, 13 June to 25 August.  
No nest records.

**Western Wood-Pewee (*Contopus sordidulus*)**  
Common.

Most sightings in West Creston. Arrives in early May.  
Nests in late May. Departs in late August.

**Willow Flycatcher (*Empidonax traillii*)**  
Frequent.

Most sightings in West Creston. Arrives in late May.  
No nest records. Last sighting 5 July.

**Least Flycatcher (*Empidonax minimus*)**  
Rare.

Only sightings were on 18 and 22 June 1978 on Dewdney Trail near Summit Creek and a nest with four eggs found on 15 June 1984, 3 m up in a mock-orange bush. The nest held four eggs on 25 June and one cold egg on 5 July. S. Roberts recorded and photographed two nests in 1981 but later questioned whether it was this species (BCWRS).

**Hammond's Flycatcher (*Empidonax hammondi*)**  
Common.

Widespread. Arrives in early May. One nest record: three eggs 22 June 1981 at Summit Creek Campground by S. Roberts (BCWRS). Sightings to mid-June.

**Dusky Flycatcher (*Empidonax oberholseri*)**  
Frequent.

Two sightings in June and August in West Creston.  
No nest records.

**Western Flycatcher (*Empidonax difficilis*)**  
Rare.

One sighting in June and one in August 1982. No nest record.

**Say's Phoebe (*Sayornis saya*)**  
Rare.

One, 20 April 1981 in Lakeview.

**Western Kingbird (*Tyrannus verticalis*)**  
Common.

Most sightings in Lister area on east side of valley. Arrives in mid-May. Eggs, 17 May – 4 July (*N* = 17 nests); young 14 June – 3 July (*N* = 6 nests). Latest sighting 27 August.

**Eastern Kingbird (*Tyrannus tyrannus*)**  
Common.

Most sightings in West Creston. Arrives in late May.  
Nests in late June. Latest sighting 19 September.

**Horned Lark (*Eremophila alpestris*)**  
Rare.

Munro (1950) saw two flocks in September. No other records.

**Purple Martin (*Progne subis*)**

Casual.

One pair observed in North Erickson 10 May 1984 by E. Arlt. No nest record.

**Tree Swallow (*Tachycineta bicolor*)**

Common.

Most sightings in West Creston, early March to end August. Nests in May and June. Departs in last week of August. Breeding behaviour and morphological data reported by Butler (unpubl. ms.) and Appendices 3 and 4.

**Violet-green Swallow (*Tachycineta thalassina*)**

Common.

Most sightings in West Creston. Arrives in early March but largest numbers occur in April (570 on 11 April 1983). Nests in May. Latest sighting 17 September.

**Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)**

Common.

Nests in bank near Summit Creek Campground in June and in dynamite drill holes on Highway 3 at Sutcliffe Point. Arrives in late April. Latest sighting 18 August.

**Bank Swallow (*Riparia riparia*)**

Common.

Most sightings in West Creston. Arrives in late May. Nests in June. Departs late August. Colonies in Corn Creek gravel pit (ca. 25 nests) and south Kootenay River – Highway 3 bridge (ca. 50 nests). In 1948, there were ca. 150 nests about 60 m from fruit-packing plant in Wynndel (BCWRS).

**Cliff Swallow (*Hirundo pyrrhonota*)**

Common.

Widespread. Arrives mid-April. Nests in May and June. Colonies on Summit Creek bridge (ca. 100 nests), Highway 3 bridge (ca. 500 nests), and CVWIC (ca. 120 nests). Numerous smaller colonies on buildings in valley. Eggs laid 5–28 May, incubation and nestlings 29 May – 17 June (Butler 1982a). Single brooded. Nest departure 10–26 June ( $N = 400$  nestlings). Number of intact nests following nesting season on 13 August was 64.0% ( $N = 139$ ). Sunbathe on CVWIC roof with *Riparia riparia* (Butler 1982b). Departs in late August to early September. Morphological data in Appendix 4.

**Barn Swallow (*Hirundo rustica*)**

Common.

Widespread. Arrives in late March. Nests from April to August. Probably multiple-brooded. Number of intact nests at end of nesting season on 13 August 1981 was 78.8% ( $N = 52$ ). Departs in late September. Morphological data in Appendix 4.

**Gray Jay (*Perisoreus canadensis*)**

Frequent.

Most sightings in Lakeview. Sightings year-round at higher elevations. Nests in March (Munro 1950). Fledged young seen in late April.

**Steller's Jay (*Cyanocitta stelleri*)**

Frequent.

Most sightings in West Creston. Presumably nests but no records.

**Blue Jay (*Cyanocitta cristata*)**

Rare.

First seen on 24 March 1974. Twenty-three records, most in Lakeview. Sightings February to May and September to November in all years since 1974 except 1978 and 1981. No nest records but two seen carrying grass in May 1979 in Lister by E. Abbey. Fitzner and Woodley (1976) consider this species to be a casual visitor in Washington; they present nine records since 1951.

**Clark's Nutcracker (*Nucifraga columbiana*)**

Frequent.

Most sightings in West Creston. Earliest sightings in mid-August and latest sightings in early February. No nest record.

**Black-billed Magpie (*Pica pica*)**

Rare.

Most sightings on flats in West Creston. Sightings year-round but formerly only in winter (Munro 1950). One nest on east side of Corn Creek Marsh.

**American Crow (*Corvus brachyrhynchos*)**

Common.

Widespread. Lays eggs from mid-April to mid-May; nestlings hatch in May and June. Observed taking Mallard, American Coot, and Red-winged Blackbird eggs. Largest flock in late summer was 500 birds in Lakeview in September 1978.

**Common Raven (*Corvus corax*)**

Common.

Most sightings in West Creston. Nests in May; fledglings in June. Largest number seen was 56: 1 January 1981, Christmas Bird Count.

**Black-capped Chickadee (*Parus atricapillus*)**

Common.

Most sightings in West Creston and Lakeview. Nests in June.

**Mountain Chickadee (*Parus gambeli*)**

Frequent.

Most seen at Salmo-Creston Summit and Thompson Mountain. Nest found on Thompson Mountain. Moves into valley in winter.

**Boreal Chickadee (*Parus hudsonicus*)**

Rare.

Two valley records in winter–spring, one record at higher elevation at Salmo-Creston Summit in June. Munro collected three, Boundary Lake, 21 August 1949 (ROM no. 85919–21).

**Chestnut-backed Chickadee (*Parus rufescens*)**

Frequent.

Most sightings in West Creston and Lakeview. Nests in June. Resident.

**Red-breasted Nuthatch (*Sitta canadensis*)**

Common.

Most sightings in West Creston. Nests in June. Resident.

**White-breasted Nuthatch (*Sitta carolinensis*)**

Casual.

Unrecorded number seen 16–29 August 1976 by W. Burgess.

- Brown Creeper (*Certhia americana*)**  
Rare.  
Most sightings in West Creston. Nests in early May.
- Rock Wren (*Salpinctes obsoletus*)**  
Rare.  
One sighting at CVWIC, 11 August 1981. One adult with two young at Sanca Creek 15 km north of Kuskanook.
- House Wren (*Troglodytes aedon*)**  
Rare.  
Most sightings on east side of valley, April–June.  
Nests in May.
- Winter Wren (*Troglodytes troglodytes*)**  
Frequent.  
Most sightings in West Creston. Presumably nests but no nest record.
- Marsh Wren (*Cistothorus palustris*)**  
Common.  
Most sightings at Duck Lake and Corn Creek Marsh. Most arrive in late April. Nests in May. Most depart by late November. Two early February sightings.
- Dipper (*Cinclus mexicanus*)**  
Frequent.  
Widespread in most creeks. Most sightings at Corn Creek. Also seen in Summit, Duck, Deadhorse, and Boundary Creeks; and Goat River. Nests in late May in Corn, Summit, and Duck Creeks. Fledglings seen in three creeks on 18 June. One seen in ditch in valley during winter.
- Golden-crowned Kinglet (*Regulus satrapa*)**  
Frequent.  
Most sightings are in Lakeview. Nesting in June.
- Ruby-crowned Kinglet (*Regulus calendula*)**  
Frequent.  
Most sightings in Lakeview. Migrates from late April to May and in August.
- Mountain Bluebird (*Sialia currucoides*)**  
Frequent.  
Widespread. Arrives in early April. Nests in valley in May and at higher elevations in June. Last sighting 30 June.
- Western Bluebird (*Sialia mexicana*)**  
Casual.  
Munro (1950) recorded this species twice; 8–12 seen each spring during 1975–80 near Corn Creek Marsh and Leach Lake by D. Moore. Nested in Lister in 1960s and up to 12 seen there each year from 1937 to 1960 (M. Helme) but no recent records.
- Townsend's Solitaire (*Myadestes townsendi*)**  
Frequent.  
Most sightings in West Creston. Most arrive in mid-April. No nest record but S. Roberts watched a pair that behaved as if a nest was nearby on 18 June 1981 in Dale Marsh (BCWRS). Most leave by mid-August. A few stay during the winter.
- Veery (*Catharus fuscescens*)**  
Rare.  
Locally common in West Creston. Arrives in late May. No nesting record, but males sing in May and June. Latest sighting is 21 July.
- Swainson's Thrush (*Catharus ustulatus*)**  
Common.  
Most sightings in West Creston but probably more widespread. Arrives mid-May. Presumably nests. Departs in late September.
- Hermit Thrush (*Catharus guttatus*)**  
Frequent.  
Most sightings in Lakeview but probably more widespread at higher elevations. Arrives mid-May. Presumably nests at higher elevations. Latest sighting in late June.
- American Robin (*Turdus migratorius*)**  
Common.  
Most arrive in early March. Nests in early May through July. Most depart late September.
- Varied Thrush (*Ixoreus naevius*)**  
Rare.  
Most sightings in Lakeview. Most arrive in early March. Defending nest in Lakeview on 7 April 1983. Fledged young seen on 27 May 1928 (Maillard 1932) and 27 May 1977. Most depart by late October.
- Gray Catbird (*Dumetella carolinensis*)**  
Frequent.  
Most sightings in West Creston. Arrives in late May. Nests in June. Latest sighting 12 September.
- Northern Mockingbird (*Mimus polyglottos*)**  
Accidental.  
One male was seen several times in Goat River bottom in June and July 1974.
- Brown Thrasher (*Toxostoma rufum*)**  
Casual.  
One sighting 18 May 1983 in Riverview by D. Wood. This is the seventh record for British Columbia and third in the eastern part of the province (BCWRS).
- Water Pipit (*Anthus spinoletta*)**  
Frequent.  
Most sightings on West Creston flats. Migrates in early May and late September. Latest sightings 29 September.
- Cedar Waxwing (*Bombycilla cedrorum*)**  
Common.  
Most sightings in West Creston. Arrives in late May. Nests in June–August. Latest sighting 27 September.
- Bohemian Waxwing (*Bombycilla garrulus*)**  
Common.  
Seen November–February in valley and on Thompson Mountain in October.
- Northern Shrike (*Lanius excubitor*)**  
Frequent.  
October through April. One seen 20 May.

**Loggerhead Shrike (*Lanius ludovicianus*)**

Casual.

One confirmed sighting, two seen 24 March 1973 (W. Merilees, pers. commun.).

**European Starling (*Sturnus vulgaris*)**

Common.

Most sightings near town of Creston. Nests first in April; second brood in May–June. First seen in valley in 1955 and first nested in 1956 (Munro 1957).

**Solitary Vireo (*Vireo solitarius*)**

Rare.

Most sightings along Dewdney Trail north of Summit Creek. One record for Kuskanook. Arrives in late May. Presumably nests. Latest sighting 16 August.

**Warbling Vireo (*Vireo gilvus*)**

Frequent.

Most sightings in West Creston. Nests in early June. Departs in late August.

**Red-eyed Vireo (*Vireo olivaceus*)**

Common.

Most sightings in West Creston. Arrives in late May. Nests in June. Departs in early September.

**Tennessee Warbler (*Vermivora peregrina*)**

Rare.

Male singing in Lakeview on 31 June and 1 July 1980 and at Summit Creek Campground on 30 May 1984 are only records.

**Orange-crowned Warbler (*Vermivora celata*)**

Rare.

Most sightings in Lakeview. Arrives in early May. Probably nests in small numbers in Lakeview. Last sighting 10 June. Munro (1950) recorded them only in fall.

**Nashville Warbler (*Vermivora ruficapilla*)**

Common.

Most sightings in West Creston. Also on Arrow (Goat) Mountain. Arrives in late April. Presumably nests but no records. Departs late August.

**Northern Parula (*Parula americana*)**

Unconfirmed.

Two seen on three occasions in Alice Siding during spring 1976, 1977, and 1979 by D. Moore. Casual in Alberta (Godfrey 1966).

**Yellow Warbler (*Dendroica petechia*)**

Common.

Widespread in West Creston. Arrives in late April. Eggs, 25 May – 25 June, young, 14–23 June (nine nests) (BCWRS). Departs late August.

**Yellow-rumped Warbler (*Dendroica coronata*)**

Common.

Most sightings are of *auduboni* group. Arrives in late April. Young in nest in West Creston orchard on 30 July 1980. Departs in early October.

**Black-throated Blue Warbler (*Dendroica caerulescens*)**

Accidental.

One photographed at CVWIC by G. Davidson (BCPM no. 936). This is the first record for British Columbia (Davidson and Van Damme, in press), only other western records in Oregon and California (Roberson 1980).

**Townsend's Warbler (*Dendroica townsendi*)**

Frequent.

Most sightings in Lakeview. Arrives in early May. Presumably nests but no records. Departs early September.

**Cerulean Warbler (*Dendroica cerulea*)**

Unconfirmed.

One seen at Wynndell in June 1982 by G. and D. Hartland. This is the first record north of California (Roberson 1980).

**American Redstart (*Setophaga ruticilla*)**

Frequent.

Most sightings in Summit Creek Campground. Arrives in early June. Departs late August.

**Northern Waterthrush (*Seiurus noveboracensis*)**

Rare.

Singing males heard in West Creston, Lakeview, and Nick's Island. Arrives in late May. No nest record. Latest sighting 18 August. One adult collected 22 July 1951 along Goat River (CVM no. 2534).

**MacGillivray's Warbler (*Oporornis tolmiei*)**

Frequent.

Most sightings in Lakeview. Arrives in late May. Munro (1957) records only nest. Latest sighting 19 July.

**Common Yellowthroat (*Geothlypis trichas*)**

Common.

Abundant in West Creston and near Duck Lake. Arrives in mid-May. Presumably nests but no records. Latest sighting 2 September.

**Wilson's Warbler (*Wilsonia pusilla*)**

Rare.

Majority of sightings in West Creston. Arrives in mid-May. No nesting record. No June or July sightings. Latest sighting 26 August.

**Yellow-breasted Chat (*Icteria virens*)**

Casual.

Most sightings in West Creston. First sighting in May. No nesting record. Latest sighting 22 August.

**Western Tanager (*Piranga ludoviciana*)**

Common.

Majority of sightings in West Creston. Arrives in mid-May. Courtship feeding near nest 22 July 1981. Latest sighting 26 August.

**Black-headed Grosbeak (*Pheucticus melanocephalus*)**

Frequent.

Most sightings in West Creston. Arrives in late May. Eggs, 23 May – 24 June (5 nests); young, 17 June – 20 August (three nests) (BCWRS). Latest sighting 29 June.

**Lazuli Bunting (*Passerina amoena*)**

Frequent.

Majority of sightings in West Creston. Arrives in late May. No nest record. Latest sighting 25 August.

**Blue Grosbeak (*Guiraca caerulea*)**

Accidental.

One was seen on the slopes above the Goat River in Erickson on 22 May 1982 by J. Sirois who provided field notes and has seen the species in Mexico. This is the first record for British Columbia. Breeds in southern Idaho (Rich and Trentlage 1981).

**Indigo Bunting (*Passerina gyanea*)**

Casual.

A pair was seen eating timothy seeds at the CVWMA on 20 August 1973 by many staff members. One was seen 6–7 July 1984 in West Creston by J. and H. Street.

**Rufous-sided Towhee (*Pipilo erythrophthalmus*)**

Common.

Most sightings in West Creston. Arrives in mid-April. Nests in early June. Latest sighting 26 September.

**Chipping Sparrow (*Spizella passerina*)**

Common.

Most sightings in West Creston. Nests in late May. Latest sighting 20 September.

**Vesper Sparrow (*Poocetes gramineus*)**

Common.

Most sightings in Lister. Earliest sightings in early May. Nests in late May. Latest sighting 29 June.

**Lark Sparrow (*Chondestes grammacus*)**

Rare.

One at Duck Lake in May 1980 and one near Summit Creek in May 1981.

**Lark Bunting (*Calamospiza melanocorys*)**

Unconfirmed.

Three seen in March and April 1984 north of town of Creston. There are eight records for British Columbia (BCWRS).

**Savannah Sparrow (*Passerculus sandwichensis*)**

Common.

Most sightings near Duck Lake and Nick's Island. Arrives in early May. Presumably nests but no records. Latest sighting 18 August.

**Fox Sparrow (*Passerella iliaca*)**

Rare.

Three sightings in June, August, and February. No nest record.

**Lincoln's Sparrow (*Melospiza lincolni*)**

Casual.

One in valley 25 May (Munro 1957), and another 22 September 1984.

**Song Sparrow (*Melospiza melodia*)**

Common.

Most sightings in West Creston. Most arrive in late April. Nests May–August (BCWRS). Latest sighting in September.

**Golden-crowned Sparrow (*Zonotrichia atricapilla*)**

Casual.

One singing on Ripple Ridge near Salmo-Creston Summit in June 1982. One seen in town of Creston May 1984.

**White-crowned Sparrow (*Zonotrichia leucophrys*)**

Rare.

Most sightings in West Creston. Sightings from September to May. No nest records. Small migration relative to Okanagan Valley.

**Dark-eyed Junco (*Junco hyemalis*)**

Common.

Widespread. Nests in early May and through June. All breeding birds were *J. h. oregonus*.

**Lapland Longspur (*Calcarius lapponicus*)**

Rare.

Six seen in September and 4 in October near Duck Lake.

**Snow Bunting (*Plectrophenax lapponicus*)**

Frequent.

Most seen on Creston Flats and near Duck Lake from late October to early March.

**Bobolink (*Dolichonyx oryzivorus*)**

Frequent.

Most sightings on Creston Flats. Arrives in late May. Presumably nests but no record. Latest sighting 15 July.

**Red-winged Blackbird (*Agelaius phoeniceus*)**

Common.

Widespread resident. Most arrive in marshes in early March. Nests in May and June. Leaves marshes by late September.

**Western Meadowlark (*Sturnella neglecta*)**

Common.

Most sightings on the Creston Flats. Most arrive in mid-April. Feeding young in late May (2 records, BCWRS). Most migrate by mid-September.

**Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*)**

Common.

Widespread in cattail marshes. Arrives in early April. Nests in May–July. Latest sighting 20 September.

**Brewer's Blackbird (*Euphagus cyanocephalus*)**

Common.

Most sightings in Corn Creek Marsh. Most arrive in March. Nests in May and June. Mean first egg dates of first clutches = 7 May  $\pm$  5.5 ( $N = 6$ ), second clutches = 7 June  $\pm$  4.7 ( $N = 5$ ) in 1980. One female paired with a male Brewer's Blackbird had amber-coloured irises (Butler 1981). Most migrate by 20 September.

**Brown-headed Cowbird (*Molothrus ater*)**

Common.

Majority of sightings in West Creston. Lays eggs from May to June in nests of Dark-eyed Junco (1), Song Sparrow (2), Hammond's Flycatcher (1), Yellow Warbler (2), American Redstart (1), Warbling Vireo (1). Latest sightings mid-August.

**Northern Oriole (*Icterus galbula*)**

Rare.

Most sightings in West Creston and Wynndel. Arrives in early May. Nests in early June at north end of Duck Lake and at CVWIC. Latest sightings in mid-August.

**Orchard Oriole (*Icterus spurius*)**

Unconfirmed.

A male was reported by Harris *et al.* (1965) at the south end of Duck Lake in July 1965. No other details. Near-est breeding birds, Manitoba (Godfrey 1966). There are no records for British Columbia.

**Rosy Finch (*Leucosticte arctoa*)**

Rare.

One in April 1980 on slopes near Summit Creek and two in Alice Siding during November 1984.

**Pine Grosbeak (*Pinicola enucleator*)**

Rare.

Most sightings in Creston and Lakeview. Sightings in early March. Only one summer sighting — 12 June.

**Cassin's Finch (*Carpodacus cassinii*)**

Frequent.

Most sightings in Creston. No nest records.

**House Finch (*Carpodacus mexicanus*)**

Rare.

Two confirmed records: 1 February 1982, 15 June 1983.

**Red Crossbill (*Loxia curvirostra*)**

Rare.

Nomadic. Recorded at least once in most years but probably more common. No nest records.

**White-winged Crossbill (*Loxia leucoptera*)**

Rare.

Spring sighting in Lakeview and Salmo-Creston Summit. No nest records. One sighting in August in West Creston.

**Common Redpoll (*Carduelis flammea*)**

Frequent.

Flocks seen in January and February 1976, 1978, 1981, and 1982.

**Pine Siskin (*Carduelis pinus*)**

Common.

Widespread. Nests in April. Moves into valley in large numbers to eat thistle seeds in August.

**American Goldfinch (*Carduelis tristis*)**

Common.

Majority of sightings in West Creston. Nests in early July–August.

**Evening Grosbeak (*Coccothraustes vespertinus*)**

Rare.

Nomadic. Majority of sightings in town of Creston. Juvenile sighted mid-August.

**House Sparrow (*Passer domesticus*)**

Common.

Widespread near human habitation. Nest records for May. Recorded by Munro (1950).

## Literature cited

**American Ornithologists' Union. 1983.** Check-list of North American Birds. Allen Press. Lawrence, Kansas.

**Bartonek, J.C.; Blandin, W.W.; Gamble, K.E.; Miller, H.W. 1980.** Number of swans wintering in the United States. In Matthews, G.V.T.; Smart, M. (Eds). Proc. Int. Swan Symp. Int. Waterfowl Res. Bur., Slimbridge, England.

**Boyd, H.; Cooch F.G. 1983.** Duck numbers and duck hunting in southern Alberta, 1975–82, and their implications for waterfowl management. Can. Wildl. Serv. Prog. Note No. 140. 24 pp.

**Buckner, C.H.; Erskine, A.J.; Lidstone, R.; McLeod, B.B.; Ward, M. 1975.** The breeding bird community of coast forest stands on Vancouver Island. Murrelet 56:6–11.

**Burleigh, T.D. 1972.** Birds of Idaho. Caxton Printers. Caldwell, Idaho.

**Butler, R.W. 1981.** Nesting of Brewer's Blackbirds on man-made structures and natural sites in British Columbia. Can. Field-Nat. 95:476–477.

**Butler, R.W. 1982a.** Wing fluttering by mud-gathering Cliff Swallows: avoidance of "rape" attempts? Auk 99:758–761.

**Butler, R.W. 1982b.** Possible use of legs as dissipators of heat in flying Cliff Swallows. Wilson Bull. 94:87–89.

**Butler, R.W.; Verbeek, N.A.M.; Footitt, R.G. 1980.** Mortality and dispersal of the Glaucous-winged Gulls of southern British Columbia. Can. Field-Nat. 94:315–320.

**Campbell, R.W. 1972.** The American Avocet (*Recurvirostra americana*) in British Columbia (1908–70). Syesis 5:173–178.

**Carl, G.C.; Clemens, W.A.; Lindsey, C.C. 1967.** The freshwater fishes of British Columbia. B.C. Prov. Mus. Handb. 5.

**Chapman, B.A.; Goossen, J.P.; Ohanjanian, I. 1985.** Occurrences of Black-necked Stilts, *Himantopus mexicanus*, in western Canada. Can. Field-Nat. 99:254–257.

**Connolly, Jr., J.W. 1978.** Trends in Blue-winged and Cinnamon Teal populations of Eastern Washington. Murrelet 59:2–6.

**Cooch, F.G.; Boyd, H. 1984.** Changes in the net export of Mallard from western Canada and the contiguous US, 1972–82. Can. Wildl. Serv. Prog. Note No. 142. 27 pp.

**Cooper, J. 1983.** Recent occurrences of the American Avocet in British Columbia. Murrelet 64:47–48.

**Davidson, G.; Van Damme, L. In press.** The first British Columbia record of the Black-throated Blue Warbler. Can. Field-Nat.

**Environment Canada. 1982a.** Canadian climate normals, 1951–80. Vols. 2,3, and 6. Atmos. Environ. Serv. Ottawa.

**Environment Canada. 1982b.** Historical stream flow summary for British Columbia. Inland Waters Dir. Ottawa.

**Erskine, A.J. 1964.** Bird migration during April in southern British Columbia. Murrelet. 45:15–22.

**Erskine, A.J. 1970.** The Breeding Bird Survey in Canada, 1966–69. Can. Wildl. Serv. Prog. Note No. 15. 19 pp.

**Erskine, A.J. 1977.** Birds in boreal Canada. Can. Wildl. Serv. Rep. Ser. No. 41. 73 pp.

- Fiedler, P.C.; Friesz, R.C. 1982.** White-winged Scoters in eastern Washington. *Murrelet* 63:69–70.
- Findholt, S.; Trost, C.H. 1981.** White Pelicans nesting in Idaho. *Murrelet* 62:19–20.
- Findholt, S.; Trost, C.H. 1982.** First nesting records of the Cattle Egret in Idaho. *Murrelet* 63:88–89.
- Fitzner, R.W.; Woodley, R.E. 1976.** Blue Jays wintering in the Columbia Basin of southeastern Washington. *Murrelet* 57:64–66.
- Flook, D.R.; Forbes, L.S. 1983.** Ospreys and water management at Creston, British Columbia. Pages 281–286 in Bird, D.M., chief ed. *Biology and management of Bald Eagles and Ospreys*. Harpell Press. Ste. Anne-de-Bellevue, Quebec.
- Forbes, L.S. 1985a.** Nesting of Eared Grebes at Duck Lake, near Creston, British Columbia. *Murrelet* 66:20–21.
- Forbes, L.S. 1985b.** The nesting ecology of the Western Grebe in British Columbia. *Can. Wildl. Serv. Delta*, B.C. Unpubl. rep.
- Forbes, L.S. 1985c.** The feeding ecology of Western Grebes at Duck Lake, British Columbia. Unpubl. MSc. thesis. Univ. Manitoba, Winnipeg.
- Forbes, L.S.; Flook, D.R. 1985.** Notes on the occurrence and ecology of the Black Bullhead (*Ictalurus melas*) near Creston, British Columbia. *Can. Field-Nat.* 99:110–111.
- Forbes, L.S.; McMackin, E. 1984.** Extreme aggression in Great Blue Herons. *Wilson Bull.* 96:318–319.
- Forbes, L.S.; Kaiser, G.W. 1984.** Observations of breeding Bald Eagles in southeastern British Columbia. *Murrelet* 65:22–25.
- Forbes, L.S.; Simpson, K.; Kelsall, J.P.; Flook, D.R. 1985.** Great Blue Heron colonies in British Columbia. *Can. Wildl. Serv. Delta*, B.C. Unpubl. rep.
- Furrer, R. 1974.** First spring sight record of the Yellow Rail for the Pacific Northwest. *Murrelet* 55:25–26.
- Fyfe, R.; Teeple, S. 1968.** 1968 field survey of colonial fish-eating birds in the Kootenay River Valley of British Columbia. *Can. Wildl. Serv. Delta*, B.C. Unpubl. rep.
- Gill, Jr., R.E.; Mewaldt, L.R. 1983.** Pacific Coast Caspian Terns: dynamics of an expanding population. *Auk* 100:369–381.
- Godfrey, W.E. 1966.** The birds of Canada. *Nat. Mus. Bull.* 203. Ottawa.
- Goossen, J.P.; Butler, R.W.; Stushnoff, B.; Stirling, D. 1982.** Distribution and breeding status of Forster's Tern, *Sterna forsteri*, in British Columbia. *Can. Field-Nat.* 96:345–346.
- Grant, J. 1966.** The Barred Owl in British Columbia. *Murrelet* 47:39–45.
- Harris, R.D.; O'Neill, J.E.; Mosher, R.W.; Freeman, G. 1965.** Report on a cooperative survey on the Duck Lake, (Creston, BC) wetlands, with management recommendations — 1965. *Can. Wildl. Serv. Delta*, B.C. Unpubl. rep.
- Holling, C.S. 1973.** Resilience and stability of ecological systems. *Annu. Rev. Ecol. Syst.* 4:1–23.
- Holroyd, G.L.; Van Tighem, K.J. 1983.** Ecological (biophysical) land classification of Banff and Jasper National Parks. Vol. III. The wildlife inventory. *Can. Wildl. Serv. Edmonton*, Alta.
- Houston, C.S. 1977.** Movements of Saskatchewan-banded California Gulls. *Bird Banding* 48:158–161.
- Houston, C.S.; Brown, P.W. 1983.** Recoveries of Saskatchewan-banded White-winged Scoters, *Melanitta fusca*. *Can. Field-Nat.* 97:454–455.
- Hubbard, J.P. 1969.** The relationships and evolution of the *Dendroica coronata* complex. *Auk* 86:393–432.
- Jehl, J.R. Jr., 1979.** The autumnal migration of Baird's Sandpiper. Pages 55–68 in Pitelka, F. *Shorebirds in marine environments*. Studies in avian biology. No. 2. Cooper Ornithol. Soc. Allen Press. Lawrence, Kans.
- Johnstone, W.B. 1949.** The birds of the east Kootenay, British Columbia. *B.C. Prov. Mus. Occas. Pap.* No. 7. Victoria.
- Kemper, J.B.; Eastman, D.S. 1970.** Osprey nesting survey in British Columbia, Canada. *Auk* 87:814.
- Klaver, R.W.; Smith, J.M.; Claar, J.J.; Betts, B.L.; Peterson, L.C. 1982.** Osprey surveys in the Flathead Valley, Montana, 1977 to 1980. *Murrelet* 103:40–45.
- Krajina, V.J. 1965.** Ecology of western North America. Univ. B.C. Press, Vancouver.
- Maillard, J. 1932.** Birds and mammals from the Kootenay Valley, southeastern British Columbia. *Proc. Calif. Acad. Sci.* 20:269–290.
- McMackin, E. 1983.** An aspiring observer's winter (Dec. and Jan.) list. *Creston Field Nat. Hist. Newsl.* 1(2):2.
- Melquist, W.E.; Johnson, D.R.; Carrier, W.D. 1978.** Migration patterns of northern Idaho and eastern Washington ospreys. *J. Field-Ornithol.* 49:234–236.
- Melquist, W.E.; Johnson, D.R. 1984.** Additional comments on the migration of northern Idaho and eastern Washington ospreys. *J. Field-Ornithol.* 55:483–485.
- Mendel, G.; Mendel, S.; Moore, R. 1981.** A second record of the Parasitic Jaeger in Idaho. *Murrelet* 62:26–27.
- Merilees, W.J. 1971.** Observations of turkeys in British Columbia. *Blue Jay* 29:25–27.
- Monroe, Jr., B. 1985.** Thirty-fifth supplement to the American Ornithologists' Union checklist of North American Birds. *Auk* 102:680–686.
- Morrison, R.I.G. 1984.** Migration systems of some New World shorebirds. Pages 125–194 in Burger, J.; Olla B. (Eds.) *Shorebirds. Migration and foraging behaviour of Marine animals*. Vol. 6. Plenum, N.Y.
- Munro, J.A.; Cowan, I. McT. 1944.** Preliminary report on the birds and mammals of Kootenay National Park, British Columbia. *Can. Field-Nat.* 58:34–51.
- Munro, J.A. 1950.** The birds and mammals of the Creston Region, British Columbia. *B.C. Prov. Mus. Victoria. Occas. Pap.* No. 8. 47 pp.
- Munro, J.A. 1957.** The birds and mammals of the Creston Region, British Columbia: a supplement. *B.C. Prov. Mus. Nat. Hist. Anthropol. Rep.* Victoria.
- Myres, M.T. 1958.** The European Starling in British Columbia 1947–1957. *B.C. Prov. Mus. Victoria. Occas. Pap.* No. 11. 15 pp.
- Province of British Columbia. 1974.** Creston Valley Wildlife Management Area Act, 1968, Order-in-Council 173. Queen's Printer, Victoria.
- Rich, T.; Trentlage, B. 1981.** Second breeding locale for the Blue Grosbeak in Idaho. *Murrelet* 62:91–92.
- Robbins, C.S.; Van Velzen, W.T. 1967.** The Breeding Bird Survey, 1966. U.S. Fish Wildl. Serv. Bur. Sport Fish. Wildl. Spec. Sci. Rep. Wildl. No. 102.
- Roberson, D. 1980.** Rare birds of the west coast. *Woodcock Publ.* Pacific Grove, Calif.
- Rohwer, S.; Martin, D.F.; Benson, G.G. 1979.** Breeding of the Black-necked Stilt in Washington. *Murrelet* 60:67–71.
- Savard, J.-P.L. 1981.** Variability of waterfowl counts in the Cariboo Parkland, British Columbia. In Miller, F.; Gunn, A.; Hieb, S. eds. *Symposium on census and inventory methods for population and habitats*. *Proc. Wildl. Soc. Northwest Sect.* Banff, Alta.
- Schroeder, G.J.; Melquist, W.E. 1974.** Additional Band-tailed Pigeon sightings in Idaho. *Murrelet* 55:27–28.
- Schwab, F.E. 1979.** Effect of vegetation structure on breeding bird communities in the Dry Zone Douglas Fir Forest of southeastern British Columbia. Unpubl. M.Sc. thesis. Univ. B.C.
- Sinclair, A.R.E. 1983.** Management of conservation areas as ecological baseline controls. In Owen-Smith, R.N. *Management of large mammals and conservation areas*. Haum Educ. Publ. Pretoria, S. Africa.
- Smith, D. 1978.** Waterfowl production and summer use of the Columbia River marshes between Radium Hotsprings and Golden, British Columbia. Unpubl. *Can. Wildl. Serv. Rep. Contract* 08SB. KL 124-8-0011.
- Smith, W.G. 1956.** Interim report to the BC Game Commission on Duck Lake, March 1956. *B.C. Game Comm. Victoria. Unpubl. Rep.* 2 pp.
- Vermeer, K. 1970.** Breeding biology of California and Ring-billed Gulls: a study of ecological adaptations to the inland habitat. *Can. Wildl. Serv. Rep.* No. 12. 52 pp.
- Wilson, M.; Wilson, C.E.; Wilson, L. 1972.** Ornithological notes from Columbia Lake, British Columbia. *Syesis* 5:63–65.



# Appendices

## Appendix 1

Numbers of nesting pairs of waterfowl using person-made nest sites on the CVWMA

Species	Year												
	72	73	74	75	76	77	78	79	80	81	82	83	84
Wood Duck	10	15	22	26	32	25	18	13	11	6	ND <sup>†</sup>	ND	ND
Goldeneye*	16	10	27	43	49	47	39	43	24	24	ND	ND	ND
Hooded Merganser	0	4	7	6	16	13	5	7	1	5	ND	ND	ND
Dump nest	0	6	17	17	22	13	4	1	0	0	ND	ND	ND
No. nest boxes	142	450	445	409	440	434	421	418	323	295	ND	ND	ND
Canada Goose	ND	1	1	2	2	4	6	4	7	14	2	7	5
Mallard	ND	2	3	16	27	21	17	8	6	4	6	6	2
No. nest baskets	ND	42	42	71	71	71	60	48	50	45	12	22	22
Canada Goose	—	0	0	2	3	6	10	21	13	36	45	62	34
Mallard	—	4	7	11	10	8	25	10	15	22	13	46	11
Teal spp.	—	2	3	6	8	3	3	0	4	6	5	11	3
Gadwall	—	0	0	0	0	0	0	0	1	2	0	0	2
Redhead	—	0	0	0	0	2	0	0	0	1	0	3	0
Pintail	—	0	0	0	0	0	0	0	0	0	0	2	0
Northern Shoveller	—	0	0	0	0	0	0	1	0	0	0	1	0
Ring-necked Duck	—	0	0	0	0	0	1	0	0	0	0	0	0
No. nest islands	0	95	95	95	95	95	101	114	133	158	165	165	165

\*Mostly Common Goldeneye.

<sup>†</sup>No data.

## Appendix 2

Total length (mm) of Black bullhead, Pumpkinseed sunfish, and Yellow perch caught with a dipnet at drainage sites during the drawdown of Corn Creek Marsh, 1 March 1984

Length	Number of fish caught		
	Bullhead	Sunfish	Perch
31- 40	0	2	0
41- 50	0	11	0
51- 60	0	3	0
61- 70	0	7	7
71- 80	0	14	34
81- 90	8	12	23
91-100	4	13	2
101-110	1	18	2
111-120	4	8	1
121-130	1	3	6
131-140	4	2	8
141-150	3	3	1
151-160	6	2	0
161-170	11	1	3
171-180	18	0	5
181-190	15	0	1
191-200	13	0	0
201-210	5	0	3
211-220	1	0	4
221-230	2	0	1
231-240	2	0	1
241-250	1	0	0
251-260	2	0	0
Mean length	168.1	90.3	109.1
SD	40.0	29.0	46.6
N	101	99	99

**Appendix 3**

Reproductive parameters of Tree Swallows in bird boxes around Corn Creek Marsh, CVWMA, in 1983 and 1984

	1983				1984			
	Number	Mean	SD	No. nests	Number	Mean	SD	No. nests
<b>Eggs</b>								
Laid	349	6.1	0.8	57	302	6.3	0.9	48
Hatched	315	5.5	1.5	57	266	5.5	1.2	48
<b>Young</b>								
Lost	54	1.0	1.9	52	25	0.5	1.2	48
Not fledged	15	0.3	1.0	51	5	<0.1	<0.1	48
Fledged	217	4.2	2.4	52	235	4.9	1.6	48
% fledged/egg laid	62.2	—	—	—	77.8	—	—	—
% fledged/egg hatched	68.9	—	—	—	88.4	—	—	—

Outcome of unhatched eggs in which one or more eggs hatched

	Number of eggs	Number of clutches
Infertile	12	21
Fertile but unhatched	23	10

**Appendix 4**

Morphological data of Tree, Cliff, and Barn Swallows at CVWMA. Values are expressed as mean  $\pm$  standard deviation. Sample size is given in parentheses

Species	Sex	Year	Weight, g	Body length, cm	Wing length, cm
Tree Swallow	Male	1983	21.1 $\pm$ 1.1 (7)	no data	12.2 $\pm$ 0.4 (7)
	Female	1983	20.6 $\pm$ 1.1(17)	no data	11.6 $\pm$ 0.5(17)
	Male	1984	21.6 $\pm$ 1.2 (3)	no data	12.0 $\pm$ 0.05 (3)
	Female	1984	21.0 $\pm$ 1.8(29)	no data	11.4 $\pm$ 0.03(29)
Barn Swallow	Unknown	1983	18.8 $\pm$ 1.5(15)	no data	11.8 $\pm$ 0.3(16)
Cliff Swallow	Unknown	1983	23.8 $\pm$ 1.7(94)	13.7 $\pm$ 0.5(54)	11.3 $\pm$ 0.3(96)

# Other publications in the Occasional Papers Series

- No. 1*  
Birds protected in Canada under the Migratory Birds Convention Act, 4th ed. Publication bilingue.  
Cat. No. CW69-1/1. Publ. 1957, rev. 1980.
- No. 2*  
Canadian bird names, French, English and scientific. Publication bilingue.  
Cat. No. CW69-1/2. Publ. 1957, rev. 1972.
- No. 3*  
Use of aerial surveys by the Canadian Wildlife Service by D.A. Benson. Out of print.  
Cat. No. CW69-1/3. Publ. 1963, repr. 1966.
- No. 4*  
Queen Elizabeth Islands game survey, 1961 by J.S. Tener.  
Cat. No. CW69-1/4. Publ. 1963, repr. 1972.
- No. 5*  
Age determination in the polar bears by T.H. Manning.  
Cat. No. CW69-1/5. Publ. 1964, repr. 1973.
- No. 6*  
A wildlife biologist looks at sampling, data processing and computers by D.A. Benson. Out of print.  
Cat. No. R69-1/6. Publ. 1964.
- No. 7*  
Preliminary report on the effects of phosphamidon on bird populations in New Brunswick by C.D. Fowle. Out of print.  
Cat. No. R69-1/7. Publ. 1965.
- No. 8*  
Birds of Nova Scotia — New Brunswick border region by G.F. Boyer.  
Cat. No. CW69-1/8. Publ. 1966, repr. 1981.
- No. 9*  
Effects of dietary methylmercury on Ring-necked Pheasants, with special reference to reproduction by N. Fimreite.  
Cat. No. R69-1/9. Publ. 1971.
- No. 10*  
Trends in populations of barren-ground caribou over the last two decades: a re-evaluation of the evidence by G.R. Parker.  
Cat. No. CW69-1/10. Publ. 1971, repr. 1972.
- No. 11*  
The Canada migratory game bird hunting permit and related surveys by D.A. Benson.  
Cat. No. R69-1/11. Publ. 1971.
- No. 12*  
Observations on duck hunting in eastern Canada in 1968 and 1969 by H.J. Boyd.  
Cat. No. R69-1/12. Publ. 1971.
- No. 13*  
Evaluation of ecological effects of recent low water levels in the Peace-Athabasca Delta by H.J. Dirschl.  
Cat. No. CW69-1/13. Publ. 1972.
- No. 14*  
The Great Cormorants of eastern Canada by A.J. Erskine.  
Cat. No. CW69-1/14. Publ. 1972.
- No. 15*  
Distribution of barren-ground caribou harvest in north-central Canada by G.R. Parker.  
Cat. No. CW69-1/15. Publ. 1972.
- No. 16*  
Bird migration forecasts for military air operations by H. Blokpoel.  
Cat. No. CW69-1/16. Publ. 1973.
- No. 17*  
Waterfowl populations on the Peace-Athabasca Delta. 1969 and 1970 by D.J. Nieman and H.J. Dirschl.  
Cat. No. CW69-1/17. Publ. 1973.
- No. 18*  
*Gammarus* predation and the possible effects of *Gammarus* and *Chaoborus* feeding on the zooplankton composition in some small lakes and ponds in western Canada by R.S. Anderson and L.G. Raasveldt.  
Cat. No. CW69-1/18. Publ. 1974.
- No. 19*  
A summary of DDE and PCB determinations in Canadian birds, 1969 to 1972 by M. Gilbertson and L. Reynolds.  
Cat. No. CW69-1/19. Publ. 1974.
- No. 20*  
Development of a simulation model of Mallard Duck populations by C.J. Walters, R. Hilborn, E. Oguss, R.M. Peterman and J.M. Stander.  
Cat. No. CW69-1/20. Publ. 1974.
- No. 21*  
Use of museum specimens in toxic chemical research by A.M. Rick.  
Cat. No. CW69-1/21. Publ. 1975.
- No. 22*  
Impoundments for waterfowl by W.R. Whitman.  
Cat. No. CW69-1/22. Publ. 1976.
- No. 23*  
Minimizing the dangers of nesting studies to raptors and other sensitive species by R.W. Fyfe and R.R. Olendorff.  
Cat. No. CW69-1/23. Publ. 1976.
- No. 24*  
Waterfowl damage to Canadian grain: current problems and research needs by L.G. Sugden.  
Cat. No. CW69-1/24. Publ. 1976.
- No. 25*  
Census techniques for seabirds of arctic and eastern Canada by D.N. Nettleship.  
Cat. No. CW69-1/25. Publ. 1976.
- No. 26*  
Notes on the present status of the polar bear in James Bay and Belcher Islands area by Charles Jonkel, Pauline Smith, Ian Stirling and George B. Kolenosky.  
Cat. No. CW69-1/26. Publ. 1976.
- No. 27*  
Limnological and planktonic studies in the Waterton Lakes, Alberta by R. Stewart Anderson and Roderick B. Green.  
Cat. No. CW69-1/27. Publ. 1976.
- No. 28*  
Birds and mammals of the Belcher, Sleeper, Ottawa, and King George Islands, Northwest Territories by T.H. Manning.  
Cat. No. CW69-1/28. Publ. 1976.
- No. 29*  
Developments in PPS sampling — Impact on current research by A.R. Sen.  
Cat. No. CW69-1/29. Publ. 1976.
- No. 30*  
Dynamics of snowshoe hare populations in the Maritime Provinces by Thomas J. Wood and Stanley A. Munroe.  
Cat. No. CW69-1/30. Publ. 1977.
- No. 31*  
Migration and population dynamics of the Peace-Athabasca Delta goldeye population by D.B. Donald and A.H. Kooyman.  
Cat. No. CW69-1/31. Publ. 1977.
- No. 32*  
The effects of fire on the ecology of the Boreal Forest, with particular reference to the Canadian north; a review and selected bibliography by John P. Kelsall, E.S. Telfer and Thomas D. Wright.  
Cat. No. CW69-1/32. Publ. 1977.
- No. 33*  
The ecology of the polar bear (*Ursus maritimus*) along the western coast of Hudson Bay by Ian Stirling, Charles Jonkel, Pauline Smith, Richard Robertson and Dale Cross.  
Cat. No. CW69-1/33. Publ. 1977.

- No. 34*  
Canvasback habitat use and production in Saskatchewan parklands by  
Lawson G. Sugden.  
Cat. No. CW69-1/34. Publ. 1978.
- No. 35*  
The diets of muskoxen and Peary caribou on some islands of the Canadian  
High Arctic by Gerald R. Parker.  
Cat. No. CW69-1/35. Publ. 1978.
- No. 36*  
Observations of Mallards in the parkland of Alberta by Michael F. Sorensen.  
Cat. No. CW69-1/36. Publ. 1978.
- No. 37*  
The wildlife valuation problem: A critical review of economic approaches by  
William A. Langford and Donald J. Cocheba.  
Cat. No. CW69-1/37. Publ. 1978.
- No. 38*  
Spatial changes in waterfowl habitat, 1964-74, on two land types in the  
Manitoba Newdale Plain by G.D. Adams and G.G. Gentle.  
Cat. No. CW69-1/38. Publ. 1978.
- No. 39*  
Patterns of pelagic distribution of seabirds in western Lancaster Sound and  
Barrow Strait, Northwest Territories, in August and September 1976 by  
D.N. Nettleship and A.J. Gaston.  
Cat. No. CW69-1/39. Publ. 1978.
- No. 40*  
Responses of Peary caribou and muskoxen to helicopter harassment by  
Frank L. Miller and Anne Gunn.  
Cat. No. CW69-1/40. Publ. 1979.
- No. 41*  
Avian community structure of six forest stands in La Mauricie National  
Park, Quebec by J.-L. DesGranges. Disponible également en français.  
Cat. No. CW69-1/41E. Publ. 1979.
- No. 42*  
Population ecology studies of the polar bear in northern Labrador by  
Ian Stirling and H.P.L. Kiliaan. Disponible également en français.  
Cat. No. CW69-1/42E. Publ. 1980.
- No. 43*  
Census methods for murre, *Uria* species; a unified approach by  
T.R. Birkhead and D.N. Nettleship. Disponible également en français.  
Cat. No. CW69-1/43E. Publ. 1980.
- No. 44*  
Population ecology studies of the polar bear in the area of southeastern  
Baffin Island by Ian Stirling, Wendy Calvert, and Dennis Andriashek.  
Disponible également en français.  
Cat. No. CW69-1/44E. Publ. 1980.
- No. 45*  
Polynyas in the Canadian Arctic by Ian Stirling and Holly Cleator, eds.  
Disponible également en français.  
Cat. No. CW69-1/45E. Publ. 1981.
- No. 46*  
The Lesser Snow Geese of the eastern Canadian Arctic by H. Boyd,  
G.E.J. Smith, and F.G. Cooch. Disponible également en français.  
Cat. No. CW69-1/46E. Publ. 1982.
- No. 47*  
The distribution and abundance of seals in the eastern Beaufort Sea, 1974-79  
by Ian Stirling, Michael Kingsley, and Wendy Calvert. Disponible également  
en français.  
Cat. No. CW69-1/47E. Publ. 1982.
- No. 48*  
Foraging behaviour of Peary caribou in response to springtime snow and ice  
conditions by F.L. Miller, E.J. Edmonds, and A. Gunn. Disponible également  
en français.  
Cat. No. CW69-1/48E. Publ. 1982.
- No. 49*  
A review of some important techniques in sampling wildlife by A.R. Sen.  
Disponible également en français.  
Cat. No. CW69-1/49E. Publ. 1982.
- No. 50*  
Intensive regulation of duck hunting in North America: its purpose and  
achievements by Hugh Boyd. Disponible également en français.  
Cat. No. CW69-1/50E. Publ. 1983.
- No. 51*  
Human dimensions of migratory game-bird hunting in Canada by  
Shane A.D. Parker and Fern L. Filion. Disponible également en français.  
Cat. No. CW69-1/51E. Publ. 1984.
- No. 52*  
Components of hunting mortality in ducks by G.S. Hochbaum and  
C.J. Walters. Disponible également en français.  
Cat. No. CW69-1/52E. Publ. 1984.
- No. 53*  
The interpretation of aerial surveys for seabirds: some effects of behaviour  
by A.J. Gaston and G.E.J. Smith. Disponible également en français.  
Cat. No. CW69-1/53E. Publ. 1984.
- No. 54*  
Waterfowl studies in Ontario, 1973-81 by S.G. Curtis, D.G. Dennis, and  
H. Boyd, eds. Disponible également en français.  
Cat. No. CW69-1/55E. Publ. 1985.
- No. 55*  
The reported kill of ducks and geese in Canada and the USA, 1974-82 by  
Hugh Boyd. Disponible également en français.  
Cat. No. CW69-1/55E. Publ. 1985.
- No. 56*  
Population dynamics of the Common Loon (*Cavia immer*) associated with mer-  
cury-contaminated waters in northwestern Ontario by J.F. Barr. Disponible  
également en français.  
Cat. No. CW69-1/56E. Publ. 1986.
- No. 57*  
The Ring-billed Gull in Ontario: a review of a new problem species by  
H. Blokpoel and G.D. Tessier. Disponible également en français.  
Cat. No. CW69-1/57E. Publ. 1986.

Canada