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NOT SUBJECT TO REVIEW

BIRDS OF THE LOWER SKAGIT VALLEY IN CANADA

ENVIRONMENTAL INVESTIGATIONS
PROPOSED HIGH ROSS RESERVOIR IN CANADA

CITY OF SEATTLE
DEPARTMENT OF LIGHTING

1972

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F. F. SLANEY & COMPANY LIMITED
VANCOUVER, B. C.

PROPERTY OF
SEATTLE CITY LIGHT
CIVIL ENGINEERING DIVISION

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ABSTRACT

Songbirds in the Lower Skagit Valley were monitored throughout the study period. A total of 173 species of birds was observed. Of these, 79 species were recorded as nesting. The remaining species were transients and most would not be significantly affected by the proposed project.

The following table shows the estimated number of pairs of breeding birds presently in the Lower Skagit Valley and the numbers which would occur with High Ross Reservoir. Estimates of the numbers of pairs are based on the densities of breeding birds in the various habitats.

NUMBER OF PAIRS OF BREEDING BIRDS IN LOWER SKAGIT VALLEY

<u>Average Level of Breeding Density</u>	<u>Without High Ross</u>	<u>With High Ross</u>
High Density: six birds per acre	4,200	1,200
Medium Density: three birds per acre	18,000	10,500
Low Density: 1.75 birds per acre	<u>20,100</u>	<u>17,500</u>
	42,300	29,200

Of the 79 species of breeding birds, 67 nest in habitats found throughout the valley. Of the 12 species which nested only in the proposed reservoir site, 11 species apparently nested there because of habitats created by man, such as the Ross Lake shallows and bushy vegetation. These types of habitat would be present with High Ross Reservoir. The remaining species, the sparrow hawk, is abundant and widely distributed and is expected to find suitable habitat elsewhere in the Skagit Valley.

The observation of two species, the American redstart and veery are of special interest as breeding populations had not been recorded west of the Cascades in Washington. Although their breeding habitat will be reduced, suitable habitat for these species will remain with High Ross Dam.

The Skagit Valley appears to be a spring-fall migration for at least 29 species of birds. Thrushes, hummingbirds and many sparrows occurred in large numbers. The valley's usefulness as a migration route would not be appreciably changed by the project.

Many species of birds owe their presence in the valley to the reservoir proper. A few semi-water-based species, are year-round residents on seepages within the Ross Lake drawdown area.

The valley's geographical position and the presence of open habitats influences the migration of some species of birds more common to the interior. Eighteen species of birds observed on the Study Area are usually not found in coastal areas. About 90 percent of the species observed are also seen regularly in coastal British Columbia.

The existing meadows in the Lower Skagit Valley would be inundated by High Ross Reservoir. Most species observed in the meadows also utilized the drawdown area of the lake. The loss of meadows would cause a decline in the observability of transient species such as meadowlarks, poor-will, boblink and some sparrows.

Wide ranging predatory birds such as the red-tailed hawk, which nest outside the reservoir site but utilize prey within the reservoir site may be reduced somewhat. The loss of prey species is estimated to cause a loss of about two pairs of red-tailed hawks.

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PREFACE

1.1 SCOPE OF ENVIRONMENTAL STUDIES

The study of songbirds is an integral part of a comprehensive study on the environmental consequences of the proposed High Ross Dam on the Skagit River system in Canada and the United States. Application for approval of the project has been submitted to the Federal Power Commission by Seattle City Light.

Some of the environmental studies are totally Canadian; others totally American. Most of the major studies are combined or co-operative Canadian-American efforts. Canadian studies are designed to provide the Federal Power Commission with the basic data required to understand the environmental consequences in Canada of the proposed High Ross project.

Other reports prepared on the environment of the Lower Skagit Valley in Canada include the following titles: "Deer," "Small Mammals," "Large Carnivorous and Furbearing Mammals," "Habitat Development and Enhancement," "The Aquatic Environment, Fishes and Fishery, Ross Lake and the Canadian Skagit River," "Relocation of Public Road," "Shoreline Stability of Ross Lake Reservoir (Canada)," "Soil Survey," "Vegetation," "Climate," and "Estimated Cost of Clearing Proposed High Ross Reservoir Site in Canada".

1.2 SKAGIT RIVER WATERSHED AND HIGH ROSS RESERVOIR SITE IN CANADA

1.2.1 The Skagit River Watershed in Canada

The Skagit River drains an area of over 380 square miles in Canada (see Relief Map). The main Skagit Valley in Canada extends from the United

States-Canadian border some 24 miles to the Hope-Princeton Highway and then turns eastward for some 10 miles as an increasingly steeper and narrower valley. The floor of the Skagit Valley in Canada is approximately 1575 feet in elevation at the International Border and the valley sides rise to over 7000 feet at the peaks of the larger mountains.

1.2.2 The Proposed High Ross Reservoir Site

The proposed High Ross Reservoir would attain a full pool level of 1725 feet and would extend about seven miles further north into the Skagit Valley, inundating an additional 4300 acres of land. The total area of High Ross Reservoir in Canada at full pond would be about 5200 acres.

The proposed High Ross Reservoir site represents about two percent of the Skagit River watershed in Canada. The environmental consequences of the proposed reservoir site would be confined primarily to the lowlands of the Lower Skagit Valley which includes a total area of about 19,000 acres or eight percent of the watershed. The environmental effects of the proposed High Ross project on the remaining 92 percent of the Skagit River drainage in Canada are considered negligible.

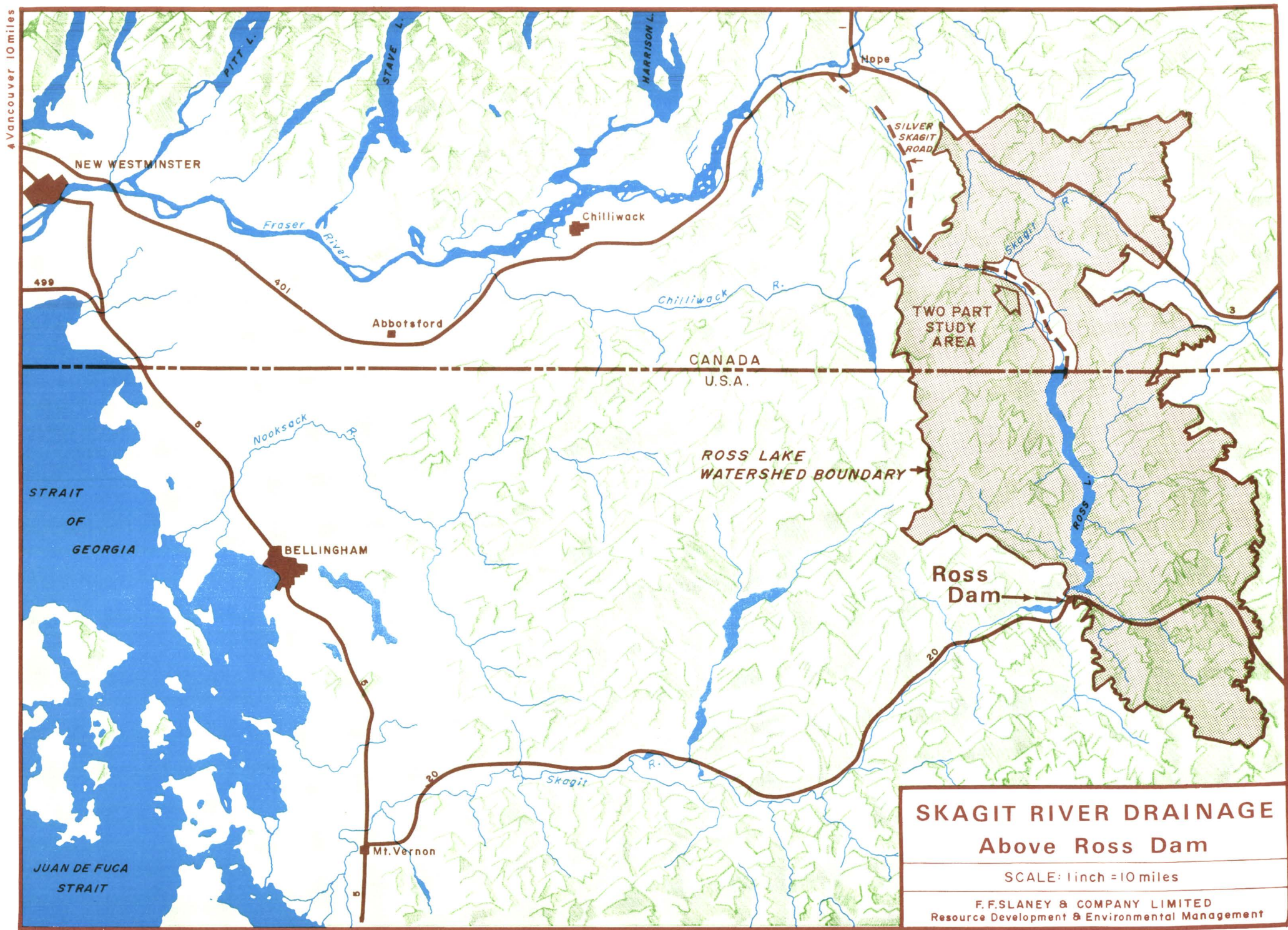
Therefore, except for the studies of fish that are found in Ross Lake and the upper tributaries of the Skagit River and monitoring of the migrating herd of deer that utilize parts of the reservoir site for a period in the spring, the detailed environmental studies were confined mostly to a Two Part Study Area (see Key Map) comprising "Part A;" the proposed reservoir site of 5200 acres and "Part B;" the adjacent lowlands that could be indirectly affected, an area of some 13,800 acres.

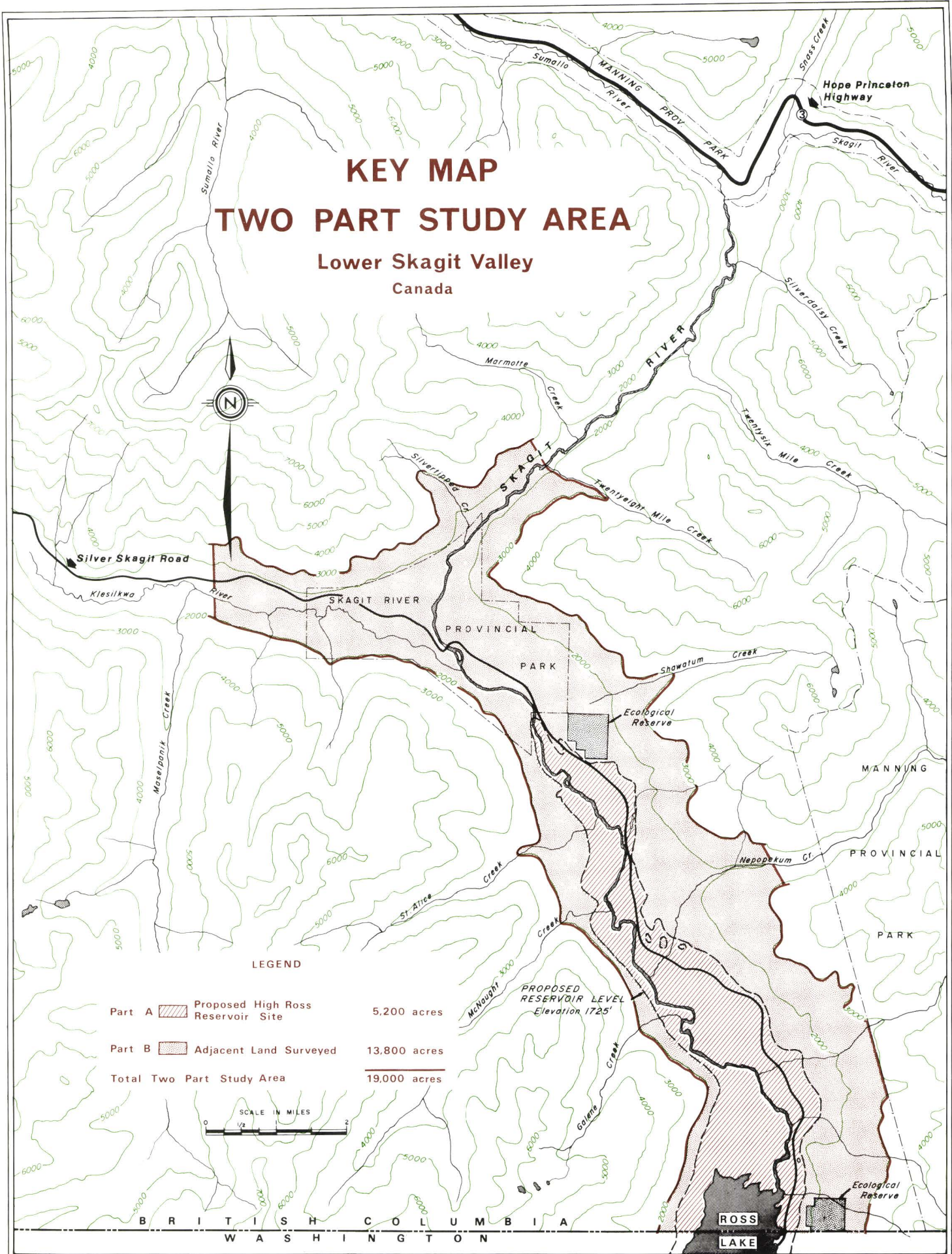
In this report, the terms Lower Skagit Valley and Two Part Study Area are used interchangeably. Both refer to the part of the Skagit Valley in Canada below 3000 feet in elevation on the east and 2000 feet on the west, and for a distance of about 12 miles north of the Canadian-United States border. This area coincides with the region of the Skagit Valley that is accessible by gravel and dirt roads and is utilized primarily for forestry, unorganized recreation and as an access route by Americans intent on camping and fishing on Ross Lake on the United States side of the border.

The upper part of the Skagit Valley is accessible by paved highway and utilized primarily as a transportation corridor (the Hope-Princeton Highway) and as an area of organized recreation within Manning Park where camping and fishing but no hunting are allowed. The Hope Slide and the Silvertip Mountain Ski Resort are also part of the recreation and tourism aspects of the Upper Skagit Valley region.

The alpine and sub-alpine regions of the Skagit River watershed are used primarily for such recreational pursuits as hiking and wilderness camping. These areas are generally over 4500 feet in elevation and would not be affected by raising the level of Ross Lake to elevation 1725 feet.

11 22 33 44 55 66 77 88 99 10 20 30 40 50 60 70 80 90 100





KEY MAP
TWO PART STUDY AREA
Lower Skagit Valley
Canada

LEGEND

- | | | | |
|---------------------------|--|-----------------------------------|--------------|
| Part A | | Proposed High Ross Reservoir Site | 5,200 acres |
| Part B | | Adjacent Land Surveyed | 13,800 acres |
| Total Two Part Study Area | | | 19,000 acres |



BIRDS OF THE LOWER SKAGIT VALLEY IN CANADA

1.1 INTRODUCTION

A census of the birds in the Two Part Study Area of the Lower Skagit Valley in Canada was carried out to aid the assessment of probable effects of High Ross Dam on wildlife. Prior to the current study, the bird life of the Study Area had not been well documented.

The Skagit Valley has a north-south orientation and is well connected with other valleys to the north and south on both sides of the Cascades. The valley appeared to be a suitable route for birds travelling between coastal and interior regions, or as a component of north-south interior flyways.

Check lists of birds have been prepared for some adjacent areas. The Manning Park list includes birds in the Upper Skagit River (Edwards, 1965; Beckett, 1969). A preliminary check list of birds for the North Cascade National Park and Ross Lake National Recreation Area was prepared by Douglas (1969). This list was expanded by Miller and Miller (1971) from observations made in 1969 and 1970 along Big Beaver Creek near the south end of Ross Lake. This list was further expanded by a team of biologists studying the wildlife around Ross Lake in 1971.

Those species of birds that fall under the general title of "Game Birds" are included in this section although treated in greater depth in a separate report.

1.2 OBJECTIVES

Objectives of the study were to:

1. Inventory the species present by seasons.
2. Determine abundance, distribution, and habitat relationships by species.
3. Determine significance of the Skagit Valley as a migration route.
4. Assess the probable effects on birds of raising Ross Reservoir.

1.3 METHODS

Bird census periods include:

Spring (April 1 to June 15),

Summer (June 15 to August 15),

Autumn (August 15 to December 1), and

Winter (December 1 to April 1).

The dates are approximate and serve mainly to delineate the periods of limited migration (winter and summer) from spring and autumn, the periods of large migrations. The term, "breeding season," as used in this report, includes both spring and summer.

Daily Records

During the winter period, bird abundance and distributions were determined from observations made on transect lines employed to census deer, carnivores and furbearers.

The number, location and habitat used by each bird species observed along the transect lines was recorded. These observations were totalled for each species in Parts A and B of the Study Area. Species were rated by occurrence on a scale similar to the one used in the Vancouver (1969) and South Okanagan (1970-71) Bird Lists.

<u>Classification</u>	<u>Relative Occurrence</u>
A - Abundant -	Species observed daily and in large numbers.
F - Frequent -	Species observed daily but in low numbers.
R - Rare -	Species seen irregularly although resident.
C - Casual -	Species seen once or twice per season and in low numbers. Most were transients.
T - Transients -	Species either common or uncommon but apparently migrating through Study Area.

Singing Male Transects

During the breeding season, 22 transect lines and two ponds were censused to collect data on the kinds and numbers of birds nesting in different habitat types. Thirteen transect lines and one pond were censused in Part "A," while nine lines and one pond were censused in Part "B" of the Study Area. Transects were located in all important and widespread habitats within the Two Part Study Area. The transect lines varied in length from 270 to 6000 feet, with an average size of 14 acres. A description of the transect lines is given in Appendix 101.

Transect lines were walked in early morning and all birds singing or sighted within 150 feet of the line were recorded. The birds were classified according to sex and migrating or breeding status.

Data from the transect lines were first analyzed in terms of the number of singing males per 100 feet of line and per acre. In this analysis, highly mobile species such as night hawks, ravens, swifts and birds of prey were omitted. These values were then examined for habitats in which they occurred. The vegetation was surveyed and a map (see Vegetation Report) was drawn showing the habitats of the valley. The number of a species was calculated by taking its density in a habitat and calculating from the total amount of this habitat the likely number of birds present.

Not all species recorded in the Two Part Study Area during the spring and summer were observed on the transect lines. Other species were largely evaluated from day-to-day observations made by biologists while carrying out other field work. Many migrant species were noted only in such observations.

A species was considered to be a breeder if its nest was found (21 cases), its young were positively identified (18 cases) or if it was resident throughout the breeding season and regularly observed singing (39 cases). Birds which were present throughout the breeding season although not observed singing were classed only as possible breeders (26 cases).

The distribution and numbers of waterfowl and grouse were evaluated from specific projects designed to census game birds.

1.4 RESULTS OF SURVEY

1.4.1 List of Species Observed in the Two Part Study Area

From October, 1970 to November, 1971, 173 bird species were positively identified in the Study Area (Appendix 102). Two additional species (not in the list), the Tennessee warbler and the grey-cheeked thrush, were tentatively identified but need confirmation, as these observations extend their recognized ranges.

An estimated 57 additional species which have wide distribution in southern British Columbia and were not recorded in 1970 and 1971 may be expected to occupy other areas within the Skagit watershed and would appear occasionally as transients (Appendix 103-Group F). Six of these species were observed by American biologists near Ross Lake in 1971 (Taber, 1972).

1.4.2 Seasonal Occurrence

Thirty-three species of birds were resident in the Study Area throughout the year (Appendix 102).

At least 129 species utilized the valley as a migration route (Appendix 102). Fifty-eight of these species were recorded only during migration. Seventy-two species of migrating birds were recorded only within the reservoir site. Of these 72 species, 43 were waterfowl or shorebirds attracted by Ross Lake. Seventeen others were recorded on grassy meadows or along the edge of the Ross Lake drawdown. The remaining 12 species were associated with the timbered areas (Appendix 102).

1.4.3 Breeding Species

Seventy-eight species of birds are recorded as nesting in the Study Area. Eight of the 78 nesting species probably nested only in Part B and 12 species probably nested only in Part A (Appendix 104). The remaining 60 species nested throughout the Study Area.

= 80,
not
78

Breeding Habitat and Densities of Singing Males

The singing male transect lines were grouped into nine habitat types based on site and canopy type. The density of singing males recorded in each type is summarized in Appendix 105. The nine habitats were further grouped as low, medium and high density on the basis of the singing male densities. The low density averaged 1.7 pairs per acre, medium density averaged 3.1 pairs per acre and the high density areas averaged 6.0 pairs per acre.

All habitats within each rating were identified on a map of the Study Area (Map 1 - back of report) and acreages were computed (Table 1).

TABLE 1

Distribution of high, medium and low density breeding habitat in the Two Part Study Area. Areas of water are not included.

<u>AREA</u>	<u>HIGH DENSITY</u>		<u>MED. DENSITY</u>		<u>LOW DENSITY</u>	
	Acres	(Percent)	Acres	(Percent)	Acres	(Percent)
Part A	500	(3)	2500	(14)	1500	(8)
Part B	<u>200</u>	<u>(1)</u>	<u>3500</u>	<u>(19)</u>	<u>10,000</u>	<u>(55)</u>
Total Study Area	700	(4)	6000	(33)	11,500	(63)

Habitats with the highest densities of singing males were the dense riparian and habitats associated with the river, ponds and marshes.

Habitats with medium densities of singing males occurred on all mesic sites.

! ? { The densities bore no obvious correlation with the kind of forest, age of the trees or the amount of ground cover and understorey.

Low densities of singing males occurred in coniferous forests on the drier slopes.

On the basis of the computed densities there are approximately 85,000 breeding birds in the Two Part Study Area. About 24,000 occur within the reservoir site, while 61,000 breed in Part B.

1.4.4

Migrating Species

The Skagit Valley is an important migration route in the spring and autumn for at least 129 species. Some species, such as thrushes, the hummingbirds and most sparrows, occurred in very large numbers.

The numbers and species suggest the birds utilize the Skagit Valley as a route between coastal areas in the United States and the central plate of British Columbia. Interior species observed during migration suggest that there may be movement from Central Washington via Lake Cbelon to the Skagit and on into Central British Columbia, particularly in spring. The presence of the northwestern crow and gulls suggest that the Skagit Valley is a route between the Puget Sound lowlands and the upper Fraser River Valley (Hope).

1.5 DISCUSSION

One hundred and seventy-five species of birds were observed in the Two Part Study Area. This total compares with 166 species observed in Manning Park over more than 25 years (Beckett, 1969), 245 in the Southern Interior (South Okanagan Natural History Society, 1971), 295 in Greater Vancouver (Campbell and Drent, 1969) and 156 in the North Cascade National Park and Ross Lake Recreation Area (Douglas, 1969; Miller and Miller, 1971; and Taber, 1971).

The habitat of the Ross Reservoir and the presence of both coastal and interior forms contributes to the high number of species in the Study Area. Nineteen species, or about 11 percent of the species recorded in the Study Area, are rarely, if ever, observed on the coast. Six of these breed in the Lower Skagit Valley (see Table 2).

Two species, the American redstart and the veery, are of particular interest, as breeding populations had not previously been recorded west of the Cascades in Washington State (Larrison and Francq, 1962) or British Columbia (Pacific Nest Records, Vertebrate Museum, University of British Columbia).

TABLE 2

Interior species observed in the Study Area which are very rare or absent in coastal areas:

<u>Breeding</u>	<u>Transient</u>	<u>Winter Resident Only</u>
Dusky Flycatcher	Black-backed tree-toed Woodpecker	Black-billed Magpie
Yellow-bellied Sapsucker	Lark Sparrow	
Calliope Hummingbird	Lazuli Bunting	
Common Crow	Harris' Sparrow	
Veery	Bullock's Oriole	
American Redstart	Poor-will	
	Northern Waterthrush	
	Bobolink	
	Bank Swallow	
	Slate-coloured Junco	
	Vesper Sparrow	
	Long-billed Curlew	

The records of the poor-will, bobolink and long-billed curlew are of interest as these species are considered uncommon east of the Cascades. Significant also are the observations of the loggerhead shrike and Harris' sparrow, as there are few observations of either in the entire province of British Columbia.

Predominantly coastal species breeding in the valley include pygmy owl, spotted owl, western flycatcher, red-breasted sapsucker, Hammond's flycatcher and western woodpeewee.

1.6 EFFECTS OF HIGH ROSS RESERVOIR

In assessing the effects of the proposed High Ross Project on birds, several factors were considered. These included the distribution and abundance of each species in Parts A and B of the Study Area, distribution and abundance in southwestern British Columbia, habitat preferences, the season of the year and alternate habitats that may arise with the completion of the High Ross project. In addition, economic, aesthetic and scientific values were considered.

The species of birds were divided into five groups on the basis of habitat relationships. A sixth group includes birds not sighted during the study but known to occur in the area.

Group A - Wetland Types	Water-based species such as waterfowl and most shorebirds (48 species).
Group B - Conifer Types	Species associated with coniferous or mixed conifer/deciduous forest (47 species).
Group C - Meadowland Types	Species associated with meadowland or very open woodlands (25 species).
Group D - Riparian Types	Species associated with the river and ponds and adjacent vegetation (16 species).
Group E - Deciduous Types	Species associated with deciduous woodlands of low elevation (38 species).
Group F - Possibles	Species not observed in Study Area but known to occur in the region (57 species).

Appendix 103 identifies the grouping of species (see Appendix 101 for their breeding status). The groups were derived from data collected on the singing male transect line, winter transect lines, special waterfowl census and numerous observations made at other times throughout the study period. A few species were present in different groups in different seasons. They were generally placed in the habitat they occupied in greatest number.

Species in Group A should be affected favourably, if at all, by the construction of High Ross Reservoir. These species probably did not occur in the Skagit prior to the construction of the present reservoir except as occasional transients. A few are now residents for one or more seasons.

Species in Group B associated with coniferous or mixed forest are expected to incur minor losses as a result of High Ross Reservoir. About 2200 acres of 14,000 acres of coniferous forest would be inundated by High Ross Lake. Losses are expected to be in the order of 10 to 20 percent of present populations on the basis of habitat loss. Changes in aesthetic or scientific values are unlikely.

Species associated with the meadowlands (Group C), the river and ponds (Group D) and the deciduous woodlands (Group E) will sustain considerable loss in numbers and distribution as a result of High Ross Reservoir. Based on habitat reduction, these losses would range from 30 to 70 percent depending upon the species.

Species in Group F include birds from all habitat types. A few species would have enhanced aquatic habitats and a few would lose habitats. Most would not be affected.

Most of the open meadowland in the Study Area would be inundated by High Ross Reservoir. Most species observed in the meadows (Group C) were also observed in the drawdown. The question of whether the meadows are a preferred or a necessary habitat compared to the drawdown area is difficult to assess. Species that used the meadow and drawdown area included the bluebirds, kingbirds, poor-will, bobolink, meadowlark, several sparrows and the sparrow hawk. Of these, only the sparrow hawk nests in the valley. The loss of the meadowlands may cause the disappearance of meadowlarks, bobolinks and poor-wills during migration.

Within the Study Area, approximately 70 percent (about 100 acres) of the riparian habitat associated with ponds and the river would be inundated. Species (Group D) such as the harlequin duck, common merganser, dipper, yellow-throat, veery, song sparrow and the blackbirds would be most affected by the loss of habitat.

Approximately 60 percent (1900 acres) of the lowland deciduous woodland will be inundated. This is the preferred habitat of a variety of warblers, flycatchers, ruffed grouse, vireos, thrushes, some finches, and some hawks and owls (Group E).

Aesthetic and scientific values of the Study Area would be reduced by losses to species in Groups C, D and E. The degree will vary depending on the distribution and abundance of the species in the remainder of the Skagit Valley and in southwestern British Columbia. The loss to the Study Area would be of significance in such species as the veery and the redstart which are at or near the western edge of their distribution in British Columbia.

As stated above, the chance that the very rarely occurring species shown in Group F would be adversely affected by High Ross Reservoir is considered remote.

In terms of numbers, 24,000 breeding birds would be removed from a breeding population of about 85,000. Proposed mitigation plans could provide breeding habitat for about 1000 birds. About 62,000 breeding birds would remain in the Two Part Study Area.

BREEDING HABITAT

High Density (average six pairs per acre)

Meadow Area



Pond and Marsh Area



BREEDING HABITAT

Medium Density (average 3.1 pairs per acre)

Mixed Deciduous and Coniferous Forest



Low Density (average 1.7 pairs per acre)

Coniferous Forest with Light Ground Cover



APPENDIX 101

APPENDIX 101

<u>LINE NO.</u>	<u>DATE OF CENSUS</u>	<u>LENGTH (Feet)</u>	<u>AREA (Acres)</u>	<u>HABITAT</u>
1	May 18, June 17, July 22	6000	22.9	Conif. Forest (Lodgepole pine, falsebox)
2	June 2, June 19, July 16	800	5.52	Conif. Forest (Mature and immature Douglas fir)
3	May 27, June 19	2130	14.7	Mixed Conif.-Deciduous Forest
4	May 28, June 17	2370	16.3	Immature Conif. Forest (Dry site)
5	May 21, June 10	2930	20.2	Mixed Conif.-Deciduous Forest (Active logging)
6	June 2, June 19, July 16	1600	11.0	Mixed Conif.-Deciduous Forest (Douglas fir)
7 (a)	July 22	2130	17.4	Mixed Mature Conif.-Deciduous Forest
7 (b)	July 22	530	3.7	Immature Deciduous (Cottonwood)
8	May 18, June 15	2200	15.2	Immature Deciduous (Cottonwood, willow)
9	May 21, June 20	3500	24.1	Deciduous-Sedge Meadow (Willow, birch, sedges)
10	June 2, June 19, July 16	270	1.8	Mixed Deciduous (Riparian vegetation - dense)
11	July 14	--	13.0	Mixed Deciduous (Pond - riparian, dense)
12	June 9, July 5	3400	11.7	Mixed Deciduous/conif. (along lakeshore)
13	May 20, June 19, July 22		25.8	Coniferous Forest (Lodgepole pine)
14	June 8, July 21	4540	31.3	Immature Coniferous (Douglas fir)
15	June 8, July 15	3740	25.8	Mature-Immature Coniferous (Douglas fir)
16 (a)	May 27, June 19	2130	14.7	Mature Coniferous (Douglas fir)
16 (b)	May 27, June 19	3200	22.0	Mature Coniferous (Douglas fir)

(Continued)

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<u>LINE NO.</u>	<u>DATE OF CENSUS</u>	<u>LENGTH (Feet)</u>	<u>AREA (Acres)</u>	<u>HABITAT</u>
17	June 10, July 20	2670	18.4	Mature Coniferous (Douglas fir, cedar, hemlock)
18	May 29, June 19, July 23	3170	21.8	Mixed Conif.-Deciduous
19 (a)	May 21, June 11	2670	18.4	Immature Deciduous (Cottonwood)
19 (b)	May 21, June 11	1330	9.2	Mature Conif.-Deciduous (Douglas fir - Cottonwood)
20	June 11, July 14	2670	18.4	Immature Deciduous (Dry site)
21	June 29	--	4.6	Pond in Coniferous Forest (Douglas fir, light riparian)

APPENDIX 102

APPENDIX 102

BIRD LIST - TWO PART STUDY AREA LOWER SKAGIT VALLEY, CANADA

LEGEND

SEASON

Fall (F) - August 15 to December 1
Winter (W) - December 1 to April 1
Spring (Sp) - April 1 to June 15
Summer (Su) - June 15 to August 16

OCCURRENCE

A - Abundant, seen daily in large numbers
F - Frequent, seen daily but few in number
R - Rare, present but seen regularly
C - Casual, seen only once or twice in season
T - Transient
Br - Recorded as a breeding bird

BREEDING DISTRIBUTION IN BRITISH COLUMBIA

C - Coastal
I - Interior
W - Widespread

HABITAT TYPES

- | | |
|-----------------|-------------------------------|
| 1. Aquatic | 4. Cottonwoods |
| 1a river | 4a mature |
| 1b lake | 4b immature |
| 1c pond | |
| 1d riparian | 5. Mixed Deciduous-Coniferous |
| 2. Meadow | 6. Cedar-Hemlock |
| 2a sedge | 7. Douglas Fir |
| 2b grass | 7a mature |
| | 7b immature |
| 3. Willow-Birch | 8. Fir-Pine or Pine |
| | 9. Alpine, Sub-Alpine |

APPENDIX 102 - Page 2

<u>Species</u>	<u>Occurrence</u>				<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B. C.</u>
	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>			
Common Loon	-	-	CT	R	1b		-
Red-necked Grebe	-	-	-	CT	1b		-
Eared Grebe	RT	-	CT	-	1b		-
Horned Grebe	CT	-	-	-	1b		-
Western Grebe	AT	-	-	-	1b		-
Pied-Billed Grebe	CT	-	-	CT	1b		-
Great Blue Heron	RT	R	R	C	1a, 1b		-
Whistling Swan	CT	-	-	-	1b		-
Canada Goose	RT	-	RT	-	1b		-
White-fronted Goose	CT	-	-	-	1b		-
Mallard	AT	F	RT	R	1b, 1c	x	W
Pintail	RT	-	RT	-	1b		-
Green-winged Teal	FT	F	RT	R	1b, 1c	x	W
Cinnamon Teal	CT	-	CT	-	1a		-
Blue-winged Teal	RT	-	CT	R	1b	x	W
American Widgeon	FT	-	CT	-	1b		-
Shoveler	RT	-	-	-	1b		-
Wood Duck	CT	-	CT	-	1a, 1c		-
Ring-necked Duck	AT	R	RT	-	1c		-
Canvasback	RT	-	-	-	1b		-
Greater Scaup	-	-	CT	-	1b		-
Lesser Scaup	RT	R	CT	-	1c		-
Common Goldeneye	RT	F	RT	R	1a, 1b, 1c	x	W
Barrow's Goldeneye	-	-	CT	-	1b		-
Bufflehead	FT	F	C	-	1a, 1b, 1c		-
Harlequin Duck	-	-	R	R	1a	x	W
White-winged Scoter	-	-	CT	-	1b		-
Ruddy Duck	RT	-	-	-	1b		-
Hooded Merganser	FT	R	-	-	1a, 1c		-
Common Merganser	RT	CT	FT	R	1a, 1b	x	W
Red-breasted Merganser	-	-	CT	-	1b		-
Goshawk	-	R	R	R	6, 7a, 5	x	W
Sharp-shinned Hawk	RT	-	R	R	4b	x	W
Cooper's Hawk	RT	-	R	R	7a, 5	x	W
Red-tailed Hawk	RT	C	R	R	1b, 6, 7a, 7b	x	W
Golden Eagle	CT	CT	CT	-	--		-
Bald Eagle	-	CT	CT	-	--		-
Marsh Hawk	RT	-	CT	-	1d, 2b		-

APPENDIX 102 - Page 3

<u>Species</u>	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>	<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B. C.</u>
Osprey	-	-	CT	-	1b		-
Pigeon Hawk	RT	-	CT	-	2b, 7a		-
Sparrow Hawk	RT	-	R	R	1b, 2b, 4a	x	W
Blue Grouse	-	F	F	F	7a	x	W
Spruce Grouse	-	-	-	C	8	x	W
Ruffed Grouse	F	F	F	F	1d, 3, 4a, 4b, 5, 6, 7a, 7b	x	W
White-tailed Ptarmigan	-	R	-	-	1b, 1d		-
Sandhill Crane	CT	-	-	-	1b		-
Virginia Rail	CT	-	C	-	3	x	W
American Coot	AT	-	CT	-	1b		-
Semipalmated Plover	CT	-	-	-	1b		-
Killdeer	C	R	F	R	1b, 1a	x	W
Golden Plover	CT	-	-	-	1b		-
Common Snipe	R	R	R	R	2b, 4b, 1c	x	W
Long-billed Curlew	-	-	CT	-	1b		-
Spotted Sandpiper	CT	-	FT	R	1b, 1a	x	W
Greater Yellowlegs	-	-	CT	-	1b		-
Lesser Yellowlegs	-	-	CT	-	1b		-
Pectoral Sandpiper	CT	-	-	-	1b		-
Long-billed Dowitcher	CT	-	-	-	1b		-
Semipalmated Sandpiper	-	-	CT	-	1b		-
Glaucous-Winged Gull	-	-	CT	RT	1b		-
California Gull	-	-	RT	RT	1b		-
Ring-billed Gull	-	-	RT	-	1b		-
Band-tailed Pigeon	CT	-	CT	R	7a, 7b, 6b, 2b	x	W
Rock Dove	-	-	CT	-	--		-
Mourning Dove	CT	-	FT	R	4b, 2b	x	W
Screech Owl	-	-	-	-	7b		-
Horned Owl	-	R	R	R	7a, 4a	x	W
Pygmy Owl	C	R	R	R	5, 7b, 7a, 4b	x	C
Spotted Owl	C	R	-	C	7a, 7b, 6	x	C
Saw-whet Owl	-	C	-	-	7a		-
Poor-will	-	-	CT	-	2b		-
Common Nighthawk	-	-	FT	F	1a, 1b	x	W

APPENDIX 102 - Page 4

<u>Species</u>	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>	<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B.C.</u>
Black Swift	-	-	AT	F	--		-
Vaux's Swift	-	-	AT	F	--	x	W
Rufous Hummingbird	-	-	AT	F	4b, 7a, 7b, 2b, 1d	x	W
Calliope Hummingbird	-	-	FT	F	2b, 5	x	I
Belted Kingfisher	FT	R	RT	R	1a, 1b	x	W
Red-shafted Flicker	R	-	FT	R	1b, 4a, 4b, 6, 7a, 7b	x	W
Pileated Woodpecker	R	F	FT	F	4a, 5, 6, 7a, 7b	x	W
Yellow-Bellied Sapsucker	CT	-	F	R	2a, 2b, 3, 4b, 5, 6, 7a, 7b	x	I
Red-breasted Sapsucker	C	-	R	R	"	x	C
Hairy Woodpecker	R	R	R	R	3, 4a, 4b, 5, 6, 7b	x	W
Downy Woodpecker	R	F	C	C	1d, 3, 4a, 4b, 5	x	W
Black-Backed Three-Toed Woodpecker	-	-	CT	-	4b, 7b		-
Northern Three-toed Wood- pecker	CT	-	R	C	6, 7b		-
Eastern Kingbird	-	-	RT	R	1c, 2b, 7b		-
Western Kingbird	-	-	RT	R	2b, 7b		-
Trail's Flycatcher	-	-	CT	C	1d, 5	x	W
Hammond's Flycatcher	-	-	AT	A	7a, 7b, 8	x	C
Dusky Flycatcher	-	-	R?	R	5, 7a	x	I
Western Flycatcher	-	-	R?	-	7b	x	C
Western Wood Peewee	-	-	RT	R	4a, 4b, 5, 7a, 7b, 8	x	C
Olive-sided Flycatcher	-	-	RT	R	5, 7a, 7b, 8		-
Horned Lark	RT	-	RT	-	1b		-
Violet-green Swallow	-	-	AT	F	--	x	W
Tree Swallow	-	-	AT	F	--	x	W
Bank Swallow	-	-	CT	-	1b		-
Rough-winged Swallow	-	-	FT	R	1a, 1b, 2a	x	-
Barn Swallow	-	-	R	R	--	x	W
Cliff Swallow	-	-	RT	-	1b		-

APPENDIX 102 - Page 5

<u>Species</u>	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>	<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B. C.</u>
Gray Jay	R	R	C	C	6, 7b, 9	x	W
Steller's Jay	R	R	R	R	1d, 4a, 4b, 5, 6, 7a, 7b, 8		-
Black-billed Magpie	R	R	-	-	4a, 4b		-
Common Raven	F	R	R	R	--	x	W
Common Crow	F	R	R	R	1b	x	I
Northwestern Crow	R	R	-	-	1b		-
Clark's Nutcracker	R	R	-	C	7a	x	W
Chestnut-backed Chickadee	A	A	A	A	5, 6, 7a, 7b, 8	x	W
Red-breasted Nuthatch	F	F	F	F	5, 6, 7a, 7b, 8	x	W
Brown Creeper	R	R	R	R	5, 6, 7a, 7b, 8	x	W
American Dipper	FT	F	RT	R	1a	x	W
House Wren	-	-	R	R	5, 7a	x	W
Winter Wren	FT	R	R	R	3, 8	x	W
American Robin	FT	-	AT	A	1d, 8	x	W
Varied Thrush	FT	C	FT	R	5, 8		-
Hermit Thrush	-	-	RT	-	4a, 5, 7a, 8		-
Swainson's Thrush	-	-	FT	F	1d, 3, 5, 7a	x	W
Veery	-	-	F	F	1d, 3, 4a, 4b, 5	x	I
Western Bluebird	-	-	CT	-	2b		-
Mountain Bluebird	RT	-	AT	-	1b, 2b		-
Townsend's Solitaire	CT	-	RT	C	3, 5		-
Golden-crowned Kinglet	AT	F	R	R	4, 8	x	W
Ruby-crowned Kinglet	AT	-	FT	-	2a, 3, 4b, 5, 7b		-
Water Pipit	FT	-	RT	-	1b, 2b		-
Cedar Waxwing	-	-	-	F	3, 4a, 4b, 5, 7b	x	W
Loggerhead Shrike	-	-	C	C	2a, 4b		-
Common Starling	R	-	R	R	2b, 5, 7b	x	W
Hutton's Vireo	-	-	CT	-	3		-
Solitary Vireo	-	-	RT	R	1d, 4a, 4b		-

APPENDIX 102 - Page 6

<u>Species</u>	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>	<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B. C.</u>
Red-eyed Vireo	-	-	R	R	1d, 4a, 4b	x	W
Warbling Vireo	-	-	F	R	1d, 4a, 4b	x	W
Orange-crowned Warbler	-	-	RT	C	4b, 5		-
Nashville Warbler	-	-	RT	R	7a		-
Yellow Warbler	-	-	AT	A	1d, 3, 4a, 4b, 5, 7b	x	W
Audubon's Warbler	FT	-	AT	F	1b, 1d, 3, 8	x	W
Black-throated Gray Warbler	-	-	RT	R	4b, 5, 7b		-
Townsend's Warbler	-	-	RT	F	5, 7a, 7b, 8		-
Northern Waterthrush	-	-	-	CT	1b		-
MacGillivray's Warbler	-	-	R	F	1d, 4b, 7b, 5, 6	x	W
Common Yellow-throat	-	-	R	R	1c, 1d, 3	x	W
Wilson's Warbler	-	-	RT	R	3, 5, 7b		-
American Redstart	-	-	CT	R	1d, 3, 4a, 4b	x	I
Bobolink	-	-	CT	-	2b, 4a		-
Western Meadowlark	RT	-	RT	-	2b		-
Yellow-headed Blackbird	-	-	CT	R	1b, 1c, 3		-
Red-winged Blackbird	RT	-	F	R	1b, 1c, 3, 7b	x	W
Bullock's Oriole	-	-	CT	C	4b, 5, 7b		-
Brewer's Blackbird	RT	-	RT	R	1b, 1c, 3, 2b	x	W
Brown-headed Cowbird	-	-	FT	F	1b, 2b, 3, 5	x	W
Western Tanager	-	-	FT	F	2b, 3, 4a, 5, 8	x	W
Black-headed Grosbeak	-	-	R	R	1d, 4b, 7b	x	W
Lazuli Bunting	-	-	CT	-	2b		-
Evening Grosbeak	F	F	R	R	3, 5, 7a, 7b		-
Purple Finch	A	F	RT	R	4b, 5, 6, 7b, 7a	x	W
Pine Grosbeak	-	C	C	-	4a, 5, 6, 7a, 7b		-
Pine Siskin	F	A	A	F	1a, 8	x	W

APPENDIX 102 - Page 7

<u>Species</u>	<u>F</u>	<u>W</u>	<u>Sp</u>	<u>Su</u>	<u>Habitat</u>	<u>Br</u>	<u>Br. Dist. in B. C.</u>
American Goldfinch	-	C	RT	R	1d, 3, 7b, 1b, 4b		-
Red Crossbill	C	F	R	R	1d, 4b, 5, 7a, 7b	x	W
White-winged Crossbill	-	-	C	-	7b		-
Rufous-sided Towhee	C	C	RT	R	1d, 3, 4a, 4b, 5, 6, 7b	x	W
Savannah Sparrow	-	-	CT	-	1b, 2b		-
Vesper Sparrow	RT	-	RT	-	1b, 2b, 1a		-
Lark Sparrow	-	-	CT	-	1b		-
Slate-coloured Junco	CT	C	CT	-	5, 7b		-
Oregon Junco	RT	R	AT	F	1d, 2b, 4b, 5, 8	x	W
Tree Sparrow	C	-	C	-	5		-
Chipping Sparrow	-	-	AT	F	1b, 2b, 7b,	x	W
Harris' Sparrow	CT	-	-	-	2b		-
White-crowned Sparrow	AT	-	FT	R	1d, 2b, 2a, 4b, 7b	x	W
Golden-crowned Sparrow	-	-	FT	-	4b, 3, 7b, 2b		-
Fox Sparrow	-	-	CT	-	2b		-
Lincoln's Sparrow	-	-	RT	-	1d, 2b		-
Song Sparrow	R	F	F	F	1a, 1b, 1c, 1d, 3	x	W
Snow Bunting	CT	-	-	-	2b		-

APPENDIX 103

APPENDIX 103

LIST OF BIRD SPECIES RECORDED IN THE TWO PART STUDY AREA OF THE LOWER
SKAGIT VALLEY - GROUPED ON BASIS OF HABITAT RELATIONSHIPS

Group A
Wetland Types

Breeding

Mallard
Green-winged Teal
Blue-winged Teal
Common Goldeneye
Common Snipe
Spotted Sandpiper
Virginia Rail
Killdeer

Non Breeding

Common Loon
Red-necked Grebe
Eared Grebe
Horned Grebe
Western Grebe
Pied-billed Grebe
Great Blue Heron
Whistling Swan
Canada Goose
White-fronted Goose
Pintail
Cinnamon Teal
American Widgeon
Shoveler
Wood Duck
Ring-necked Duck
Canvasback
Greater Scaup
Lesser Scaup
Barrow's Goldeneye
Bufflehead
White-winged Scoter
Ruddy Duck
Hooded Merganser
Red-breasted Merganser
Bald Eagle
Osprey
Golden Plover
Long-billed Curlew
Greater Yellowlegs
Lesser Yellowlegs
Pectoral Sandpiper
Long-billed Dowitcher
Semipalmated Sandpiper
Glaucous-winged Gull
California Gull
Ring-billed Gull
Sandhill Crane
American Coot
Semipalmated Plover

LIST OF BIRD SPECIES - Continued

Group B
Conifer Types

Breeding

Goshawk
Sharp-shinned Hawk
Cooper's Hawk
Red-tailed Hawk
Band-tailed Pigeon
Horned Owl
Spotted Owl
Vaux's Swift
Pileated Woodpecker
Yellow-bellied Sapsucker
Red-breasted Sapsucker
Hairy Woodpecker
Hammond's Flycatcher
Blue Grouse
Spruce Grouse
Clark's Nutcracker
Chestnut-backed Chickadee
Red-breasted Nuthatch
Brown Creeper
Golden-crowned Kinglet
Audubon's Warbler
Gray Jay
Common Raven
Purple Finch
Pine Siskin
Red Crossbill

Non Breeding

Golden Eagle
Pigeon Hawk
Rock Dove
Screech Owl
Saw-whet Owl
Black Swift
Black-backed Three-toed Woodpecker
Northern Three-toed Woodpecker
White-tailed Ptarmigan
Townsend's Solitaire
Ruby-crowned Kinglet
Nashville Warbler
Black-throated Grey Warbler
Townsend's Warbler
Olive-sided Flycatcher
Bank Swallow
Cliff Swallow
Steller's Jay
Fox Sparrow
Pine Grosbeak
White-winged Crossbill

APPENDIX 103 - Page 3

LIST OF BIRD SPECIES - Continued

Group C
Meadowland Types

Breeding

Sparrow Hawk
Mourning Dove
Common Crow
Chipping Sparrow

Non Breeding

Marsh Hawk
Poor-will
Eastern Kingbird
Western Kingbird
Northwestern Crow
Western Bluebird
Mountain Bluebird
Water Pipit
Horned Lark
Black-billed Magpie
Savannah Sparrow
Vesper Sparrow
Lark Sparrow
Harris' Sparrow
Golden-crowned Sparrow
Lincoln's Sparrow
Snow Bunting
Bobolink
Western Meadowlark
Lazuli Bunting
Northern Waterthrush

Group D
Riparian Types

Breeding

Harlequin Duck
Common Merganser
Belted Kingfisher
Trail's Flycatcher
American Dipper
Red-eyed Vireo
Common Yellow-throat
Western Wood Pewee
Tree Swallow
Barn Swallow
Song Sparrow
Red-winged Blackbird
Brewer's Blackbird
American Redstart

Non Breeding

Rough-winged Swallow
Yellow-headed Blackbird

APPENDIX 103 - Page 4

LIST OF BIRD SPECIES - Continued

Group E
Deciduous Types

Breeding

Pygmy Owl
Common Nighthawk
Rufous Hummingbird
Calliope Hummingbird
Red-shafted Flicker
Downy Woodpecker
Dusky Flycatcher
Western Flycatcher
Ruffed Grouse
House Wren
Winter Wren
American Robin
Veery
Cedar Waxwing
Common Starling
Warbling Vireo
Yellow Warbler
MacGillivray's Warbler
Violet-green Swallow
Rufous-sided Towhee
Oregon Junco
Black-headed Grosbeak

Non Breeding

Varied Thrush
Hermit Thrush
Swainson's Thrush
Loggerhead Shrike
Hutton's Vireo
Solitary Vireo
Orange-crowned Warbler
Wilson's Warbler
Slate-colored Junco
Tree Sparrow
Bullock's Oriole
Evening Grosbeak
American Goldfinch
Brown-headed Cowbird
Western Tanager
White-crowned Sparrow

LIST OF BIRD SPECIES - Continued

Group F

LIST OF POTENTIAL BIRD SPECIES WHICH MAY BE EXPECTED IN THE
CANADIAN SKAGIT VALLEY

Arctic Loon	Black Tern
Double-crested Cormorant	Snowy Owl
Green Heron	Hawk Owl
American Bittern	Long-eared Owl
Gadwall	Black-chinned Hummingbird
Redhead	Lewis' Woodpecker
Surf Scoter	Say's Phoebe
Turkey Vulture	Purple Martin
Swainson's Hawk	Mountain Chickadee
Rough-legged Hawk	Boreal Chickadee
Peregrine Falcon	Common Bushtit
Sora Rail	White-breasted Nuthatch
Black-bellied Plover	Bewick's Wren
Solitary Sandpiper	Long-billed Marsh Wren
Baird's Sandpiper	Catbird
Least Sandpiper	Bohemian Waxwing
Dunlin	Northern Shrike
Short-billed Dowitcher	Magnolia Warbler
Western Sandpiper	Myrtle Warbler
Sanderling	Yellow-breasted Chat
Wilson's Phalarope	House Sparrow
Northern Phalarope	Cassin's Finch
Western Gull	House Finch
Herring Gull	Gray-crowned Rosy Finch
Mew Gull	Common Redpoll
Bonaparte's Gull	Lark Bunting
Common Tern	White-throated Sparrow
Arctic Tern	Lapland Longspur
Caspian Tern	

APPENDIX 104

APPENDIX 104

LIST OF SPECIES WITH RESTRICTED NESTING DISTRIBUTIONS IN THE STUDY AREA

<u>Nesting in Part B only</u>	<u>Nesting in Part A only</u>	<u>Nesting Mostly in Part A</u>
Spotted Owl	Mallard	Harlequin Duck
Goshawk	Green-winged Teal	Common Merganser
Red-tailed Hawk	Common Goldeneye	Spotted Sandpiper
Blue Grouse	Killdeer	Common Nighthawk
Band-tailed Pigeon	Common Snipe	Starling
Raven	Sparrow Hawk	Yellowthroat
Clark's Nutcracker	Mourning Dove	Red-winged Blackbird
Gray Jay	Barn Swallow	Brown-headed Cowbird
	Common Crow	Veery
	House Wren	American Redstart
	Brewer's Blackbird	
	White-crowned Sparrow	

APPENDIX 105

APPENDIX 105
(a)

SINGING MALE SONG BIRDS IN DIFFERENT HABITAT TYPES IN TWO PART STUDY AREA

<u>Habitat</u>	<u>No. of Lines</u>	<u>Average No. of Singing Males Per Acre</u>	<u>Average No. of Singing Males Per 100 Ft. of Line</u>	<u>Density Rating</u>	<u>Average No. of Species Per Line</u>
Pond and river riparian	2	10.50	---	High	18
Pond in coniferous forest	1	4.33	---	High	12
Wet Site, Birch-Hawthorn	1	4.0	2.77	High	29
Mesic Site mixed coniferous	8	2.85	1.94	Medium	20
Mesic Site Regeneration deciduous and deciduous- coniferous (40 feet)	3	3.31	1.70	Medium	16
Mesic Site mature deciduous- coniferous mix	1	3.21	2.20	Medium	33
Semi-open hillside	1	3.10	2.12	Medium	21
Dry Site regeneration-deciduous	2	1.74	1.20	Low	15
Dry Site, pure coniferous and mixed coniferous	5	1.74	1.04	Low	15

APPENDIX 105

(b)

SINGING MALES PER ACRE AND PER 100 FEET OF TRANSECT LINE

<u>Line No.</u> (See Appendix 101)	<u>Per Acre</u>	<u>Per 100 Feet</u>
1	2.05	0.79
2	3.63	2.50
3	2.52	1.74
4	2.50	1.73
5	4.00	2.73
6	3.64	2.50
7 (a)	1.77	1.22
7 (b)	1.63	1.13
8	3.10	2.14
9	4.00	2.77
10	12.00	---
11	9.00	---
12	4.10	1.41
13	1.34	0.78
14	1.95	1.34
15	2.44	1.55
16 (a)	1.57	1.08
16 (b)	3.10	2.12
17	2.35	1.61
18	3.21	2.20
19 (a)	2.72	1.55
19 (b)	1.74	1.20
20	1.85	1.28
21	4.33	---

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