HABITAT ASSESSMENT
FOR
DRY FOREST AND GRASSLAND DEPENDANT BIRDS
IN
BRITISH COLUMBIA

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PART I
OBJECTIVES, METHODS, AND RATINGS

EXECUTIVE SUMMARY

Coupled with British Columbia's great diversity of ecosystems and habitats is the large number of wildlife species – the largest number for any other comparable sized area in Canada. Using the Broad Terrestrial Ecosystem Inventory (BEI) habitat mapping (at 1:250,000) to define the habitats to be evaluated and the Ecoregion and Biogeoclimatic Zonation classifications to define the major ecological subdivisions. And the Provincial Wildlife Habitat Ratings Standards, this project assessed the habitat of 26 bird species that when in British Columbia depend on the dry forests and grasslands of the interior of the province for part of their habitat requirements.

This project was conducted in 3 phases: Phase 1, was the core project, in that it examined the habitat use of 25 bird species (the 27th one lives in the boreal forests of the northeast) in their prime habitat in the southern interior area of the province; Phase 2, was a regional review and edit of the habitat data base; Phase 3, was an expansion to the entire province in order to gain a provincial perspective for the 25 species, with the additional of the Boreal Sharp-tailed Grouse.

The 25 species chosen include ten that live in dry forested habitats and 15 that live in mainly open dry grassland and sagebrush steppe habitats, although many species will use both forested and grassland habitats in order to satisfy part of their life requisites, the species include:

Dry Forest Birds
B-BAGO - Barrow's Goldeneye
B-FLOW – Flammulated Owl
B-WSOW – Western Screech-Owl
B-LEOW – Long-eared Owl
B-LEWO – Lewis's Woodpecker
B-WISA – Williamson's Sapsucker
B-GRFL – Gray Flycatcher
B-PYNU – Pygmy Nuthatch
B-NAWA - Nashville Warbler
B-CAFI – Cassin's Finch

Open Boreal Forests Bird
B-STGP - Prairie Sharp-tailed Grouse

Grassland Birds
B-LBCU – Long-billed Curlew
B-SWHA – Swainson's Hawk
B-RLHA – Rough-legged Hawk
B-STGC – Columbian Sharp-tailed Grouse
B-SEOW – Short-eared Owl
B-COPO – Common Poorwill
B-WEBL – Western Bluebird
B-MOBL – Mountain Bluebird
B-SATH – Sage Thrasher
B-BRSP – Brewer's Sparrow
B-TISP – "Timberline" Sparrow
B-LASP – Lark Sparrow
B-GRSP – Grasshopper Sparrow
B-BOBO – Bobolink
B-WEME – Western Meadowlark

Phase 1 and 3 of the over all project has 3 parts – the BEI units are rated for their ability to support the listed 26 species; a written description is provided on the distribution and ecology and habitat for those species; and, a map is generated showing of the ratings for each species. The finished product includes: a methodology report;

species accounts on the ecology and habitat uses for each of the 26 species; and a folio of maps highlighting the habitat capability and suitability ratings for each of the 26 species.

FUNDING AND TECHNICAL SUPPORT

The first phase of this project, July 2001 - March 2002, was funded by the Habitat Conservation Trust Fund (project 0-251) and was monitored by Tony Button of the Terrestrial Information Branch, Ministry of Sustainable Resource Management. In addition, Tony Button provided data management and map production support, and Lynne Bonner correlated the habitat ratings to comply with the Resources Inventory Committee's 1999 British Columbia Wildlife Habitat Ratings Standards.

The second phase of this project, July - December 2002, was funded by the Habitat Conservation Trust Fund and was monitored by Tony Button of the Terrestrial Information Branch, Ministry of Sustainable Resource Management.

The third phase of this project, December 2002 - February 2003, was funded by the Ministry of Sustainable Resource Management, Terrestrial Information Branch. Tony Button was the Contract Monitor, as well, he provided data management and map production support. Lynne Bonner, former provincial habitat correlator, and currently with the Ministry of Water, Air and Land Protection correlated the habitat ratings to comply with the Resources Inventory Committee's 1999 British Columbia Wildlife Habitat Ratings Standards.

TABLE OF CONTENTS

PROJECT RATIONALE

There is a general lack of mapped habitat use information for birds in British Columbia. Extensive information exists for provincial species in the 4 volumes of the Birds of British Columbia (Campbell *et al.* 1990, 1990, 1997 and 2001) and various other publications, but except for Stevens' (1995) use of the Biogeoclimatic classification none relates bird species specific habitats to actual mapped habitats. The Provincial (RIC) Wildlife Habitat Ratings Standards (Resources Inventory Committee 1999) are intended to unify the approach to habitat rating and evaluation across the province. The Broad Ecosystem Inventory, mapped at 1:250,000, is one of the approved ecosystem classifications for rating wildlife species using Provincial standards (Resources Inventory Committee 2000).

OBJECTIVES

Using the Provincial Wildlife Habitat Ratings Standards (Resources Inventory Committee 1999), the habitat potential was evaluated and rated for a number of provincially important bird species that rely on steppe, shrub/steppe, dry forests and surrounding habitats for breeding, rearing of young, feeding, or wintering. The habitats used were based on the Broad Ecosystem Inventory units (Resources Inventory Committee 2000).

Provide an edited version of the values and maps that can be published on the Ministry of Sustainable Resource Management's data warehouse, the Terrestrial Information Branch's Internet web-site, and as hard copy maps.

This project was developed in 3 phases:
Phase 1 - Rate the habitat potential for bird species within each structural stage in each Broad Ecosystem Unit (plus site modifier variations) within the framework of Ecosections and Biogeoclimatic Sub-zone/Variants for their ability to produce the necessary life requisites for the 25 birds in this study in the southern interior portion of the province.
Phase 2 - Conduct a review with regional staff who are responsible for the habitat management of the 25 bird species in this study.
Phase 3 - Expand the evaluation area from the southern interior to the entire province, using criteria established in Phase 1. Include the Boreal Sharp-tailed Grouse as a species to be evaluated.

STUDY AREA

The first study area was the southern portion of the interior of the province, from the Quesnel Lowland and Chilcotin Plateau ecosections south and eastward to the Canada/United States and the British Columbia/Alberta boundaries. The second study area was the entire province of British Columbia. The specific ecoprovinces, ecoregions and ecosections are included in Table 1. Within the study area, all habitat units in every Biogeoclimatic zone were evaluated and given a rating for the various species, and the various Life Requisites and Seasons combinations. See Table 2 for a list of all Biogeoclimatic Zones that occur in each Ecosection.

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ECOSYSTEM CLASSIFICATIONS USED

Habitat ratings included four ecosystem classification levels: Ecoregions, Biogeoclimatic Zones, Generalized Site Series, and Structural Stage (Demarchi *et al.* 2000). The Ecoregion classification used was the 2003 version – it has a hierarchy of five levels, the last three, ecoprovinces, ecoregions, and ecosections define specific geographical units based on macroclimatic processes and landforms (Demarchi 2003; Demarchi *et al.* 1990). The Biogeoclimatic Classification used was the 2001 version – it has a hierarchy of 4 levels, zone, subzone, variant, and phase define climatic climax plant associations (Meidinger and Pojar 1991). Terminology and unit descriptions were taken from: Braumandl and Curran (1992) for the Nelson Forest Region; Loyd *et al.* (1990) for the Kamloops Forest Region; Steen and Coupe' (1997) for the Cariboo Forest Region. The Broad Terrestrial Ecosystem Inventory – version 2 (2000), was used to define the generalized site series at 1:250,000. Each unit could have a variety of site modifiers – slope, aspect or materials (Ecosystems Working Group 2000). Structural Stage is the age of forest communities in 4 age classes, plus non-forested communities in one age class, the definitions for these age classes were from the Broad Terrestrial Ecosystem Inventory Classification (Ecosystems Working Group 2000).

SPECIES RATIONALE

The basic concept of this project was to evaluate 25 species[4] that were restricted in their provincial distribution primarily to the Dry Forests and Grasslands of the southern portion of the interior of the province. Several species were chosen strictly from their distribution and not from any management or habitat concerns. While other species were chosen because of immediate management concerns. In addition, several species (such as Western Meadowlark and Western Bluebird) were chosen because they are high profile species that have public interest. Of importance is, that the habitats that all species chosen require must be identifiable at the 1:250,000 Broad Terrestrial Ecosystem level of mapping. See Table 2 for the list of species chosen and a brief rationale for their selection.

For each species we used the Provincial Wildlife Habitat Rating Standards; and evaluated habitats used for reproducing, feeding, migration as well as, winter feeding needs.

Ratings Assumptions

There were a number of assumptions made when rating the habitats of each of the 25 birds species in this project:

[4] Species codes follow Cannings and Harcombe (1990), except for "Timberline" Sparrow (B-TISP) which is a new subspecies.

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open forests versus dense forests within the Douglas-fir, ponderosa pine, or Douglas-fir/ponderosa pine forest units; narrow riparian forests along lake and river shores; individual or small groups of trees out in grasslands or big sagebrush habitats), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Security/thermal requisite implies roosting for the purposes of this project.

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990, 1990, 1997, 2001).

METHODOLOGY

Ratings Procedures

The data represented by the habitat capability and suitability maps for this project was obtained from a team consisting of a bird species expert, a habitat expert, and a data manager. R. Wayne Campbell served as the species expert, due to his extensive knowledge of the 25 species in the project, their life requisites, and actual field observations of each species. Dennis A. Demarchi served as habitat expert, due to his extensive knowledge of the 4 ecosystem classifications used in this project, plus his extensive knowledge of the habitats in various portions of the study area. Diana N. Demarchi served as data manager, due to her knowledge of the Broad Ecosystem Inventory Data Base, and her familiarity with all species and habitat terms, and the provincial habitat ratings standards (Bonner and Demarchi 2000).

This project was conducted in three phases:
Phase 1 was conducted from July 2001 to March 2002;
Phase 2 was conducted from August to December 2002;
Phase 3 was conducted from December 2002 to February 2003.

A regional expert review was conducted in September 2002. Experts in the Cariboo Region (Julie Steciew, Species at Risk Biologist), the Thompson - Nicola Region (Rick Howie, Habitat Biologist; John Surgenor, Species at Risk Biologist; and Doug Jury, Wildlife Section Head), and the Okanagan Region (Oreville Dyer, Species at Risk Biologist).

Map Production

The look-up tables for the 25 bird species birds in this project is the first step in a process that will lead to the production of several maps representing the ability of the dry forests and grassland ecosystems to provide all the life requisites to sustain those species while present in the southern portion of the interior of the province. From those look-up tables maps have been produced which represent specific ecosystem-polygon values, however, capability and suitability habitat values are based on individual ecosystem parameters (habitat, structure or site modifier). But, more than one of those parameters can be mapped in any polygon leading to the dilemma – how to represent all the ecosystem values that can exist in one polygon in a map display. There are 2 basic ways to portray the habitat ratings – Highest Value (the ecosystem parameter with the highest rating, irrespective of representation within the polygon, represents the entire polygon) this method over-estimates habitat potential, but it does provide a meaningful display of the distribution of high value habitats; Weighted Average (the value of each ecosystem parameter is determined based on the proportion of that parameter within the polygon, and an overall polygon rating is then averaged for the polygon), this method gives a meaningful overview image of habitat potential for a species, but, diminishes valuable habitats that occur within polygons that also have habitats with low value parameters.

SPECIES SUMMARY

The 25 species chosen for this project all require some aspects of the south-central interior dry forests (ponderosa pine and Douglas-fir) or dry grasslands (big sagebrush - steppe and bunchgrass grassland). Some species such as the Mountain Bluebird are wide spread and use a variety of habitats just as long as they can feed and breed in fairly open areas and there is suitable nesting cavities for them to raise their young. Other species have very narrow habitat tolerances, for example the Bobolink nest in only a few places in the very south of the province, where there are cultivated grass-hay fields. Of the 25 species, 23 have their provincial benchmark ecosections in the project area; the benchmark ecosection for 11 species is the Southern Okanogan Basin (Table 4).

Twenty-three species come to the project area in the spring to reproduce and most birds leave for southern wintering grounds, although a few birds move to the lowlands of the Fraser Valley and east coast of Vancouver Island, or the protected waters of the Strait of Georgia. However, 2 species reproduce completely outside the project area - the Rough-legged Hawk breeds in the low-Arctic and subarctic, and the "Timberline" Sparrow, a race of the Brewer's Sparrow, breeds in the far northwestern portion of British Columbia. Two species are resident in the southern interior portion of the province – the Columbia Sharp-tailed Grouse, and the Western Screech-Owl; while a few

individuals of many other species may remain in the southern interior most leave. For more detail about each species' distribution, ecology and habitat requirements please refer to the Species Accounts in Part II of this report; Habitat Suitability maps for Reproducing in Summer and Living in Summer (except for Rough-legged Hawks where the maps are for Living in Fall).

CAUTION WHEN USING THE MAPS

There are several things to be aware of when using the habitat capability and suitability maps. Firstly, capability maps using the Broad Ecosystem Inventory product represent the highest value of the current habitat potential, for example, urban and agriculture areas were not mapped to their preconversion states, dry grassland and Big Sagebrush habitats were not mapped to seral stage or range condition, only to the current occurrence of big sagebrush or dry grassland, thus many areas of historic bird species habitats have not been rated as such. Secondly, habitat capability represents the potential of individual polygons, however not all habitats were in ideal habitat condition at the same time. So there should be no attempt to determine the total area of historic habitat availability (only the potential of current habitats).

The highest value capability map represents the maximum extend of the highest value habitats. It does however overestimate the actual high value habitats by ignoring lower value habitats that occur with complex polygons. The weighted average habitat capability map represents a more realistic view of the potential bird species habitat requirements, however it does underestimate Class 1 habitats, where Class 1 habitats exist with Class 3 or poorer habitats.

Habitat suitability maps using the Broad Ecosystem Inventory product represent the current habitat potential at the time of mapping and at the time of map support data. Due to the time-lag between habitat change and its being represented on forest cover maps, or the age of Landsat imagery used in the BEI mapping, many old growth forest areas have since been logged. So that the habitat suitability map represents an optimistic view of current habitat conditions. Like the weighted average habitat capability map, the weighted average habitat suitability map underestimates Class 1 habitats.

Comparisons between the habitat suitability and the habitat capability maps provide a meaningful expression of loss of habitat potential, but they do not provide a measure of absolute habitat loss.

Finally, in order to define Wildlife Habitat Areas, habitat supply estimates derived from the dataset must be "stepped down" to local conditions at much finer habitat resolution than the 1:250,000 BEI mapping provides.

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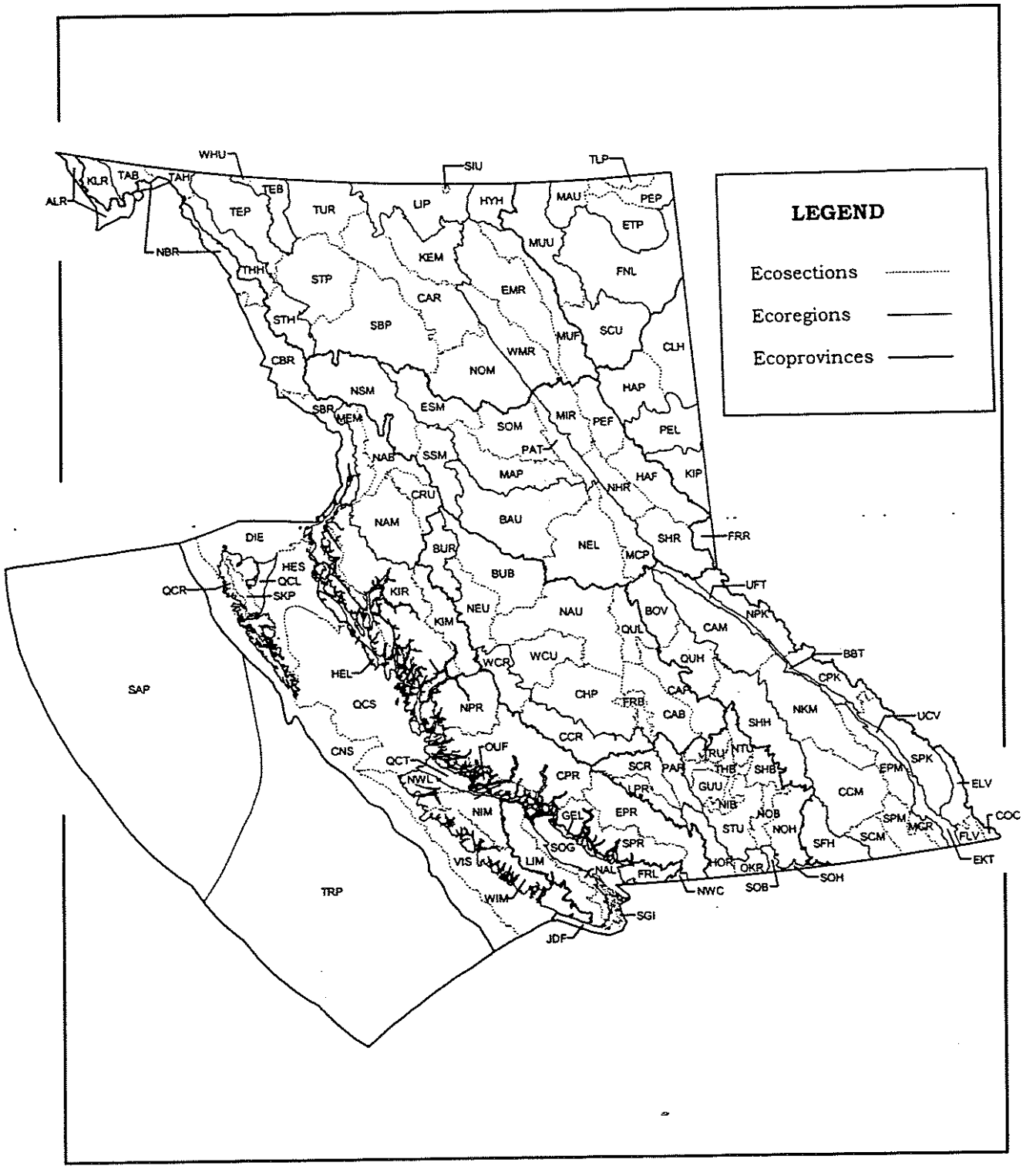

MAP 1. ECOREGIONS OF BRITISH COLUMBIA

Table1. Ecoregion Units That Were Evaluated in the Dry Forest and Grassland Dependant] Birds Habitat Assessment Project. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN ALASKA MOUNTAINS ECOPROVINCE (SAL)			
CUGHACH MOUNTAINS AND ICEFIELDS	CMI	ALSEK RANGES	ALR
COAST AND MOUNTAINS ECOPROVINCE (COM)			
CASCADIA CONTINENTAL SHELF	CCS	VANCOUVER ISLAND SHELF	VIS
COASTAL GAP	COG	HECATE LOWLAND	HEL
		KIMSQUIT MOUNTAINS	KIM
		KITIMAT RANGES	KIR
HECATE CONTINENTAL SHELF	HCS	DIXON ENTRANCE	DIE
		HECATE STRAIT	HES
		QUEEN CHARLOTTE SOUND	QCS
		QUEEN CHARLOTTE STRAIT	QCT
NASS RANGES	NAR	CRANBERRY UPLAND	CRU
		MEZIADIN MOUNTAINS	MEM
		NASS MOUNTAINS	NAM
NASS BASIN	NBA	NASS BASIN	NAB
NORTHERN COASTAL MOUNTAINS	NCM	BOUNDARY RANGES	BOR
		CENTRAL BOUNDARY RANGES	CBR
		NORTHERN BOUNDARY RANGES	NBR
		SOUTHERN BOUNDARY RANGES	SBR
PACIFIC RANGES	PAC	CENTRAL PACIFIC RANGES	CPR
		EASTERN PACIFIC RANGES	EPR
		NORTHERN PACIFIC RANGES	NPR
		NORTHWESTERN CASCADE RANGES	NWC
		OUTER FIORDLAND	OUF
		SOUTHERN PACIFIC RANGES	SPR
GWAII HAANAS	GWH	QUEEN CHARLOTTE LOWLAND	QCL
		SKIDEGATE PLATEAU	SKP
		QUEEN CHARLOTTE RANGES	WQC
WESTERN VANCOUVER ISLAND	WVI	NORTHERN ISLAND MOUNTAINS	NIM
		NAHWITTI LOWLAND	NWL
		WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	JUAN DE FUCA STRAIT	JDF
		SOUTHERN GULF ISLANDS	SGI
	GPB	STRAIT OF GEORGIA	SOG
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	LEEWARD PACIFIC RANGES	LPR
		PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	HOZAMEEN RANGE	HOR
		OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU

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Table1. Ecoregion Units That Were Evaluated in the Dry Forest and Grassland Dependant Birds Habitat Assessment Project. (Arranged by Ecoprovince)

		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
		THOMPSON - SHUSWAP UPLAND	TSU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	BOWRON VALLEY	BOV
		QUESNEL HIGHLAND	QUH
		SHUSWAP HIGHLAND	SHH
EASTERN CONTINENAL RANGES	ECR	FRONT RANGES	FRR
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CARIBOO MOUNTIANS	CAM
		CENTRAL COLUMBIA MOUNTAINS	CCM
		NORTHERN KOOTENAY MOUNTAINS	NKM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	BIG BEND TRENCH	BBT
		EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
		UPPER FRASER TRENCH	UFT
WESTERN CONTINENTAL RANGES	WRA	CENTRAL PARK RANGES	CPK
		NORTHERN PARK RANGES	NPK
		SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
		WESTERN CHILCOTIN RANGES	WCR
EASTERN HAZELTON MOUNTAINS	EHM	BULKLEY RANGES	BUR
		NECHAKO UPLAND	NEU
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
		CARIBOO BASIN	CAB
		CARIBOO PLATEAU	CAP
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		NAZKO UPLAND	NAU
		QUESNEL LOWLAND	QUL
		WESTERN CHILCOTIN UPLAND	WCU
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
CENTRAL CANADIAN ROCKY MOUNTAINS	CRM	HART FOOTHILLS	HAF
		MISINCHINKA RANGES	MIR
		NORTHERN HART RANGES	NHR
		PEACE FOOTHILLS	PEF
		SOUTHERN HART RANGES	SHR
FRASER BASIN	FAB	BABINE UPLAND	BAU
		McGREGOR PLATEAU	MCP
		NECHAKO LOWLAND	NEL
OMINECA MOUNTAINS	OMM	EASTERN SKEENA MOUNTAINS	ESM
		MANSON PLATEAU	MAP
		PARSNIP TRENCH	PAT
		SOUTHERN OMINECA MOUNTAINS	SOM

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Table1. Ecoregion Units That Were Evaluated in the Dry Forest and Grassland Dependant Birds Habitat Assessment Project. (Arranged by Ecoprovince)

SKEENA MOUNTAINS	SKM	NORTHERN SKEENA MOUNTAINS	NSM
		SOUTHERN SKEENA MOUNTAINS	SSM
BOREAL PLAINS ECOPROVINCE (BOP)			
CENTRAL ALBERTA UPLAND	CAU	CLEAR HILLS	CLH
		HALFWAY PLATEAU	HAP
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL
SOUTHERN ALBERTA UPLAND	SAU	KISKATINAW PLATEAU	KIP
TAIGA PLAINS ECOPROVINCE (TAP)			
HAY RIVER LOWLAND	HRL	FORT NELSON LOWLAND	FNL
MUSKWA PLATEAU	MPL	MUSKWA UPLAND	MUU
		SIKANNI CHIEF UPLAND	SCU
NORTHERN ALBERTA UPLAND	NUP	ETHSO PLATEAU	ETP
		MAXHAMISH UPLAND	MAU
		PETITOT PLAIN	PEP
NORTHERN BOREAL MOUNTAINS ECOPROVINCE (NBM)			
BOREAL MOUNTAINS AND PLATEAUS	BMP	CASSIAR RANGES	CAR
		KECHIKA MOUNTAINS	KEM
		NORTHERN OMINECA MOUNTAINS	NOM
		SOUTHERN BOREAL PLATEAU	SBP
		STIKINE PLATEAU	STP
		TESLIN PLATEAU	TEP
HYLAND HIGHLAND	HHI	HYLAND PLATEAU	HYP
LIARD BASIN	LIB	LIARD PLAIN	LIP
NORTHERN CANADIAN ROCKY MOUNTAINS	NRM	EASTERN MUSKWA RANGES	EMR
		MUSKWA FOOTHILLS	MUF
		WESTERN MUSKWA RANGES	WMR
PELLY MOUNTAINS	PEM	TUYA RANGE	TUR
SOUTHERN YUKON LAKES	SYL	TESLIN BASIN	TEB
		WHITEHORSE UPLAND	WHU
ST ELIAS MOUNTAINS	STM	KLUANE RANGES	KLR
YUKON - STIKINE HIGHLANDS	YSH	STIKINE HIGHLAND	STH
		TATSHENSHINI BASIN	TAB
		TAGISH HIGHLAND	TAH
		TAHLTAN HIGHLAND	THH

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Table 2. Species of Bird Selected For Broad Ecosystem Inventory Habitat Evaluation in the Dry Forest and Grassland Dependant Birds Habitat Assessment Project.

Dry Forests	**Grasslands**
Species Code and Name and Comments	Species Code and Name and Comments
B-BAGO Barrow's Goldeneye (British Columbia supports most of the world breeding population)	**B-SWHA** Swainson's Hawk (of management concern; populations are declining world-wide)
B-FLOW Flammulated Owl (British Columbia supports most of the Canadian population)	**B-RLHA** Rough-legged Hawk (major winter populations in southern BC; its population is declining in North America)
B-WSOW Western Screech-Owl (a regionally significant sub-species)	**B-STGR_CO** Columbian Sharp-tailed Grouse (of management concern; major population declines have occurred)
B-LEOW Long-eared Owl (of management concern, prime riparian nesting habitat is being converted to agriculture and subdivisions)	**B-SEOW** Short-eared Owl (status of the southern interior population is unknown)
B-LEWO Lewis's Woodpecker (of management concern, relies on snags for nesting, those snags are also sought after as firewood)	**B-COPO** Common Poorwill (a grassland species of regional significance)
B-WISA Williamson's Sapsucker (a regionally significant sub-species, that uses an uncommon forest type)	**B-WEBL** Western Bluebird (an important bird for the control of grasshoppers and other insect pests)
B-GRFL Gray Flycatcher (a regionally significant species that has recently invaded the province)	**B-MOBL** Mountain Bluebird (an important species for the control of grasshoppers and other insect pests)
B-PYNU Pygmy Nuthatch (a regionally significant cavity nester)	**B-SATH** Sage Thrasher (an uncommon bird of regional significance)
B-NAWA Nashville Warbler (in Canada the western race is confined to British Columbia.)	**B-BRSP** Brewer's Sparrow (the southern race "breweri" is indicative of the health of sagebrush stands)
B-CAFI Cassin's Finch (restricted in BC to the southern interior, a species that nests primarily in old-growth Douglas-fir and ponderosa pine)	**B-TISP** "Timberline" Sparrow (a mountain race of Brewer's Sparrow, population health unknown)
	B-LASP Lark Sparrow (a species that is impacted by livestock grazing and the urban expansion into grasslands)
Boreal Forests	**B-GRSP** Grasshopper Sparrow (a rare grassland bird that occurs primarily in the Okanagan Valley. It can be impacted by livestock and the urban expansion into grasslands)
B-STG_PR Prairie Sharp-tailed Grouse (a native grassland and agricultural field dependant sub-species)	**B-BOBO** Bobolink (conversion of agricultural fields to subdivisions impacts on nesting grounds, very local populations)
	B-WEME Western Meadowlark (a high profile grassland species)

Table 3. Benchmark Ecosections, Biogeoclimatic Zones and BEI Habitats for identified Life Requisites and Seasons for the 26 birds species evaluated in the Dry Forest and Grassland Dependant Birds Habitat Assessment project.

Species	Ecosection	Biogeoclimatic Unit	BEI Habitat Class and Structural Stage	Life Requisite	Season
B-BAGO	CAB	IDFdk3	WL	Feeding & Breeding	Spring & Summer
B-LBCU	FRB	IDFxm	BS	"	"
B-SWHA	STU	IDFxh2	DP 5	Breeding	"
"	"	IDFxh2a	BS	Feeding	"
B-RLHA	SCM	ICHxw	CF	Living	Autumn
B-STGR-CO	STU	IDFxh2a	BS	Feeding & Breeding	Summer
B-STGR-PR	PEL	BWBS mw1	CF	"	All
B-FLOW	THB	PPxh2	DP 6	"	Summer
B-WSOW	NAL	CWHxm2	CD3-6	"	"
B-LEOW	STU	BGxw1	RR 3	"	Spring & Summer
B-SEOW	FRB	IDFxm	BS	"	"
B-COPO	SOB	BGxh1	BS	Feeding	"
"	"	PPxh1	PP 4	Breeding	"
B-LEWO	SOB	PPxh1	PP 5	Feeding & Breeding	"
B-WISA	NOH	IDFdm1	DL 5	"	"
B-GRFL	SOB	PPxh1	DP 2	"	"
B-PYNU	SOB	PPxh1	PP 6	Feeding	"
"	"	"	PP 5	Breeding	"
B-WEBL	SOB	BGxh1	BS	Feeding	"
"	"	PPxh1	PP 5	Breeding	"
B-MOBL	SOB	BGxh1	BS	Feeding & Breeding	"
B-SATH	SOB	BGxh1	SS	"	"
B-NAWA	SOB	PPxh1	DP2	"	"
B-BRSP	SOB	BGxh1	SS	"	"
B-TISP	TAB	SWBdk	MS	"	"
B-LASP	SOB	BGxh1	AB	"	"
B-GRSP	SOB	PPxh1	BS	"	"
B-BOBO	SOH	IDFxh1	CF	"	"
B-WEME	SOB	BGxh1	BS	"	"
B-CAFI	SOB	PPxh1	DP5	"	"

PART II

SPECIES ACCOUNTS

B-BAGO - Barrow's Goldeneye
B-LBCU – Long-billed Curlew
B-SWHA – Swainson's Hawk
B-RLHA – Rough-legged Hawk
B-STGR-CO – Columbian Sharp-tailed Grouse
B-STGR-PR - Prairie Sharp-tailed Grouse
B-FLOW – Flammulated Owl
B-WSOW – Western Screech-Owl
B-LEOW – Long-eared Owl
B-SEOW – Short-eared Owl
B-COPO – Common Poorwill
B-LEWO – Lewis's Woodpecker
B-WISA – Williamson's Sapsucker
B-GRFL – Gray Flycatcher
B-PYNU – Pygmy Nuthatch
B-WEBL – Western Bluebird
B-MOBL – Mountain Bluebird
B-SATH – Sage Thrasher
B-NAWA - Nashville Warbler
B-BRSP – Brewer's Sparrow
B-TISP – "Timberline" Sparrow
B-LASP – Lark Sparrow
B-GRSP – Grasshopper Sparrow
B-BOBO – Bobolink
B-WEME – Western Meadowlark
B-CAFI – Cassin's Finch

Species Account for Barrow's Goldeneye
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

BARROW'S GOLDENEYE

Scientific Name: *Bucephala islandica* (Gmelin)
Species Code: **B-BAGO**
Subspecies: None recognized in British Columbia.

Provincial Status: Not applicable

Distribution

British Columbia Range

The Barrow's Goldeneye is widely distributed along the entire coast of British Columbia, including Vancouver Island and the Queen Charlotte Islands, and throughout the interior (Campbell *et al.* 1990).

Breeding Range

The Barrow's Goldeneye is a widespread breeder throughout the interior of the province, especially south of 53°N latitude, where over 95% of our records have been gathered. Farther north, it is considered an uncommon and sometimes local breeder. There are only isolated breeding records west of the Coast Ranges. Its centre of abundance is the Chilcotin-Cariboo region (Campbell *et al.* 1990).

Small numbers winter in the interior in the Okanagan, the West Kootenay, and the South Thompson River valleys, but rarely elsewhere in the interior. Major wintering areas along the coast include rocky shores off southern Vancouver Island and the adjacent southern mainland coast (Campbell *et al.* 1990).

Spring and Autumn Migrations

In March, this species migrates from wintering sites along the coast for the interior breeding grounds. Most of this movement is completed by April. Most birds leave the wintering areas gradually, suggesting the movement occurs in relatively small groups rather than in large flocks. The movement in autumn from the central and southern-interior areas occurs mainly from late October through early November (Eadie *et al.* 2000).

Staging Habitat Requirements

Post-breeding (i.e., moulting) areas for males in summer are unknown. During the nonbreeding seasons, rocky marine shores are preferred habitats.

Provincial Context

This species breeds in North America from Alaska, southern Yukon, and western Northwest Territories, south through British Columbia and southwestern Alberta to northern Washington and western Montana; locally at higher elevations farther south. It also breeds in Greenland and Iceland. Winters primarily along the Pacific coast from Alaska south to California and Arizona; on the Atlantic coast from the Gulf of St. Lawrence south to New York, rarely as far south as South Carolina (Eadie *et al.* 2000). It has been estimated that 60 – 90% of the world's breeding population is found in British Columbia (Campbell *et al.* 199o).

Project Area

Ecoregions

All the ecoprovinces, ecoregions and ecosections in the province were examined for Barrow's Goldeneye, and all ecoregion units were found to contain habitat suitable for this species.

Biogeoclimatic Zones

All the Biogeoclimatic Zones of the entire Province were evaluated for potential Barrow's Goldeneye habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, Barrow's Goldeneye breeds from 280 to 1,830 m (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Barrow's Goldeneye frequents a variety of rocky, nearshore marine habitats along the coast, primarily in the nonbreeding season. In the interior, it is found most often on freshwater habitats that include, lakes, ponds, and rivers. It is also found on sloughs, creeks, marshes, and sewage lagoons (Campbell *et al.* 1990).

Breeding habitats mostly include lakes associated with trembling aspen parkland, open ponderosa pine forests, farmland, rangeland and infrequently alpine meadows, as well as the wetter, closed coniferous forests including those of the sub-alpine regions from 300 to 1,830m in elevation. Alkaline lakes are preferred; occasionally the Barrow's Goldeneye breeds near ponds, rivers, and creeks (Campbell *et al.* 1990).

Habitat Uses Rated

Living, Staging, Reproducing

The three life requisites that were rated for Barrow's Goldeneye included living, staging, and breeding. Habitat requirements for all life requisites include marine and freshwater habitats, the latter usually associated with mature and old trembling aspen stands, or other deciduous, coniferous and riparian forests (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn, Winter

During late winter and early spring (early March), large flocks of Barrow's Goldeneyes concentrate locally in areas where Pacific herring are spawning. About the same time, spring migration commences and birds leave gradually throughout April, not *en masse*, for their breeding grounds. The Breeding season extends from late April though August, with most egg-laying and hatching occurring between late May and mid July. They arrive on the coast after the autumn migration from October through November (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

Barrow's Goldeneye are found in all biogeoclimatic zones in the study area, and the Broad Ecosystem Inventory habitats used are as follows:

Water bodies –

Fast Perennial Stream (FS), Gravel Bar (GB), Large Lake (LL), Small Lake (LS), Shallow Open Water (OW), Slow Perennial Stream (SP), Reservoir (RE), Wetland (WL)

Older trembling aspen habitats (structural stage 4 and 5) –

Trembling Aspen Copse (AC)

Deciduous stage (trembling aspen – structural stage 5) of coniferous habitat types –
Interior Douglas-fir Forest (DF), Douglas-fir - Ponderosa Pine (DP), Douglas-fir - Lodgepole Pine (DL), Lodgepole Pine (LP), Ponderosa Pine (PP), Subboreal White Spruce - Lodgepole Pine (SL)

Riparian habitats with older structure (structural stage 5 and 6) –
Black Cottonwood Riparian (CR), Engelmann Spruce Riparian (ER), Western Redcedar - Black Cottonwood Riparian (RR), Hybrid White Spruce - Black Cottonwood Riparian (WR)

Old-growth ponderosa pine (structural stage 6) –
Douglas-fir - Ponderosa Pine (DP), Ponderosa Pine (PP)

Provincial Benchmarks

Feeding and Reproducing in Spring and Summer for Barrow's Goldeneye in the following ecosystems were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Cariboo Basin (CAB)
Biogeoclimatic Zone:	Fraser Dry Cool Interior Douglas-fir variant (IDF dk3)
Habitats:	Wetlands (WL),
Stand Structure:	climax and disclimax communities – structural stage 0 in the Broad Terrestrial Ecosystem Inventory classification system (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for this species' breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 1. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Barrow's Goldeneye species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at

4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for Barrow's Goldeneye.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., small lakes and the narrow strip of riparian forest) were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  staging
  breeding
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies staging for the purposes of this project.

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Table 1. Ratings Assumptions for Barrow's Goldeneye in the Breeding Season.
(Master Report Contains Table With All the Ecoregion Unit Names).

SOUTHERN INTERIOR MOUNTAINS AND SOUTHERN INTERIOR ECOPROVINCES

ECOPROVINCE			SIM															SOI												
ECOREGION			NCD	WRA			SRT				PTR	SBF	NCM		COH			OKH	NCR	TOP									ITR		
BGC ZONE	PHASE	HABITAT	ELV	SPK	CPK	NPK	EKT	UCV	BBT	UFT	EPM	SFH	CCM	CAM	SHH	BOV	QUH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	SCR	LPR
BG		CR																	5												
BG		GB																							4						
BG		LL																4			4			3	4						
BG		LS																5													
BG		PP																4	5		4			4	3						
BG		SP																							5						
PP		CR																					4								
PP		DP					5																5							4	
PP		LL																			4										
PP		LS																4			5										
PP		PP					5														4	4	4	4						4	
PP		RE					5																								
PP		SP																							4						
PP		WL					5																								
PP		WR					5														5				5						
IDF	a	DL																				5		5							
IDF	a	DP																			4		4	4			4		4		
IDF	a	LL																			4			4			4				
IDF	a	LS																			5						3,5				
IDF	a	PP																									4		4		
IDF		DF						5									5														4
IDF		DL																			4						4				4
IDF		DP					5	5													4	4	4	4	4	3	3,4,5	3		4	
IDF		GB					5																								
IDF		LL						5							4		3				4				4	4	4		4	4	4
IDF		LS																			5	5	4,5		4	4	4,5			4	4
IDF		OW						5																							
IDF		PP																4			4				4		4			4	
IDF		RR						5									3									4					4
IDF		WL					5	5															3			4	3,5	5			
IDF		WR					5	5									3		5		4		4			4	4,5			4	
ICH		DL															5														
ICH		LL			5								4,5	3,5	4	5	2,3,5														
ICH		LP															5														
ICH		LS											4,5		4																
ICH		RR							5	5				4	4																
ICH		SP								5																					
ICH		WL			5				5	5				3,5		5	3,4,5									5	4				
ICH		WR												4,5			3,4,5														
CWH		LL																													4
MH		LL																													
ESSF		ER														5															
ESSF		LL		5											5																
ESSF		LP																													
ESSF		LS	5	5								5	5		5	5				5							5			5	5
ESSF		WL	5												4	5	4											5			
ESSF		WR														5															

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(Master Report Contains Table With All the Ecoregion Unit Names).

SOUTHERN INTERIOR MOUNTAINS AND SOUTHERN INTERIOR ECOPROVINCES

ECOPROVINCE			SIM															SOI													
ECOREGION			NCD	WRA			SRT				PTR	SBF	NCM		COH			OKH	NCR	TOP									ITR		
BGC ZONE	PHASE	HABITAT	ELV	SPK	CPK	NPK	EKT	UCV	BBT	UFT	EPM	SFH	CCM	CAM	SHH	BOV	QUH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	SCR	LPR
MS		DF																													
MS		DL																													
MS		LL									5											5						5			
MS		LS									5											5					5				
MS		SL																								4					
MS		WR																													
SBPS		AC																													
SBPS		DL																													
SBPS		LL																													
SBPS		LP																													
SBPS		LS																													
SBPS		SL																													
SBPS		WL																													
SBPS		WR																													
SBS		DF																													
SBS		DL																													
SBS		LL				5								5		3															
SBS		LP															5														
SBS		LS				5				5						4															
SBS		MR														4															
SBS		SD								5																					
SBS		SL				5				5							5														
SBS		WL				5				5				5		4	4														
SBS		WR				5				5				5		5															
AT		LL		5							5																			5	
AT		LS											5																		5

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ECOPROVINCE			CEI											SBI												COM				SAL
ECOREGION			FRP							CHR		EHM		FAB			OMM				CRM			SKM	BOU	NRA	PAC		CMI
BGC ZONE	PHASE	HABITAT	CAB	FRB	CHP	BUB	CAP	NAU	WCU	CCR	WCR	BUR	NEU	BAU	MCP	NEL	ESM	MAP	PAT	SOM	MIR	NHR	SHR	NSM	CBR	CRU	CPR	NPR	ALR
IDF		AC	1							2,3																			
IDF		DF	1,2,3	1	2,3,4					3,4	5																		
IDF		DL	2		3,4					3,4	5																		
IDF		DP	1																										
IDF		FS	4																										
IDF		GB									5																		
IDF		LL	2		3					2,4	5																		
IDF		LP			4																								
IDF		LS									5																		
IDF		SL								4	5																		
IDF		WL	B	1	1,3					1	5																		
IDF		WR	3		3,4					4																			
ICH		LL																								5			
ICH		LS																						4					
ICH		SP																								5			
ICH		WL																						4					
CWH		ES																									5		
CWH		FS																										5	
CWH		LL								4																		5	
CWH		WL										5																	5
MH		LL																							5				
MH		WL																							5				
ESSF		LL									5		5												5				
ESSF		LP				4		4	5																				
ESSF		LS						4			5		5																
ESSF		WL			4	5		4	5	5	5		5												5				
MS		DF			5				5	3	5																		
MS		DL			4				5	3	5																		
MS		ER								4																			
MS		LL							3	3,4	5																		
MS		LP			4			5	5	4	5																		
MS		SL			4			5	5	4	5																		
MS		WL			4			4		3	5																		
MS		WR			4				4	4	5																		
SBPS		AC			3																								
SBPS		DL	5		3			4																					
SBPS		LL	3		3			2,3	2																				
SBPS		LP	4		4			4	4																				
SBPS		LS	3					3																					
SBPS		SL			4			4,5	4,5																				
SBPS		WL	2		3			2,3	2,3																				
SBPS		WR	5		4			3	3																				
SBS		DF	4,5			4,5								5															
SBS		DL	4,5			4		4																					
SBS		GB														5													
SBS		LL	4			2,4		2,3						3,4,5	3	3,4	4	4,5				5	5						
SBS		LP				4,5		4,5						4,5		5													
SBS		LS				2,4		3,4						4,5	4	4,5	4	4,5	5		5								
SBS		RE				4										3			5		5								
SBS		SD						4																					
SBS		SL				4,5		4,5						4,5															
SBS		SP												5	5	3,4,5		4											
SBS		WL	4,5			3,4		3,4						3,4	3,5	4,5	4	4,5	5		5								
SBS		WR				3,4		3,4						4,5	5	4,5	4	5	5	5	5								
BWBS		LL																		4									
BWBS		LS																		4									
BWBS		PR																		5				5					
BWBS		WL																						5					
SWB		WL																		5									

Table 1. Ratings Assumptions for Barrow's Goldeneye in the Breeding Season.
(Master Report Contains List of Ecoregion Names.)

NORTHERN BOREAL MOUNTAINS, BOREAL PLAINS,
TAIGA PLAINS ECOPROVINCES

ECOPROVINCE			NBM														BOP				TAP						
ECOREGION			BMP						NRM			HHI	LIB	YSH	YSL		PEM	CAU		SAU	PRB	NUP				HSL	MPL	
BGC ZONE	PHASE	HABITAT	CAR	KEM	NOM	SBP	STP	TEP	EMR	MUF	WMR	HYP	LIP	TAB	TEB	WHU	TUR	CLH	HAP	KIP	PEL	ETP	MAU	PEP	TLP	FNL	MUU	SCU
SBS		LS						5																				
SBS		WL						5																				
BWBS		BA		3						5		4,5	4,5					5	5	4	4	5	5	5	5	5	5	5
BWBS		BP		4	4	4	4	4		5		5	5		5	5	5											
BWBS		FS			5	5	5																					
BWBS		LL	4	4	4	4	4	4					4		4	4	4			4	4	4	4	4		2	5	5
BWBS		LS	4	4	4	4	4	4				5	4		4	4	4,5			3	3	5	5	5	5	3	5	5
BWBS		PR	3	3	3	3	3	3		5		5	4,5				5		5	4	3	3	3	3		5	5	5
BWBS		RE			5																							
BWBS		SP	3		3					5		5	4													4	5	5
BWBS		WL	4	4	4	4	4	4		5		5	4		4	4	4,5		5	4	4	5	5	5	5	4	5	5
SWB		BP			5						5	5																
SWB		ER									5																	
SWB		LL	3,5	3,5	3	5	5	5	5		5			5	5		5											
SWB		LS	3,5	3,5	3	5	5	5	5	5	5	5			5		5											
SWB		PR	4		4	4	4	4	5	5	5	5		5			5											
SWB		SP							5	5																		
SWB		WL	4	4	4	4	4	4	5	5	5	5		5	5		5											
AT		LL																										
AT		LS																										

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Species Account for Long-Billed Curlew
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
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Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

LONG-BILLED CURLEW

Scientific Name: *Numenius americanus* (Bechstein)
Species Code: **B-LBCU**
Subspecies: Two recognized in North America; only *Numenius americanus parvus* occurs in British Columbia

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Long-billed Curlew is widely distributed throughout the southern and central interior, north to the Nechako Lowlands and locally near McBride. It rarely occurs on the south coast (Vancouver Island and in the Fraser Lowlands). (Campbell *et al.*1990)

Breeding Range

Breeding habitat for the Long-billed Curlew is restricted to the dry grasslands and agricultural fields of the southern interior between 280 and 750 m in elevation. Highest numbers occur in the Chilcotin-Cariboo region. It also breeds in scattered locations throughout the Thompson-Okanagan Plateau, particularly Lac du Bois, Douglas Lake, and upper Nicola areas. It is still a fairly common breeder in the north Okanagan Valley, but less so in the south Okanagan Valley (Campbell *et al.* 1990). Small numbers also breed near Quesnel and McBride.

Spring and Autumn Migrations

The Long-billed Curlew is considered an uncommon to locally very common spring migrant in the central-southern interior; casual in autumn. On the south coast, it is a rare spring migrant, but a casual migrant in autumn. This bird occasionally winters on coastal habitats and wetlands (Campbell *et al.*1990).

Staging Habitat Requirements

This species stages in the spring in British Columbia but only in small groups. The habitat required is open grasslands, agricultural fields, and low, sparse shrublands. The optimal staging habitats in the province are in the bunchgrass habitats in the Fraser River Basin and Cariboo Basin.

Provincial Context

Breeds from the southern interior of British Columbia and the southern Canadian prairies south to Utah and Texas. Winters on coastal lowlands from California and Louisiana, south to Guatamala (Campbell *et al.*1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Long-billed Curlew in this project; For a list of those ecoregion units that contain potential Long-billed Curlew habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Long-billed Curlew habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, the Long-billed Curlew occurs between 280 and 750 m in elevation (Campbell *et al.*1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

In the interior, the Long-billed Curlew frequents grassy steppes, not necessarily near water, as well as newly ploughed fields, green hayfields, meadows, and pastures. On the coast it occurs in wetter habitats, especially on tidal mud flats and beaches, or in nearby fields.

Breeding habitat requires large tracts of open grasslands with low vegetative cover (less than 20 cm); the presence of trees or large shrubs discourages breeding. This species prefers flat grassy uplands or gravelly ridges and hillsides for nesting (Campbell *et al.* 1990).

Habitat Uses Rated

Reproducing, Living, Staging

The 3 life requisites that were rated for Long-billed Curlew included reproducing, living, and staging. Habitat requirements for all life requisites are dry and open habitat with low vegetation and on flat or gently sloping terrain.

Seasonal Chronology

Spring, Summer, Autumn

The Long-billed Curlew is present in British Columbia in the spring; from March to early April (some staging), and breeds from late April throughout mid-July. By mid-August most birds have departed for wintering grounds.

Habitat Use and Ecosystem Attributes

The Long-billed Curlew is a dry grassland dependent species. At 1:250 000, bunchgrass, sagebrush-steppe, and cultivated field habitats are key habitat types for this species. This bird also occurs mainly at low elevations and level to moderate slopes.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer for Long-billed Curlew in the following ecosystems were used as benchmarks for which all other life requisites and ecosystems were compared:

Ecosection:	Fraser River Basin (FRB)
Biogeoclimatic Zone:	The Interior Very Dry Mild Interior Douglas-fir Subzone (IDFxm)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	herbaceous climax or disclimax communities as represented by structural stage 0 in the Broad Ecosystem Inventory classification (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Long-billed Curlew's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Long-billed Curlew and its habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Long-billed Curlew.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., level bunchgrass habitat within a generally steep slope, or grassy openings in forested habitats), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:

foraging
drinking
roosting
cover

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers), Pages 158-161. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

Ecosystems Working Group. 2000. Standards for Broad Terrestrial Ecosystem Classification and Mapping for British Columbia: Classification and Correlation of the Broad Habitat Classes Used in the 1:250,000 Ecological Mapping. Version 2.0.Terrestrial Ecosystems Task Force, Resources Inventory Committee, Victoria, BC. 212 pages.

Resources Inventory Committee. 1999. British Columbia Wildlife Habitat Ratings Standards. Version 2.0. BC Ministry of Environment, Lands and Parks, for the Terrestrial Ecosystem Task Force, Resources Inventory Committee. Victoria, BC. 97 pages.

Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Long-billed] Curlew. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
WESTERN VANCOUVER ISLAND	WVI	WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	NANAIMO LOWLAND	NAL
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN COLUMBIA MOUNTAINS	SCM
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
		UPPER FRASER TRENCH	UFT
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Long-billed Curlew in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM				SOI											CEI			
ECOREGION			SRT			NCM	TOP								OKH	NCR	ITR	FRP			
BGC ZONE	PHASE	HABITAT	EKT	UCV	UFT	SCM	NOH	NOB	STU	NIB	GUU	THB	NTU	SHB	SOB	OKR	PAR	CAB	FRB	QUL	CHP
BG		AB													4,5						
BG		BS						4		3,4		3,4			3				2		
BG		CF						4		3		3,4			3	5	5		2,4		
BG		SS						5			4	3,4			5	5			5		
PP	a	SS															5				
PP		AB						5							5						
PP		BS	3					5	3	3					4						
PP		CF	3					5		3	3	3				5	4				
PP		SS						5		5		4			4	5					
IDF	a	BS					4	3,4	4	3,4	3	3,4		3,4			3,4				
IDF	a	CF					4	4		4	4		5	4			3,4				
IDF	a	SS								4		5		4							
IDF		BS	5	5			4	4	4,5	3,4	3,4	3,4,5		3,4	3	5	4,5	1,2,4,5	**B**	4	3
IDF		CF	5	5			4	4	5		4	3	4,5	4,5		5	4,5	3,4	3	4	4
IDF		DF																			
IDF		ME																4			
IDF		SS						5			4,5	5		4,5	5	5					
ICH		CF			3	4															

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Species Account for Swainson's Hawk
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

SWAINSON'S HAWK

Scientific Name: *Buteo swainsoni* (Bonaparte)
Species Code: **B-SWHA**
Subspecies: None recognized in North America.

Provincial Status: Red-listed

Distribution

British Columbia Range

The Swainson's Hawk occurs mainly as a summer visitant in the central interior of the province from the Okanagan Valley through the Thompson-Okanagan and Fraser plateaus northwest to the vicinity of Hazelton. It occurs as a migrant in the East Kootenay and on southwestern Vancouver Island (Campbell *et al.*1990). Recently a pair has been suspected breeding near Dawson Creek in the Peace River Lowland.

Breeding Range

This species breeds mainly in the Southern Interior Ecoprovince throughout the Thompson-Okanagan Plateau from Princeton, the northern Okanagan Valley to Nicola and Thompson River valleys; also locally in the Bulkley Basin. The centre of abundance is in the Nicola and north Okanagan Valleys (Campbell *et al.*1990).

Spring and Autumn Migrations

The Swainson's Hawk is highly migratory and arrives in southern British Columbia from its wintering grounds in South America in March as it moves north to breed in Alaska. The main movement in British Columbia, however, occurs from late April through early May. The Autumn migration occurs mainly in late August and early September, but some birds may linger into early November, especially in alpine habitats.

Staging Habitat Requirements

In spring migration this species stops in small hunting groups on grasslands, mainly in the Nicola and Thompson basins.

Provincial Context

Breeds locally in central Alaska, northern Northwest Territories and locally from northeastern and south-central British Columbia, central Alberta, central Saskatchewan, southern Manitoba, western and southern Minnesota, and western Illinois south to northern Mexico. Winters primarily in South America (Campbell *et al.* 1990; England *et al.* 1997).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Swainson's Hawk in this project; For a list of those ecoregion units that contain potential Swainson's Hawk habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Swainson's Hawk habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, Swainson's Hawk has been recorded from between 280 and 1,250 m in elevation (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Swainson's Hawk inhabits fairly open country, including grasslands and rangelands, sparse shrublands, alpine meadows (in migration), mountain passes, burns, and clearcuts (Campbell *et al.* 1990). This species is very susceptible to pesticides due to their use of agricultural areas on its breeding grounds and especially on its wintering grounds in Argentina and Brazil where it aggregates in immense flocks.

Habitat Uses Rated

Reproducing, Living, Staging

The 3 life requisites that were rated for Swainson's Hawk were reproducing, living and staging. Habitat requirements for all life requisites are dry and open grass-dominated habitats or with open or mature structure and all aspects.

Seasonal Chronology

Spring, Summer, Early Autumn

The main spring movement into British Columbia occurs in late April and early May. Most birds have departed to winter grounds by late August and early September. It has been documented in the province from March 7 to October 30; interior records are from March 25 to October 7. There is 1 possible winter record (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

Using the Broad Ecosystem Mapping at 1:250 000, the Swainson's Hawk utilizes open, dry grass-dominated habitats such as antelope brush, bunchgrass, sagebrush-steppe, and cultivated fields. Douglas-fir and ponderosa pine forests in structural stage 1, that have been clearcut or burned providing open structure, or stages 4, 5 or 6, which are open and mature forest structure are also used to some degree.

Provincial Benchmarks

Breeding in spring and summer in the following ecosystems, for Swainson's Hawk, were used as benchmarks for which all other life requisites and ecosystems were compared:

Ecosection:	Southern Thompson Upland (STU)
Biogeoclimatic Zone:	Thompson Very Dry Hot Interior Douglas-fir Variant, grassland phase (IDFxh2a)
Habitats:	Douglas-fir/Ponderosa Pine (DP)
Stand Structure:	mature forests (60 to 140 years old) of broad-leaved or mixed deciduous and coniferous) represented by structural stage 5 using the Broad Ecosystem Inventory habitat classification (Ecosystems

Ratings Assumptions

For the specific ratings that were determined for Swainson's Hawk's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Swainson's Hawk species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Swainson's Hawk.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., level habitat within a generally steep slope, or grassy openings in forested habitats), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  - Spring – March, April, May
  - Summer – June, July, August
  - Autumn – September, October, November
  - Winter – December, January, February

- Living requisite includes many aspects, such as:
  - foraging
  - drinking
  - roosting
  - cover

thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers), Pages 32-33. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Swainson's] Hawk. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
		QUESNEL HIGHLAND	QUH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN COLUMBIA MOUNTAINS	SCM
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
		CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	BABINE UPLAND	BAU
		NECHAKO LOWLAND	NEL
NORTHERN BOREAL MOUNTAINS ECOPROVINCE (NBM)			
BOREAL MOUNTAINS AND PLATEAUS	BMP	SOUTHERN BOREAL PLATEAU	SBP
		STIKINE PLATEAU	STP
		TESLIN PLATEAU	TEP

Table 2. Ratings Assumptions for Swainson's Hawk in the Breeding season.
(Table1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SOI								CEI	
ECOREGION			OKH		TOP						FRP	
BGC ZONE	PHASE	HABITAT	SOH	SOB	NOB	STU	NIB	GUU	SHB	THB	FRB	BUB
BG		DF									5	
BG		DP								4		
BG		PP								4		
PP	a	PP		4								
PP		DP										
PP		PP				5	5					
IDF	a	DP	4		3	**B**	1	1	1,3			
IDF	a	PP			3	2			2	5		
IDF		DF	4									
IDF		DP	4		3	1,3	3	3	3			
IDF		PP	4		3				3,4			
SBS		CF										4
SBS		DF										4
SBS		DL										4
SBS		EF										4

Species Account for Rough-legged Hawk
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

ROUGH-LEGGED HAWK

Scientific Name: *Buteo lagopus* (Pontoppidan)
Species Code: **B-RLHA**
Subspecies: None recognized in British Columbia.

Provincial Status: Yellow-listed

Distribution

British Columbia Range

The Rough-legged Hawk occurs as a spring and autumn migrant throughout most of the province east of the Coast Ranges, becoming locally distributed north of 52°N latitude. It is a regular winter visitant on the southwest mainland coast and locally in the south-central interior. It also occurs on the south coast primarily along the southeast coast of Vancouver Island and in the Fraser Lowlands (Campbell *et al.* 1990).

Breeding Range

This species does not breed in British Columbia.

Staging Habitat Requirements

This species stages in open grassland habitats (for example, Bechers Prairie and Hamilton Commonage) and agricultural fields (e.g., Creston Valley and the Fraser River delta) (Campbell *et al.* 1990).

Provincial Context

Circumpolar. In North America, the Rough-legged Hawk breeds from Alaska eastward across low arctic and sub-arctic Canada to Newfoundland. This species winters from southern Canada, south to California, Arizona, New Mexico, Oklahoma, Tennessee, and Virginia (Campbell *et al.* 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Rough-legged Hawk in this project; For a list of those ecoregion units that contain potential Rough-legged Hawk habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Rough-legged Hawk habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

This species has been recorded in the project area from 280 m to at least 2,130 m in elevation (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Rough-legged Hawk inhabits open, treeless areas including grasslands, rangelands, marshes, alpine meadows, grassy slopes of hills, short grass fields of airports, and agricultural fields (Campbell *et al.* 1990).

Habitat Uses Rated

Living, Staging

The 2 life requisites that were rated for Rough-legged Hawk were living and staging. Habitat requirements for all life requisites are dry and open habitat on flat or moderate south-facing slopes. Banding returns indicate that birds associated with British Columbia breed in northern Alaska (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Autumn

Rough-legged Hawks migrate singly or in small numbers, rarely in flocks. Spring migration in southern areas occurs mostly in late March and early April. In northern areas, the movement is most noticeable in mid-April. Autumn migrants appear in mid-to-late September in some years, but the main autumn movement across southern areas occurs in late October and early November (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Broad Ecosystem Units used by this species are low vegetation units such as bunchgrass, antelope brush, meadows, sagebrush-steppe, wetlands, and cultivated fields. Forested units such as Douglas-fir and ponderosa pine in structural stage 1, which are associated with herbs and shrubs less than 3 metres in height are also significant. Alpine units such as alpine heath, meadows, and tundra are used during staging.

Provincial Benchmark

Living and Staging in Autumn in the following ecosystems, for Rough-legged Hawk, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Columbia Mountains (SCM)
Biogeoclimatic Zone:	Very Dry Warm Interior Cedar- Hemlock Subzone (ICH xw)
Habitats:	Cultivated Field (CF)
Stand Structure:	herbaceous or bare fields represented by structural stage 0 in the Broad Ecosystem Inventory habitat classification (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Rough-legged Hawk's fall staging habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Rough-legged Hawk species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at four age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Rough-legged Hawk.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., vegetable crops, alfalfa, hay, and cereal crops are all classified as cultivated fields), were not to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

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Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey), Pages 40-43. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Rough-legged Hawk. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
WESTERN VANCOUVER ISLAND	WVI	WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	LEEWARD PACIFIC RANGES	LPR
		PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	HOZAMEEN RANGE	HOR
		OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Rough-legged Hawk. (Arranged by Ecoprovince)

CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
		CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	NECHAKO LOWLAND	NEL
BOREAL PLAINS ECOPROVINCE (BOP)			
CENTRAL ALBERTA UPLAND	CAU	CLEAR HILLS	CLH
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL
TAIGA PLAINS ECOPROVINCE (TAP)			
HAY RIVER LOWLAND	HRL	FORT NELSON LOWLAND	FNL
NORTHERN BOREAL MOUNTAINS ECOPROVINCE (NBM)			
BOREAL MOUNTAINS AND PLATEAUS	BMP	SOUTHERN BOREAL PLATEAU	SBP
		STIKINE PLATEAU	STP
		TESLIN PLATEAU	TEP
YUKON - STIKINE HIGHLANDS	YSH	TATSHENSHINI BASIN	TAB

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Table 2. Ratings Assumptions for Rough-legged Hawk Staging in the Autumn Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Autumn Staging Habitat.

ECOPROVINCE			SIM				SOI										CEI		
ECOREGION			SRT		NCM	SBF	OKH		NCR	TOP						ITR	FRP		
BGC ZON	PHASE	HABITAT	EKT	UCV	SCM	SFH	SOH	SOB	OKR	NOH	NOB	STU	NIB	GUU	THB	PAR	CAB	FRB	CHP
BG		AB						3											
BG		BS						3			3	2	2		3,5			3	
BG		CF						3	4		4	2,3	2		4,5	5		3	
BG		PP						3	4		5								
BG		SS						3	4		3	3			4	5		4	
PP	a	PP						3											
PP	a	SS														5			
PP		AB						3			4								
PP		BS	4				5	3			4	3	3		5				
PP		CF	4				5		4		3		3	3	5	5			
PP		DP	4																
PP		PP	4					4	4										
PP		SS						3	4				4		5	5			
IDF	a	BS								2	2	3,4	3	3	4,5	4,5			
IDF	a	CF					3			2	2		3	3		4,5			
IDF	a	DP					3			4	4								
IDF	a	SS							5			3			5				
IDF		BS	4	4			3	3	5	2	3	4,5	4	4	5	4,5	3,4	3	4
IDF		CF	4	4			3		5	2	3	4			5	4,5	3,4	3	4
IDF		DF	4	4			3												
IDF		DP	4	4			3	4											
IDF		ME															3		
IDF		PP					3												
IDF		SS						4	4		4	4		4	5	5			
ICH		CF			B	4													
ICH		WL			3														

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Species Account for Columbian Sharp-Tailed Grouse
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

COLUMBIAN SHARP-TAILED GROUSE

Scientific Name: *Tympanuchus phasianellus* (Ord 1815)
Species Code: **B-STGR_CO**
Subspecies: *Tympanuchus phasianellus columbianius*, Is one of six susbspecies in North America, and one of two that occur in British Columbia (Connelly *et al.*): and

Provincial Status: Blue-listed

Distribution

British Columbia Range of Sharp-tailed Grouse

The Sharp-tailed Grouse occurs locally in 3 disjunct populations; one scattered throughout the East Kootenay, the south and central interior north to the vicinity of Babine Lake, and the other in the parklands and boreal forests of northeastern British Columbia (Campbell *et al.* 1990).

Breeding Range of Columbian Sharp-tailed Grouse

This species breeds in the East Kootenay, in the central-southern interior from Enderby and Kamloops north throughout the Cariboo-Chilcotin region.

The Sharp-tailed Grouse is the only tetranoid in the province that gathers on traditional 'dancing' grounds, or leks; therefore this habitat requirement is an important factor in the spring distribution of the species. It also gathers at these same leks in the autumn (Campbell *et al.* 1990).

Provincial Context

Sharp-tailed Grouse are resident from north-central Alaska east to central-western Quebec and south through the western North American interior to eastern Oregon, northern Nevada, Utah, northeastern New Mexico, western Nebraska, central South Dakota, northern Minnesota, northern Wisconsin, and northern Michigan (Campbell *et al.* 1990; Connelly *et al.* 1998).

Columbian Sharp-tailed Grouse occur from the Columbia Plateau and Great Basin, occupying sagebrush/grassland habitats and mountain shrub habitats from interior central and southern British Columbia (formerly including the East Kootenay) south to Utah and southwestern Colorado (Connelley *et al.* 1998).

Project Area

Ecoregions

All the ecoprovinces, ecoregions and ecosections in the Central and southern interior of the province were examined for Columbian Sharp-tailed Grouse in this project; for a list of those ecoregion units that contain potential potential Columbian Sharp-tailed Grouse habitat see Table 1.

Biogeoclimatic Zones

The Biogeoclimatic Zones that were evaluated for potential Columbian Sharp-tailed grouse habitat included: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, and Alpine Tundra zones.

Elevation Range

For the project area, Columbian Sharp-tailed Grouse from occurs between 280 and 2,135 m in elevation (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Columbian Sharp-tailed Grouse frequents a variety of habitats but the presence of open lowlands (grasslands) adjacent to brushy or scattered open woodlands is common to all. Such habitats include bunchgrass grasslands, sagebrush flats, and open ponderosa pine, lodgepole pine and birch woodlands in the southern interior. In the Cariboo-Chilcotin and in the northern Fraser Plateau regions, habitats include open parklands with adjacent Douglas-fir, trembling aspen, and spruce forests.

In March and April, small winter flocks begin to break up and males move onto leks, followed later by the females. There is a subtle, local altitudinal movement from more wooded areas to grassy lowlands. After mating ends in June, males drift away from leks to spend the summer in good foraging areas (Campbell *et al.* 1990).

Habitat Uses Rated

Reproducing, Living

The 2 life requisites that were rated for Columbian Sharp-tailed Grouse are living and breeding. Habitat requirements for all life requisites are dry and open habitat on flat or moderate south-facing slopes.

Seasonal Chronology

Spring, Summer, Autumn, Winter

The Columbian Sharp-tailed Grouse is a year-round resident in the central and southern interior of the province, and was mapped for all seasons including breeding (summer). Courting begins in March and April, mating occurs in May and June (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Columbian Sharp-tailed Grouse use a variety of habitats especially open grassland habitats, trembling aspen forests of all ages, and Douglas-fir and/or Ponderosa Pine forests in structural stage 1 which is associated with early herbaceous or low shrub age class.

At the broad scale grassland units used by this species are bunchgrass, sagebrush antelope brush, cultivated fields, and meadows.

Provincial Benchmarks

Feeding and Reproducing in Summer for the following ecosystems for the Columbian Sharp-tailed Grouse were used as benchmarks for which all other life requisites and ecosystems were compared:

Ecosection:	Southern Thompson Upland (STU)
Biogeoclimatic Zone:	Thompson Very Hot Dry Interior Douglas-fir Variant, Grassland Phase (IDFxh2a)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	herbaceous climax or disclimax communities as represented by structural stage 0 in Broad Ecosystem Inventory (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Columbian Sharp-tailed Grouse's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by

ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Columbia Sharp-tailed Grouse subspecies and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Columbian Sharp-tailed Grouse.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open patches of bunchgrass or sagebrush), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Habitats used for leks by this species are too small to be identified at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging, drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication The of Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Columbian] Sharp-tailed Grouse. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	BOWRON VALLEY	BOV
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
		CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		NAZKO UPLAND	NAU
		QUESNEL LOWLAND	QUL
		WESTERN CHILCOTIN UPLAND	WCU
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	BABINE UPLAND	BAU
		NECHAKO LOWLAND	NEL

Table 2. Ratings Assumptions for Columbian Sharp-tailed Grouse in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM				SOI												CEI							
ECOREGION			SRT		PTR	COH	OKH		NCR	TOP								ITR	FRP							CHR
BGC ZONE	PHASE	HABITAT	EKT	UCV	EPM	BOV	SOH	SOB	OKR	NOH	NOB	STU	NIB	GUU	THB	NTU	SHB	TRU	PAR	CAB	FRB	QUL	CHP	BUB	NAU	WCU	CCR
BG		AB						5																			
BG		BS						4			5	1,2	1,2		1,2						2						
BG		CF						5	5		5	3,5	3		2,3				5		3,5						
BG		DF																			3						
BG		DP													3												
BG		PP						5	5		5	3			3,4												
BG		SS						4	5		5	4			2				5		4						
PP	a	PP						5			5	5							4								
PP	a	SS																	4								
PP		AB						5			5																
PP		BS	2				5	5			5	4	4		3												
PP		CF	4				5		5		5		4	4	5				5								
PP		DP	3				5		5		5																
PP		PP	3				4	4	5		5	5	5		5				5								
PP		SS						5	5		5		5		5				5								
IDF	a	BS								4	3	B	1	1	1		1,4		4								
IDF	a	CF					5			4	4		2	2		5	2,4		4,5								
IDF	a	DP					4			5	4	3,5	3	3	4		3,5		5								
IDF	a	PP													5		3										
IDF	a	SS							5				3		5		3										
IDF		AC																		2,3,4							3,4,5
IDF		BS	2	2,4	3		5	5	5	4	4	3,5	3,4	3,4	4		4,5		4,5	2,4	2,4	5	4				3,4
IDF		CF	4	4,5			5		5		4	5		5	4	5	4,5		5	3,5	3	5	4				4
IDF		DF																	5	2,3,4	3,4		2,4,5				5
IDF		DL																		2,4,5			2,3,4				
IDF		DP	3	4			5	5	5		5	5	5	5	5	5	5	5	5								
IDF		LP																					4				
IDF		ME																		5							
IDF		PP	3				5		5		5				5		5	5	5								
IDF		SD																		2,4							
IDF		SL																		4			4				
IDF		SS						5	5		5			5	5		5		5								
IDF		WL																		3			5				
MS		DF																								4	
MS		DL																								4	
MS		LP																							4	4	
MS		MS																								4	
MS		SL																		,					4	4	
MS		SU																								4	
MS		WL																							4	4	
MS		WR																								4	
SBPS		BS																					5				
SBPS		CF																					4		5	5	
SBPS		DL																					4,5		5		
SBPS		LP																							5	5	
SBPS		MS																							5		
SBPS		SL																							5	5	
SBPS		WL																							5	5	
SBPS		WR																							5	5	

Table 2. Ratings Assumptions for Columbian Sharp-tailed Grouse in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)

B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM				SOI													CEI							
ECOREGION			SRT		PTR	COH	OKH		NCR	TOP									ITR	FRP							CHR
BGC ZONE	PHASE	HABITAT	EKT	UCV	EPM	BOV	SOH	SOB	OKR	NOH	NOB	STU	NIB	GUU	THB	NTU	SHB	TRU	PAR	CAB	FRB	QUL	CHP	BUB	NAU	WCU	CCR
SBS		CF																						4,5	5		
SBS		DF																						4			
SBS		DL																						4	5		
SBS		LP				5																		5	5		
SBS		MR				5																					
SBS		MS																							5		
SBS		SD																						5	5		
SBS		SL				5																		4,5	5		
SBS		WL				5																		4,5	5		
SBS		WR				5																		4,5	5		

Species Account for the Prairie Sharp-Tailed Grouse
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

PRAIRIE SHARP-TAILED GROUSE

Scientific Name: *Tympanuchus phasianellus* (Linneaus)
Species Code: **B-STGR_PR**
Subspecies: *Tympanuchus phasianellus jamesi* is one of six susbspecies in North America, and one of two that occur in British Columbia (Connelly *et al.*).

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Sharp-tailed Grouse occurs locally in 3 disjunct populations; one scattered throughout the East Kootenay, the south and central interior north to the vicinity of Babine Lake, and the other in the parklands and boreal forests of northeastern British Columbia (Campbell *et al.* 1990).

Breeding Range of Prairie Sharp-tailed Grouse

This subspecies breeds in the Boreal Plains and Taiga Plains ecoprovinces.

The Sharp-tailed Grouse is the only tetranoid in the province that gathers on traditional 'dancing' grounds, or leks; therefore this habitat requirement is an important factor in the spring distribution of the species. It also gathers at these same leks in the autumn (Campbell *et al.* 1990).

Provincial Context

Resident from north-central Alaska east to central-western Quebec and south through the western North American interior to eastern Oregon, northern Nevada, Utah, northeastern New Mexico, western Nebraska, central South Dakota, northern Minnesota, northern Wisconsin, and northern Michigan (Campbell *et al.* 1990; Connelly *et al.* 1998).

Prairie Sharp-tailed Grouse occur in the Great Plains in subclimax brush-grasslands east of the Rocky Mountains from northeastern British Columbia, through central and southern Alberta, southern Saskatchewan, southwestern Manitoba south to northeastern Colorado and Nebraska.

Project Area

Ecoregions

All the ecoprovinces, ecoregions and ecosections in the northern and northeastern part of the province were examined for Prairie Sharp-tailed Grouse habitat in this project; for a list of those ecoregion units that contain potential Prairie Sharp-tailed Grouse habitat see Table 1.

Biogeoclimatic Zones

The Biogeoclimatic Zones that were evaluated for potential Prairie Sharp-tailed Grouse habitat included: the Boreal White and Black Spruce, Spruce - Willow - Birch and Alpine Tundra zones.

Elevation Range

For the project area, Prairie Sharp-tailed Grouse from occurs between 280 and 2,135 m in elevation (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Prairie Sharp-tailed Grouse frequents a variety of habitats but the presence of open lowlands (grasslands and agricultural fields) adjacent to brushy or scattered open woodlands is common to all. Habitats also include open parklands with adjacent trembling aspen, and spruce forests.

In March and April, small winter flocks begin to break up and males move onto leks, followed later by the females. There is a subtle, local altitudinal movement from more wooded areas to grassy lowlands. After mating ends in June, males drift away from leks to spend the summer in good foraging areas (Campbell *et al.* 1990).

Habitat Uses Rated

Reproducing, Living

The 2 life requisites that were rated for Prairie Sharp-tailed Grouse are living and breeding. Habitat requirements for all life requisites are dry and open habitat on flat or moderate south-facing slopes.

Seasonal Chronology

Spring, Summer, Autumn, Winter

The Prairie Sharp-tailed Grouse is a year-round resident in British Columbia, and was mapped for all seasons including breeding (summer). Courting begins in March and April, mating occurs in May and June (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Prairie Sharp-tailed Grouse use a variety of habitats especially open grassland habitats, trembling aspen forests of all ages, and cultivated fields which is associated with early herbaceous or low shrub age class.

At the broad scale grassy units used by this subspecies are bunchgrass/shrublands, cultivated fields, and meadows.

Provincial Benchmarks

Feeding and Reproducing in Summer for the following ecosystems for the Prairie Sharp-tailed Grouse were used as benchmarks for which all other life requisites and ecosystems were compared:

Ecosection:	Peace Lowland (PEL)
Biogeoclimatic Zone:	Peace Boreal White and Black Spruce Variant (BWBSmw1)
Habitats:	Boreal White Spruce/Trembling Aspen (BA)
Stand Structure:	recently disturbed (less than 20 old for normal forest succession) represented by grassy and shrubby communities or structural stage 1 using the Broad Ecosystem Inventory habitat classification (Ecosystems

Ratings Assumptions

For the specific ratings that were determined for Prairie Sharp-tailed Grouse's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class

system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Prairie Sharp-tailed Grouse species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Prairie Sharp-tailed Grouse.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open patches of grassland or meadow), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Habitats used for leks by this species are too small to be identified at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging, drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication The of Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers) Pages 88-91. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Prairie Sharp-] tailed Grouse. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
BOREAL PLAINS ECOPROVINCE (BOP)			
CENTRAL ALBERTA UPLAND	CAU	CLEAR HILLS	CLH
		HALFWAY PLATEAU	HAP
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL
SOUTHERN ALBERTA UPLAND	SAU	KISKATINAW PLATEAU	KIP
TAIGA PLAINS ECOPROVINCE (TAP)			
HAY RIVER LOWLAND	HRL	FORT NELSON LOWLAND	FNL
MUSKWA PLATEAU	MPL	MUSKWA UPLAND	MUU
NORTHERN BOREAL MOUNTAINS ECOPROVINCE (NBM)			
HYLAND HIGHLAND	HHI	HYLAND PLATEAU	HYP
LIARD BASIN	LIB	LIARD PLAIN	LIP

Table 2. Ratings Assumptions for Prairie Sharp-tailed Grouse in the Breeding Season.
(Table 1 Contains Ecoregion Unit Names
B = Benchmark for Breeding Habitat.

ECOPROVINCE			BOP				TAP	
ECOREGION			CAU		PRB	SAU	HSL	MPL
BGC ZONE	PHASE	HABITAT	CLH	HAP	PEL	KIP	FNL	MUU
BWBS		BA	3	5	2		5	5
BWBS		BB					4	4
BWBS		BG					4	4
BWBS		CF	1	4,5	B	2		
BWBS		MS	4	5	2			
BWBS		PR	5	4,5	3	3	5	5
BWBS		SB						5
BWBS		SH						5
BWBS		SU		5			5	5
BWBS		WL	5	5			4	4

Species Account for Flammulated Owl
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

FLAMMULATED OWL

Scientific Name: *Otus flammeolus* (Kaup)
Species Code: **B-FLOW**
Subspecies: Under review. *Otus flammeolus idahoensis* occurs in western North America north of Mexico

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Flammulated Owl occurs in south-central British Columbia from the Cariboo-Chilcotin south locally through the Thompson, Nicola and Okanagan valleys. Small numbers occur in the West and East Kootenays (Campbell *et al.* 1990).

Breeding Range

Breeding range – nesting confirmed or adults observed during breeding season – in southernmost British Columbia, Okanagan and South Thompson Valleys, Fraser River north to Riske Creek, east Kootenay Trench (McCallum 1994).

The Flammulated Owl breeds locally in the Thompson-Okanagan Plateau along valley sides of the Northern Thompson Upland and Thompson Basin, the southern Fraser Plateau and throughout the Okanagan Valley. Nests have been found between 610 and 1,210 m elevation. (Campbell *et al.* 1990)

Provincial Context

The Flammulated Owl is perhaps the most common Strigiform of the montane ponderosa pine forests *of south-central British Columbia,* of the western United States, and Mexico. It is highly migratory in the northern United States and Canada (McCallum 1994).

It breeds from south-central British Columbia south through the western cordillera into Mexico. It winters in Mexico and Guatemala (Campbell *et al.* 1990; McCallum 1994).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Flammulated Owl in this project; For a list of those ecoregion units that contain potential Flammulated Owl habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Flammulated Owl habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

The elevation range for this species is between 375 and 1,250 m in the project area (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Flammulated Owl appears to be restricted to mountainous valley side areas within the Interior Douglas-fir biogeoclimatic zone where Douglas-fir is the dominant climax species and ponderosa pine is a seral species. It also prefers forests over 100 years in age and highest densities occur in age classes 140 to 200+ years (Campbell *et al.* 1990).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Flammulated Owl were living and breeding. Habitat requirements for all life requisites include open and mature Douglas-fir and ponderosa pine habitat (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn

In spring, the Flammulated Owl arrives in British Columbia, during the first half of May. Most nesting is well underway by mid-May. Most birds have departed by early September although late records have occurred to the third week of October (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

In British Columbia, this species is restricted to the Douglas-fir, ponderosa pine and Douglas-fir/ponderosa pine habitat classes under the Broad Terrestrial Ecosystem Inventory classification system. Structural stages 4 and 6 are preferred for their open and mature structure with low shrub cover.

Provincial Benchmarks

Feeding and Reproducing in Spring and Summer for the following ecosystems, for Flammulated Owl, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Thompson Basin (THB)
Biogeoclimatic Zone:	Thompson Very Dry Hot Interior Douglas-fir Variant (IDFxh2)
Habitats:	Douglas-fir, Douglas-fir/Ponderosa Pine
Stand Structure:	Old growth coniferous age classes (greater than 140 years) represented by structural stage 6 in the Broad Ecosystem Inventory classification (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Flammulated Owl's' breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the

Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of Flammulated Owl species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for Flammulated Owl.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open forests versus dense forests within the Douglas-fir, ponderosa pine, or Douglas-fir/ponderosa pine forest units), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers), Pages 356-357. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units That Have Potential Habitats for Flammulated Owl.
(Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Flammulated Owl in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM				SOI												CEI				
ECOREGION			SRT		PTR		OKH		NCR	TOP								ITR		FRP				CHR
BGC ZONE	PHASE	HABITAT	EKT	UCV	EPM	MCR	SOH	SOB	OKR	NOH	NOB	STU	NIB	GUU	THB	SHB	TRU	PAR	SCR	CAB	FRB	QUL	CHP	CCR
BG		DF																			3			
BG		PP						2	4		4	5	5		5			5			3			
PP	a	PP						2			3	2						5						
PP		DP	5				3	3	4		3	3,5		5	5			5	5					
PP		PP	5				3	3	4	3	3	1	1	1,5	5		3	5	5					
IDF	a	DF																5						
IDF	a	DP					3		4	3	3	1	2,5	2	5	3,5		5						
IDF	a	PP													3	5		5						
IDF		DF	5	4	5	5	3		4,5	3,4	5	4,5		4	**B**	3,4,5	3,4	5	5	4,5	3,4,5	5	3,4,5	5
IDF		DP	5	4	5	5	3	2,4	4,5	3,4	3	1,5	1,3,5	1,5	**B**	3,4,5	5	5	5	5				
IDF		PP					3	2	5	3	3				2,3	3,5		5	5					

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Species Account for Western Screech-Owl
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
Habitat Conservation Trust Fund
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Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

WESTERN SCREECH-OWL

Scientific Name: **B-WSOW**
Species Code: *Otis kennicottii* (Elliot)
Subspecies: Two subspecies in British Columbia.
Otis kennicottii macfarlanei (southern interior of British Columbia
Otis kennicottii kennicottii (along Pacific coast of British Columbia)

Provincial Status: *O. t. macfarlanei* subspecies – Red-listed

Distribution

British Columbia Range

The Western Screech-Owl is essentially non-migratory; it occurs year-round on Vancouver Island, the Canadian Gulf Islands, and on the adjacent mainland coast throughout the Fraser Lowlands to Hope, and the Sunshine Coast. It probably also occurs as a local resident along the northern mainland coast, west of the Coast Mountains, north to at least Terrace. In the interior, it is a local resident below 600 m elevation from Adams Lake and Shuswap Lake south through the Okanagan Valley. Elsewhere, it is rarely encountered (Campbell *et al.* 1990).

Breeding Range

Most nesting sites are situated near water below 540 m in elevation. In the interior, it breeds mainly in the southern Okanagan Valley (Campbell *et al.* 1990); small numbers also breed near Castelgar in the West Kootenay.

Provincial Context

The Western Screech-Owl is resident from southeastern Alaska south along the coast to Baja California; in the interior it occurs from southern British Columbia south through Idaho, Utah, New Mexico, southeastern Colorado, and western Texas to southeastern Coahuila and Mexico City (Campbell *et al.* 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Western Screech-Owl in this project; For a list of those ecoregion units that contain potential Western Screech-Owl habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were rated for potential Western Screech-Owl habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, the Western Screech-Owl is found from 280 to 600 m in elevation; on the coast it seldom occurs above 100 m (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

On the coast, the Western Screech-Owl is found in all woodland habitats, but it prefers mixed deciduous/coniferous forests, usually near a source of water. In the interior, most birds are found in deciduous woodlands along lakeshores and streams. It roosts in tree cavities, nest boxes, buildings, coniferous trees, vines, and crevices in cliffs (Campbell *et al.* 1990).

The Western Screech-Owl nests in open, deciduous and coniferous woods and riparian habitats including rivers, creeks, marshes, bogs, lakes, and large ponds. In urban and residential areas it frequents orchards, parks, and gardens. It frequently nests and roosts in artificial nest boxes.

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Western Screech-Owl were living and breeding. Habitat requirements for all life requisites are open coniferous or deciduous forests located near water on flat or sloped habitat (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn, Winter

The Western Screech-Owl is a non-migratory, year-round resident, although young birds may disperse regionally from mid-summer through autumn. Hooting has been recorded in every month, but in the interior it begins in earnest in early March. Egg-laying occurs from mid-March to late May and young appear between early May and June (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Western Screech-Owl uses mixed riparian forest habitats that are represented by Douglas-fir, ponderosa pine and interior grand fir, in the Broad Ecosystem Inventory classification, in structural stages 3 and 5 which characterize mixed conifer/deciduous structure. Riparian and wetland use is represented by cottonwood riparian, redcedar riparian, white spruce riparian – all in structural stages 3 and 5 – as well as slow perennial streams, and wetlands.

Provincial Benchmarks

Feeding and Reproducing in Summer in the following ecosystems, for Western Screech-Owl, were used as benchmark for which all other life requisites and ecosystems were compared:

Ecosection:	Nanaimo Lowland (NAL)
Biogeoclimatic Zone:	Very Dry Maritime Coastal Western Hemlock Variant 2 (CWHxm2)
Habitats:	Coastal Douglas-fir (CD)
Stand Structure:	young, mature and old forests (60 to 140 years old) of broad-leaved or mixed deciduous and coniferous) represented by structural stages 3 - 6 using the Broad Ecosystem Inventory habitat classification (Ecosystems

Ratings Assumptions

For the specific ratings that were determined for Western Screech-Owl's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Western Screech-Owl species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Western Screech-Owl.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open versus closed forested habitat, or narrow riparian forests beside a river or lake), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

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Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990.The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers), Pages 358-359. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Western Screech-Owl. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
COASTAL GAP	COG	HECATE LOWLAND	HEL
		KIMSQUIT MOUNTAINS	KIM
		KITIMAT RANGES	KIR
HECATE CONTINENTAL SHELF	HCS	QUEEN CHARLOTTE STRAIT	QCT
NASS RANGES	NAR	NASS MOUNTAINS	NAM
PACIFIC RANGES	PAC	CENTRAL PACIFIC RANGES	CPR
		EASTERN PACIFIC RANGES	EPR
		NORTHERN PACIFIC RANGES	NPR
		NORTHWESTERN CASCADE RANGES	NWC
		OUTER FIORDLAND	OUF
		SOUTHERN PACIFIC RANGES	SPR
WESTERN VANCOUVER ISLAND	WVI	NORTHERN ISLAND MOUNTAINS	NIM
		NAHWITTI LOWLAND	NWL
		WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
		STRAIT OF GEORGIA	SOG
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT

Table 2. Ratings Assumptions for Western Screech-Owl in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM		SOI										COM												
ECOREGION			NCM		TOP								OKH	NCR	PAC						COG		NRA	WVI			HCS
BGC ZON	PHASE	HABITAT	SCM	SPM	NOH	NOB	STU	GUU	NIB	THB	SHB	TRU	SOB	OKR	CPR	EPR	NPR	NWC	OUF	SPR	HEL	KIR	NAM	NIM	NWL	WIM	QCT
BG		CR												3													
BG		PP				2			4	4,5			2	5													
PP	a	PP				3																					
PP		CR						5																			
PP		DP				3		5		5			2	3													
PP		PP				3	5	5	5	5			3	3													
PP		WR				2				5																	
IDF	a	DP			3		5	5	5	5	5			4													
IDF	a	PP								5	5																
IDF		DF			4	4	5			5	4			4		3											
IDF		DP			4	3	5			5	3,4	4	4	4,5													
IDF		IH														3											
IDF		PP				3				5	3,4		4	4													
IDF		RD														3											
IDF		RR														4											
IDF		WR				3					3,5			4													
ICH		DF	5	5																							
ICH		DP	5																								
ICH		RR	4																								
ICH		WL	4																								
CDF		CD																									
CDF		CG																									
CDF		CR																									
CDF		CW																									
CDF		DA																									
CDF		GO																									
CDF		SR																									
CDF		UR																									
CWH		CD													4	3	4	3	4	3				3			
CWH		CH																	4	3	4	4			4	4	4
CWH		CR																									
CWH		CW													4	3	4	3	4	3				3,4			
CWH		FR														4				4				4	4	4,5	
CWH		HB														5											
CWH		HS														5											
CWH		SR													4	5		4	4	4			4				
CWH		UR																									
CWH		WL																									

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B = Benchmark for Breeding Habitat.

ECOPROVINCE			GED					
ECOREGION			LOM		EVI		GPB	
BGC ZON	PHASE	HABITAT	FRL	GEL	LIM	NAL	SGI	SOG
BG		CR						
BG		PP						
PP	a	PP						
PP		CR						
PP		DP						
PP		PP						
PP		WR						
IDF	a	DP						
IDF	a	PP						
IDF		DF						
IDF		DP						
IDF		IH						
IDF		PP						
IDF		RD						
IDF		RR						
IDF		WR						
ICH		DF						
ICH		DP						
ICH		RR						
ICH		WL						
CDF		CD				3	2	2
CDF		CG				3	3	3
CDF		CR				3		
CDF		CW				2	2	2
CDF		DA				4		
CDF		GO				4	4	
CDF		SR				3		
CDF		UR				4	4	
CWH		CD	1,2	5	1,2,5	B	3	3
CWH		CH	2	5				
CWH		CR	2		3	3		
CWH		CW	1,2	5	1	1	3,4	3
CWH		FR	4	5	4,5	5		
CWH		HB						
CWH		HS						
CWH		SR	3,4		3,4	3,4		
CWH		UR	5		4,5	5		
CWH		WL			5	4		

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Species Account for Long-eared Owl
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

LONG-EARED OWL

Scientific Name: *Asio otus* (Linneaus)
Species Code: **B-LEOW**
Subspecies: *Asio otus tuffsi* breeds in British Columbia

Provincial Status: Not applicable

Distribution

British Columbia Range

The Long-eared Owl occurs chiefly throughout the southern one-third of the interior of the province, with its centre of abundance on the Thompson-Okanagan Plateau. It occurs regularly on the southern mainland coast and in the Cariboo-Chilcotin where it is a local breeder. There are isolated breeding records from the Prince George region, Peace River and Muncho Lake Provincial Park (Campbell *et al.* 1990).

Breeding Range

The Long-eared Owl breeds mainly in the interior from the Okanagan and Nicola valleys, Douglas Plateau, and South Thompson River valley, north to Chilako River and Nulki Lake. Small numbers also breed in the Lower Mainland, in the vicinity of Prince George, and near Muncho Lake in the northern Rocky Mountains. The centre of abundance is the Okanagan Valley (Campbell *et al.* 1990).

Roosting Habitat Requirements

The Long-eared Owl uses deciduous woodlands, often in mixed and riparian situations adjacent to open country including trembling aspen groves, black cottonwood stands, and birch tangles along rivers and creeks, tall willow-thickets bordering marshes, sloughs, and damp meadows, deciduous thickets on islands in lakes, shrub-choked ravines, dry orchards, and hawthorn thickets on dry hillsides (Campbell *et al.* 1990).

Provincial Context

This is a Holartic species. In North America, it breeds from northeastern and central British Columbia, southern Northwest Territories, southern Nunavut, Ontario, and Quebec to California, Texas, Arkansas, and Virginia to northwestern Mexico. Winters from southern Canada south Texas, the Gulf coast and Georgia (Campbell *et al.* 1990; Marks *et al.* 1994).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Long-eared Owl in this project; For a list of those ecoregion units that contain potential Lon-eared Owl habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Long-eared Owl habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

The Long-eared Owl occurs from 280 to 1200 m in elevation in the interior, and near sea level on the coast (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

Although the Long-eared Owl prefers to nest and roost in dense vegetation, it hunts almost exclusively in open habitats (Marks et al. 1994).

This species usually breeds in deciduous thickets composed of pure and mixed stands of western birch, tall willows, trembling aspen, hawthorn, black cottonwood, and occasionally wild cherry and red alder. Nests are often associated with wetlands. Specific habitats include river bottoms, shores of lakes and ponds, banks of creeks, wet and dry gullies, wet and damp meadows and marshes, and occasionally dry hillsides. Nests have been found from near sea level to 1,020 m elevation (Campbell *et al.* 1990).

The Long-eared Owl typically nests in trees, laying its eggs in the abandoned stick nests of other species such as American Crow and Black-billed Magpie. It may also nest in cavities in trees or cliffs, and occasionally on the ground (Marks et al. 1994).

Habitat Uses Rated

Living, Reproducing, Roosting

The 3 life requisites that were rated for Long-eared Owl included: living, breeding and roosting. Requirements for foraging include open habitats for hunting such as grasslands, shrublands, and early seral forests (structural stage 1).

Seasonal Chronology

Spring, Summer, Autumn, Winter

The migration patterns of the Long-eared Owl in British Columbia are poorly understood, partly because of the presence of the species year-round in some areas of the province. Birds in the northern interior are migratory, while those in the extreme south-central interior may be only partially migratory. The breeding season begins in mid-March and continues until August. Roosting begins as early as mid-August and continues into the winter (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Long-eared Owl uses a variety of habitats for different life requisites. Breeding requires dense stands of tall brushes in wetlands or mature structure such as ponderosa pine and riparian forests. Living requisites in the spring and summer require more open habitats for hunting, examples of this using the Broad Ecosystem Inventory habitat classes are antelope-brush, bunchgrass steppe, cultivated fields, and sagebrush steppe, as well as, ponderosa pine and riparian forests which have herbaceous or low shrub vegetation in the understory.

In autumn and winter, mature structure, especially tall shrubs, is required again for roosting and protection from predators. Douglas-fir, ponderosa pine, and riparian forests are used in proximity to open habitats for hunting.

Provincial Benchmarks

Feeding and Reproducing in the Spring and Summer in the following ecosystems, for Long-eared Owl, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Nicola Basin (NIB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Bunchgrass Variant (BGxh1)
Habitats:	Western Redcedar – Black Cottonwood Riparian (RR)
Stand Structure:	Young forests (less than 60 years old) of broad-leaved or mixed deciduous and coniferous - structural stage 3 using the Broad Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Long-eared Owl's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Long-eared Owl species and habitat requirements.

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The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Long-eared Owl.

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- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., black cottonwood stands along a river, but not the river itself) were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since the publication of The Birds of British Columbia (Campbell *et al.* 1990).

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ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
COASTAL GAP	COG	KITIMAT RANGES	KIR
NASS RANGES	NAR	NASS MOUNTAINS	NAM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
		CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	NECHAKO LOWLAND	NEL
BOREAL PLAINS ECOPROVINCE (BOP)			
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL

Table 2. Ratings Assumptions for Long-eared Owl in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Winter Habitat.

ECOPROVINCE			SIM			SOI												CEI						GED	SBI
ECOREGION			NCD		NCM	OKH		NCR	TOP								ITR	FRP				CHR	EHM	LOM	FAB
BGC ZONE	PHASE	HABITAT	FLV	ELV	SCM	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	CAB	FRB	QUL	CHP	CCR	BUB	FRL	NEL
BG		CR					B	2,3																		
BG		DF																		3						
BG		DP												4												
BG		PP					4	3		4	1			4												
BG		SP												3												
PP	a	PP					3,5			4	3,4							4,5								
PP		CR									3,4	3,4														
PP		DP				4,5		3		4	3,4															
PP		PP				4,5	4	3		4	3,4		3,4	5	5		5	4,5								
PP		SP												3												
PP		WR								4				5												
IDF	a	DP				5			5	3	4	4	4	3,5		3,4		4,5								
IDF	a	PP									4			5												
IDF		AC																	3,5				5			
IDF		DF				4,5		5	4,5	5	4,5	4		4,5	4	4,5			2,3	2	5	3,4,5	5			
IDF		DP				4,5	5	5	4,5	3	4,5	4	4	4,5	5	3,4,5	5	4,5	4,5							
IDF		PP				4,5		5	4	3				4		3,4,5		4,5								
IDF		RR							4,5						4											
IDF		WL										4			4	4,5	5		4	4						
IDF		WR						5	4	3		5			5	3,5			2,3,4		5	3,4,5	5			
ICH		RR			1,5																					
SBS		LS																						5		
SBS		WL																						5		
SBS		WR																						5		5
MS		WR	5	5																						
CDF		BG																							5	
CDF		ES																							5	
CWH		CR																							5	
CWH		SR																							5	
CWH		WL																							5	

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Species Account for Short-eared Owl
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
Habitat Conservation Trust Fund
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Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

SHORT-EARED OWL

Scientific Name: *Asio flammeus* (Pontoppidan)
Species Code: **B-SEOW**
Subspecies: None recognized in British Columbia.

Provincial Status: Blue-listed

Distribution

British Columbia Range

This species occurs throughout British Columbia, and maybe found year-round in the Lower Fraser River Valley. Infrequently it has been found throughout the year on southeastern Vancouver Island and in southern interior (Campbell *et al.* 1990).

Breeding Range

The Short-eared Owl breeds locally, and erratically, in the south and central interior from Creston and the southern Okanagan Valley north through the Thompson and Chilcotin-Cariboo Basins to Prince George, and on the south mainland coast through the Fraser River delta east to Sumas. There is a single breeding record for the extreme northwestern area of British Columbia. It is probably more widely distributed than records indicate (Campbell *et al.* 1990).

Spring and Autumn Migrations

Migration patterns are not well known, mainly because of the difficulty of separating over-wintering, resident, and migratory populations and the species' dependence on fluctuation microtine populations (Campbell *et al.* 1990).

Provincial Context

The Short-eared Owl is one of the world's most widely distributed owls. It is an open country, ground-nesting species that inhabits marshes, grasslands, and tundra throughout much of North America and Eurasia (Holt and Leasure 1993). This species is nearly cosmopolitan. In North America, it breeds from Alaska across the southern Canadian Arctic to northern Quebec and Newfoundland south locally to central California, Utah, Kansas, Ohio, and New Jersey. It winters from southern Canada south to California, Texas, and Florida (Campbell *et al.* 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Short-eared Owl in this project; and all were found to contain potential Short-eared Owl habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Short-eared Owl habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

For the project area, this bird can be found from 280 to 2,165 m.

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Short-eared Owl is a diurnal, sometime gregarious species, that occurs in a wide variety of open-country habitats throughout the province, including alpine meadows, marshes, swamps, sloughs, estuaries, lakeshores, spits, marine foreshores, beaches, and lagoons, as well as sedge-cranberry fields, sedge-hardhack associations, grasslands, rangelands, and grassy fields. In addition, it is frequently found in human created

habitats such as airports, golf courses, dykes, and agricultural fields (Campbell *et al.* 1990).

Breeding habitat consists of open environments with short vegetation, including rangelands, grasslands, near-dry marshes, farmlands, low-arctic tundra, brushy fields, and forest clearings (Campbell *et al.* 1990).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Short-eared Owl in this project were living and breeding. Habitat requirements for all life requisites are open grass and shrublands, and early seral riparian, and coniferous forests (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn, Winter

In southern areas, the spring movement occurs mostly from late March through mid-April, and the autumn movement occurs from late October through November. The breeding season extends from late March into mid-September, depending on population levels of microtines (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

Primary habitats used by the Short-eared Owl include grassland and shrubland environments such as antelope brush, bunchgrass-steppe, and sagebrush-steppe. Other habitat types include meadows, wetlands, cultivated fields, and early seral redcedar riparian for their shrub component and proximity to grasslands. Similarly, early seral Douglas-fir and ponderosa pine forests, which have, open shrub structure are frequented during migration.

These birds do not use steep habitats, however there is some use of gentle south-facing and north-facing slopes. They winter primarily in cultivated fields, bunchgrass-steppe, and sagebrush-steppe, however the value for this season in British Columbia is low because most birds have left the province.

Provincial Benchmarks

Feeding and Reproducing in Spring and Summer in the following ecosystems, for Short-eared Owl, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Fraser River Basin (FRB)
Biogeoclimatic Zone:	Very Dry Mild Interior Douglas-fir subzone (IDF xm)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	herbaceous climax or disclimax communities as represented by structural stage 0 in the Broad Ecosystem Inventory habitat classification (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Short-eared Owl's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Short-eared Owl species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at four age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Short-eared Owl.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., small wetlands and meadows or grasslands within a forested unit) could not be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisites include:
  foraging
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers) Pages 382-385. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table 1. Ratings Assumptions for Short-eared Owl in the Breeding Season. (Master Report Contains Table With Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM			SOI												CEI					GED	SBI
ECOREGION			NCM		SBF	OKH		NCR	TOP								ITR	FRP				CHR	LOM	FAB
BGC ZONE	PHASE	HABITAT	SCM	SPM	SFH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	PAR	CAB	FRB	QUL	CHP	CCR	FRL	NEL
BG		AB					5																	
BG		BS					5			5			2	4,5					2					
BG		CF						4		5			5	5					5					
BG		SS					5	5		5		5		5					5					
PP	a	PP					5																	
PP		AB					5			5														
PP		BS				5	4			5	5		5											
PP		CF								5														
PP		SS					5			5			5											
IDF	a	BS							3	2	5	2	2,5	5		2	5							
IDF	a	CF				5			4	4						4								
IDF	a	SS											3			3								
IDF		BS							5	5		5	5			5		5	B	5	5	5		
IDF		CF							5						4	5		5	5					
IDF		ME																5						
IDF		SS								5						5								
IDF		WL																5						
ICH		CF	3		5																			
ICH		DF	5	5																				
ICH		DP	5																					
ICH		OV	5																					
ICH		RR	5																					
ICH		WL	5		4																			
CDF		CF																					1	
CDF		ES																					3	
CDF		TR																					2	
CDF		UR																					1	
CWH		CF																					2,3	
CWH		UR																					2,3	
CWH		WL																					3	
SBS		CF																						4
SBS		UR																						4
SBS		WL																						4

Species Account for Common Poorwill
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

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Victoria, B.C.

February, 2003

COMMON POORWILL

Scientific Name: *Phalaenoptilus nuttallii* (Audubon)
Species Code: **B-COPO**
Subspecies: *Phalaenoptilus nuttallii nuttallii* breeds in British Columbia

Provincial Status: Not Applicable

Distribution

British Columbia Range

The Common Poorwill occurs mainly in the Bunchgrass and Interior Douglas-fir biogeoclimatic zones of the southern interior from the Okanagan Valley north through the Nicola and Thompson valleys and locally in the Cariboo-Chilcotin region. It is rarely found west of the Coast Mountains, or east of the Kettle Valley (Campbell *et al.* 1990).

Breeding Range

The Common Poorwill breeds in the Okanagan Valley (from Osoyoos north to Coldstream), the Nicola and Thompson valleys, and locally in parts of the Cariboo-Chilcotin region (Campbell *et al.* 1990).

Provincial Context

The Common Poorwill breeds from south-central British Columbia and Alberta, south through the western United States to central Mexico. It winters from the southern United States to the southern limits of its breeding range (Campbell et al. 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Common Poorwill in this project; For a list of those ecoregion units that contain potential Common Poorwill habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Common Poorwill habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

The elevation for this species in the project area ranges from 280 to 1500 m (Campbell et al. 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

This species forages and roosts in open grassland and mature, open ponderosa pine and/or Douglas-fir forests. Open rocky habitats often with scant vegetation are also used.

The Common Poorwill breeds in semi-arid, open habitats including ponderosa pine forests, lower level Douglas-fir forests with a parkland-like character, dry pastureland, and rocky sagebrush-bunchgrass hillsides (Campbell *et al.* 1990).

Habitat Uses Rated

Reproducing, Living

The 2 life requisites that were rated for Common Poorwill were living and breeding. Habitat requirements for all life requisites are dry, open and/or mature habitat on flat or moderate south-facing slopes.

Seasonal Chronology

Spring, Summer, Autumn

The Common Poorwill is a summer visitant in British Columbia, but life requisites are mapped for spring, summer and autumn (fall) seasons, including the breeding period. This species may arrive in the Okanagan Valley as early as mid-April, but the main movement occurs in mid-May. At this time loose flocks of up to 20 birds can be found. Most have left for the wintering grounds by mid-September, but a few may remain until October (Campbell et al. 1990).

Habitat Use and Ecosystem Attributes

Habitats used by the Common Poorwill all occur in the dry biogeoclimatic zones: Bunchgrass, Ponderosa Pine, Interior Douglas-fir, and Interior Cedar - Hemlock. Concentrations of birds occur in open grass and shrub habitats: antelope brush, bunchgrass-steppe, and sagebrush-steppe. In forested habitats they occupy open, mature, coniferous forests typically ponderosa pine, Douglas-fir and mixtures of both.

Provincial Benchmarks

Breeding and Feeding in Spring and Summer in the following ecosystems, for the Common Poorwill, were used as benchmarks from which all other habitat uses and ecosystems were compared:

Breeding -

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Bunchgrass Variant (BGxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	Mature forests (60 to 140 years old) represented by structural stage 4 in the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000)

Feeding -

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Bunchgrass Variant (BGxh1)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	climax or disclimax herbaceous or shrubby vegetation represented structural stage 0 in the Broad Ecosystem Inventory habitat classification (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Common Poowwill's' breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of Common Poorwill species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for Common Poorwill.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (*e.g.*, a grassy opening within a forested unit) were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisites include:
  foraging
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers). Pages 394-395. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Resources Inventory Committee. 1999. British Columbia Wildlife Habitat Ratings Standards. Version 2.0. BC Ministry of Environment, Lands and Parks, for the Terrestrial Ecosystem Task Force, Resources Inventory Committee. Victoria, BC. 97 pages.

Table1. Ecoregion Units in British Columbia That Contain Potential Habitats for Common] Poorwill. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
GEORGIA DEPRESSION ECOPROVINCE (GED)			
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Common Poorwill in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM	SOI												CEI		
ECOREGION			SRT	OKH		NCR	TOP								ITR	FRP		
BGC ZON	PHASE	HABITAT	UCV	SOH	SOB	OKR	NOH	NOB	STU	NIB	GUU	THB	SHB	TRU	PAR	CAB	FRB	CHP
BG		AB			1													
BG		BS			1			1	3	3		2,3						
BG		DF															3,4	
BG		DP										3						
BG		PP			B	2		1	3			3,4						
BG		SS			1	2		1	3		3	3					4	
PP	a	PP			2			1	4						3,4			
PP	a	SS													3			
PP		AB			2			1										
PP		BS			2			1	4	4		5						
PP		DP				3		1		4								
PP		PP			2	3		1	4			4		4	4			
PP		SS			2	3		1							4			
IDF	a	BS					2	2	4	4			2		4			
IDF	a	DP					2,3	2	4			4	2		4			
IDF	a	PP										4						
IDF	a	SS																
IDF		BS		1	3		2,4	3	4	4	4	4	3,4		4			
IDF		DF	4,5	1,2			2,3,4						4				4	4
IDF		DP		1,2	3		2,3,4	3	4	4	4	4	3,4	3,4	4	4		
IDF		PP		1,2			3,4	3					3,4		4			
IDF		SS			3			3					3		4			

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Species Account for Lewis's Woodpecker
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Prepared for:
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Terrestrial Information Branch,
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Victoria, B.C.

February, 2003

LEWIS'S WOODPECKER

Scientific Name: *Melanerpes lewis* (Gray)
Species Code: **B-LEWO**
Subspecies: None recognized in British Columbia.

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Lewis's Woodpecker is regionally distributed across southern British Columbia from Vancouver Island (now casual) east to the British Columbia/Alberta border and north locally to the Chilcotin-Cariboo Basin. It wanders irregularly and has been reported as far north Hazelton, Takla Lake, and Indianpoint Lake in the central interior of the province. It is casual on the coast outside of Vancouver Island (Campbell *et al.* 1990).

Breeding Range

The Lewis's Woodpecker breeds locally throughout the southern interior of the province from the Similkameen Valley east through the West and East Kootenays and north locally to the Chilcotin-Cariboo. Its centre of abundance is the Okanagan Valley. Breeding habitats include a mixture of open forested areas including deciduous and coniferous groves, open ponderosa pine forests, sagebrush/bunchgrass grassland with living and dead snags, farmland and rangeland with trees, pastureland, orchards, and urban areas. It breeds from 250 to 950 m elevation (Campbell *et al.* 1990).

Provincial Context

This species breeds from south-central British Columbia and south-western Alberta south to northern Arizona and south-central California. It winters from southern British Columbia south to northern Mexico (Campbell *et al.* 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Lewis's Woodpecker in this project; For a list of those ecoregion units that contain potential Lewis's Woodpecker habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Lewis's Woodpecker habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

This species is found from 280 to 1,150 m elevation in the study area (Campbell *et al.* 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

This species frequents open mixed deciduous and coniferous forests and bottomland environments throughout its range including edges of pure forests and mixed woodlands, deciduous groves near lakes and streams, burns, logged areas, farmland, pastureland, orchards, rural gardens, and urban areas. Availability of cavities is critical, in either living or dead trees. In winter, this species is mostly restricted to residential areas or orchards (Campbell *et al.* 1990).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Lewis's Woodpecker are living and breeding. Habitat requirements for all life requisites include open grassland, rangeland and/or

shrub habitats with standing living or dead snags and mature coniferous or deciduous forests on flat or gently sloping habitat (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn, Winter

Lewis's Woodpecker is a migratory species in British Columbia. The main spring movement occurs during the first 2 weeks of May, although some birds may arrive in mid-April in the extreme southern interior. Breeding occurs from mid-April through July. The autumn movement, begins in August when large wandering flocks can be seen. This movement peaks in late August and early September. By the end of September most birds have departed and only small numbers winter in lowland valleys such as the Okanagan Valley, mostly from Vaseaux Lake to Summerland (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

Lewis's Woodpecker uses a variety of habitats: grasslands and shrublands; living and dead snags; mature riparian, coniferous, and deciduous woodlands; urban environments and orchards (in the Okanagan Valley). Bunchgrass-steppe, sagebrush-steppe, and antelope-brush steppe are open habitats with appropriate requisites are used for foraging and breeding. Riparian forests are mapped as cottonwood riparian, western redcedar riparian, and white spruce riparian and this species uses structural stage 5 for these habitats, which is the open, mature, deciduous stage.

The coniferous forest types used are pure and mixed Douglas-fir, ponderosa pine, and Douglas-fir/lodgepole pine. The structural stages used are: 1, which is open herbaceous/low shrub habitat; 4 open, mature coniferous; 5 open, mature aspen coniferous mixture; and 6 old growth coniferous. Strictly deciduous habitats are isolated in trembling aspen copse habitats in structural stage 5, mature deciduous structure.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Lewis's Woodpecker, were used as benchmarks for which all other life requisites and ecosystems were rated:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Ponderosa Pine Variant (PPxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	Structural stage 5 (mature forests, 60 to 140 years old, of broad-leaved or mixed deciduous and coniferous) using the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Lewis's Woodpecker's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Lewis's Woodpecker species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Lewis's Woodpecker.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., snags or snag habitat within a grassland unit), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

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Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey through Woodpeckers), Pages 422-425. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Resources Inventory Committee. 1999. British Columbia Wildlife Habitat Ratings Standards. Version 2.0. BC Ministry of Environment, Lands and Parks, for the Terrestrial Ecosystem Task Force, Resources Inventory Committee. Victoria, BC. 97 pages.

Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Lewis's]
Woodpecker. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
PACIFIC RANGES	PAC	EASTERN PACIFIC RANGES	EPR
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	JUAN DE FUCA STRAIT	JDF
		SOUTHERN GULF ISLANDS	SGI
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CARIBOO MOUNTIANS	CAM
		CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CARIBOO PLATEAU	CAP
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Lewis's Woodpecker in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM											SOI													CEI			
ECOREGION			NCD		WRA	SRT		PTR		NCM			SBF	OKH		NCR	TOP									ITR	FRP			CHR
BGC ZONE	PHASE	HABITAT	ELV	FLV	SPK	EKT	UCV	EPM	MCR	SCM	SPM	CCM	SFH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	CAB	FRB	CHP	CCR
BG		AB													5															
BG		BS													5			4			5	5						5		
BG		CR													2	2														
BG		DF																										4		
BG		DP																				3,4								
BG		OV													3			5												
BG		PP													1	2		1,2				3,4								
BG		SS													5	5		4		5		5				5		4		
BG		UR													5			5			5	5								
PP	a	PP													3			3,4								4				
PP	a	SS																								5				
PP		AB													4			4												
PP		BS				3								4	4		4	4	5		5	5								
PP		CR																		3										
PP		DP				1										3		1,3												
PP		OV																5												
PP		PP				1								3	B	3	4	1,3	3		3	3			5	5				
PP		SS													4	5		4			5	5				5				
PP		UR				5								5				5												
PP		WR				2												3				3,4								
IDF	a	BS																4	5	5	5	3,5		4,5		5				
IDF	a	DF																								4				
IDF	a	DP												4			3	3,4	3	4	4	4		3,4		5				
IDF	a	OV																5						5						
IDF	a	PP																				3,4		4						
IDF	a	SS														5					5	5		5						
IDF	a	UR																5						5						
IDF		AC																									5			
IDF		BS				3	3,5	5						3,4	5	5	5	5	5	5	5	5		5		5	5		5		
IDF		DF	1,4		1	1,3	1,3,5	5	4				5	3,4		5	3,4		5			5	4,5	3,4,5			4,5		4,5	4
IDF		DP			1	1,3	5		4					3,4	3	4	3,4	4	4,5	4	4	4	4	4,5	4	4,5				
IDF		OV																5						5						
IDF		PP												3,4		4		4				4		4		5				
IDF		RR					4										3,4													
IDF		SS													5	5		5				5		5		5				
IDF		UR				5	5							5				5					5	5						
IDF		WR				4	4,5	5	4							4	4	4					4	4,5			5		5	
ICH		DF								5	5	5	5																	
ICH		DP								5	5		5																	
ICH		OV								5																				
ICH		RR	3							5		5	5																	
ICH		UR										5																		
MS		WR	4	4																										

Species Account for Williamson's Sapsucker
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

WILLIAMSON'S SAPSUCKER

Scientific Name: *Sphyrapicus thyroideus* (Cassin)
Species Code: **B-WISA**
Subspecies: Two subspecies occur in North America and both are found in British Columbia.
Sphyrapicus thyroideus thyroideus in the Okanagan
Sphyrapicus thyroideus Natalie locally in southeastern British Columbia

Provincial Status: *S. t. natalie* – Red-listed
S. t. thyroideus – Blue-listed

Distribution

British Columbia Range

The Williamson's Sapsucker is restricted to south-central British Columbia north to the vicinity of Hat Creek and locally in the extreme southern East Kootenay. It breeds in forested areas at elevations between 850 and 1300 m, principally in western larch, Douglas-fir, and ponderosa pine forests. South of Merritt and near Princeton, birds have been found nesting in groves of trembling aspen (Campbell *et al.* 1990).

Breeding Range

The Williamson's Sapsucker breeds at high elevations throughout the Thompson-Okanagan Plateau from Anarchist Mountain north to the vicinity of Terrace Mountain and

Scottie Creek (Cache Creek) and west to the Manning Park and Lytton areas. It formerly bred in the East Kootenay (*S. t. natalie*) (Campbell *et al.* 1990).

Spring and Autumn Migration

The Williamson's Sapsucker arrives in British Columbia by mid-April and begins moving out of the province in late summer through the first 2 weeks in September (Dobbs *et al.* 1997). This species leaves the province before the onset of deep winter, they are usually gone by mid-October (Campbell *et al.* 1990). It appears to flock during migration (Swarth, 1904 in Dobbs *et al.* 1997). Frequently this sapsuckeris observed in lower elevations below coniferous forest habitat outside of breeding season (Campbell *et al.* 1990; Dobbs *et al.* 1997).

Provincial Context

This species inhabits open coniferous and mixed coniferous-deciduous forest of western North America (Dobbs *et al.* 1997). It breeds from south-central and southeastern British Columbia south to New Mexico. Winters from Arizona to central Mexico (Campbell *et al.* 1990).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Williamson's Sapsucker in this project; For a list of those ecoregion units that contain potential Williamson's Sapsucker habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Williamson's Sapsucker habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

The elevation for this species in the project area ranges from 310 to 1,425 m (Campbell et al. 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Williamson's Sapsucker frequents montane forests, principally western larch forests of the Interior Douglas-fir biogeoclimatic zone. It has occasionally been observed in orchards in the Okanagan Valley (Campbell *et al.* 1990). Dry parkland forests in the higher, montane biogeoclimatic zones, which have western larch, Douglas-fir, spruce and trembling aspen are also used. This species does not use grassland habitats, as they forage on sap and ants found in forested habitats (Dobbs *et al.* 1997).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for the Williamson's Sapsucker were living and breeding. Habitat requirements for all life requisites are open mixed coniferous forests located on flat habitat (Campbell *et al.* 1990).

Seasonal Chronology

Spring, Summer, Autumn

The Williamson's Sapsucker arrives in British Columbia by mid-April; the breeding season lasts from mid-April to mid-July. Most birds have probably left the province by mid-September, although they can occasionally be found as late as mid-October (Campbell *et al.* 1990).

Habitat Use and Ecosystem Attributes

The Williamson's Sapsucker primarily uses western larch forests, however this forest type is not mapped in the Broad Ecosystem Inventory as it is associated with several other tree species. Therefore, in selected ecosections and biogeoclimatic zones Douglas-fir, ponderosa pine, lodgepole pine, spruce and grand fir habitat combinations were rated alternatively. Structural stages 4, 5 and 6 are used by this species for their open and mature structure. Structural stage 5 for cottonwood and white spruce riparian habitats have value for trembling aspen component.

Provincial Benchmark

Feeding and Reproducing in the following ecosystems, for the Williamson's Sapsucker, were used as benchmarks for which all other life requisites and seasons were compared:

Ecosection:	North Okanagan Highlands (NOH)
Biogeoclimatic Zone:	Kettle Dry Mild Interior Douglas-fir Variant (IDFdm1)
Habitats:	Douglas-fir – Lodgepole Pine (DL)
Stand Structure:	mature forests (60 to 140 years old) of broad-leaved or mixed deciduous and coniferous) represented by structural stage 5 using the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Williamson's Sapsucker's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Williamson's Sapsucker species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Williamson's Sapsucker.

Methodology Assumptions

- The Williamson's Sapsucker uses western larch forests which are not mapped at the 1:250,000 BEI level, so associated habitat types were evaluated.

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., western larch), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  - foraging
  - drinking
  - roosting
  - cover
  - thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1990. The Birds of British Columbia, Volume 2, Non-Passerines (Diurnal Birds of Prey Through Woodpeckers), Pages 434-435. Environment Canada, Canadian Wildlife Service, Delta BC, Royal British Columbia Museum, Victoria, BC. 636 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Williamson's] Sapsucker. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK

Table 2. Ratings Assumptions for Williamson's Sapsucker in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM							SOI												
ECOREGION			NCD			WRA	SRT		PTR	OKH		NCR	TOP									ITR
BGC ZONE	PHASE	HABITAT	COC	ELV	FLV	SPK	EKT	UCV	EPM	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR
BG		PP												5								
PP	a	PP												4								3
PP		DL																				
PP		DP					5					5		4								
PP		PP					5				5	5	5	4								
IDF	a	DP											5									4
IDF		DF		4			5	5	5	1,2			1,5		4					4		
IDF		DL								1,2		4	**B**	5	4,5	5	5		4,5	4,5	4,5	
IDF		DP					5			1,2	5		1,5	4	2			5		4		
IDF		PP								2			2	4						4		
ICH		DL		5																		
MS		DL		4									4									
MS		SD	4	4																		
MS		SF	4																			

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Species Account for Gray Flycatcher
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
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Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

GRAY FLYCATCHER

Scientific Name: *Empidonax wrightii* (Baird)
Species Code: **B-GRFL**
Subspecies: None recognized in North America (Sterling 1999).

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Gray Flycatcher has a restricted distribution in British Columbia; it only occurs locally in the southern Okanagan Valley, between Oliver and Summerland (Campbell *et al.* 1997).

Breeding Range

The Gray Flycatcher only breeds only in the southern Okanagan Valley. Breeding locations include Summerland, the Vaseaux Lake area, and along the Camp McKinney Road east of Oliver (Campbell *et al.* 1997).

Spring and Autumn Migrations

The Gray Flycatcher has been recorded in the province from April 29 to September 2 (Campbell *et al.* 1997). Most birds arrive in May and depart in August.

Provincial Context

The Gray Flycatcher breeds from extreme south-central British Columbia and south-central Idaho south through the Great Basin desert of the western United States to south-central California, southern Nevada, central Arizona, south-central New Mexico, and locally in western Texas. Winters from central Arizona and northern Mexico south to central Mexico and Baja California (Campbell *et al.* 1997; Sterling 1999).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Gray Flycatcher in this project; For a list of those ecoregion units that contain potential Gray Flycatcher habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Gray Flycatcher habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

The elevation for this species in the project area ranges from 280 to 600 m (Campbell et al. 1990).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Gray Flycatcher's preferred habitats include areas where ponderosa pine forests meet grasslands in a narrow elevational band along benchlands above the valley (Campbell *et al.* 1997).

Breeding habitat in British Columbia is restricted to open ponderosa pine forests with an understorey of grasses and scattered shrubs or young pines that the flycatcher uses for perching (Campbell *et al.* 1997). Shrubs may consist of antlelope-bush, threetip sagebrush, or buckbrush.

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for the Gray Flycatcher were living and breeding. Habitat requirements for all life requisites are open ponderosa pine forests located or antelope brush on flat landscapes (Campbell *et al.* 1997).

Seasonal Chronology

Spring, Summer, Autumn

Spring arrival can begin as early as the last week of April, but most birds return in early May, with the peak movement from mid- to late May. The entire breeding period extends from late May to early August. The southward, movement is evident in August and rarely extends into early September (Campbell *et al.* 1997).

Habitat Use and Ecosystem Attributes

This Gray Flycatcher inhabits only the Bunchgrass and Ponderosa Pine biogeoclimatic zones. The specific habitats used include antelope-brush; and pure ponderosa pine and Douglas-fir/ponderosa pine structure in structural stages 1 (shrub stage), 2 (pole sapling), and 4 (mature) for their association with antelope-brush in the rated areas. They also require flat or gentle south-facing slopes in low elevations, see above biogeoclimatic zones.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Gray Flycatcher, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Ponderosa Pine Variant (PPxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	young conifer forests (less than 60 years old)- structural stage 2 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000).

Ratings Assumptions

For the specific ratings that were determined for Gray Flycatcher's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class

system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Gray Flycatcher species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Gray Flycatcher.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open versus dense ponderosa pine stands), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
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- Living requisite includes many aspects, such as:
  foraging
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  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1990).

- Security/Thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Gray Flycatcher] (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
THOMPSON - OKANAGAN PLATEAU	TOP	NORTHERN OKANAGAN BASIN	NOB

Table 2. Ratings Assumptions for Gray Flycatcher in the Breeding Season.
(Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SOI	
ECOREGION			OKH	TOP
BGC ZONE	PHASE	HABITAT	SOB	NOB
BG		AB	1	
BG		PP	1,2	1,2
PP	a	PP	1,2	1,4
PP		AB	1	1
PP		DP		2,3,5
PP		PP	B	3,4

Species Account for Pygmy Nuthatch
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

PYGMY NUTHATCH

Scientific Name: *Sitta pygmaea* (Vigors)
Species Code: **B-PYNU**
Subspecies: Eight recognized in North America; only *Sitta pygmaea tenuissima* is resident (southern interior). Two other races are rare – *Sitta pygmaea cookei* (northeastern British Columbia and *Sitta pygmaea aculeata* (southeastern British Columbia), (Kingery and Ghalambor 2001).

Provincial Status: Not applicable

Distribution

British Columbia Range

The Pygmy Nuthatch has a restricted distribution in the province and occurs regularly only in the Southern Interior ecoprovince. It is most numerous in the Okanagan Valley, and becomes less common further north and west in the Thompson Plateau. It is locally distributed in the Southern Interior Mountains ecoprovince, mainly in the East Kootenay Trench between Newgate and Radium. Only a few occurrences have been reported from the West Kootenay; Christina Lake appears to be as far east as it regularly occurs in that region (Campbell et al. 1997).

Breeding Range

The breeding distribution of the Pygmy Nuthatch is essentially restricted to ponderosa pine forests (sometimes Douglas-fir/ponderosa pine) of the Southern Interior, mainly in

the Similkameen and Okanagan valleys. Breeding also occurs in the Nicola and Thompson valleys (Campbell et al. 1997).

Provincial Context

This species is essentially considered a resident from southern interior British Columbia, northern Idaho, western Montana, central Wyoming and southwestern South Dakota south generally west of the Rocky Mountains, to Baja California, southern Nevada, southeastern Arizona, and Mexico (Campbell et al. 1997; Kingery and Ghalambor 2001).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Pygmy Nuthatch in this project; For a list of those ecoregion units that contain potential Pygmy Nuthatch habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Pygmy Nuthatch habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, this species is reported from valley bottoms at elevations of 280 up to 1,370 m (Campbell et al. 1997).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

Throughout the year the Pygmy Nuthatch is primarily associated with open forests of ponderosa pine, mixed ponderosa pine and Douglas-fir, and western larch. During the winter, most of the Pygmy Nuthatch population remains associated with old-growth or mature ponderosa pine stands, but some flocks enter residential areas along the valleys of the Thompson, Okanagan, Similkameen, and Kootenay rivers, where they forage in ornamental conifers and occasionally visit backyard bird feeders (Campbell et al. 1997). Some may roost in residential buildings.

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Pygmy Nuthatch were living and breeding. Habitat requirements for all life requisites are open, mature coniferous forests, mainly ponderosa pine (Campbell *et al.* 1997).

Seasonal Chronology

Spring, Summer, Autumn, Winter

The Pygmy Nuthatch is resident in the province throughout the year. The breeding season extends from early April (egg-laying) to early September (fledging) (Campbell et al. 1997).

Habitat Use and Ecosystem Attributes

Habitat types used by the Pygmy Nuthatch, with Broad Ecosystem Inventory habitat classes, are ponderosa pine, Douglas-fir, and mixtures of both. These forests are open and have grassy understory in the interior and all age classes are rated. Black cottonwood and white spruce riparian habitats in mature and old age classes also have value for this species as foraging and roosting sites. Urban and residential environments and orchards and vineyards are used by this species in the winter in the Okanagan valley.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Pygmy Nuthatch, were used as benchmarks for which all other life requisites and ecosystems were compared:

Feeding -	
Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanogan Very Dry Hot Ponderosa Pine Variant (PPxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	Old growth coniferous age classes (greater than 140 years) represented by structural stage 6 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000)

Reproducing-	
Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanogan Very Dry Hot Ponderosa Pine Variant (PPxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	mature forests (60 to 140 years old) of broad-leaved or mixed deciduous and coniferous) represented by structural stage 5 using the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Pygmy Nuthatch's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Pygmy Nuthatch species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Pygmy Nuthatch.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., single ponderosa pine trees in bunchgrass-steppe or sagebrush-steppe habitats), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting

cover
thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1997).

- Security/Thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 1997. The Birds of British Columbia, Volume 3, Passerines (Flycatchers Through Vireos), Pages 286-291. Environment Canada, Canadian Wildlife Service, Delta BC, British Columbia Ministry of Environment, Lands and Parks, Victoria, BC, and University of British Columbia Press, Vancouver, BC. 693 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Pygmy Nuthatch
(Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		FRASER RIVER BASIN	FRB
		NAZKO UPLAND	NAU

Table 2. Ratings Assumptions for Pygmy Nuthatch in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM	SOI											
ECOREGION			SRT	OKH		NCR	TOP								ITR
BGC ZONE	PHASE	HABITAT	EKT	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	SHB	TRU	PAR
BG		CR			3	4									
BG		DP										1,2			
BG		OV			4			1							
BG		PP			1,2	4,5		1,2				1,2,4			
BG		UR			1							5			
PP	a	PP			2,3			1,2							
PP		DP	4,5			1,2		1,2							
PP		OV						4							
PP		PP	4,5		B	1,2	2,3	1,2				1,2		5	5
PP		UR						4				4			
PP		WR						4				4			
IDF	a	DP		2,3			2,3	2,3	5	5	5	4,5	2,3,5		
IDF	a	OV						5					5		
IDF	a	PP										4	5		
IDF	a	UR						5					5		
IDF		DF		2,3			3,4	5	4,5	5		5	4,5		
IDF		DP		2,3	1,2	3,4	2,3,4	1,2	5			5	1,2,3,5		5
IDF		OV						4					4		
IDF		PP		2,3		3,4	2,3	1,2				5	1,2		5
IDF		UR						4,5					4		
IDF		WR				5		4		5			4,5		

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Species Account for Western Bluebird
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

WESTERN BLUEBIRD

Scientific Name: *Sialia mexicana* (Swainson)
Species Code: **B-WEBL**
Subspecies: Only *Sialia mexicana occidentalis* occurs in British Columbia

Provincial Status: Interior Population – Not Applicable

Distribution

British Columbia Range

The Western Bluebird is widely distributed across the southern portions of the province from Vancouver Island east to the British Columbia-Alberta border, and north through the interior to southern portions of the Central Interior and Sub-Boreal Interior ecoprovinces where it is far less common. Formerly, it occurred regularly, in small numbers, on southeastern Vancouver Island. There are scattered records for western and northern Vancouver Island and along the mainland coast to north Powell River (Campbell *et al.* 1997).

In the interior, it is most numerous in the Okanagan Valley, but also occurs locally across the province east of the Cascade Mountains from Manning Park (rarely) to the Rocky Mountain Trench. Small numbers occur in the Thompson and Nicola Valleys and in the East and West Kootenays. It has been reported as far north as Anahim Lake in the Central Interior (Campbell *et al.* 1997).

The Western Bluebird reaches its highest numbers in winter in the Okanagan Valley of the Southern Interior. It favours open plant communities but not requiring the extensive, open habitats sought by the Mountain Bluebird (Campbell *et al.* 1997).

Breeding Range

The Western Bluebird breeds across southern areas of the province from southeastern Vancouver Island east to Castlegar in the lower Columbia River valley and Fort Steele in the Rocky Mountain Trench (Campbell *et al.* 1997), north in the Okanagan and Thompson Valleys to Enderby, Kamloops, and Heffley Creek. On Vancouver Island, there are no records of nesting north of Comox. This species reaches its highest numbers in summer in the Southern Interior (Campbell *et al.* 1997).

Staging Habitat Requirements

During spring migration, mainly in April and early May, small flocks gather to forage in snow-free vegetation. In autumn, mainly August and September, larger flocks, often with many juveniles forage in open areas before departing to wintering grounds.

Provincial Context

The Western Bluebird is is restricted to western North America where it ranges from southern British Columbia, western and south-central Montana, and north-central Colorado south through the mountains to northern Baja California, western and southern Nevada, southern Utah, western and southeastern Arizona, western Texas, and New Mexico south to the Mexican highlands (Campbell *et al.* 1997; Guiran *et al.* 2000).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Western Bluebird in this project; For a list of those ecoregion units that contain potential Western Bluebird habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Western Bluebird habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

For the project area, Western Bluebirds can be found from 280 to 1,200 m in elevation (Campbell *et al.* 1997).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

In the interior, preferred habitats include open-growth forests of ponderosa pine and Douglas-fir adjacent to open environments. It also can be found in orchards, farm fields, fenced roadsides, suburban parks with plantings of Russian olive, swales with red-osier dogwood thickets, rangeland edges, and stands of big sagebrush (Campbell *et al.* 1997).

Specific habitats for this species includes flower fields; weedy, logged or burned forests, farms, Garry oak woodlands, and log-strewn or stony beaches, where the bluebird forages on intertidal and upper-beach invertebrates. During the 1950s, it was common on the Fraser River delta, where mixed farming was practiced, since then natural nest sites have been destroyed and nest boxes were provided (Campbell *et al.* 1997).

The Western Bluebird nests primarily within human-influenced habitat, including forests, grasslands, and park-like woodlands. In all habitats, it prefers interspersed trees and meadows. In the interior, cultivated farms, rural and suburban lands, orchards, and vineyards provide over one-half of the habitat used; open stands of ponderosa pine and Douglas-fir interspersed with areas of big sagebrush and grasses provide another one-third (Campbell *et al.* 1997. Vigorous nest box programs during the past decade or so have increased local breeding populations and slowly extended its range eastward and northward in the province.

Habitat Uses Rated

Living, Reproducing, Staging

The 3 life requisites that were rated for Western Bluebird were living, breeding, and staging. Habitat requirements for all life requisites are open grasslands interspersed amongst open forests at lower elevations (Campbell *et al.* 1997).

Seasonal Chronology

Spring, Summer, Autumn, Winter

In the Southern Interior, the small number of wintering birds is augmented by returning migrants about the second week of March, with the number of birds reaching a peak by the end of March. This species has been recorded breeding (egg-laying to fledging) in the interior from April 10 to August 24. Migration occurs in late summer and early autumn from August to October. Small numbers may linger through the winter in some years (Campbell *et al*, 1997)

Habitat Use and Ecosystem Attributes

Using the Broad Ecosystem Inventory classification, Western Bluebird is found in Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, and Montane Spruce biogeoclimatic zones. Habitat use is characterized by: grasslands and shrublands, antelope brush, bunchgrass, sagebrush-steppe; aspen copse; coniferous forests, Douglas-fir, ponderosa pine, Douglas-fir/ponderosa pine mix, interior grand fir; and human-influenced habitats, cultivated fields, orchards/vineyards, and urban areas (in winter). This species uses all structural stages because of the forest structure mixed with grassy areas, and is present on flat or gently sloping landscapes.

Breeding occurs in open habitats such as antelope brush, bunchgrass, sagebrush-steppe and along edges or fencerows of cultivated fields. Ponderosa pine forests with mature to old structure are also used for the open areas in the Okanagan Basin.

Provincial Benchmarks

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Western Bluebird, were used as benchmarks from which all other life requisites and ecosystems wee compared:

Feeding -

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Bunchgrass Variant (BGxh1)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	Open grassland climax or disclimax communities - structural stage 0 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000).

Breeding -

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Ponderosa Pine Variant (PPxh1)
Habitats:	Ponderosa Pine (PP)
Stand Structure:	Structural stage 5 (mature forests, 60 to 140 years old, of broad-leaved or mixed deciduous and coniferous) using the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Western Bluebird's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Western Bluebird species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Western Bluebird.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open versus closed canopy forests of the same habitat class or small open copses in bunchgrass-steppe and sagebrush-steppe communities), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

References

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Western] Bluebird. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
		STRAIT OF GEORGIA	SOG
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Western Bluebird in the Breeding Season. (Table 1 Cointains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM					SOI											GED			
ECOREGION			SRT		PTR	NCM	SBF	OKH		NCR	TOP								LOM	NAL	GPB	
BGC ZONE	PHASE	HABITAT	EKT	UCV	MCR	SCM	SFH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	FRL	NAL	SGI	SOG
BG		AB							2													
BG		BS							2			1	5		5	5						
BG		CF							2	2		1	5		5	5						
BG		DP														5						
BG		OV							4			5										
BG		PP							2,4	2,3		2,3,4	5			3,5						
BG		SS								2		2	5	5		3,5						
BG		UR											5		5							
PP	a	PP							2,4			3,4	5									
PP		AB							1			2										
PP		BS	4					3	1		5	2	5		5							
PP		CF	4					4		3		2		5	5							
PP		DP	4,5					5		3,4		2,3										
PP		OV										5										
PP		PP	4,5					5	B	3,4	5	2,3	5		5							
PP		SS							1	3		2			5							
PP		UR	5																			
IDF	a	BS									5	4	5					4				
IDF	a	CF						2			5	4						4				
IDF	a	DP						3,4			5	4,5	5					4,5				
IDF	a	OV										5						5				
IDF	a	UR										5						5				
IDF		BS	4	4,5				4	3		4,5	5	5					5				
IDF		CF	4	4,5				4			4,5	5					5	5				
IDF		DF						4,5			5						5	5				
IDF		DP	4,5	5	5			4,5	3,4		4,5	5						5				
IDF		PP						4,5			4,5	5						5				
IDF		SS							3			5						5				
IDF		UR	5					5														
ICH		CF				5	5															
ICH		OV				5																
ICH		UR		5		5	5															
CDF		CF																		5	5	
CDF		GO																		5	5	
CWH		CD																			5	5
CWH		CF																	5			

Species Account for Mountain Bluebird
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

MOUNTAIN BLUEBIRD

Scientific Name: *Sialia currucoides* (Bechstein)
Species Code: **B-MOBL**
Subspecies: No subspecies recognized in North America.

Provincial Status: Not Applicable

Distribution

British Columbia Range

The Mountain Bluebird is widely distributed across the southern regions of the province. On the coast, it occurs most years, on southeastern Vancouver Island, from Victoria to Campbell River, and in the Fraser Lowland on the adjacent mainland. It occurs infrequently on the Sunshine Coast, and the rest of Vancouver Island and north along the coast to the upper Skeena River valley, as well as on the Queen Charlotte Islands. The northernmost coastal records are from Meziadin Lake and Stikine River (Campbell *et al.* 1997).

In the interior, the Mountain Bluebird occurs north to the Cariboo and Chilcotin areas and locally in the Nechako and Bulkley River valleys and in the Peace Lowland. Further north, it is sparsely distributed. Specific localities along the British Columbia/Yukon boundary extend from Chilkat Pass, in the far west, to the Kwokullie Lake area in the northeastern corner of the province (Campbell *et al.* 1997).

Breeding Range

The Mountain Bluebird breeds across the province east of the Coast Ranges from Manning Park to the Crowsnest Pass and north to the Cariboo and Chilcotin areas. Its known breeding distribution north of 55°N latitude includes only 4 localities: Beryl Prairie, Sawmill Lake (Telegraph Creek), Atlin, and Aline Lake (Campbell *et al.* 1997).

This bluebird does not normally nest west of the summit of the Cascade Mountains. On the coast, there are only 2 confirmed nesting occurrences: Whistler (Atla Lake; Campbell *et al.* 1997) and Hazelton (Campbell *et al.* 1997). The Mountain Bluebird reaches its highest numbers in summer in the Okanagan Valley in the Southern Interior ecoprovince (Campbell *et al.* 1997).

Spring and Autumn Migrations

In migration, the Mountain Bluebird uses a variety of habitats, including the edges of ponderosa pine forests, rangeland, trembling aspen parkland, areas of burned or cut-over forest with standing snags, the arbutus-Garry oak-Douglas-fir association of eastern Vancouver Island, subalpine meadows, farmsteads, meadows and pastures, especially those where fence posts or powerlines offer perching sites. On southeastern Vancouver Island, migrant Mountain Bluebirds also seek the open summits of hills and low mountains (Campbell *et al.* 1997).

Provincial Context

This species breeds from east-central Alaska, southern Yukon, north-central Alberta, central Saskatchewan, and western Manitoba south in the mountains east of the Coast Mountains to southern California and New Mexico; east to North Dakota, Nebraska, and Oklahoma. It winters from southern British Columbia (casually) to Baja California, and in the eastern parts of its range, from Montana south to Mexico (Campbell *et al.* 1997; Power and Lombaro 1996).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Mountain Bluebird in this project; Mountain Bluebird Potential habitat exits in all Ecoprovinces; all but two ecoregions - Nass Basin and Yukon - Stikine Highlands; and all but 12 ecosection - Cassiar Rang, Cranberry Upland, Eastern Muskwa Range, Meziadin Mountains, Nass Basin, Northern Omineca Mountains, Queen Charlotte Ranges, Queen Charlotte Strait, Stikine Highland, Tagish Highland, Tahlatan Highland and Western Muskwa Ranges.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Mountain Bluebird habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-

fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

For the project area, this bird can be found from 280 m to the high mountain passes and alpine meadows at over 2,700 m elevation (Campbell *et al.* 1997).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

This bird has expanded its range into the Cariboo and Chilcotin due to active nest box programs by naturalist clubs working co-operatively with the BC Cattlemen's Association.

The characteristic nesting habitat of this bluebird in British Columbia features open space, and is centered on the rangelands and parklands. Nesting is associated with grassland, including those dominated by big sagebrush. Following in importance were areas influenced by human activity, and open forest stands of ponderosa pine, interior Douglas-fir, and trembling aspen. Subalpine meadows are also used (during autumn migration and port-fledging period), as were burns in subalpine and montane forests.

The Mountain Bluebird will use any appropriate cavity in open habitats for nesting and as a consequence its range has expanded north-westward. It is uncertain, at this time, whether or not this would have happened anyway.

Habitat Uses Rated

Living, Reproducing, Staging

The 3 life requisites that were rated for Mountain Bluebird were living, breeding, and staging. Habitat requirements for all life requisites are grasslands and open forests from valley bottoms to alpine habitats (Campbell *et al.* 1997).

Seasonal Chronology

Spring, Summer, Autumn, Winter

In the interior, the spring migration may begin as early as the second week of February, but mostly it occurs from early March and continues until the end of April. The entire breeding season occurs from March 29 to August 13. The autumn migration occurs

from mid-August to mid-September mostly in subalpine areas. Very few birds stay to winter in the interior (Campbell *et al.* 1997).

Habitat Use and Ecosystem Attributes

This species is widespread and uses a variety of habitat types. Using the Broad Ecosystem Inventory classification many habitat types structural stages suitable for this bird.
Unlike other dry forest and grassland species, the Mountain Bluebird is not restricted by habitat type, but rather by structure. They are found in all biogeoclimatic zones within the project area, and were mapped for any habitat type within those zones where the forest or grassland structure is suitable.

The Class 1 breeding habitats for this species are found in the Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones in the North and South Okanagan Basins, Fraser River Basin, and Thompson Basin ecosections. Optimal habitat types for this activity are antelope brush, bunchgrass, sagebrush-steppe, and cultivated fields on flat landscapes.

Alpine and subalpine biogeoclimatic zones for this project include, Alpine Tundra, open edges of Engelmann Spruce - Subalpine Fir, Montane Spruce, Sub-Boreal Pine - Spruce, and Sub-Boreal Spruce. Habitat types used in these areas range from grasslands and meadows; deciduous forests, such as, trembling aspen copses and structural stage 3 and 5 (which has deciduous structure in the Broad Ecosystem Inventory classification) for coniferous forest types; and parkland forests.

Provincial Benchmark

Feeding and Reproducing in the Spring and Summer in the following ecosystems, for the Mountain Bluebird, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Bunchgrass Variant (BGxh1)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	herbaceous or shrubby climax or disclimax communities – structural stage 0 in the Broad Terrestrial Ecosystem Inventory (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Mountain Bluebird's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Mountain Bluebird species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Mountain Bluebird.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., the amount of trembling aspen in structural stages 3 and 5 or open versus closed canopy forests of the same habitat class), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

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Table 1. Ratings Assumptions for Mountain Bluebird in the Breeding Season. (Master Report Contains Table With Ecoregion Unit Names.) **B** = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM																			SOI																	
ECOREGION			NCD		WRA		SRT				PTR		NCM						SBF	COH		OKH		NCR		TOP												ITR		
BGC ZONE	PHASE	HABITAT	ELV	FLV	SPK	NPK	EKT	UCV	BBT	UFT	EPM	MCR	SCM	SPM	CCM	BOV	CAM	NKM	SFH	SHH	QUH	SOH	SOB	OKR	HOR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	SCR	LPR
BG		AB																					1,3															
BG		BS																					B				1,3			3,4	1,3,4,5						
BG		CF																					3	3			1			3	1,3				4		
BG		CR																					5	5														
BG		DF																																			
BG		DP																												3,4						
BG		OV																					4				5										
BG		PP																					3,4,5	4,5			3,4,5				3,4,5				5		
BG		SS																					1,3	3,4			1,3			3	1,4,5				4,5		
BG		UR																												5	5						
BG		UV																																			
PP	a	BS																									4										
PP	a	PP																					2,5				4,5								3,4		
PP	a	SS																					3	4			4								3,4		
PP		AB																					4				3										
PP		BS					3															3,4	4,5	4		5	3,4	4		4	3						
PP		CF					3															3		3			3		4	4	3				4		
PP		CR																											5								
PP		DP					3,4,5															4	4,5	4,5			4,5				4				5		
PP		OV																									5										
PP		PP					3,4,5															4,5	3,4,5	4,5		5	4,5	5		5	3,4,5			5	4,5	4,5	
PP		SS																					1,3	3,5			3,4		5	4,5	4,5				4,5		
PP		UR																													5				5		
PP		WR					5																														
IDF	a	BS																								4	3,4	3,5	3	3	4,5		3,4		3,5		
IDF	a	CF																				2				4	3		3	3		5	3		3,5		
IDF	a	DF																																	5		
IDF	a	DL																										5		5							
IDF	a	DP																				3,4		5		4,5	4,5	4,5	4,5	4,5	5		4,5		4,5		
IDF	a	PP																													4,5		4,5		5		
IDF	a	SS																						5						3	4		3				
IDF		AC																																			
IDF		BS					3,5	3,5			5											3	4	4,5		4,5	4,5	4	4,5	4,5	5		4,5		4,5		
IDF		CF			4		3	3			5	5										3		4		4	4	4	4		5	3,4,5	3,4,5	4,5			
IDF		DF	4,5		5		4,5	3,4,5				5								5		4,5		5		5	5	4,5	4,5		5	4,5	4,5	5	5	5	5
IDF		DL					5	5				5										5						5	5	5	5	5	5	5	5	5	
IDF		DP			4		4,5	3,4														4,5	4,5	5		4,5	4,5	4,5	4,5	4,5	5	4,5	4,5	4,5	4,5	4,5	
IDF		LP																																			
IDF		PP																				4,5	5	5		4,5	4,5				5		4,5		4,5	5	
IDF		SD																																5	5		
IDF		SS																					1,3	4,5			3,4		4		4,5		3,4		4,5	5	
IDF		UR																															5	5			
IDF		WR						5																													
ICH		BS																								5											
ICH		CF	4							5			4	4	4			4	3,5	4,5													5				
ICH		DF													5				5	5								5					5				
ICH		DL	5	5																5	4																
ICH		DP											5	5	5				4,5			4,5															
ICH		IH														5	4	4			4,5																
ICH		IS														5	4	4			4,5																
ICH		LP														4					4																
ICH		OV											5																								
ICH		RB														4					4																
ICH		RR	5																																		
ICH		SF															4				4																
ICH		SL															4																				
ICH		UR							5									4		5	4																
ICH		WL															4	4																			
ICH		WR																			4																

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ECOPROVINCE			CEI										COM				SBI								NBM		BOP	
ECOREGION			FRP								CHR		PAC		SAU	PRB	FAB		OMM			CRM			BMP		CAU	
BGC ZONE	PHASE	HABITAT	CAB	FRB	QUL	CHP	CAP	BUB	NAU	WCU	CCR	WCR	EPR	SPR	KIP	PEL	BAU	NEL	ESM	MAP	PAT	HAF	MIR	NHR	STP	TEP	CLH	HAP
BG		AB																										
BG		BS		1,4																								
BG		CF		1,4																								
BG		CR																										
BG		DF		3,5																								
BG		DP		5																								
BG		OV																										
BG		PP		5																								
BG		SS		4,5																								
BG		UR																										
BG		UV		5																								
PP	a	BS																										
PP	a	PP																										
PP	a	SS																										
PP		AB																										
PP		BS																										
PP		CF																										
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PP		DP																										
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PP		PP																										
PP		SS																										
PP		UR																										
PP		WR																										
IDF	a	BS																										
IDF	a	CF																										
IDF	a	DF																										
IDF	a	DL																										
IDF	a	DP																										
IDF	a	PP																										
IDF	a	SS																										
IDF		AC	2,3								3,4																	
IDF		BS	2,3,4,5	1,4,5	3	3,4,5					4,5																	
IDF		CF	2,4	1	3	3,5					4																	
IDF		DF	4,5	3,5	4,5	4,5					5																	
IDF		DL	5	5		5					5																	
IDF		DP	4,5																									
IDF		LP				5																						
IDF		PP																										
IDF		SD	5	5																								
IDF		SS																										
IDF		UR	5																									
IDF		WR																										
ICH		BS																										
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ICH		SF																										
ICH		SL																										
ICH		UR																										
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ICH		WR																										

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ECOREGION			NCD		WRA		SRT				PTR		NCM						SBF	COH			OKH		NCR		TOP									ITR		
BGC ZONE	PHASE	HABITAT	ELV	FLV	SPK	NPK	EKT	UCV	BBT	UFT	EPM	MCR	SCM	SPM	CCM	BOV	CAM	NKM	SFH	SHH	QUH	SOH	SOB	OKR	HOR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	SCR	LPR
ESSF		EF																							5			5	5								
ESSF		SF																															5				
ESSF		SM																							5												
ESSF		WP																							5												
MS		BS																																	5		
MS		CF			5																																
MS		DF	5	5																				5													
MS		DL																										5					5		5	5	
MS		SD			5																							5							5		
MS		SF																							5			5					5		5	5	
MS		SL																														5				5	
SBPS		AC																																			
SBPS		BS																																			
SBPS		CF																																			
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SBPS		DL																																			
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SBPS		ME																																			
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SBPS		SF																																			
SBPS		SL																																			
SBS		CF								5																											
SBS		DF																																			
SBS		DL														4																					
SBS		EF																																			
SBS		LL				5																															
SBS		LP														4					5																
SBS		MS																																			
SBS		SD																																			
SBS		SF														4,5					5																
SBS		SL														4																					
SBS		UR								5																											
SBS		WR				5										4.5					5																
BWBS		BA																																			
BWBS		CF																																			
BWBS		ME																																			
BWBS		PR																																			
BWBS		UR																																			
CWH		CD																																			
CWH		CF																																			
CWH		CW																																			
CWH		ES																																			
CWH		SR																																			
CWH		UR																																			

Table 1. Ratings Assumptions for Mountain Bluebird in the Breeding Season. (Master Report Contains Table With Ecoregion Unit Names.) **B** = Benchmark for Breeding Habitat.

ECOPROVINCE			CEI										COM				SBI								NBM		BOP	
ECOREGION			FRP								CHR		PAC		SAU	PRB	FAB		OMM			CRM			BMP		CAU	
BGC ZONE	PHASE	HABITAT	CAB	FRB	QUL	CHP	CAP	BUB	NAU	WCU	CCR	WCR	EPR	SPR	KIP	PEL	BAU	NEL	ESM	MAP	PAT	HAF	MIR	NHR	STP	TEP	CLH	HAP
ESSF		EF																										
ESSF		SF																										
ESSF		SM																										
ESSF		WP																										
MS		BS									5																	
MS		CF																										
MS		DF																										
MS		DL									5																	
MS		SD																										
MS		SF																										
MS		SL																										
SBPS		AC				3,4,5																						
SBPS		BS				4,5	3																					
SBPS		CF				4	3		5	5																		
SBPS		DF					5																					
SBPS		DL				5	5		5																			
SBPS		LP							5	5																		
SBPS		ME				4																						
SBPS		MS							5																			
SBPS		SF							5																			
SBPS		SL							5	5																		
SBS		CF					4,5	2,4	5								4	3,4,5										
SBS		DF					5	4									4											
SBS		DL					5	4	4,5								5											
SBS		EF						4									4			4								
SBS		LL																										
SBS		LP						4	4,5								4,5	5		4								
SBS		MS							4																			
SBS		SD						4	4,5								5											
SBS		SF						4	4								5											
SBS		SL						4	4,5								4,5	5	4	4								
SBS		UR						4										4,5										
SBS		WR															4	5		4	5	4,5	5	5				
BWBS		BA													4	3											4	4
BWBS		CF													4	3											4	4
BWBS		ME																							5	5		
BWBS		PR																							5	5		
BWBS		UR													4	3												
CWH		CD											5	5														
CWH		CF											5	5														
CWH		CW										5	5	5														
CWH		ES												5														
CWH		SR										5		5														
CWH		UR											5															

Species Account for Sage Thrasher
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
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and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

SAGE THRASHER

Scientific Name: *Oreoscoptes montanus* (Townsend)
Species Code: **B-SATH**
Subspecies: None recognized in North America.

Provincial Status: Red-listed

Distribution

British Columbia Range

The Sage Thrasher is a locally rare species in British Columbia mainly because it is at the northern limit of its range. Numbers fluctuate from year to year, and in some years may not be present at all. It occurs regularly only in the Okanagan and Similkameen valleys of the Southern Interior ecoprovince. Historically, records have extended from Chopaka and Osoyoos, near the international boundary with Washington State, north to Vernon at the northern end of the Okanagan Valley (Campbell et al. 1997). Vagrants have appeared on the south coast, including Vancouver Island, and in the West Kootenay.

Breeding Range

Confirmed nesting records for British Columbia are from the arid sagebrush basins of the southern Okanagan and Similkameen valleys, from the vicinity of Chopaka, Osoyoos, Kilpoola Lake, Richter Pass, and White Lake (Campbell et al. 1997).

Provincial Context

The Sage Thrasher breeds from south-central British Columbia, central Idaho, south-central Montana, southwestern Alberta, southwestern Saskatchewan, northern and southeastern Wyoming, and Colorado south through eastern Washington, eastern Oregon, east-central California, southern Nevada, southern Utah, northeastern Arizona, northern New Mexico, northern Texas, western Oklahoma, and southwestern Kansas. Winters from central California, southern Nevada, northern Arizona, New Mexico, and central Texas south to southern Baja California. Also occurs in mainland Mexico (Campbell *et al.* 1997; Reynolds *et al.* 1999).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Sage Thrasher in this project; For a list of those ecoregion units that contain potential Sage Thrasher habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Sage Thrasher habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

This bird occurs from 280 to 950 m in elevation in the interior (Campbell et al. 1997).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Sage Thrasher frequents the tall shrub-steppe habitats characteristic of the Great Basin of western North America. This habitat is often characterized by its extensive stands of big sagebrush, antelope-brush, and rabbit-brush. In British Columbia, it extends north up the Similkameen and Okanagan valleys (Campbell et al. 1997).

Braun *et al.* 1976 (*in* Campbell *et al.* 1997) consider the Sage Thrasher as a sagebrush obligate, being almost entirely dependent on mature big sagebrush environments. In British Columbia, this bird is seldom seen in any other habitat.

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Sage Thrasher were living and breeding. Habitat requirements for all life requisites are exclusively dry and open sagebrush habitats on flat or gently sloping landscapes (Campbell et al. 1997).

Seasonal Chronology

Spring, Summer, Autumn, Winter

Migrants may arrive in the Okanagan Valley in early April, but most appear in May, sometimes not arriving until early June. The entire breeding season extends from late May to mid-August. In autumn, most birds leave the province in late August and early September. All birds have departed by the end of September (Campbell et al. 1997).

Habitat Use and Ecosystem Attributes

Using the Broad Ecosystem Inventory classification, the sage-brush habitats used by Sage Thrasher are associated with antelope-brush steppe, bunchgrass steppe, cultivated fields, and sage-brush steppe. They also utilize only flat or gently sloping landscapes.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Sage Thrasher, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Bunchgrass Variant (BGxh1)
Habitats:	Big Sagebrush Shrub/Grassland (SS)
Stand Structure:	shrubby climax or disclimax communities - structural stage 0 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000).

Ratings Assumptions

For the specific ratings that were determined for Sage Thrasher's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the

Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Sage Thrasher species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Sage Thrasher.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., the difference between dense sagebrush and open sagebrush stands), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Sage Thrasher.]
(Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
THOMPSON - OKANAGAN PLATEAU	TOP	NORTHERN OKANAGAN BASIN	NOB
		THOMPSON BASIN	THB

Table 2. Ratings Assumptions for Sage Thrasher in the Breeding Season.
(Table 1 Contains Ecoregion Unit Names).
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SOI			
ECOREGION			OKH	NCR	TOP	ITR
BGC ZONE	PHASE	HABITAT	SOB	OKR	THB	PAR
BG		AB	5			
BG		BS			5	
BG		SS	B	1		5
PP	a	SS				5
PP		SS	1	1		
IDF		DP		3		

Species Account for Nashville Warbler
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

NASHVILLE WARBLER

Scientific Name: *Vermivora ruficapilla* (Wilson)
Species Code: **B-NAWA**
Subspecies: Two in North America only *Vermivora ruficapilla ridgwayi,* occurs in British Columbia (Williams 1996).

Provincial Status: Not Applicable

Distribution

British Columbia Range

The Nashville Warbler is widely distributed across the southern mainland of British Columbia. It is fairly widespread in the Okanagan, Thompson, and West Kootenay regions at moderate elevations, but is scarcer in the East Kootenay. It is more sparsely distributed and local in the Cariboo and Chilcotin areas, reaching its northern limit south of Prince George in the Quesnel Lowland ecosection, vagrants have occurred on Vancouver Island (Campbell *et al.* 1997).

Breeding Range

The Nashville Warbler breeds mainly in the southern portions of the interior of the province from Osoyoos to Nelson and north to Squaam Bay on Adams Lake and the lower Blaeberry River valley near Golden, all in the Southern Interior or Southern Interior Mountains ecoprovinces. There are no nesting records west of the Okanagan Valley in the ecologically similar Similkameen Valley (Campbell *et al.* 1997).

The Nashville Warbler reaches its highest numbers in summer in the Southern Interior ecoprovince, from Osoyoos north to Kamloops. In the interior, most breeding occurs close to valley bottom elevations, between 350 and 450 m, but the species probably breeds to about 1,000 m (Campbell *et al.* 1997).

In southern British Columbia, singing males have been observed as high as 1,000 m on south-facing slopes in the Okanagan Valley (Cannings et al. 1987 *in* Williams 1996).

Spring and Fall Migrations

Spring migration mainly occurs from April 20 to May 19. The autumn migration is difficult to detect but appears to begin in early August, with the largest numbers moving between mid-August and mid-September. Most migrants have left the interior of the province by late September (Campbell *et al.* 1997).

In the interior, the Nashville Warbler migrates in fair numbers through the major valleys of the Southern Interior and Southern Interior Mountains ecoprovinces. Most spring migrants in the interior, are at valley bottom elevations but, as at the coast, the autumn migrants move over a wide elevation band and have been recorded as high as 2,150 m (Campbell *et al.* 1997).

This bird is a nocturnal migrant; in autumn, migrations respond to favourable weather conditions, especially high-pressure systems, clear skies, and strong north-northwest winds (Williams 1996).

Provincial Context

The Nashville Warbler breeds in 2 geographically separate regions of North America. In the west, *V. r. ridgwayi* breeds from the southern interior of British Columbia and northern and northwestern Washington south through the Cascade Range into northern, western, and southwestern Idaho and northwestern Montana; also in central and southern Oregon, northern California, and west-central Nevada. In the east, *V. r. ruficapilla* breeds from central Saskatchewan and Manitoba across central Ontario and southern Quebec, and through the Maritime provinces, south to central Minnesota, east to Connecticut, New York, Maryland, and West Virginia. Both subspecies winter from southern Texas south through Mexico to Honduras and El Salvador (Campbell *et al.* 1997; Williams 1997).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Nashville Warbler in this project; For a list of those ecoregion units that contain potential Nashville Warbler habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Nashville Warbler habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

During spring and late summer migration periods, the Nashville Warbler inhabits valley bottoms from 280 m to as high as 2,150 m elevation in the interior (Campbell *et al.* 1997).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

In British Columbia, the Nashville Warbler prefers open, second-growth forests, either mixed or deciduous, with abundant shrub growth. In the interior, except for a greater use of suburban environments during migration, habitat use during the nonbreeding seasons is similar to that of the breeding season (Campbell *et al.* 1997).

The Nashville Warbler nests on the ground and its breeding habitat in British Columbia includes the mixed arid forests of the ponderosa pine and Douglas-fir on the lower, often steep, southerly slopes of the mountains bordering the Okanagan Valley and small areas of the Columbia Valley. There, on dry hillsides, gullies through grassland slopes, and the edges of riparian areas, this warbler frequents an open understory of mock-orange, snowbrush, saskatoon, choke cherry, common snowberry, tall Oregon-grape, and roses (Campbell *et al.* 1997).

In the Creston Valley, it nests on open shrubby and bushy slopes vegetated with ocean-spray, saskatoon and mock-orange. Typically, the nesting territory includes tall shrubs and both deciduous and coniferous trees that are used for singing perches and for foraging (Campbell *et al.* 1997).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Nashville Warbler were living and breeding. Habitat requirements for all life requisites are open and dry forests, with coniferous, deciduous or riparian structure on either flat or sloped habitat (Campbell *et al.* 1997).

Seasonal Chronology

Spring, Summer, Autumn

The Nashville Warbler is migratory arriving in the interior from mid-April to mid-May in the spring. The entire breeding season occurs from mid-May to late July. The late-summer and early autumn migration occurs mainly from mid-August to mid-September and is usually finished by late September (Campbell *et al.* 1997).

Habitat Use and Ecosystem Attributes

The Nashville Warbler is strictly a brush and shrub bird that uses ponderosa pine and Douglas-fir/ponderosa pine mixed forests that are open and dry with a tall shrub understory; structural stages are rated depending on the density of the understory in a particular region. These habitat types are rated for breeding, especially on gentle to steep, south-facing slopes in the Bunchgrass, Ponderosa Pine, and Interior Douglas-fir (very hot and dry variants) biogeoclimatic zonal units. Similar habitats including pure Douglas-fir, Douglas-fir/lodgepole pine, and interior grand fir, are used to a lesser extent.

The deciduous component of riparian habitats such as, black cottonwood, western redcedar and white spruce riparian units are used by this warbler, as well as trembling aspen copses. Urban areas and orchards are also used, especially during migration. Nashville Warblers do not use grassland habitats, however they use meadows, wetlands and avalanche tracks which all have significant shrub structure.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Nashville Warbler, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1)
Habitat:	Douglas-fir -Ponderosa Pine (DP)
Stand Structure:	young conifer forests less than 60 years old- structural stage 2 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000).

Ratings Assumptions

For the specific ratings that were determined for Nashville Warbler's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Nashville Warbler species and its habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Nashville Warbler.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., Bunchgrass Grasslands with tall shrubs or tall shrub cover within a forested unit), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 1997).

- Security/thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Nashville] Warbler. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
NASS RANGES	NAR	NASS MOUNTAINS	NAM
WESTERN VANCOUVER ISLAND	WVI	NAHWITTI LOWLAND	NWL
		WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	LEEWARD PACIFIC RANGES	LPR
		PAVILION RANGES	PAR
INTERIOR TRANSITION RANGES	ITR	SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CARIBOO PLATEAU	CAP
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	NECHAKO LOWLAND	NEL

Table 2. Ratings Assumptions for Nashville Warbler in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM									SOI													CEI		COM
ECOREGION			NCD	SRT		PTR		NCM			SBF	OKH		NCR	TOP									ITR		FRP		NRA
BGC ZONE	PHASE	HABITAT	ELV	EKT	UCV	EPM	MCR	SCM	SPM	CCM	SFH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	LPR	CAB	FRB	NAM
BG		CR											3	3,4														
BG		DF																									3,4	
BG		DP																		3,4								
BG		PP											1,2,3	3,4		1,2				1,3,4				4				
PP	a	PP											4,5			2,3								4				
PP		CR																5										
PP		DL																										
PP		DP		5								2,4	B	3,4		1,2												
PP		PP		5								2,4	1,2,3	3,4	4	1,2,3	3,4	3,4	3,4	3,4,5				4				
PP		WR		5												3,4				5								
IDF	a	DP										3,5		3,4	3,5	2,3,4				3,4		2,3,4						
IDF	a	PP																		3,4								
IDF		AC																								4,5		
IDF		AV																							4			
IDF		DF	4,5	4,5	4,5	5	5				2,3,4,5	3,4,5			3,4,5	3,4					3,4		3,4		5	4,5	3,4,5	
IDF		DL		5	4,5						4	4,5			3,4,5	3									5			
IDF		DP		4,5	5		5					3,4,5	1,2,3,4		2,3,4,5	3,4,5						3,4,5						
IDF		PP										3,4,5	2,3		2,3	3,4,5				3,4		3,4,5						
IDF		RD																							5			
IDF		RR			5										5										5			
IDF		WR		5	5										5													
ICH		AV							4	4,5																		
ICH		DF						2,4	2,4	5	2,4																	
ICH		DL								5	4	5																
ICH		DP						2,4	2,4	5	2,3,4,5	4,5																
ICH		IG						4			2,4																	
ICH		RR						4	4	4,5	3,5																	
ICH		WL						5	5																			
CWH		ES																										5
CWH		UR																										5
CWH		WL																										5

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Species Account for Brewer's Sparrow
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
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Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

BREWER'S SPARROW

Scientific Name: *Spizella breweri* (Cassin)
Species Code: **B-BRSP**
Subspecies: Two subspecies occur in British Columbia, both of which occur in British Columbia. Both subspecies will be treated separately.
Spizella breweri breweri,
Spizella breweri taverneri ("Timberline" Sparrow)

Provincial Status: *S. b. breweri* – Red-listed

Distribution

British Columbia Range

The Brewer's Sparrow is distributed in 2 separate regions of the province, separated by elevation: the southern portions of the interior, mostly south of latitude 52°N (*S. b. breweri*), and the high elevation populations (*S. b. taverneri*) that is most common in northwestern portions of the Northern Boreal Mountains ecoprovince. In both areas its distribution is rather localized, elsewhere in the province it is an unusual find (Campbell *et al.* 2001).

Two races of the Brewer's Sparrow occur in British Columbia: *S. b. breweri* and *S. b. taverni* (also known as the "Timberline" Sparrow). Although the morphological differences between the 2 subspecies are "subtle and it is not yet clear whether or not they can be recognized in the field" (Campbell *et al.* 2001), the races differ from each other in their distribution and habitat preferences. They probably represent separate species (Campbell *et al.* 2001).

The known distribution of *S. b. breweri* in province includes only the Southern Interior ecoprovince. There it is known to occur from the international boundary east to Midway, west to Keremeos, and north to at least Ashcroft. Individuals, of this subspecies, have been reported from Vernon, Kamloops, Clinton, and perhaps as far north as Dog Creek, south of Williams Lake in the Central Interior ecoprovince. Most of this population is concentrated in the extreme southern Okanagan Valley, from White Lake south to Chopaka (Campbell *et al.* 2001).

Breeding Range

The Brewer's Sparrow (both sub-species) is known to breed in 4 well-known but disjunct areas of British Columbia: the extreme southern portions of the Southern Interior ecoprovince west of the Okanagan River, from the Marron River valley south of Kilpoola Lake near the international boundary; the Sparwood area of the Southern Interior Mountains ecoprovinces; and the extreme northwestern corner of Northern Boreal Mountains, from Atlin westward. It probably also breeds in a number of other areas of the province (Campbell *et al.* 2001).

Provincial Context

The Brewer's Sparrow (both subspecies) breeds from southwestern Yukon, northwestern and southern British Columbia, southern Alberta, and Saskatchewan, and southwestern North Dakota south, through the Great Basin region east of the coastal ranges, to southern California and northwestern New Mexico. Winters from southern interior California and southern Nevada southeast to western and central Texas and south to Baja California, the Pacific Lowlands of northern and central Mexico, and the Highlands of west-central Mexico to Guanajuato (Campbell *et al.* 2001; Rotenberry *et al.* 1999).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Brewer's Sparrow (*S. b. breweri)* in this project; For a list of those ecoregion units that contain potential Brewer's Sparrow (*S. b.* breweri) habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones of the entire Province were evaluated for potential Brewer's Sparrow (*S. b. breweri*) habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

The Brewer's Sparrow (*S. b. breweri)* – occurs between 280 and 750 m within the project area (Campbell *et al.* 2001).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The 2 subspecies of Brewer's Sparrow are separated regionally, elevationally and by habitat. *S. b. breweri* is the more southern in distribution, lower in elevation and uses sagebrush habitat. *S. b. taverneri* is higher in elevation, and sub-alpine habitats and its highest numbers occur in the extreme northwestern portion of British Columbia.

The Brewer's Sparrow *(S. b. breweri)* frequents the big sagebrush shrub-steppe communities of the Southern Interior ecoprovince at lower elevations (Campbell *et al.* 2001).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Brewer's Sparrow were living and breeding. Habitat requirements for all life requisites are open, shrubby habitat (Campbell *et al.* 2001).

Seasonal Chronology

Spring, Summer, Autumn

The Brewer's Sparrow *(S. b. breweri)* arrives in the Southern Interior ecoprovince as early as the third week of April but most spring migrants arrive the first three weeks of May. The breeding season extends from early May to early August. In late summer, a small movement is apparent in northern populations during the first 2 weeks of August and can last well into September (Campbell *et al.* 2001).

Habitat Use and Ecosystem Attributes

The Brewer Sparrow *(S. b. breweri)* inhabits the lower elevation Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones on various slopes. It strictly uses antelope-brush and sagebrush-steppe habitats, no grasslands. Pure ponderosa pine and Douglas-fir/ponderosa pine habitats in the shrub age class which can contain sagebrush and antelope brush vegetation.

Provincial Benchmark

Foraging and Reproducing in Spring and Summer in the following ecosystems, for the Brewer's Sparrow (*S. b. breweri*), were used as benchmarks from which all other Life Requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Bunchgrass Variant (BGxh1)
Habitat:	Big Sagebrush Shrub/Grassland (SS)
Stand Structure:	herbaceous or shrubby climax or disclimax communities – structural stage 0 in the Broad Terrestrial Ecosystem Inventory classification (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Brewer's Sparrows' breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Brewer's Sparrow species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Brewer's Sparrow (*S. b. breweri*).

Ratings Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., bunchgrass communities within the sagebrush-steppe unit or vice versa), were not

able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 2001. The Birds of British Columbia, Volume 4, Passerines (Wood Warblers Through Old World Sparrows), Pages 205-213, Environment Canada, Canadian Wildlife Service, Delta BC, British Columbia Ministry of Environment, Lands and Parks, Victoria, BC, and University of British Columbia Press, Vancouver, BC. 739 pages.

Ecosystems Working Group. 2000. Standards for Broad Terrestrial Ecosystem Classification and Mapping for British Columbia: Classification and Correlation of the Broad Habitat Classes Used in the 1:250,000 Ecological Mapping. Version 2.0.Terrestrial Ecosystems Task Force, Resources Inventory Committee, Victoria, BC. 212 pages.

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Rotenberry, J.T., M.A. Patten, and K.C. Preston. 1999. Brewer's Sparrow (*Spizella breweri*) *In* The Birds of North America, No. 390 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA. 24 pages.

Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Brewer's Sparrow. (Arranged by Ecoprovince.)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	FRASER RIVER BASIN	FRB

Table 2. Ratings Assumptions for Brewer's Sparrow in the Breeding Season.
(Table 1 Contains Ecoregion Unit Names.) **B** = Benchmark for Breeding Habitat.

ECOPROVINCE			SOI						
ECOREGION			OKH	NCR	TOP				
BGC ZONE	PHASE	HABITAT	SOB	OKR	NOB	GUU	NIB	THB	SHB
BG		SS	B	2,4,5	3	5		4,5	
PP	a	SS	4	4					
PP		SS	1,4,5	2,4,5	3		5		
IDF		SS			5				5

Species Account for "Timberline" Sparrow
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

"TIMBERLINE" SPARROW

Scientific Name: *Spizella breweri* (Cassin)
Species Code: **B-BRSP**
Subspecies: Two subspecies occur in North America, both of which are found in British Columbia.
Spizella breweri breweri,
Spizella breweri taverneri ("Timberline" Sparrow) (This species account refers to this subspecies)

Provincial Status: *S. b. tavernerii* – Not applicable

Distribution

British Columbia Range

The Brewer's Sparrow is distributed in 2 widely separate regions of the province: the southern portions of the interior, mostly south of latitude 52°N, and the extreme northwestern portions of the Northern Boreal Mountains ecoprovince. In both areas its distribution is rather localized, elsewhere in the province it is an unusual find (Campbell *et al.* 2001).

Two races of the Brewer's Sparrow occur in British Columbia: *S. b. breweri* and *S. t. taverni* (also known as the "Timberline" Sparrow). Although the morphological differences between the 2 subspecies are 'subtle and it is not yet clear whether or not they can be recognized in the field' (Campbell *et al.* 2001), the races differ from each

other in their distribution and habitat preferences. They probably represent separate species (Campbell *et al.* 2001).

The *S. b. taverneri* subspecies, however, is known to occur regularly only in 2 widely separate regions of the province. Most of the Brewer's Sparrow reports from mountainous regions away from the arid big sagebrush shrub-steppe of the Southern Interior ecoprovince are likely of "Timberline" Sparrow (*S. b. taverni).* It has been reported from Sparwood in the Elk Valley and northwestern British Columbia, where its primary distribution includes the Teslin Plateau west to the Tatshenshini Basin (Campbell *et al.* 2001).

Breeding Range

The Brewer's Sparrow is known to breed in 3 disjunct areas of British Columbia: the extreme southern portions of the Southern Interior ecoprovince west of the Okanagan River, from the Marron River valley south of Kilpoola Lake near the international boundary; the Sparwood area of the Southern Interior Mountains ecoprovinces; and the extreme northwestern corner of Northern Boreal Mountains, from Atlin westward. It probably also breeds in a number of other areas of the province (Campbell *et al.* 2001).

Provincial Context

Breeds from southwestern Yukon, northwestern and southern British Columbia, southern Alberta, and Saskatchewan, and southwestern North Dakota south, through the Great Basin region east of the coastal ranges, to southern California and northwestern New Mexico. Winters from southern interior California and southern Nevada southeast to western and central Texas and south to Baja California, the Pacific Lowlands of northern and central Mexico, and the Highlands of west-central Mexico to Guanajuato (Campbell *et al.* 2001; Rotenberry *et al.* 1999).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the "Timberline" Sparrow in this project; For a list of those ecoregion units that contain potential "Timberline" Sparrow habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential "Timberline" Sparrow habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

"Timberline" Sparrow (*S. b. taverneri)* – occurs in the interior from 870 to 2,040 m in elevation (Campbell *et al.* 2001).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The 2 subspecies of Brewer's Sparrow are separated regionally, elevationally and by habitat. *S. b. breweri* is the more southern in distribution, lower in elevation and uses sagebrush habitat. *S. b. taverneri* is more northern, higher in elevation and uses sub-alpine and alpine habitats.

S. b. taverneri makes use of shrublands or open grassy habitats interspersed with shrubs or scrubby trees, usually above the timberline. In the south, the habitats of *S. b. taverneri* include the shrubby slopes of avalanche chutes and scrubby clumps of trees, often near water (Campbell *et al.* 2001).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for "Timberline" Sparrow were living and breeding. Habitat requirements for all life requisites are open, shrubby habitat (Campbell *et al.* 2001).

Seasonal Chronology

Summer, Autumn

S. *b. taverneri* probably moves through the Okanagan Valley in mid to late May. There is limited breeding data for this subspecies, however it may occur in July in the Southern Interior Mountains ecoprovince (Campbell *et al.* 2001).

Habitat Use and Ecosystem Attributes

S. *b. taverneri* inhabits the higher elevation Alpine Tundra, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Spruce –Willow - Birch biogeoclimatic zones on any slope or aspect except north-facing slopes. The preferred habitats are meadows, subalpine meadows with birch and willows, and avalanche tracks for the shrub component.

Provincial Benchmark

Foraging and Reproducing in Spring and Summer in the following ecosystems, for the "Timberline" Sparrow, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Tatshenshini Basin (TAB)
Biogeoclimatic Zone:	Dry Cool Spruce – Willow – Birch Subzone (SWBdk)
Habitat:	Montane Shrub/Grassland (MS)
Stand Structure:	shrubby climax or disclimax communities - structural stage 0 in the Broad Ecosystem Inventory (Ecosystems Working Group, 2000).

Ratings Assumptions

For the specific ratings that were determined for "Timberline" Sparrow's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the "Timberline" Sparrow subspecies and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the "Timberline" Sparrow.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., willow communities within subalpine or alpine meadows), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

References

Campbell, R.W. N.K. Dawe, I. McTaggart-Cowan, J.M. Cooper, G.W. Kaiser, and M.C.E. McNall. 2001. The Birds of British Columbia, Volume 4, Passerines (Wood-Warblers Through Old World Sparrows), Pages 205-213. Environment Canada, Canadian Wildlife Service, Delta BC, British Columbia Ministry of Environment, Lands and Parks, Victoria, BC, and University of British Columbia Press, Vancouver, BC. 739 pages.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for "Timberline"] Sparrow. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
THOMPSON - OKANAGAN PLATEAU	TOP	NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SHUSWAP BASIN	SHB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	SHUSWAP HIGHLAND	SHH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
FRASER PLATEAU	FRP	CHILCOTIN PLATEAU	CHP
NORTHERN BOREAL MOUNTAINS ECOPROVINCE (NBM)			
BOREAL MOUNTAINS AND PLATEAUS	BMP	TESLIN PLATEAU	TEP
NORTHERN CANADIAN ROCKY MOUNTAINS	NRM	MUSKWA FOOTHILLS	MUF
SOUTHERN YUKON LAKES	SYL	TESLIN BASIN	TEB
ST ELIAS MOUNTAINS	STM	KLUANE RANGES	KLR
YUKON - STIKINE HIGHLANDS	YSH	TATSHENSHINI BASIN	TAB

Table 2. Ratings Assumptions for "Timberline" Sparrow in the Breeding Season. (Table 1 Conatains Ecoregion Unit Names.)

B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM						SOI	NBM				
ECOREGION			NCD			WRA	SRT		NCR	SEM	NRM	YSH	YSL	BMP
BGC ZONE	PHASE	HABITAT	COC	ELV	FLV	SPK	EKT	UCV	OKR	KLR	MUF	TAB	TEB	TEP
PP		PP												
IDF		RR						5						
IDF		WR					5	5						
SWB		AV								2	5	2		2
SWB		FB								1	5	**B**	1	1
ESSF		AV	4	4,5		4,5			4					
ESSF		SM			4	4			4,5					
AT		AM		4,5		4,5								

Species Account for Lark Sparrow
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
Diana N. Demarchi

Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

LARK SPARROW

Scientific Name: *Chondestes grammacus* (Say)
Species Code: **B-LASP**
Subspecies: Two in North America: only *Chondestes grammacus strigatus* occurs in British Columbia

Provincial Status: Red-listed

Distribution

British Columbia Range

The Lark Sparrow, although one of the less abundant and most habitat-specific sparrows in British Columbia, it is a characteristic summer bird in the southern Okanagan and Similkameen valleys, and occurs regularly as far north as the South Thompson River valley. Elsewhere it is less common across the south areas of the interior of the province (Campbell *et al.* 2001). Breeding has recently been confirmed near Merritt.

The easternmost vagrant occurrences in the south are from Fernie and Field; the northernmost record west of the Rocky Mountains is from McLeod Lake, north of Prince George. There is a single record from Trutch in the southern Taiga Plains ecoprovince. The species occurs irregularly on the south coast, including southern and eastern Vancouver Island to Tofino and Nimpkish, the Gulf Islands, the lower Fraser River valley to Hope, and the Sunshine Coast to Powell River. The northernmost coastal occurrence is from Bella Coola (Campbell *et al.* 2001).

Breeding Range

The Lark Sparrow has a restricted breeding range in British Columbia. It is mostly confined to the Okanagan and Similkameen Valleys, with 90% of occurrences south of the latitude of Summerland. Hat Creek is both the northernmost and westernmost nesting locality (Campbell *et al.* 2001).

Provincial Context

The Lark Sparrow breeds from south-central British Columbia, southeastern Alberta, southern Saskatchewan, and Manitoba south in the west into southern California and Arizona, and in Mexico to Zacatecas and Tamaulipas. In the east, from southern Ontario south through Wisconsin, Minnesota, and Michigan to eastern Texas, Louisiana, western Virginia, and North Carolina. It winters from central California, southern Arizona, eastern Texas, and the Gulf coast south in Mexico to southern Baja California, Chiapas, and Veracruz (Campbell *et al.* 2001; martin and Parrish 2000).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Lark Sparrow in this project; For a list of those ecoregion units that contain potential Lark Sparrow habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Lark Sparrow habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, it has been reported from 280 m in the valley bottoms near Osoyoos to about 1,200 m on Anarchist Mountain (Cannings *et al.* 1987) with most of the population found below 750 m (Campbell *et al.* 2001).

Project Map Scale

Habitat attributes derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Lark Sparrow frequents open habitats during migration and the post-breeding period in late summer, similar to those used for breeding (Campbell *et al.* 2001).

The Lark Sparrow reaches it highest numbers in stands of antelope-brush. Lower densities occur in mixed shrubbery dominated by big sagebrush and associated perennial grasses. R. Millikin (pers. comm *in* Campbell *et al.* 2001) found breeding Lark Sparrows in drier habitats with bare ground and low sagebrush cover. In the northern Okanagan Valley and in the Kamloops area, where antelope-brush is absent, it is found in big sagebrush stands and "degraded bunchgrass habitats with saskatoon and other shrubs and adjacent weedy fields" (Cannings *et al.* 1987). West of Savona, Dawe and Buechart (1996) found singing males in heavily grazed bluebunch wheatgrass habitat with scattered ponderosa pine, big sagebrush, and some prickly-pear cactus.

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Lark Sparrow were living and breeding. Habitat requirements for all life requisites are open grassland and shrublands on flat landscapes (Campbell *et al.* 2001).

Seasonal Chronology

Spring, Summer, Autumn

The Lark Sparrow is one of the later spring migrants to arrive in the province arriving mid-April to late May. The Lark Sparrow has been recorded breeding in British Columbia from May 11 (calculated) to July 19. The autumn (post-breeding) migration occurs as early as mid-July until late September (Cannings *et al.* 1987; Campbell *et al.* 2001).

Habitat Use and Ecosystem Attributes

The Lark Sparrow is present in the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar-Hemlock biogeoclimatic zones, on flat or gently sloping terrain, in the dry forest and grassland regions of British Columbia. Higher ratings were assigned to habitats such as antelope-brush, as well as bunchgrass-steppe and sagebrush-steppe. Other habitats rated were agricultural units, cultivated fields and orchards/vineyards, and early seral forested units with Ponderosa Pine or Douglas-fir structure in age-class 1 (herb or shrub).

Provincial Benchmarks

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Lark Sparrow, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Bunchgrass Variant (BGxh1)
Habitats:	Antelope-brush Shrub/Grassland (AB)
Stand Structure:	climax and disclimax herbaceous and shrub dominated communities – structural stage 0 in Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Lark Sparrow's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Lark Sparrow species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Lark Sparrow.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., climax versus over-grazed Bunchgrass Steppe or Sagebrush Steppe), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November

Winter – December, January, February

- Living requisite includes many aspects, such as:
  - foraging
  - drinking
  - roosting
  - cover
  - thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

References

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Lark sparrow.]
(Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
WESTERN VANCOUVER ISLAND	WVI	WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	STRAIT OF GEORGIA	SOG
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		NAZKO UPLAND	NAU
		QUESNEL LOWLAND	QUL
		WESTERN CHILCOTIN UPLAND	WCU
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	NECHAKO LOWLAND	NEL

Table 2. Ratings Assumptions for Lark Sparrow in the Breeding Season. (Table 1 Contains Ecoregion Unit Names). **B** = Benchmark Habitat.

ECOPROVINCE			SIM	SOI								CEI	COM
ECOREGION			SBF	OKH		NCR	TOP					FRP	WVI
BGC ZONE	PHASE	HABITAT	SFH	SOH	SOB	OKR	NOH	NOB	GUU	NIB	THB	CAB	WIM
BG		AB			B								
BG		BS			3			3		5	5		
BG		CF			5	4							
BG		DP									5		
BG		PP			5	5		4			5		
BG		SS			3	1		1	5		4,5		
PP	a	PP			4			5					
PP		AB			2			5					
PP		BS	5	5	4								
PP		PP			5								
PP		SS			2	4		5		5			
IDF	a	BS					5	5	5	5			
IDF	a	DP	5	5			5						
IDF	a	SS								5			
IDF		BS			5			4			5	5	
IDF		DF											
IDF		SS			4	5	5	3	5				
ICH		CF	5										
ICH		DF	5										
ICH		DP	4,5										
CWH		ES											5
CWH		UR											5

Species Account for Grasshopper Sparrow
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
Dennis A. Demarchi
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

GRASSHOPPER SPARROW

Scientific Name: *Ammodramus savannarum* (Gmelin)
Species Code: **B-GRSP**
Subspecies: Four recognized in North America, only one occurs in British Columbia (Vicery 1996) -
Ammodramus savannarum perpallidus

Provincial Status: Red-listed

Distribution

British Columbia Range

The Grasshopper Sparrow is locally distributed in the south-central interior of British Columbia, mainly in the Okanagan Valley of the Southern Interior ecoprovince between Osoyoos Lake in the south and Goose Lake north of Vernon. It also occurs irregularly near Spotted Lake and Kilpoola Lake in Richter Pass and near Chopaka in the southern Similkameen Valley. It has occurred as a vagrant on Beecher's Prairie, west of William's Lake, in the Central Interior ecoprovince. On the coast, this species has occurred as a vagrant in the Fraser Lowland and near Victoria on southern Vancouver Island (Campbell *et al.* 2001).

Breeding Range

The few actual nests that have been found in the province and the behavioral evidence of nesting indicate that the Grasshopper Sparrow breeds mainly in the Okanagan Valley and the extreme southern end of the Similkameen River valley. A small breeding

population has been reported in the Nicola Valley near Chapperon Lake (Campbell *et al.* 2001).

Provincial Context

This species breeds from south-central interior British Columbia, eastern Washington, southern Alberta, southern Saskatchewan, southern Manitoba, western and southern Ontario, and southwestern Quebec south in the west through eastern Washington, western Idaho, locally in eastern Oregon, and coastal California; east of the Rocky Mountains, from eastern Montana to southern Maine, south into Texas, Arkansas, Tennessee, Georgia, and Florida. Winters in Arizona, New Mexico, Texas, Arkansas, Tennessee, and South Carolina south through Baja California, mainland Mexico, and Central America to Costa Rica (Campbell *et al.* 2001; Vickery 1996).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Grasshopper Sparrow in this project; For a list of those ecoregion units that contain potential Grasshopper Sparrow habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Grasshopper Sparrow habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

For the project area, this bird is only found from 280 to 400 m.

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Terrestrial Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

Grasslands with patches of moderately open ground and a generally sparse shrub and grass cover are preferred. In the Okanagan and adjacent valleys, the habitats selected feature bluebunch wheatgrass, Idaho fescue, needle-and-thread grass, the introduced crested wheatgrass, and a variety of forbs, now often dominated by the noxious diffuse knapweed (Campbell *et al.* 2001).

On dry grassy hills, damper areas with clumps of wild rose provide singing perches for males, while nests are in adjacent grasses. Other shrubs frequently present include big sagebrush, antelope-brush, and rabbit-brush, but in their presence the sparrows appear to select patches of grass within the shrub stands. The Grasshopper Sparrow avoids tracts of dense sagebrush (Campbell *et al.* 2001).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Grasshopper Sparrow were living and breeding. Habitat requirements for all life requisites are open grassland and shrubland habitats on flat landscapes (Campbell *et al.* 2001).

Seasonal Chronology

Spring, Summer, Autumn

Spring migrants arrive on known nesting grounds in the southern Okanagan Valley in early May. The autumn departure is difficult to document because of this species' secretive behaviour, but probably occurs mostly in September. Some birds may linger into October (Cannings *et al.* 1987).

Habitat Use and Ecosystem Attributes

The only habitats used by this species in the Broad Terrestrial Ecosystem Inventory system classification are bunchgrass-steppe and sagebrush-steppe on flat or gentle slopes. They are found in the Bunchgrass, Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer in the following ecosystems, for the Grasshopper Sparrow, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1)
Habitats:	Bunchgrass Grassland (BS)
Stand Structure:	herbaceous or shrubby climax or disclimax communities – structural stage 0 in the Broad Ecosystem Inventory (Ecosystems Working Group, 2000)

Ratings Assumptions

For the specific ratings that were determined for Grasshopper Sparrow's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Grasshopper Sparrow species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Grasshopper Sparrow.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., grassy openings with sagebrush-steppe units or open versus dense sagebrush stands), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia that Have Potential Habitats for Grasshopper] Sparrow. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV

Table 2. Ratings Assumptions for Grasshopper Sparrow in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)

ECOPROVINCE			SIM		SOI					
ECOREGION			SRT		OKH	TOP				
BGC ZONE	PHASE	HABITAT	EKT	UCV	SOB	STU	GUU	NIB	THB	SHB
BG		BS			2					
PP		BS			B					
PP		PP								
PP		SS			2					
IDF	a	BS				5	4	4,5	5	4
IDF		RR		5						
IDF		WR	5	5						

B = benchmark

Species Account for Bobolink
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

Prepared by:
R. Wayne Campbell
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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

BOBOLINK

Scientific Name: *Dolichonyx oryzivorus* (Linneaus)
Species Code: **B-BOBO**
Subspecies: None recognized in British Columbia.

Provincial Status: Blue-listed

Distribution

British Columbia Range

The Bobolink occurs regularly in British Columbia only in the southern and central interior of the province, where it reaches the northernmost limit of its range in western North America. It is locally, but widely, distributed across the province from Princeton east to Sparwood and Golden in the East Kootenay, and north to Williams Lake in the Chilcotin-Cariboo area and Giscome, northeast of Prince George, in the Nechako Lowland. There are several occurrence records for the Peace Lowland ecosection in the Boreal Plains. On the coast, it is a vagrant in the lower Fraser River valley and on southern Vancouver Island (Campbell *et al.* 2001).

This species reaches its highest numbers in summer in the Okanagan Valley in the Southern Interior ecoprovince and in the West Kootenay region in the Southern Interior Mountains ecoprovince (Campbell *et al.* 2001).

Breeding Range

The Bobolink breeds locally in suitable open habitat in the southern one-half of the interior. It breeds from near Osoyoos Lake and Creston in the south, north through the central and northern Okanagan to Golden, Williams Lake, and Giscome (Campbell *et al.* 2001).

Spring and Autumn Migrations

In the southern Okanagan Valley, the first spring migrants appear in the latter half of May, with males arriving up to a week before the females (Cannings *et al.* 1987). This movement, during mid to late May and early June, occurs throughout the southern areas of the breeding range in the West Kootenay region, such as, Creston, and Columbia Valleys of the Southern Interior Mountains. Migrants arrive in the Thompson Valley of the Southern Interior ecoprovince in the latter half of May through mid-June, and continue a northward movement into the Cariboo and Chilcotin areas of the Central Interior ecoprovince (Campbell *et al.* 2001).

Bobolinks leave British Columbia very soon after nesting. Most have departed by the third week in August. A few may linger into September in some years (Van Damme 1999).

Provincial Context

Breeds from central and southern British Columbia, southern Alberta, southern Saskatchewan, southern Manitoba, central Ontario, southern Quebec, and the Maritime provinces south to eastern and south-central Washington, eastern Oregon, northeastern Nevada, northern Utah, eastern Colorado, Kansas, northern Missouri, central Illinois, central Indiana, southern Ohio, southern Pennsylvania, and central New Jersey to north-central Kentucky, northeastern Tennessee, western North Carolina, Virginia, and Maryland. Winters in southern South America (mostly east of the Andes) in eastern Bolivia, central Brazil, Paraguay, and northern Argentina (Campbell *et al.* 2001; Martin and Gavin 1995).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Bobolink in this project; For a list of those ecoregion units that contain potential Bobolink habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Bobolink habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce,

Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation range

This species is a low-elevation, valley bottom bird recorded from between 280 m at Osoyoos to 1,000 m in the central and southern interior (Campbell *et al.* 2001).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

The Bobolink is a bird of lower elevations, occupying habitat within the valley bottoms. This species occurs mainly in human-influenced landscapes (Martin and Gavin 1995). Throughout its breeding range, the Bobolink is closely associated with open, contiguous habitats, primarily in fields where forage crops of timothy and alfalfa are cultivated. The key habitat component is a mixture of grasses and broad-leaved forbs; other habitats include pastures, weedy fields, and moist meadows (Campbell *et al.* 2001; van Damme 1999).

In a population survey conducted in 1994, a mixture of plant species such as sedges, horsetails, tall grasses, buttercups, daisies, red and white clovers, thistles, common dandelions, American vetch, and either alfalfa or timothy hay crop were common to all sites (Van Damme 1999).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Bobolink were living and breeding. Habitat requirements for all life requisites are open cultivated fields often in dry valley bottoms (Campbell *et al.* 2001).

Seasonal Chronology

Spring, Summer, Autumn

Spring migrants can arrive in the southern interior as early as mid-April, but the main movement occurs during the last two weeks of May and the first week of June. In the interior, the Bobolink has been recorded breeding from June 8 to July 22. By early August, autumn (late summer or post-breeding) migration is initiated and mainly continues through August. By September very few birds remain in the province (Campbell *et al.* 2001).

Habitat Use and Ecosystem Attributes

Bobolinks breed locally in the Bunchgrass, Interior Douglas-fir, Ponderosa Pine and Interior Cedar - Hemlock biogeoclimatic zones. Under the Broad Ecosystem Inventory classification, the only habitat that is rated for Bobolink is cultivated fields.

Provincial Benchmark

Feeding and Reproducing in Spring and Early Summer in the following ecosystems, for the Bobolink, were used as benchmarks from which all other Life Requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Highlands (SOH)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Interior Douglas-fir Variant (IDFxh1)
Habitats:	Cultivated Fields (CF)
Stand Structure:	herbaceous disclimax communities maintained through agricultural practices – structural stage 0 in the Broad Terrestrial Ecosystem habitat classification (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Bobolink's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Bobolink species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Bobolink.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., cultivated fields are not subdivided into type of crop – grass, corn, sunflowers, cereal crops, and hay crops are all classified as cultivated fields), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.
- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite, for the purposes of this project, implies roosting.

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Bobolink]
(Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	NANAIMO LOWLAND	NAL
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
THOMPSON - OKANAGAN PLATEAU	TOP	NICOLA BASIN	NIB
THOMPSON - OKANAGAN PLATEAU	TOP	NORTHERN OKANAGAN BASIN	NOB
THOMPSON - OKANAGAN PLATEAU	TOP	NORTHERN OKANAGAN HIGHLAND	NOH
THOMPSON - OKANAGAN PLATEAU	TOP	SOUTHERN THOMPSON UPLAND	STU
THOMPSON - OKANAGAN PLATEAU	TOP	SHUSWAP BASIN	SHB
THOMPSON - OKANAGAN PLATEAU	TOP	THOMPSON BASIN	THB
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN COLUMBIA MOUNTAINS	SCM
NORTHERN COLUMBIA MOUNTAINS	NCM	SOUTHERN PURCELL MOUNTAINS	SPM
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	EAST KOOTENAY TRENCH	EKT
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	UPPER COLUMBIA VALLEY	UCV
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
FRASER PLATEAU	FRP	FRASER RIVER BASIN	FRB
FRASER PLATEAU	FRP	QUESNEL LOWLAND	QUL
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	NECHAKO LOWLAND	NEL
BOREAL PLAINS ECOPROVINCE (BOP)			
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL

Table 2. Ratings Assumptions for Bobolink in the Breeding Season. (Table 1 Contains All Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE / ECOREGION			SIM					SOI						CEI	
			SRT		SBF	NCM		OKH		TOP				FRP	
BGC ZONE	PHASE	HABITAT	EKT	UCV	SFH	SCM	CCM	SOH	SOB	NOB	GUU	NIB	SHB	CAB	FRB
BG		CF							2			5			4
PP		PP													
IDF	a	CF								5	5	5	5		
IDF		CF						B		5			5	3	
IDF		RR		5											
IDF		WR	5	5											
ICH		CF			3	1	3					-			

Species Account for Western Meadowlark
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

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Prepared for:
Habitat Conservation Trust Fund
and
Terrestrial Information Branch,
Ministry of Sustainable Resource Management
Victoria, B.C.

February, 2003

WESTERN MEADOWLARK

Scientific Name: *Sturnella neglecta* (Audubon)
Species Code: **B-WEME**
Subspecies: *S.n. confluenta* – southwest and central British Columbia
S.n. neglecta – southeast British Columbia
Note: the subspecies in northeast British Columbia are unknown

Provincial Status: Not Applicable

Distribution

British Columbia Range

The Western Meadowlark is widely distributed at low to mid-elevations across the southern regions of the province, south of the Cariboo and east of the Coast Mountains. Further north it is locally distributed.

On the coast, it occurs regularly, and recently more locally, on southeastern Vancouver Island, from Victoria to Campbell River, and in the Fraser Lowland on the southwest mainland. It occurs infrequently on the rest of Vancouver Island and north along the mainland coast to Prince Rupert and New Aiyansh. It is casual on the Queen Charlotte Islands. This bird reaches its highest numbers in winter in the Fraser Lowland ecosection of the Georgia Depression ecoprovince (Campbell *et al.* 2001).

In the interior, the Western Meadowlark occurs regularly north to the Cariboo and Chilcotin areas, and irregularly and locally in the Nechako and Bulkley River valleys. There is a disjunct population distributed locally in the Peace Lowland probably from

populations in adjacent Alberta (Semenchuk 1992). Further north, it is sparsely distributed. The Western Meadowlark reaches its highest numbers in summer in the Southern Interior ecoprovince (Campbell *et al.* 2001).

Breeding Range

The Western Meadowlark is widely distributed across the province east of the Coast Mountains from Vancouver Island to the British Columbia/Alberta border and north through the Columbia, Okanagan, Nicola and Thompson River valleys to Quesnel and Prince George. It also breeds locally in the southern Peace River area (Campbell *et al.* 2001).

Spring and Autumn Migrations

The Western Meadowlark is considered a migrant and summer visitant in British Columbia although the species may be present year-round in some areas of southern British Columbia. Spring migration commences in late February and March in southern areas and continues through early May. The autumn movement takes place from September (in the north) through November (in the south). A few winter each year in southeast British Columbia and valley bottoms in south-central interior.

Provincial Context

The Western Meadowlark breeds from southern and northeastern British Columbia, north-central Alberta, central Saskatchewan, southern Manitoba, western Ontario, northeastern Minnesota, northern Wisconsin, northern Michigan, southern Ontario, and northwestern Ohio south to northwestern Baja California, southern California, northwestern Sonora, western and central Arizona, in the Mexican highlands and to west-central Texas, northwestern Louisiana, southwestern Tennessee, southern Illinois, northern Indiana, central Ohio, and western New York (Campbell *et al.* 2001; Lanyon 1994).

This species winters from the southern coast and south-central British Columbia, central Idaho, central Colorado, southern South Dakota, southern Wisconsin, and northern Indiana south to southern Baja California, Michoacan, the state of Mexico, Veracruz and the Gulf coast east to northwestern Florida, occurring east to central Kentucky, central Tennessee, and eastern Alabama (Campbell *et al.* 2001).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Western Meadowlark in this project; For a list of those ecoregion units that contain potential Western Meadowlark habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones for the entire Province were evaluated for potential Western Meadowlark habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

In the interior, the Western Meadowlark occurs in valley bottoms at 280 to 1,900 m in elevation, with most records occurring below 1,000 m (Campbell *et al.* 2001).

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Key Habitat Requirements

In the southern interior, lower-elevation grasslands, open shrub grasslands, pastures, agricultural fields and grassy openings in ponderosa pine parkland are the main non-breeding habitats (Campbell *et al.* 2001).

The characteristic nesting habitat of this ground-nesting species in British Columbia features open spaces with short herb vegetation, including natural grasslands, agricultural grasslands as well as alfalfa fields, pastures, and abandoned fields with dense forb and grass cover. A few nests have been found in open forest and parkland areas where grasses were the main understory component, or in grassy shrubland habitats. Nests are found at elevations from 280 to 1,300 m (Campbell *et al.* 2001). Nests are well concealed, on the ground, often in shallow depression and usually in fairly dense vegetation (Lanyon 1994).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Western Meadowlark are living and breeding. Habitat requirements for all life requisites include open, dry, natural grasslands, agricultural fields, alfalfa fields, pastures and vacant fields with dense herb growth on flat or gently sloping habitat (Campbell *et al.* 2001).

Seasonal Chronology

Spring, Summer, Autumn, Winter

The Western Meadowlark arrive in the Southern Interior ecoprovince from late February to early March, in the Southern Interior Mountains ecoprovince from late March and

peak in early May, and in the Central Interior ecoprovince from late February to early May. This breeding season extends from early April to late July across the study area. Small numbers winter at low elevations in the study area (Campbell et al. 2001). Winter ranges are typically open country, including cultivated fields and feedlots. The northern limit of winter range is correlated with freezing temperatures (Lanyon 1994).

Habitat Use and Ecosystem Attributes

Open habitats with few shrubs or trees are preferred by this species. Primary habitats under the Broad Terrestrial Ecosystem Inventory system for the Western Meadowlark include bunchgrass (includes native range and pasture lands). Cultivated fields, sagebrush-steppe, and antelope brush are other open habitats rated. Open ponderosa pine and Douglas-fir/ponderosa pine are also used in structural stage 1, which is a herbaceous, low shrub age class. Urban areas and orchards also have value, but to a lesser extent.

Provincial Benchmark

Feeding and Reproducing in Spring and Summer for the following ecosystems, for the Western Meadowlark, were the benchmarks for which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Hot Dry Bunchgrass Variant (BGxh1)
Habitats:	Bunchgrass Steppe (BS)
Stand Structure:	herbaceous or shrubby climax or disclimax communities – structural stage 0 in Broad Terrestrial Ecosystem Inventory (Ecosystems Working Group 2000)

Ratings Assumptions

For the specific ratings that were determined for Western Meadowlark's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Western Meadowlark species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological

information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Western Meadowlark.

Methodology Assumptions

- due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., vegetation around a lake but not the lake itself or shrub cover within a forested unit), were not able to be isolated or specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

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Table1. Ecoregion Units in British Columbia that Have Potential Habitats for Western Meadowlark. (Arranged by Ecoprovince)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
COAST AND MOUNTAINS ECOPROVINCE (COM)			
COASTAL GAP	COG	HECATE LOWLAND	HEL
COASTAL GAP		KIMSQUIT MOUNTAINS	KIM
COASTAL GAP		KITIMAT RANGES	KIR
NASS RANGES	NAR	MEZIADIN MOUNTAINS	MEM
NASS RANGES		NASS MOUNTAINS	NAM
NORTHERN COASTAL MOUNTAINS	NCM	CENTRAL BOUNDARY RANGES	CBR
NORTHERN COASTAL MOUNTAINS		NORTHERN BOUNDARY RANGES	NBR
NORTHERN COASTAL MOUNTAINS		SOUTHERN BOUNDARY RANGES	SBR
PACIFIC RANGES	PAC	CENTRAL PACIFIC RANGES	CPR
PACIFIC RANGES		EASTERN PACIFIC RANGES	EPR
PACIFIC RANGES		NORTHERN PACIFIC RANGES	NPR
PACIFIC RANGES		NORTHWESTERN CASCADE RANGES	NWC
PACIFIC RANGES		OUTER FIORDLAND	OUF
PACIFIC RANGES		SOUTHERN PACIFIC RANGES	SPR
GWAII HAANAS	GWH	QUEEN CHARLOTTE LOWLAND	QCL
GWAII HAANAS		SKIDEGATE PLATEAU	SKP
WESTERN VANCOUVER ISLAND	WVI	NORTHERN ISLAND MOUNTAINS	NIM
WESTERN VANCOUVER ISLAND		NAHWITTI LOWLAND	NWL
WESTERN VANCOUVER ISLAND		WINDWARD ISLAND MOUNTAINS	WIM
GEORGIA DEPRESSION ECOPROVINCE (GED)			
EASTERN VANCOUVER ISLAND	EVI	LEEWARD ISLAND MOUNTAINS	LIM
EASTERN VANCOUVER ISLAND		NANAIMO LOWLAND	NAL
GEORGIA - PUGET BASIN	GPB	SOUTHERN GULF ISLANDS	SGI
LOWER MAINLAND	LOM	FRASER LOWLAND	FRL
LOWER MAINLAND		GEORGIA LOWLAND	GEL
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	PAVILION RANGES	PAR
INTERIOR TRANSITION RANGES		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
OKANOGAN HIGHLAND		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
THOMPSON - OKANAGAN PLATEAU		NICOLA BASIN	NIB
THOMPSON - OKANAGAN PLATEAU		NORTHERN OKANAGAN BASIN	NOB
THOMPSON - OKANAGAN PLATEAU		NORTHERN OKANAGAN HIGHLAND	NOH
THOMPSON - OKANAGAN PLATEAU		NORTHERN THOMPSON UPLAND	NTU
THOMPSON - OKANAGAN PLATEAU		SOUTHERN THOMPSON UPLAND	STU
THOMPSON - OKANAGAN PLATEAU		SHUSWAP BASIN	SHB
THOMPSON - OKANAGAN PLATEAU		THOMPSON BASIN	THB
THOMPSON - OKANAGAN PLATEAU		TRANQUILLE UPLAND	TRU

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Table1. Ecoregion Units in British Columbia that Have Potential Habitats for Western Meadowlark. (Arranged by Ecoprovince)

SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	QUESNEL HIGHLAND	QUH
COLUMBIA HIGHLANDS		SHUSWAP HIGHLAND	SHH
EASTERN CONTINENAL RANGES	ECR	FRONT RANGES	FRR
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
NORTHERN CONTINENTAL DIVIDE		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CENTRAL COLUMBIA MOUNTAINS	CCM
NORTHERN COLUMBIA MOUNTAINS		NORTHERN KOOTENAY MOUNTAINS	NKM
NORTHERN COLUMBIA MOUNTAINS		SOUTHERN COLUMBIA MOUNTAINS	SCM
NORTHERN COLUMBIA MOUNTAINS		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
PURCELL TRANSITIONAL MOUNTAINS		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	BIG BEND TRENCH	BBT
SOUTHERN ROCKY MOUNTAIN TRENCH		EAST KOOTENAY TRENCH	EKT
SOUTHERN ROCKY MOUNTAIN TRENCH		UPPER COLUMBIA VALLEY	UCV
SOUTHERN ROCKY MOUNTAIN TRENCH		UPPER FRASER TRENCH	UFT
WESTERN CONTINENTAL RANGES	WRA	SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
CHILCOTIN RANGES	CHR	CENTRAL CHILCOTIN RANGES	CCR
EASTERN HAZELTON MOUNTAINS	EHM	BULKLEY RANGES	BUR
FRASER PLATEAU	FRP	BULKLEY BASIN	BUB
FRASER PLATEAU		CARIBOO BASIN	CAB
FRASER PLATEAU		CARIBOO PLATEAU	CAP
FRASER PLATEAU		CHILCOTIN PLATEAU	CHP
FRASER PLATEAU		FRASER RIVER BASIN	FRB
FRASER PLATEAU		NAZKO UPLAND	NAU
FRASER PLATEAU		QUESNEL LOWLAND	QUL
FRASER PLATEAU		WESTERN CHILCOTIN UPLAND	WCU
SUB-BOREAL INTERIOR ECOPROVINCE (SBI)			
FRASER BASIN	FAB	BABINE UPLAND	BAU
FRASER BASIN		McGREGOR PLATEAU	MCP
FRASER BASIN		NECHAKO LOWLAND	NEL
BOREAL PLAINS ECOPROVINCE (BOP)			
CENTRAL ALBERTA UPLAND	CAU	CLEAR HILLS	CLH
CENTRAL ALBERTA UPLAND		HALFWAY PLATEAU	HAP
PEACE RIVER BASIN	PRB	PEACE LOWLAND	PEL

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Table 2. Ratings Assumptions for Western Meadowlark in the Breeding Season. (Table 1 Contains Ecoregion Unit Names. **B** = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM						SOI											CEI				
ECOREGION			WRA	SRT		NCM	SBF	COH	OKH		NCR	TOP							ITR	FRP				CHR
BGC ZONE	PHASE	HABITAT	SPK	EKT	UCV	SCM	SFH	SHH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	PAR	CAB	FRB	QUL	CHP	CCR
BG		AB								1															
BG		BS								B			1			3	1,3					4			
BG		CF								4	4		4			4	4,5			5		4,5			
BG		DP															5								
BG		OV								5			5												
BG		PP								4	5						5								
BG		SS								1	3		1		4		1,2			4		2,5			
BG		UR															5								
PP	a	PP								3			4							5					
PP	a	SS																		4					
PP		AB								1			4												
PP		BS		4					5	1			4	5		5	4								
PP		CF		5							5		5				5			4					
PP		PP		5						4															
PP		SS								1	4		4			4	4			4					
IDF	a	BS										4	3	4,5	4	4,5	4		3,4	5					
IDF	a	CF							4			5	4		5	5			4,5	5					
IDF	a	DP							5				5	5					5						
IDF	a	PP															5								
IDF	a	SS														3	4		3						
IDF	a	UR											5						5						
IDF		BS		5	5				5	4	5	4,5	5	5	4,5	4,5	5		4,5	5	4,5	4,5	5	5	5
IDF		CF	5	5	5							5			5			4,5	4,5	5	5	5			
IDF		DP								5															
IDF		PP																							
IDF		SS								3	5	5	4		5		5		4,5	5					
IDF		UR																			5				
ICH		CF				5	5	5											5						
MS		CF	5																						
SBPS		BS																						5	
SBPS		CF																						5	
BWBS		CF																							
BWBS		UR																							
SBS		CF																							
SBS		UR																							
CWH		CF																							
CWH		UR																							
CDF		CF																							
CDF		ES																							
CDF		TR																							
CDF		UR																							

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Table 2. Ratings Assumptions for Western Meadowlark in the Breeding Season. (Table 1 Contains Ecoregion Unit Names. **B** = Benchmark for Breeding Habitat.

ECOPROVINCE			SBI						GED			BOP			
ECOREGION			FAB			OMM	CRM		LOM	EVI	GPB	CAU		SAU	PRB
BGC ZONE	PHASE	HABITAT	BAU	MCP	NEL	PAT	HAF	PEF	FRL	NAL	SGI	CLH	HAP	KIP	PEL
BG		AB													
BG		BS													
BG		CF													
BG		DP													
BG		OV													
BG		PP													
BG		SS													
BG		UR													
PP	a	PP													
PP	a	SS													
PP		AB													
PP		BS													
PP		CF													
PP		PP													
PP		SS													
IDF	a	BS													
IDF	a	CF													
IDF	a	DP													
IDF	a	PP													
IDF	a	SS													
IDF	a	UR													
IDF		BS													
IDF		CF													
IDF		DP													
IDF		PP													
IDF		SS													
IDF		UR													
ICH		CF													
MS		CF													
SBPS		BS													
SBPS		CF													
BWBS		CF					5					4	4	4	4
BWBS		UR					5	5						4	4
SBS		CF	5	5	5										
SBS		UR			5	5									
CWH		CF							5						
CWH		UR							5						
CDF		CF							4	5	5				
CDF		ES							4	5					
CDF		TR							4						
CDF		UR							4	5	5				

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Species Account for Cassin's Finch
Based on 1:250,000 Broad Ecosystem Inventory Habitat Mapping

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Prepared for:
Habitat Conservation Trust Fund
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Victoria, B.C.

February, 2003

CASSIN'S FINCH

Scientific Name: *Carpodacus cassinii* (Baird)
Species Code: **B-CAFI**
Subspecies: None recognized in British Columbia.

Provincial Status: Not applicable

Distribution

British Columbia Range

The Cassin's Finch is widely distributed at low and intermediate elevations across southern portions of interior British Columbia. It occurs most abundantly in the Southern Interior ecoprovince, becoming more locally distributed in southern parts of the Southern Interior Mountains ecoprovince. In the Central Interior ecoprovince, it occurs locally north in the Cariboo Basin and Fraser River Basin to Williams Lake and Riske Creek, and casually west in the Chilcotin Plateau to Stum Lake and Kleena Kleene. In the Southern Interior Mountains ecoprovince, it occasionally may be found north to McBride and Papoose Lake. In winter, the highest numbers of the Cassin's Finch in British Columbia occurs in the Southern Interior ecoprovince (Campbell *et al.* 2001).

Breeding Range

The Cassin's Finch breeds in the southern and south-central portions of interior British Columbia. Breeding has been documented from the Coldwater and Nicola Rivers west and southwest of Merritt, east through the lower Similkameen and Okanagan valleys, to the West Kootenay near Trail and Rossland, and locally in the East Kootenay Trench

ecosection and Kishenina Creek. Small numbers breed north in the East Kootenay to Wasa and throughout the Okanagan Valley north to Shuswap Lake and the South Thompson River. The most northern breeding localities at Williams Lake and near Riske Creek in the Central Interior ecoprovince (Campbell *et al.* 2001).

Provincial Context

The Cassin's Finch breeds from south-central British Columbia, southwestern Alberta, western Montana, Wyoming, and South Dakota south along the eastern slope of the Cascade Mountains and Sierra Nevada to California, and along the eastern slope of the Rocky Mountains to northern New Mexico. It also breeds locally in coastal California and Baja California. Winters from southern interior British Columbia through its breeding range, south along mountainous areas through Arizona and New Mexico to northern Mexico (Campbell *et al.* 2001; Hahn 1996).

Project Area

Ecoregions

All the provincial ecoprovinces, ecoregions and ecosections were examined for the Cassin's Finch in this project; For a list of those ecoregion units that contain potential Cassin's Finch habitat see Table 1.

Biogeoclimatic Zones

All the Biogeoclimatic Zones or the entire Province were rated for potential Cassin's Finch habitat, notably: the Bunchgrass, Ponderosa Pine, Interior Douglas-fir, Interior Cedar - Hemlock, Montane Spruce, Engelmann Spruce - Subalpine Fir, Sub-Boreal Pine - Spruce, Sub-Boreal Spruce, Coastal Douglas-Fir, Coastal Western Hemlock, Mountain Hemlock, Boreal White and Black Spruce, Spruce - Willow- Birch, and Alpine Tundra zones.

Elevation Range

This species has been recorded in the project area from 280 to 2,100 m.

Project Map Scale

Habitat attributes were derived from 1:250,000 Broad Ecosystem Inventory mapping; presentation scale may vary.

Ecology and Significant Habitat Requirements

In the interior, the Cassin's Finch occurs regularly in drier parts of southern British Columbia, generally corresponding to the distribution of the Bunchgrass, Ponderosa Pine, and Interior Douglas-fir biogeoclimatic zones. The Cassin's Finch is a branch-gleaning species, and in all areas is most abundant in ponderosa pine or mixed ponderosa pine and Douglas-fir forests. Non-breeding habitat is similar to breeding

habitat and consists mainly of open ponderosa pine, Douglas-fir, and mixed riparian stands, but the Cassin's Finch also forages in brushy riparian habitat along rivers, gullies, and lakeshores as well as pastures, weedy roadsides, and burns. In winter, backyard feeders and gardens are often frequented. Small numbers of birds occur in subalpine forests and may occur up to timberline in forest edges of meadows and the high canopy of forested areas (Campbell *et al.* 2001).

This species breeds mainly in dry and open coniferous forests, or the ecotone between grasslands and forests, at low to moderate elevations. Nesting has been recorded at elevations from 280 to 1,900 m, but few are above 1,000 m. This species' breeding distribution correlates to non-breeding habitats, but it also nests along riparian strips of black cottonwood and trembling aspen along wetlands and rivers (Campbell *et al.* 2001).

Habitat Uses Rated

Living, Reproducing

The 2 life requisites that were rated for Cassin's Finch were living and breeding. Habitat requirements for all life requisites are open coniferous and/or deciduous forests located near water on flat or moderately-sloping habitats.

Seasonal Chronology

Spring, Summer, Autumn, Winter

In the interior, spring migration may commence in early March, but the main influx occurs during the last week of March and the first week of April. The main spring movement occurs in April and May. The breeding season in British Columbia extends from April 14 to August 22. Premigration flocks form in early August and some may leave the region by the end of the month, although the peak movement is evident from early to mid-September. Only a small population remains to spend the winter (Campbell *et al.* 2001).

Habitat Use and Ecosystem Attributes

Using the Broad Terrestrial Ecosystem Inventory classification system, the Cassin's Finch primarily occupies Douglas-fir, Douglas-fir/lodgepole pine, Douglas-fir/ponderosa pine, interior western hemlock/Douglas-fir, and ponderosa pine habitats. The species lives and nests in mature coniferous/deciduous (with trembling aspen), and old growth age classes. Some nesting occurs in black cottonwood riparian in the same age classes mentioned above; urban habitats with feeding stations, are mostly used in winter; and cultivated fields are used in the Cariboo-Chilcotin region. The Cassin's Finch also use - flat, moderate and steep south-facing slopes, and north-facing slopes at low elevation Ponderosa Pine and Interior Douglas-fir biogeoclimatic zones.

Provincial Benchmarks

Feeding and Reproducing in Spring and summer in the following ecosystems, for the Cassin's Finch, were used as benchmarks from which all other life requisites and ecosystems were compared:

Ecosection:	Southern Okanogan Basin (SOB)
Biogeoclimatic Zone:	Okanagan Very Dry Hot Ponderosa Pine Variant (PPxh1)
Habitats:	Douglas-fir - Ponderosa Pine (DP)
Stand Structure:	Structural stage 5 (mature forests, 60 to 140 years old, of broad-leaved or mixed deciduous and coniferous) using the Broad Terrestrial Ecosystem Inventory habitat classification (Ecosystems Working Group 2000).

Ratings Assumptions

For the specific ratings that were determined for Cassin's Finch's breeding habitat requirements by biogeoclimatic zone, grassland phase, and habitat by ecosection, see Table 2. More than one value occurs where there is different ratings for either biogeoclimatic subzone, variant, habitat modifier, or structural stage.

Ratings

The provincial six-class rating scheme was used (Resources Inventory Committee 1999). Those standards recommend that for 1:250,000 habitat mapping that only a 2-class system be used for birds (Appendix A, page 57), but the biologists involved with the Grassland and Dry Forest Birds ratings project in July and August 2001 recommended that the more detailed 6-class system be used because of the detailed knowledge of the Cassin's Finch species and habitat requirements.

Ecosystem Delineation

The basic units of mapping were Broad Ecosystem units within Biogeoclimatic Subzone/Variants and Ecosections; all were mapped at 1:250,000. Ecosections describe areas of similar climate and physiography and geographically bound the ecological information contained in the Biogeoclimatic Subzone/Variant designation. Broad Ecosystem units are amalgamations of Biogeoclimatic Ecosystem Classification, site series, and site association units and are identified for each Biogeoclimatic Zonation class. Each mapped Broad Ecosystem unit has also been stratified by structural stage at 4 age classes, and by physical environment, based on broad classes of terrain, soil moisture, slope and aspect (Ecosystem Working Group 2000). This combination of place and ecosystems has been evaluated for its ability to supply suitable habitat requirements for the Cassin's Finch.

Methodology Assumptions

- Due to the coarseness of 1:250,000 mapping scale, certain key habitat types (e.g., open canopy versus dense canopy forests), were not able to be isolated or

specifically rated. Therefore, those habitats had to be rated based on their association with habitat features that appear at 1:250,000.

- Season delineation is separated as:
  Spring – March, April, May
  Summer – June, July, August
  Autumn – September, October, November
  Winter – December, January, February

- Living requisite includes many aspects, such as:
  foraging
  drinking
  roosting
  cover
  thermal protection

- Ratings are determined by implied knowledge of species' habitat requirement based on updated information since publication of The Birds of British Columbia (Campbell *et al.* 2001).

- Security/thermal requisite implies roosting for the purposes of this project.

References

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Table1. Ecoregion Units in British Columbia That Have Potential Habitats for Cassin's Finch.]
(Arranged by Ecoprovince.)

ECOREGION	EcoRg Code	ECOSECTION	EcoSc Code
SOUTHERN INTERIOR ECOPROVINCE (SOI)			
INTERIOR TRANSITION RANGES	ITR	LEEWARD PACIFIC RANGES	LPR
		PAVILION RANGES	PAR
		SOUTHERN CHILCOTIN RANGES	SCR
NORTHERN CASCADE RANGES	NCR	OKANAGAN RANGE	OKR
OKANOGAN HIGHLAND	OKH	SOUTHERN OKANOGAN BASIN	SOB
		SOUTHERN OKANOGAN HIGHLAND	SOH
THOMPSON - OKANAGAN PLATEAU	TOP	GUICHON UPLAND	GUU
		NICOLA BASIN	NIB
		NORTHERN OKANAGAN BASIN	NOB
		NORTHERN OKANAGAN HIGHLAND	NOH
		NORTHERN THOMPSON UPLAND	NTU
		SOUTHERN THOMPSON UPLAND	STU
		SHUSWAP BASIN	SHB
		THOMPSON BASIN	THB
		TRANQUILLE UPLAND	TRU
SOUTHERN INTERIOR MOUNTAINS ECOPROVINCE (SIM)			
COLUMBIA HIGHLANDS	COH	BOWRON VALLEY	BOV
		QUESNEL HIGHLAND	QUH
		SHUSWAP HIGHLAND	SHH
NORTHERN CONTINENTAL DIVIDE	NCD	ELK VALLEY	ELV
		CROWN OF THE CONTINENT	COC
		FLATHEAD VALLEY	FLV
NORTHERN COLUMBIA MOUNTAINS	NCM	CARIBOO MOUNTIANS	CAM
		CENTRAL COLUMBIA MOUNTAINS	CCM
		NORTHERN KOOTENAY MOUNTAINS	NKM
		SOUTHERN COLUMBIA MOUNTAINS	SCM
		SOUTHERN PURCELL MOUNTAINS	SPM
PURCELL TRANSITIONAL MOUNTAINS	PTM	EASTERN PURCELL MOUNTAINS	EPM
		McGILLIVRAY RANGES	MCR
SELKIRK - BITTERROOT FOOTHILLS	SBF	SELKIRK FOOTHILLS	SFH
SOUTHERN ROCKY MOUNTAIN TRENCH	SRT	BIG BEND TRENCH	BBT
		EAST KOOTENAY TRENCH	EKT
		UPPER COLUMBIA VALLEY	UCV
		UPPER FRASER TRENCH	UFT
WESTERN CONTINENTAL RANGES	WRA	CENTRAL PARK RANGES	CPK
		SOUTHERN PARK RANGES	SPK
CENTRAL INTERIOR ECOPROVINCE (CEI)			
FRASER PLATEAU	FRP	CARIBOO BASIN	CAB
		CARIBOO PLATEAU	CAP
		CHILCOTIN PLATEAU	CHP
		FRASER RIVER BASIN	FRB
		QUESNEL LOWLAND	QUL

Table 2. Ratings Assumptions for Cassin's Finch in the Breeding Season. (Table 1 Contains Ecoregion Unit Names.)
B = Benchmark for Breeding Habitat.

ECOPROVINCE			SIM												SOI														CEI			
ECOREGION			NCD		WRA	SRT		PTR		NCM			SBF	COH	OKH		NCR	TOP									ITR		FRP			
BGC ZON	PHASE	HABITAT	ELV	NFV	SPK	EKT	UCV	EPM	MCR	SCM	SPM	CCM	SFH	SHH	SOH	SOB	OKR	NOH	NOB	STU	GUU	NIB	THB	NTU	SHB	TRU	PAR	SCR	CAB	FRB	QUL	CHP
BG		CR														3	4															
BG		DF																												3,5		
BG		DP																					2							5		
BG		PP														1,2	2,3		1			4	2,3				5					
PP	a	PP														2,3			3,4								4					
PP		CR																			5											
PP		DP				2,3									3	B	2		1,2		4		3				5	5				
PP		PP				2									3	1,2	2,3	3	1,2,3	3	3,4	3	1,3			5	4	4				
IDF	a	DF													2									3			5					
IDF	a	DL																		5		5					5					
IDF	a	DP															2	3	2,3	3	4	4,5	4		2,3,4,5		4,5					
IDF	a	PP																					4		4		4					
IDF		CF											5																			
IDF		DF	2		3	2	2	3	3				4,5	5	2,4,5		5	2,3,4	3	3,4	3		3,4,5	3,4,5	3,4,5	3,4	4,5	5	3,4	3,5	4	3,5
IDF		DL		2	4	3	3	5	4				5		3,4,5		5	3,4,5	3,4	4,5	4,5	4	3,4	3,4	3,4,5	3,4	5	5	4			3
IDF		DP			3	2	2	4	3,4						2,3,4,5	1,2	4,5	3,4	2,3,4	3,4,5	3,5	3,5	3,4,5	4	2,3,4,5	4,5	4,5	5	3,5			
IDF		PP													2,4	1	4	3	1,3				3,4,5		1,3,4,5		5	5				
ICH		DF								3,5	3,5	3	4,5	4,5				3		5				5	5	5						
ICH		DL	2	2	4				4	5	5	5	5	5	4			4						5	5							
ICH		DP								3,5	3	3	3,4		3																	
ICH		IH								3	3	3,4	3																			
MS		DF	3	3				4																								
MS		DL	4	4				5	5											5	5			5	5		5					

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