BRITISH
COLUMBIA

Date: 15 February, 1999

From: Larry Pedersen, Chief Forester - Ministry of Forests
Cassie Doyle, Deputy Minister - Ministry of Environment, Lands and Parks

To: Regional Managers and District Managers, Ministry of Forests,
Regional Directors and Designated Environment Officials, Ministry of Environment, Lands and Parks, and
All Staff Involved in Implementing the Identified Wildlife Management Strategy

Re: Release and Implementation of the Identified Wildlife Management Strategy (IWMS)

Introduction

Volume 1 of the *Identified Wildlife Management Strategy* has been approved for distribution. It is intended that implementation will occur immediately following agency and staff training which is expected to be completed over the next few months. The Strategy is comprised of two documents: *Species and Plant Community Accounts for Identified Wildlife* and *Managing Identified Wildlife: Procedures and Measures*. This Strategy provides certainty to licensees and clarity to statutory decision makers on the:

1. biology of Identified Wildlife;
2. procedures to be followed in designating WHAs; and
3. mandatory forest practices within WHAs

The procedures portion will be subject to a one year trial and review period (see the first 32 pages of the *Procedures and Measures* document). Government felt it prudent to allow a review period so that parts of the procedures that prove not to be effective can be corrected where necessary. Stakeholders will be involved in the review and revision of the procedures.

An additional letter has been signed off that is associated with this strategy. It is referred to as a Higher Level Plan (HLP) Clarification letter and is intended to clarify the role of HLP recommendations in the Strategy (i.e., why do some species have HLP recommendations whereas others do not, and which species government recommends should and should not be considered by HLP tables).

This letter and other associated strategy documents are available for viewing on the MELP - Wildlife Branch - Identified Wildlife Management Strategy site (www.env.gov.bc.ca/wld/).

There is a one percent timber supply impact applied to the strategy as part of the overall six percent impact that was assigned to FPC requirements such as the Biodiversity Guidebook and the Riparian Management Areas Guidebook (See Timber Supply Analysis - February 1996). The one percent impact will be maintained at the district level over the next two years, at which time analysis will be done to determine whether the strategy is having a positive effect on Identified Wildlife species. If it appears that a species requires more efforts to maintain or increase its populations, then adjustments will have to be made such as increasing or re-apportioning the impact, changing the WHA size or modifying the general wildlife measures.

Government recognizes the need to avoid cost increases to the forest industry as a whole. To that end, the strategy ensures that all proposals fully consider economic impacts.

Government also wishes to ensure that large cost or timber supply impacts on individual licensees are avoided whenever possible. Because the procedure for establishing wildlife habitat areas is designed to avoid such impacts they should be rare, but where they are unavoidable a variety of local options will be used to mitigate their effect on the licensees.

Implementation Plan

Upon release of the Strategy, three types of committees will be established. They are:

1. a Stakeholder Technical Review committee;
2. several Regional WHA review committees; and
3. a provincial WHA Technical Review Committee.

Membership for the last two committees has been determined and is listed in Appendix 8 and 9 of the *Procedures and Measures* document. The stakeholder technical review committee will be comprised of 9 to 11 stakeholders who will have an opportunity, over the course of the next year, to review technical information prepared by the Identified Wildlife government working group. The kind of information to be prepared includes determining Volume 2 species, and reviewing the species in Volume 1 to ensure that they are still applicable. In addition to reviewing this technical information, the stakeholder technical review committee will be expected to canvass comments from their respective organizations on the procedures part of the Strategy for the one year review.

Once the one year review is completed, the expanded list of Identified Wildlife is determined, and the procedures are reviewed, then work can begin on the Measures and Accounts for the second volume.

Marbled Murrelet Account

The Marbled Murrelet account is implemented through the Guide to Landscape Unit Planning (in prep.) and the designation of Landscape Units. Since the Guide has not been released to date, it will be difficult to proceed with establishing WHAs for this species at this time. It is expected that this document will be released shortly and until such time as it is released, the only part of the account that can be enabled is interim measures. If the Guide is not released within the next few weeks and delayed indefinitely, a special set of procedures will be released to implement the Marbled Murrelet account that will allow WHAs to be approved.

Interim Measures

Attached to this letter is chief forester policy regarding the implementation of interim measures. This information is also available on the internet site.

Larry Pedersen
Chief Forester
Ministry of Forests

Cassie Doyle
Deputy Minister
Ministry of Environment, Lands, and Parks

ATTACHMENT

Interim Measures

Interim Measures are designed to minimize the effects of forest or range practices on critical habitat attributes, such as a nest site, and an adjacent area (interim zone) until a decision is made by the chief forester and deputy minister of Environment, Lands and Parks (CF and ADM-MELP) on a proposed WHA. The purpose of this section is to describe how interim measures are to be applied and under whose authority.

It is the opinion of the statutory decision makers (CF and ADM-MELP) that pending the designation of a WHA, interim measures should be applied to maintain those features of a proposed WHA critical to the survival of a species (Table 1). They are a prudent measure to ensure the qualities of a proposed WHA are maintained and provide a protective buffer for those critical features. Interim measures are not mandatory but are provided here for district managers and forest licensees to consider during the preparation and evaluation of operational plans.

Interim measures should be applied to WHA proposals accepted by the RES in step 2 of the procedures for establishing WHAs. It is recommended that the species general wildlife measures be applied within the interim zone. When a WHA is approved, interim measures should remain until such time as the WHA is designated and "known" (as defined in the Forest Practices Code of BC). When a WHA is rejected, maintenance of the interim zone is not required; however, other Code mechanisms, such as wildlife tree patches, may be used to maintain the critical feature. The number of interim sites that can be in place at any one time for some species has been limited (See "Planning thresholds" and Appendix 10 in the *Procedures and Measures* document)

Recommended interim zones for Identified Wildlife

Species	Habitat attribute	Interim zone (~ha)	Interim zone (m)
Red-listed			
Night snake	hibernaculum	0.3	30 m radius
Ferruginous hawk	nest site	7	150 m radius
Prairie falcon	nest site	7	150 m radius
Queen Charlotte goshawk	nest site	12	200 m radius
Western grebe	nest site	0.8	50 m radius
Marbled murrelet	nest site[a]	113	600 m radius
White-headed woodpecker	nest site	20	250 m radius
Brewer's sparrow	nest site	up to 200	n/a
Grasshopper sparrow	nest site	up to 12	200 m radius
Sage thrasher	nest site	up to 200	n/a
Yellow-breasted chat	nest site	up to 5	n/a
Pacific water shrew	occupied stream reach	up to 18	30 m on both stream sides
Keen's long-eared myotis	hibernaculum	12	200 m radius
Vancouver Island marmot	den(s)	consult MELP	consult MELP
Mountain beaver - *rufa* subspecies	den(s)	up to 10	50 m radius
Plant communities	occurrence	up to 80	250 m radius

Blue-listed			
Bull trout	concentration	up to 200	500 m on both stream sides
Tailed frog	natal headwater stream reach	up to 5	50 m on both stream sides
Gopher snake	hibernaculum	0.3	30 m radius
Racer	hibernaculum	0.3	30 m radius
Rubber boa	hibernaculum	0.3	30 m radius
American bittern	nest site	0.8	50 m radius
Sandhill crane	nest site	0.8	50 m radius
Trumpeter swan	nest site	up to 24	200 m radius
Long-billed curlew	nest site	up to 5	n/a
Ancient murrelet	nest site(s)	up to 10	100 m radius
Cassin's auklet	nest site(s)	up to 10	100 m radius
Lewis's woodpecker	aggregation	up to 3	100 m radius
Bobolink	nest site	up to 12	200 m radius
Mountain beaver - *rainieri* subspecies	den(s)	up to 10	50 m radius
Bighorn sheep	lambing areas	up to 50	n/a

a Nest site refers to occupied stands as defined in the Resource Inventory Committee (RIC) inventory manual for marbled murrelets.

Feb. 19, 1999

Ministry of Environment, Lands and Parks

IDENTIFIED WILDLIFE MANAGEMENT STRATEGY

The Forest Practices Code of British Columbia has as one of its goals the conservation of British Columbia's biological diversity. Implementation of the Code's biodiversity and riparian provisions covers habitat protection and management for the majority of wildlife species. But it has always been recognized that some species would require additional special habitat management to ensure the survival of their populations across their natural ranges. Volume 1 of the Identified Wildlife Management Strategy details the procedures and management practices that are mandatory for Identified Wildlife under the Code.

Volume 1 of the Identified Wildlife Strategy is comprised of two companion documents: *Species and Plant Community Accounts for Identified Wildlife* and *Managing Identified Wildlife: Procedures and Measures.* It contains 36 species and four plant communities (see Appendix A). The Province will start compiling a list of Identified Wildlife for Volume 2 in April 1999.

For the most part, the species and plant communities listed in Identified Wildlife are considered to be at risk (endangered, threatened or vulnerable) and require special management of critical habitats in order to maintain or restore populations or distributions. Critical habitats include breeding, denning or feeding sites. For example, breeding sites for ancient murrelets are considered critical, or limiting, as this species returns to the same area each year, breeds in undisturbed old forest and requires freedom from most predators.

The mechanisms to manage Identified Wildlife under the code are , wildlife habitat areas, general wildlife measures and higher level plan recommendations.

Wildlife habitat areas contain critical habitat elements for one or more species of Identified Wildlife. These areas are mapped and approved by the chief forester (Ministry of Forests) and deputy minister (Ministry of Environment, Lands and Parks).

General wildlife measures direct what forest and range management practices can occur within a wildlife habitat area. They may restrict forest or range activities during sensitive periods (e.g., the breeding season) to minimize disturbance or may restrict activities entirely within an area in order to maintain the integrity of the habitat. This strategy will be implemented as wildlife habitat areas are identified and mapped, their locations are made known to licencees and this information is incorporated into forest development plans. As with wildlife habitat areas the general wildlife measures are approved by the chief forester (MOF) and deputy minister (MELP).

Higher level plans that relate to Identified Wildlife are Resource Management Zones (RMZ) that are approved by the code ministers (Minister of Environment, Lands and Parks; Minister of Forests; and the Minister of Energy and Mines). These zones are defined in the code and typically are a product of Regional Land Use Plans and Land and Resource Management Plans (LRMP). At this time the government has recommended that three species from Volume 1 (grizzly bear, fisher and bull trout) be considered in higher level plans because of the scope of their habitat needs.

The Identified Wildlife Management Strategy is designed to have a timber supply impact of one per cent.

Appendix A

List of Identified Wildlife

To date 36 species/subspecies and four plant communities have been designated as Identified Wildlife.

Animal species/subspecies:

1.	American bittern	*Botaurus lentiginosus*
2.	American white pelican	*Pelecanus erythrorhynchos*
3.	Ancient murrelet	*Synthliboramphus antiquus*
4.	"California" bighorn sheep - *californiana* subspecies	*Ovis canadensis californiana*
5.	"Rocky Mountain" bighorn sheep - *canadensis* subspecies	*Ovis canadensis canadensis*
6.	Bobolink	*Dolichonyx oryzivorus*
7.	"Sagebrush" Brewer's sparrow - *breweri* subspecies	*Spizella breweri breweri*
8.	Bull trout	*Salvelinus confluentus*
9.	Cassin's auklet	*Ptychoramphus aleuticus*
10.	Ferruginous hawk	*Buteo regalis*
11.	Fisher	*Martes pennanti*
12.	"Great Basin" gopher snake - *deserticola* subspecies	*Pituophis catenifer deserticola*
13.	Grasshopper sparrow	*Ammodramus savannarum*
14.	Grizzly bear	*Ursus arctos*
15.	Keen's long-eared myotis	*Myotis keenii*
16.	Lewis's woodpecker	*Melanerpes lewis*
17.	Long-billed curlew	*Numenius americanus*
18.	Marbled murrelet	*Brachyramphus marmoratus*
19.	Mountain beaver - *rainieri* subspecies	*Aplodontia rufa rainieri*
20.	Mountain beaver - *rufa* subspecies	*Aplodontia rufa rufa*
21.	Mountain goat	*Oreamnos americanus*
22.	Night snake	*Hypsiglena torquata*
23.	Northern goshawk - *atricapillus* subspecies	*Accipiter gentilis atricapillus*
24.	"Queen Charlotte" northern goshawk - *laingi* subspecies	*Accipiter gentilis laingi*
25.	Pacific water shrew	*Sorex bendirii*
26.	Prairie falcon	*Falco mexicanus*
27.	Racer	*Coluber constrictor*

28. Rubber boa *Charina bottae*
29. Sage thrasher *Oreoscoptes montanus*
30. Sandhill crane *Grus canadensis*
31. Tailed frog *Ascaphus truei*
32. Trumpeter swan *Cygnus buccinator*
33. Vancouver Island marmot *Marmota vancouverensis*
34. Western grebe *Aechmophorus occidentalis*
35. White-headed woodpecker *Picoides albolarvatus*
36. Yellow-breasted chat *Icteria virens*

Plant Communities:

1. Douglas-fir/Garry oak - oniongrass
   Pseudotsuga menziesii/Quercus garryana - Melica subulata
2. Ponderosa pine - black cottonwood - Nootka rose - poison ivy
   Pinus ponderosa - Populus balsamifera ssp. *trichocarpa - Rhus radicans*
3. Ponderosa pine - black cottonwood - snowberry
   Pinus ponderosa - Populus balsamifera ssp. *trichocarpa - Symphoricarpos albus*
4. Water birch - red-osier dogwood
   Betula occidentalis - Cornus stolonifera

FOREST PRACTICES CODE of BRITISH COLUMBIA

Managing Identified Wildlife: Procedures and Measures

Volume I

February 1999

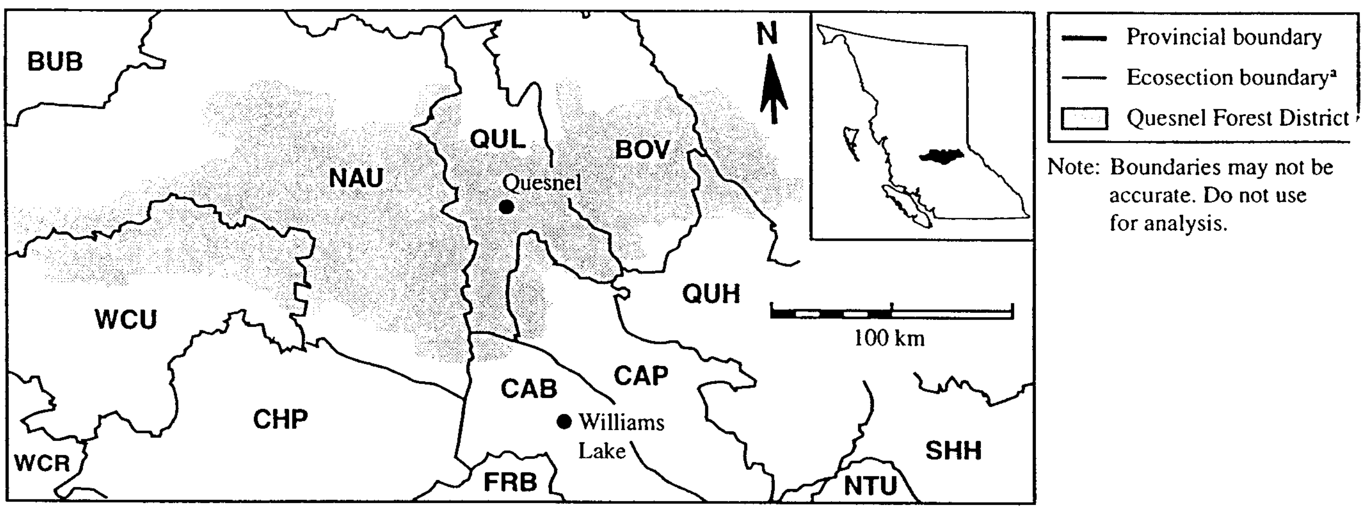
Authority

Forest Practices Code of British Columbia Act
Forest Road Regulation
Operational Planning Regulation
Silvicultural Practices Regulation
Timber Harvesting Practices Regulation

Cariboo Forest Region – Quesnel Forest District

Common name	Ecosections[a]							
	CAB	CAP	NAU	WCU	QUL	BOV	CAM	QUH
Fish								
Bull trout	x	x	x	x	x	x	x	x
Birds								
American white pelican	x		x	x				
American bittern	x	x	x		x	x	x	x
Northern goshawk ssp. *atricapillus*	x	x	x	x	x	x	x	x
Sandhill crane	x	x	x	x	x	x	x	x
Long-billed curlew	x							
Bobolink	x				x			
Mammals								
Fisher	x	x	x	x	x	x	x	x
Grizzly bear		x	x	x	x	x	x	x
Mountain goat							x	x

[a] Ecosection codes are defined on page 121.



Note: Boundaries may not be accurate. Do not use for analysis.

Introduction

The conservation of biological diversity is a goal of the *Forest Practices Code of British Columbia Act.* Two Forest Practices Code guidebooks, the *Biodiversity Guidebook* and the *Riparian Management Area Guidebook*, address the requirements of the majority of species and plant communities on a broad scale. These guidebooks are referred to as the "coarse filter," as they should maintain habitat for the majority of species, plant communities and ecosystem processes. The Identified Wildlife Management Strategy is designed to be the "fine filter," addressing habitat requirements of wildlife that require additional management attention.

The goals of the Identified Wildlife Management Strategy are to minimize the effects of forest practices on Identified Wildlife, and to maintain their limiting habitats throughout their current ranges and, where appropriate, their historic ranges. In some cases, this will entail restoration of previously occupied habitats, particularly for those species most at risk.

The term "Identified Wildlife" refers to those species at risk that the deputy minister of Environment, Lands and Parks, or person authorized by that deputy minister, and the chief forester, agree require special management attention. Within the Code, the terms "wildlife" and "species at risk" have been defined so that endangered, threatened or vulnerable species of vertebrates and invertebrates, endangered or threatened plants and plant communities, and regionally important vertebrates may be designated as Identified Wildlife.

The Identified Wildlife Management Strategy can be applied only to Crown forest and range land or private land that is subject to a tree farm or woodlot licence. It only addresses forest practices regulated by the Code. It does not address activities such as hunting or poaching. Under the *Wildlife Act*, native terrestrial vertebrates designated as "wildlife" are protected from killing, capture and harrassment except by permit or regulation. The strategy also does not address agriculture or urban development. A role of the Ministry of Environment, Lands and Parks is to develop conservation strategies and recovery plans for species at risk. These strategies and plans address all habitats in the province and all requirements for a species' conservation including research and inventory needs, habitat conservation and regulatory changes. Examples of these strategies include the Provincial Grizzly Bear Conservation Strategy and the Marbled Murrelet National Recovery Plan. For information on conservation strategies, recovery plans and how other activities are being addressed contact the Ministry of Environment, Lands and Parks, Wildlife Branch.

Identified Wildlife are managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs), or through other management practices specified in higher level plans. Wildlife habitat areas are mapped areas that have been approved by the chief forester and deputy minister of Environment, Lands and Parks as requiring special management attention. The purpose of WHAs is to conserve those habitats considered most limiting to a given species. For example, feeding lakes for American white pelican are considered limiting because they must occur near the breeding site, contain the appropriate prey species, and be relatively free of human disturbance. Breeding sites for ancient murrelet are considered limiting because this species returns to the same area each year, breeds in undisturbed old forest habitat, and requires freedom from most mammalian predators. Although research is not always adequate to indicate which habitats or habitat attributes are most limiting, the *Identified Wildlife Management Strategy* adheres to the precautionary principle—where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for failing to implement appropriate, cost-effective environmental measures.

General wildlife measures describe the management practices that must be implemented within an approved WHA. A GWM may limit activities partially (e.g., seasonally) or entirely. General wildlife measures prescribe a level of management appropriate to the conservation status of Identified Wildlife. Management objectives are consistent with the goals and commitments of the Canadian Biodiversity Strategy and provincial goals for the management of wildlife (i.e., as outlined in the Provincial Wildlife Strategy). However, it should be recognized that these measures may prove to be insufficient to conserve viable populations of a species throughout its range in British Columbia and may have to be amended accordingly. Amendments will generally follow an assessment, prepared by the Ministry of Environment, Lands and Parks (MELP), of the conservation needs of the species. When an assessment indicates that additional measures are required to conserve the species and the recommendations have an impact on other resources beyond the limits approved for Identified Wildlife, it may be necessary to consider the species within a public planning process (i.e., higher level plan).

It is believed that this strategy marks a significant step toward responsible stewardship of Identified Wildlife. The management practices presented here are designed to reduce the impacts of forest and range management on Identified Wildlife within targeted social and economic constraints. They represent an attempt to balance both socio-economic considerations and conservation of species at risk in managed forests and rangelands. For the most part, Identified Wildlife provisions are stand level measures that can not address the issues of habitat supply, habitat connectivity and population viability. Such considerations should be taken into account during landscape level or regional planning.

Provincial status

Species at risk under the Forest Practices Code

Under the Forest Practices Code, species at risk includes provincially red- and blue-listed vertebrates and invertebrates, red-listed plants and plant communities as well as selected yellow-listed species (i.e., regionally important). Regionally important species are considered at risk under the Code when it has been determined that these species are not adequately addressed by coarse filter guidelines and therefore require special management attention.

Provincial status (e.g., red, blue and yellow) is determined and reviewed on a biannual basis by the Conservation Data Centre (CDC) and Wildlife Branch using the internationally accepted criteria developed by the Nature Conservancy. These criteria are provincial abundance, estimated occurrences, range, trends, protected occurrences and threats. Species and plant communities are ranked from 1–5 where 1 is critically imperiled and 5 is secure. Generally, red-listed species are ranked 1 or 2, and blue-listed species are ranked 3 or 3/4. Regionally important wildlife are species that are ranked 4 or 4/5 indicating a potential conservation concern and are "at risk" in adjacent jurisdictions. The species at risk list is approved by the deputy minister of Environment, Lands and Parks.

Identified Wildlife

Identified Wildlife are selected from the provincially red- or blue-listed vertebrates and invertebrates; regionally important vertebrates; and red-listed plants or plant communities. An inter-agency committee (Ministry of Environment, Lands and Parks and Ministry of Forests) consults with species experts to determine which of these species and plant communities should be recommended for designation as Identified Wildlife.

Species and plant communities are evaluated to determine what habitats are considered limiting for their survival. Both species experts and literature are consulted during this evaluation. For red-listed plant communities the remaining occurrences of the community are considered limiting. Plant communities and species whose known limiting habitats are not affected by forest or range management are not considered for designation as Identified Wildlife. Species and plant communities whose habitat needs are adequately addressed by the *Biodiversity Guidebook* and the *Riparian Management Area Guidebook* are also not considered.

Only species and plant communities that were not adequately addressed at the coarse filter level and were considered to need protection of limiting habitats were put forward to the chief forester and deputy minister of Environment, Lands and Parks for designation as Identified Wildlife.

Identified Wildlife may be de-designated by agreement of the chief forester and deputy minister of Environment, Lands and Parks. This is necessary when a change in species or community status occurs.

Volume 1 species

The first volume of the Identified Wildlife Management Strategy contains 36 species and subspecies and four plant communities. This is only a portion of the species and plant communities that are at risk and affected by forest and range practices. The list of species and communities reflects the efforts of the interagency committee to represent a diversity of species in a diversity of habitats, and includes species from all the forest regions. Additional species and communities will be included in the forthcoming volume 2.

Appendices 1–6 contain information on the distribution of volume 1 Identified Wildlife by ecosection and forest district.

Management of Identified Wildlife

Coarse filter guidelines

Application of Forest Practices Code documents such as the *Biodiversity Guidebook* and the *Riparian Management Area Guidebook* will contribute to the maintenance of most of the biodiversity in British Columbia, including some of the habitat needs of Identified Wildlife.

The *Biodiversity Guidebook* addresses the maintenance of biodiversity at both the stand level and landscape level. Stand level biodiversity provisions involve maintaining stand structure through the retention of wildlife trees, coarse woody debris, tree species diversity, and understorey vegetation diversity. Stand level biodiversity is addressed during operational planning (e.g., silviculture prescriptions) whereas landscape level biodiversity is addressed through landscape unit planning. During landscape unit planning, objectives for some or all of the following landscape characteristics are set: seral stage distribution, temporal and spatial distribution of cutblocks, old seral retention and representation, landscape connectivity, stand structure and species composition.

Landscape unit planning is directed by the *Guide to Landscape Unit Planning* (In prep.). This document outlines current policy for conducting landscape unit planning. In the short term, the focus or priorities are old seral retention and wildlife tree patches.

If the requirements of certain Identified Wildlife (e.g., marbled murrelet and northern goshawk) and placement of WHAs are considered during landscape unit planning, it may be possible to effectively plan for a greater number of species and accommodate their connectivity requirements while reducing the incremental forest impacts. For instance, by identifying the seral stage mosaic required by some Identified Wildlife early in the planning process, species requirements may be partially or completely accommodated by applying intermediate or higher biodiversity emphasis options to landscape units. The selection of intermediate and higher biodiversity emphasis options must still be carried out within the chief forester's policy direction including the apportionment of 45% of the timber harvesting landbase in each sub-regional planning unit to lower biodiversity emphasis, 45% to intermediate, and 10% to higher biodiversity emphasis.

Fine filter management

The fine filter component of the Forest Practices Code is the Identified Wildlife Management Strategy. As defined within the *Operational Planning Regulations*, Identified Wildlife are "those species at risk that the deputy minister of Environment, Lands and Parks or a person authorized by that deputy minister, and the chief forester, agree will be managed through a higher level plan, wildlife habitat area or general wildlife measure."

Wildlife habitat areas

Wildlife habitat areas are areas of limiting habitat that have been mapped and approved by the chief forester and deputy minister of Environment, Lands and Parks. Wildlife habitat areas are designed to minimize disturbance or habitat alteration to a species' limiting habitat or to a rare plant community. In most cases, the WHA contains a core area that is protected from habitat alteration and a buffer to minimize disturbance (i.e., WHA includes both the core area and the buffer). All species and plant communities in volume 1 have WHA provisions, except fisher, which is addressed through higher level plan recommendations.

General wildlife measures

General wildlife measures direct forest and range practices within a WHA, and have been approved by the chief forester and deputy minister of Environment, Lands and Parks making them legally required under the Code. GWMs can address any forest practice as defined under the Code. This includes road construction, road maintenance, grazing, haying and timber harvesting. Practices have been grouped under the following headings: access, range, recreation, restoration and enhancement, and silviculture. A GWM may limit activities partially or entirely.

Because GWMs are legally required, variances are provided for some measures that enable district managers and regional fish and wildlife managers to vary measures. For more information on variances see page 17.

Higher level plans (resource management zone objectives)

Wildlife habitat areas maintain limiting habitats and cannot always address all aspects of a species' habitat requirements. Some species have large home ranges, occur at low densities, have widely and sparsely distributed limiting habitats, or are sensitive to forest level disturbances. The requirements of such species must be addressed over large areas, such as regions or subregions, in order to effectively manage their populations. For these reasons, some species habitat requirements are not appropriately managed as WHAs and cannot be adequately addressed by coarse filter provisions. Therefore management of these species is best addressed through higher level plans.

For the purposes of this document, a higher level plan is a resource management zone (RMZ) objective approved by the three ministers responsible for the Code (MELP, MOF, MEM). The definition of higher level plans has been restricted because setting RMZ objectives involves significant socio-economic considerations. During RMZ objective setting, the regional or landscape level requirements of these species will be considered in context with other species' habitat needs, measures to conserve biodiversity, other resource values, and social and economic issues. These recommendations may be considered by ongoing strategic land use planning tables who have not yet passed the scenario development stage in situations where it would not cause backtracking of the progress accomplished to date.

This document provides higher level plan recommendations for planning tables to consider for three species: fisher, bull trout and grizzly bear. Government is not recommending any other volume 1 species be considered within higher level plans at this time. Should conservation assessments indicate that one or more other volume 1 species cannot be adequately managed through the current provisions of the Identified Wildlife Management Strategy or other Code mechanisms, government may amend the strategy to include higher level plan recommendations for the additional species.

For any species to be considered in a higher level plan, government planning teams should develop a range of management options for the species before tabling this information with non-government planning team members. The government planning team should also evaluate the environmental, social and economic impacts associated with the range of options and present this information to the non-government planning team members.

Conservation assessments

The effectiveness of the fine filter management approach is dependent on the adequacy of the coarse filter mechanisms as well as the development of species-specific conservation assessments that will provide guidance on where and how much is required to maintain a species or plant community.

A conservation assessment, prepared by government, will examine the spatial arrangement of existing land use designations (e.g., protected areas, riparian reserves, ungulate winter ranges) and how these contribute to the conservation needs of a species or plant community. Conservation assessments will indicate where placement of WHAs would be most effective and will assist the regional rare and endangered species specialist (RES) in evaluating WHA proposals. They will also provide objectives for the management of the species or plant community within the context of government policy regarding the impacts of WHAs on the forest, range, mining and petroleum industries.

Inventory and monitoring

An important part of the Identified Wildlife Management Strategy is a program for inventory and monitoring of Identified Wildlife populations. Monitoring takes three forms: compliance monitoring, effectiveness monitoring and population monitoring.

Compliance monitoring confirms whether the recommendations are being followed in the field. Compliance monitoring is carried out by the Ministry of Forests and Ministry of Environment, Lands and Parks. Effectiveness monitoring evaluates the response of the habitat to the management practices within and adjacent to a WHA. Population monitoring evaluates the effectiveness of maintaining populations of Identified Wildlife. Without adequate baseline inventory information, it will be difficult to carry out population monitoring or to know when to modify the WHA design, placement, frequency or measures.

FOREST PRACTICES
CODE

of

BRITISH COLUMBIA

Species and Plant Community Accounts for Identified Wildlife

Volume I

June 1997

Fish – Salmonids

BULL TROUT (*Salvelinus confluentus*)

Status

The bull trout is BLUE-listed because populations are declining throughout its global range. In B.C., the declines are mainly due to habitat degradation, disruption of migration patterns, and over fishing.

Ecology

Bull trout display a variety of life-history patterns. The stream resident form is usually smaller and lives its entire life in small headwater streams where cold water and velocity barriers are common. Another form lives in large rivers and makes long spawning migrations to small tributary streams. A similar form lives as an adult in lakes and spawns in tributary streams. Both of these types often achieve large size. Migrant and resident forms can occur together. Hybrids of bull trout and dolly varden can occur in watersheds where the two species co-exist.

Lake and large river forms are often late maturing. These forms usually survive at least five summers before beginning their first spawning run. All adults do not spawn every year. Spawning migrations occur during the summer. After migrating, virtually all adults in a run congregate in a single staging area (usually a large pool), prior to spawning. Spawning occurs once water temperatures drop to about 9°C in the fall but may occur as early as mid-August. Where observed, they chose gravel sites with low to moderate velocity (0.03–0.8 m/sec), and a depth of 0.1–0.7 m in association with stream or overstream cover. Migrant forms move downstream to over winter in rivers or lakes after spawning.

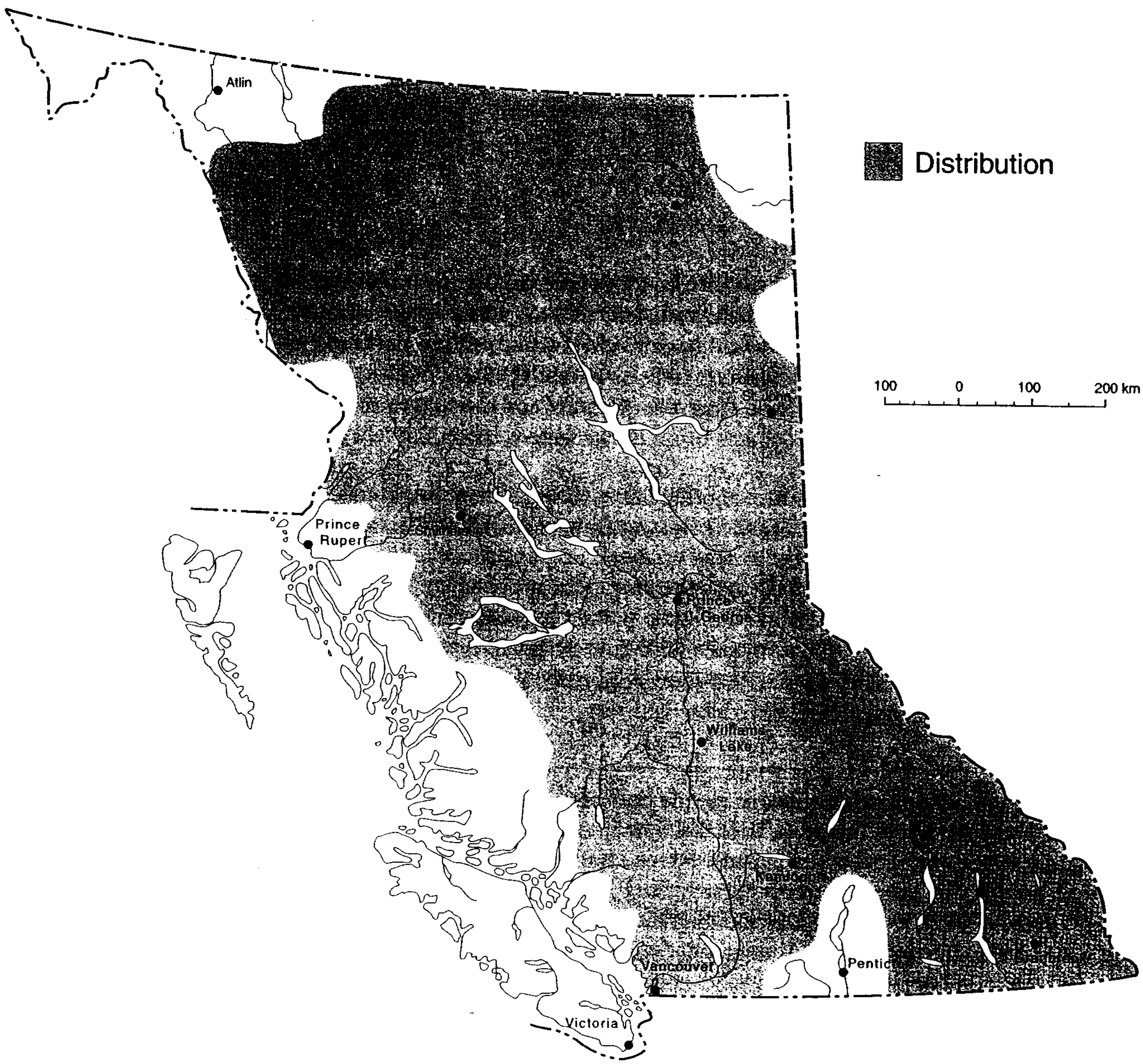
The optimal incubation temperature ranges from 2–4°C. After emerging, fry disappear into the gravel along stream edges or in side channels. As they grow larger, they move to the deeper water of pools, riffles and runs. Juveniles remain near the bottom and are strongly associated with cobbles and boulders or woody debris. Optimum temperature for growth is <12°C. The diet of small fish and juveniles is mostly made up of aquatic insects taken either from the bottom or from drift. Timing of juvenile migration varies with the population and can occur any time from spring through fall. Bull trout will become piscivorous at 100–200 mm in length where other fish species are present. Sculpins, whitefish and kokanee are the preferred prey.

Distribution

Bull trout likely occur in all mainland ecosections except those in the Kettle, Okanagan and Lewes river drainages. It may be absent from the Alsek river system on the north coast. It does not occur on Vancouver Island, the Queen Charlotte Islands or most coastal mainland ecosections.

Bull trout

(*Salvelinus confluentus*)



Ecoprovinces: Ecosections

COM:	NWC, KIR, NAB, NAR, BOR, EPR, NPR, SPR
GED:	FRL
CEI:	BUR, CCR, WCR, BUB, CAB, CAP, FRB, NAU, NEU, WCU
SBI:	HAF, HAR, MIR, PEF, BAU, MCP, QUL, NEL, ESM, MAP, PAT, SOM, NSM, SSM
SOI:	LPR, PAR, SCR, HOR, NTU, STU, THB
BOP:	HAP, KIP, PEL
TAP:	FNL, MUP, ETP, NAU
NBM:	HYH, LIP, MUF, EMR, WMR, CAR, KEM, SBP, STP, TEP, TUR, THH

Major watersheds

South coast rivers, Fraser, Harrison, Thompson, South Thompson, North Thompson, Chilcotin, Quesnel, Stuart, Columbia, Pend Oreille, Lower Kootenay, Upper Kootenay, Kicking Horse, Illecillewaet, Nass, Kitsumkalum, Bulkley, Zymoetz, Bell-Irving, Peace, Parsnip, Finlay, Omineca, Nation, Beatton, Pine, Halfway, Liard, Fort Nelson, Kechika, Dease, Swift and Gladys drainages.

Habitat requirements

Broad ecosystem units

ES, FS, LL, LS, RE, SP, ST

Critical habitats and habitat features

Bull trout are extremely sensitive to habitat degradation and are considered an indicator species of ecosystem health. They appear to have a narrower range of habitat preferences than other salmonids and require clean, well-oxygenated water within a narrow range of cold temperature conditions. They may be found in high gradient areas (up to 30%) where other game fish would not be expected to occur. They are uncommon where temperatures exceed 15°C. When temperatures increase, the risk of invasion by other species that may displace bull trout increases.

The distribution and abundance of bull trout is strongly influenced by channel and hydrologic stability, substrate composition, cover, temperature and the maintenance of migration corridors. Woody debris and channel complexity may also be important. Bull trout require large, deep pools for over wintering. Increased sedimentation may lead to reduced pool depths and pool frequency, as well as reductions in interstitial spaces and channel braiding. Increased levels of sediment may reduce embryo survival, fry emergence and overwinter survival of juveniles.

Bull trout spawn in streams and tend to be extremely selective when picking a spawning site. In some systems a whole population spawns in one small area, ignoring other apparently suitable habitat. The presence of ground water may be a critical requirement. Large deep pools, often bedrock controlled, adjacent to appropriate spawning habitat may also be important. Small, very high gradient tributary streams and ground water seepage channels are often utilized for spawning and rearing. Juveniles require one to four years of stream rearing. Juveniles prefer pools and runs, up to 1.0 m in depth, with cobble and boulder substrate and overhead cover.

Access to spawning and juvenile rearing habitat is critical. Spawning habitat is often located at some distance from other seasonal habitats such as wintering or foraging habitat. It is important that migratory corridors link habitats required at different life-history stages and different seasons.

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Birds – Waders

AMERICAN BITTERN (*Botaurus lentiginosus*)

Status

The American bittern is BLUE-listed because of its unknown population size and its dependence on wetlands with extensive stands of tall, emergent vegetation, a habitat that continues to be lost. It is designated as NOT AT RISK in Canada by COSEWIC, but is known to be declining throughout most of its North American range.

Ecology

The American bittern is a secretive bird inhabiting lush, emergent vegetation along the borders of lakes, marshes and rivers. Breeding occurs in valley bottom marshes or on flat plateau regions, from near sea level on the coast, up to 1300 m in the interior. The American bittern is almost never seen on the ground because it rarely leaves heavy cover, and its cryptic plumage provides excellent camouflage. It is active mainly at dawn and dusk, when it forages by standing motionless to capture passing prey such as insects, amphibians, crayfish, and small fish and mammals. It is most often noticed when territorial males give their distinctive call. Because of its secretive habits, it is likely more abundant and widespread than currently known.

The American bittern nests in emergent vegetation, and builds its platform nest over water or mud. Nesting marshes must have extensive stands of emergent vegetation and have stable water levels throughout the nest-building, egg-laying, incubation and nestling periods. It is a solitary breeder, and the nesting season extends from early April to mid-August. Coastal populations have suffered from the loss of brackish marshes along the lower Fraser River and its major tributaries, and the drainage of most wetlands in the lower Fraser River valley. Interior populations are threatened mainly by drainage of wetlands and fluctuating water levels.

Distribution

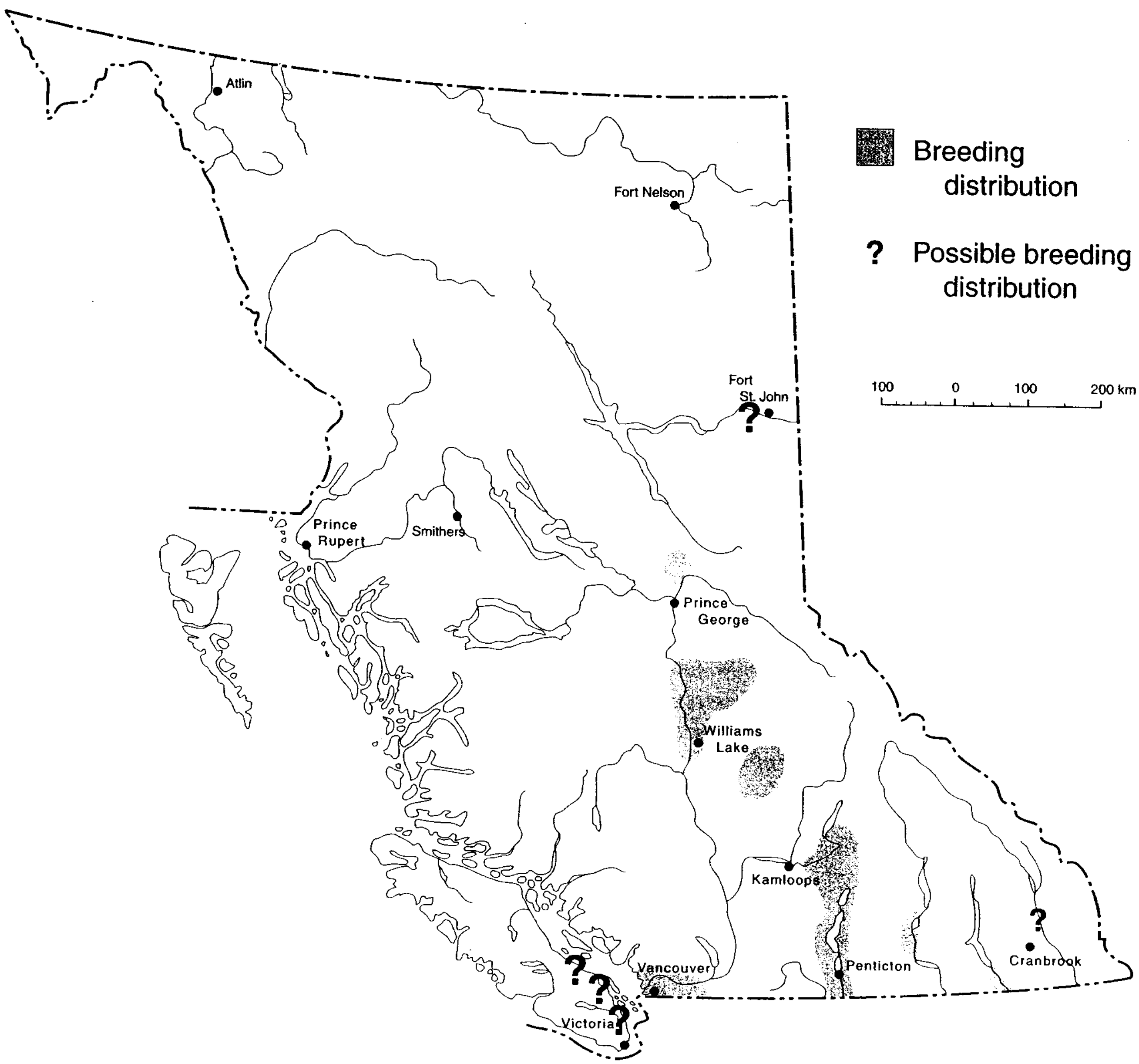
Ecoprovinces: Ecosections

COM:	NWC, NAB, EPR, QCL, NWL, NIM
GED:	LIM, NAL, FRL
CEI:	BUB, CAB, CAP, CHP, NAU, QUL, WCU
SBI:	BAU, MCP, NEL, MAP, PAT, SSM
SIM:	BOV, CAM, CCM, NKM, QUH, SCM, SFH, EKT, UFT
SOI:	SOB, NOB, NTU, STU, THB
BOP:	PEL
TAP:	FNL, ETP, PEP

Biogeoclimatic units

BG, BWBS, CDF, CWH, ICH, IDF, MS, SBPS, SBS

American bittern
(*Botaurus lentiginosus*)



Breeding range

The American bittern breeds in the interior from the U.S. border (e.g., Creston and Osoyoos), north to the Mackenzie area, and on the coast along the Fraser River valley. Its centre of breeding abundance is in the Cariboo parklands. It probably also breeds in larger marshes along southeastern Vancouver Island, in the Rocky Mountain Trench of the east Kootenay, and in the Peace River lowlands.

Nonbreeding range

The nonbreeding range includes the Fort Nelson Lowland, Babine Upland, Nass Basin, and northeastern Vancouver Island. The occasional vagrant reaches the Queen Charlotte Islands.

Wintering and migration

In B.C., a few American bittern winter in the marshes of southeastern Vancouver Island and the Fraser Lowlands. Its main wintering area is in the southern U.S. and Mexico. Migrants move as single birds, and are very secretive and seldom seen. Spring migrants arrive mainly in late April and May. Autumn migrants move mainly in September and early October.

Habitat requirements

Broad ecosystem units

ES, LL, ME, MR, RE, SH

Structural stage

2: herb – (nests are built in emergent vegetation)

Critical habitats and habitat features

The American bittern requires extensive stands of tall emergent vegetation (bulrush, *Scirpus* sp.; cattail, *Typha latifolia*; willow, *Salix* sp.), in sloughs, marshes, swamps, protected bays of lakes or river oxbows. Most nests are placed in water 5–20 cm in depth. Stable water levels are important for successful breeding.

The American bittern inhabits wetlands of all sizes, but tends to be more abundant on larger wetlands. In Iowa, nesting occurred only on wetlands >10 ha, and in upstate New York, they were formerly found mainly on marshes >4 ha.

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SANDHILL CRANE (*Grus canadensis*)

Status

The sandhill crane is BLUE-listed because of the lack of data on breeding populations in B.C., and habitat loss and degradation for breeding populations in the Fraser Lowlands and Okanagan valley. The greater sandhill crane, a subspecies of the sandhill crane, is designated as NOT AT RISK in Canada by COSEWIC.

Ecology

The sandhill crane roosts and feeds in open wetland areas such as bogs, swamps, marshes, estuaries, fens and dry upland areas such as grasslands and agricultural fields. It nests in secluded freshwater wetlands that are surrounded by forest cover. Nests are large heaps of vegetation in water, surrounded by a screen of emergent vegetation. Young leave the nest and forage with their parents around the perimeter of the wetland, primarily in sedge meadows. When threatened, adult and young sandhill cranes will often run into heavy forest cover. In B.C., the sandhill crane is a solitary nester with breeding pairs sparsely distributed across available habitat. The breeding season extends from early April (coastal), and early May (interior), to late August.

Distribution

Ecoprovinces: Ecosections

COM:	HEL, NAB, NAR, NPR, OUF, SPR, QCL, SKP, WQC, NWL, NIM, WIM
GED:	LIM, NAL, FRL
CEI:	BUB, CAB, CAP, CHP, FRB, NAU, NEU, QUL, WCU
SBI:	BAU, MCP, NEL, PAT
SIM:	BOV, QUH, SCM, SFH, BBT, EKT, UFT
SOI:	SOB, OKR, NOB, STU, (THB – eastern end only)
BOP:	CLH, PEL, KIP
TAP:	FNL, ETP, PEP
NBM:	TEP, LIP

Biogeoclimatic units

BG:	all
BWBS:	BWBSmw
CDF:	CDFmm
CWH:	all
ICH:	all
IDF:	IDFdk, IDFmw
MS:	all
PP:	all
SBPS:	SBPSxc, SBPSdc, SBPSmk, SBPSmc
SBS:	SBSdw, SBSdk, SBSmh, SBSmw, SBSmk, SBSmc

Breeding range

The American bittern breeds in the interior from the U.S. border (e.g., Creston and Osoyoos), north to the Mackenzie area, and on the coast along the Fraser River valley. Its centre of breeding abundance is in the Cariboo parklands. It probably also breeds in larger marshes along southeastern Vancouver Island, in the Rocky Mountain Trench of the east Kootenay, and in the Peace River lowlands.

Nonbreeding range

The nonbreeding range includes the Fort Nelson Lowland, Babine Upland, Nass Basin, and northeastern Vancouver Island. The occasional vagrant reaches the Queen Charlotte Islands.

Wintering and migration

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Habitat requirements

Broad ecosystem units

ES, LL, ME, MR, RE, SH

Structural stage

2: herb – (nests are built in emergent vegetation)

Critical habitats and habitat features

The American bittern requires extensive stands of tall emergent vegetation (bulrush, *Scirpus* sp.; cattail, *Typha latifolia*; willow, *Salix* sp.), in sloughs, marshes, swamps, protected bays of lakes or river oxbows. Most nests are placed in water 5–20 cm in depth. Stable water levels are important for successful breeding.

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SANDHILL CRANE (*Grus canadensis*)

Status

The sandhill crane is BLUE-listed because of the lack of data on breeding populations in B.C., and habitat loss and degradation for breeding populations in the Fraser Lowlands and Okanagan valley. The greater sandhill crane, a subspecies of the sandhill crane, is designated as NOT AT RISK in Canada by COSEWIC.

Ecology

The sandhill crane roosts and feeds in open wetland areas such as bogs, swamps, marshes, estuaries, fens and dry upland areas such as grasslands and agricultural fields. It nests in secluded freshwater wetlands that are surrounded by forest cover. Nests are large heaps of vegetation in water, surrounded by a screen of emergent vegetation. Young leave the nest and forage with their parents around the perimeter of the wetland, primarily in sedge meadows. When threatened, adult and young sandhill cranes will often run into heavy forest cover. In B.C., the sandhill crane is a solitary nester with breeding pairs sparsely distributed across available habitat. The breeding season extends from early April (coastal), and early May (interior), to late August.

Distribution

Ecoprovinces: Ecosections

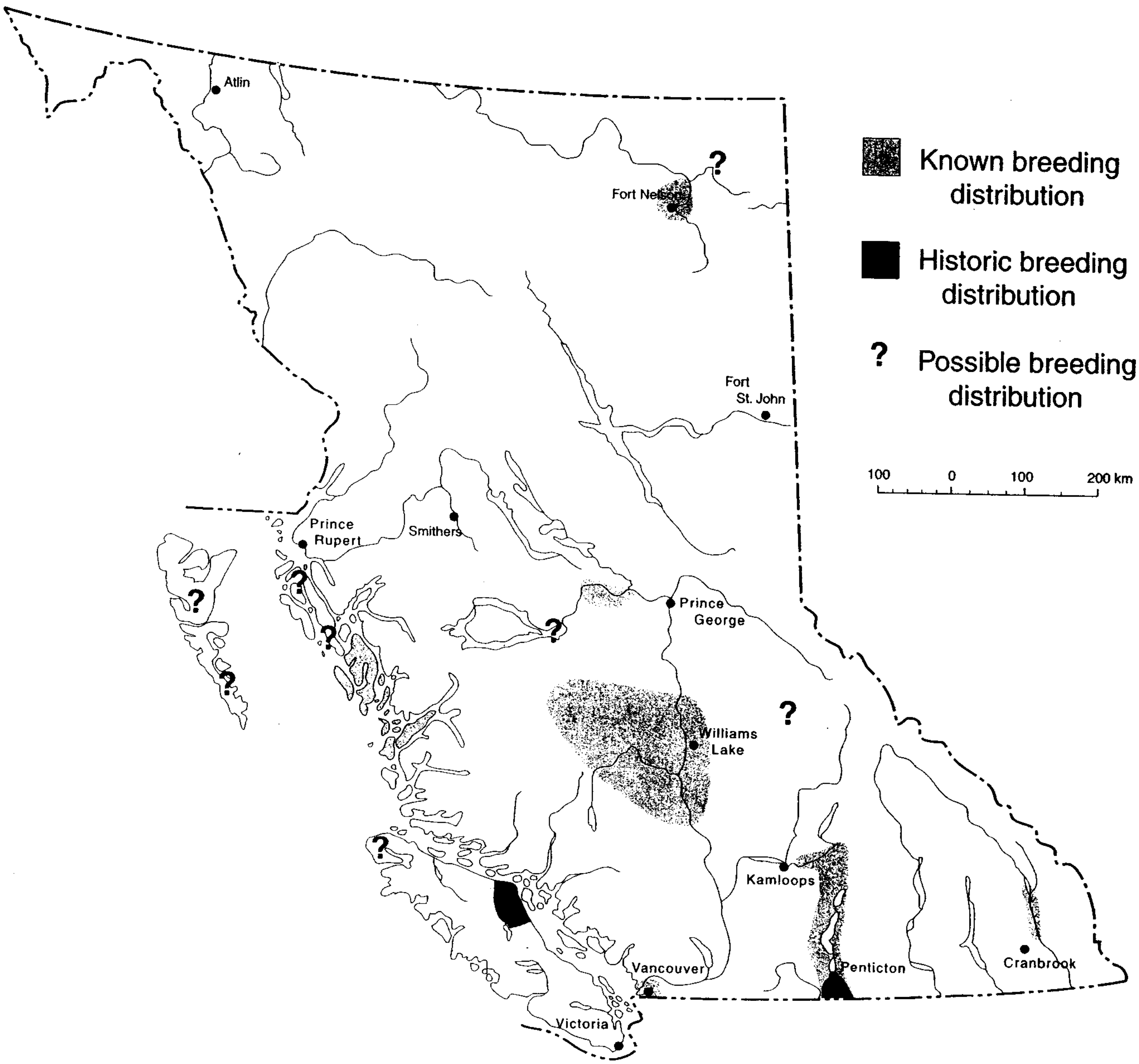
COM:	HEL, NAB, NAR, NPR, OUF, SPR, QCL, SKP, WQC, NWL, NIM, WIM
GED:	LIM, NAL, FRL
CEI:	BUB, CAB, CAP, CHP, FRB, NAU, NEU, QUL, WCU
SBI:	BAU, MCP, NEL, PAT
SIM:	BOV, QUH, SCM, SFH, BBT, EKT, UFT
SOI:	SOB, OKR, NOB, STU, (THB – eastern end only)
BOP:	CLH, PEL, KIP
TAP:	FNL, ETP, PEP
NBM:	TEP, LIP

Biogeoclimatic units

BG:	all
BWBS:	BWBSmw
CDF:	CDFmm
CWH:	all
ICH:	all
IDF:	IDFdk, IDFmw
MS:	all
PP:	all
SBPS:	SBPSxc, SBPSdc, SBPSmk, SBPSmc
SBS:	SBSdw, SBSdk, SBSmh, SBSmw, SBSmk, SBSmc

Sandhill crane

(*Grus canadensis*)



Breeding range

The sandhill crane breeds throughout most of the central interior, the Queen Charlotte Islands, the Fort Nelson Lowland, and in low elevation bogs, marshes and muskeg wetlands up to 1220 m elevation. It is a local breeder in the East Kootenay Trench, along the mainland coast, in the Okanagan and Thompson Basin, and at Pitt Meadows and Burns Bog in the Fraser Lowland. Breeding is probable throughout the Central Interior, the southern Sub-boreal Interior. About 2000–4000 cranes are thought to breed in B.C.

Nonbreeding range

The nonbreeding range includes western and southern Vancouver Island, local areas of the east Kootenay, and northwestern B.C.

Wintering and migration

The sandhill crane is a common to abundant migrant in the interior and an uncommon to common migrant on the coast. Three major migration corridors exist in B.C. Lessers and greaters (about 25 000 birds) pass through the Okanagan valley and Thompson plateau, Williams Lake and the Kispiox valley before the lesser sandhill cranes carry on towards Alaska. A second, coastal route follows southern and central Vancouver Island, then extends up the mainland coast. A third route brings cranes (mainly lessers, up to 200 000) from Alberta through the Peace River and Fort Nelson Lowlands. Small numbers winter on the Queen Charlotte Islands, Vancouver Island and the lower Fraser River valley.

Habitat requirements

Broad ecosystem units

BB, BG, BS, CB, CF, ES, FE, ME, MR, RE, SH, SS

Structural stage

2–7: herb – old forest

Critical habitats and habitat features

The sandhill crane requires shallow freshwater wetlands with emergent vegetation (sedge, cattails, bulrush, hardhack, willows, Labrador tea) for nesting and brood rearing. Nesting wetlands are usually secluded, free from disturbance and surrounded by forest. On the coast, brackish estuaries are used for brood rearing.

Forested buffer zones around nesting marshes are likely critical for relatively small (1–10 ha) wetlands. Although the sandhill crane will occasionally nest in revegetating clearcuts, clearcuts are not suitable habitat alternatives to wetlands.

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NORTHERN GOSHAWK (*Accipiter gentilis atricapillus – Accipiter gentilis laingi*)

Status

Two subspecies of the northern goshawk occur in British Columbia: *A. g. atricapillus* and *A. g. laingi*. Hereafter referred to as the Queen Charlotte goshawk, *A. g. laingi* is RED-listed because the population is sparse, restricted to coastal forest, and heavily reliant on mature-to-old forest. It is designated as VULNERABLE in Canada by COSEWIC. *A. g. atricapillus* is considered to be REGIONALLY IMPORTANT. It is considered a species of conservation concern because it is associated with habitats that are becoming rare, and it is a species for which B.C. has a global responsibility because adjacent jurisdictions have listed it at risk. This subspecies is designated as NOT AT RISK in Canada by COSEWIC.

Ecology

The species is a robust, long-tailed and short-winged accipiter. It generally feeds on large prey, including birds such as crows, varied thrush, grouse, woodpeckers, sapsuckers, Steller's jays and mammals such as hares, squirrels, ground squirrels and chipmunks. Major prey are usually associated with old-growth forests or forest edges.

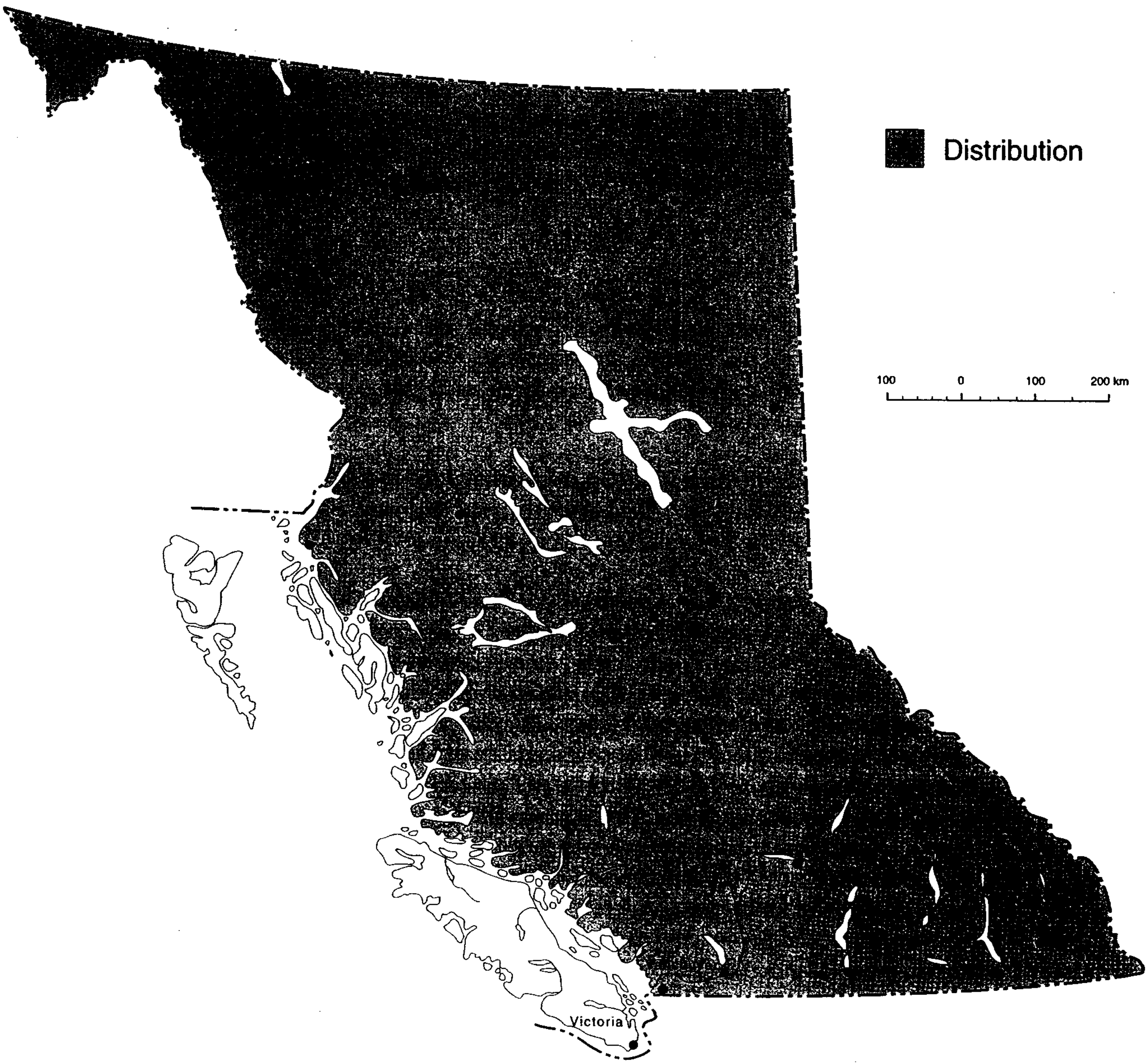
The breeding and brood-rearing season extends from April to September. Clutches of 3–4 eggs are incubated for 30–32 days, and chicks fledge at approximately 35–42 days of age. After fledging, chicks remain in the vicinity of the nest for 30–50 days.

The home range is hierarchically organized, composed of nest sites, nest areas, a post-fledging area and a foraging area. The "nest site" is defined as a known nest tree and a 1 ha area surrounding it. The "nest area," which may contain several nest sites, is approximately 12 ha, and is characterized by several stands of large, old trees with dense canopy cover. This area is at the centre of all breeding movements and behaviours, from courtship through fledging. The "post-fledging area" (approximately 240 ha) surrounds the active nest area and 1–2 alternate nest areas, and corresponds roughly to the defended area of the breeding pair. It is characterized by an abundance of the habitat attributes critical for goshawk prey (snags, coarse woody debris, forest openings), and extensive canopy cover, which provides protection to fledglings while learning to hunt. The "foraging area" occupies about 2400 ha including the post-fledging area. It may include a diversity of landforms and forest cover types, but areas with greater canopy cover, greater basal area, and more trees per hectare are used more frequently in some parts of the species range. In Alaska, the Queen Charlotte goshawk prefers high productivity old forest, and avoids early seral forests.

Distribution

Most of the global range of the Queen Charlotte goshawk is in B.C. It occurs in three disjunct populations along the Pacific Coast, from southeast Alaska to western Washington. The first of these occupies the Alexander Archipelago and a narrow mainland strip below the Coast Mountains, in southeast Alaska. The second occurs on the Queen Charlotte Islands, about 250 km to the southwest. The third population occurs on Vancouver Island.

Northern goshawk – subspecies *atricapillus*
(*Accipiter gentilis atricapillus*)



The Queen Charlotte goshawk may also occur along the coastal mainland of B.C., particularly opposite the Alaskan populations in the Stikine River area, but records to date provide evidence only for the presence of *A. g. atricapillus* on the mainland.

The northern goshawk (*atricapillus*) breeds throughout the province, with the exception of Vancouver Island and the Queen Charlotte Islands, where the *laingi* subspecies is found.

Ecoprovinces: Ecosections

Northern Goshawk
The northern goshawk is considered to occur in all mainland ecosections.

Queen Charlotte Goshawk
CAM: QCL, SKP, WQC, NWL, NIM, WIM, (HEL, OUF, BOR – possible)
GED: LIM, NAL (GEL – possible)

Biogeoclimatic units

Northern Goshawk
All except Alpine Tundra (AT)

Queen Charlotte Goshawk
CDF: CDFmm
CWH: CWHwh, CWHvh, CWHxm, CWHdm, CWHmm, CWHvm
MH: MHwh Mhmm

Habitat requirements

Broad ecosystem units

Northern Goshawk
AC, BA, BB, BG, BL, BP, CB, CD, CS, CP, CW, DA, DF, DL, DP, EF, EW, FR, HB, HL, HS, IG, IH, IS, LP, MF, PP, PR, RB, RD, RR, SD, SF, SK, SL, SR, SW, WB, WR, YB, YM, YS

Queen Charlotte Goshawk
CB, CD, CG, CH, CP, CR, CW, DA, EF, FR, HB, HL, HS, LP, RS, SR, WB, YB

Structural stage

6: mature forest
7: old forest

Critical habitats and habitat features

The nest area is situated in stands of large trees, with dense canopies and relatively open understories. Nesting habitat is typically on gentle slopes, usually less than 30% slope, and always less than 60% slope.

The post-fledging area contains numerous feeding perches (stumps, downed snags, large horizontal limbs below the canopy), and their relatively open understorey is thought to facilitate the pursuit and capture of prey. The post-fledging area should provide abundant hunting opportunities to young, while maintaining higher than average cover from predators.

The post-fledging area is characterized by a mosaic of structural stages, and coarse woody debris throughout, which provides extensive and varied habitat for the prey base of the goshawk. Telemetry studies have shown that the northern goshawk avoids foraging in open habitats, selecting sites with more and larger trees, and increased canopy closure. Approximately 70% of Queen Charlotte goshawk activity occurs in high productivity old orest within the home range.

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Mammals – Carnivores

FISHER (*Martes pennanti*)

Status

The fisher is BLUE-listed because populations are believed to have declined recently over much of their range. Populations are particularly susceptible to over-harvest by trapping, and are sensitive to habitat change through forest harvest, regeneration and stand tending. No provincial population estimate exists for the fisher, but it is legally harvested for its pelt in some areas of the province.

Ecology

Fishers inhabit forested habitats, particularly those with mixed habitat and structural classes, edges and riparian areas. In the mid-western and northeastern United States, the fisher occurs in extensive mid-successional to mature forests, but in western North America they are more associated with late successional forests. Aspects of forest structure (see "Habitat requirements"), are likely more important determinants of distribution and habitat use than are forest types.

In B.C., the fisher is often closely associated with riparian and dense wetland forest types. It generally stays in or near forests with canopy closure of at least 30%. Resting and maternal denning sites are located in these habitats in large, mature and declining trees. Winter resting sites are associated with large coarse woody debris (CWD) and large spruce with spruce broom rust. Maternal den sites in B.C. are almost entirely found in large declining cottonwood, although they will likely use other tree species. Availability of suitable maternal and resting den sites may be limiting factors for the population.

The fisher is a generalist predator. Prey include porcupine, snowshoe hare, squirrels, mice, voles, shrews, birds and carrion. In central B.C. (dry SBS), 55% of their diet is comprised of snowshoe hare, squirrels and mice. Most foraging in winter occurs above the snow layer, and as such snow conditions likely influence foraging and distribution patterns. Summer foraging is strongly associated with CWD. Primary prey species are associated with abundant CWD and understorey shrub cover.

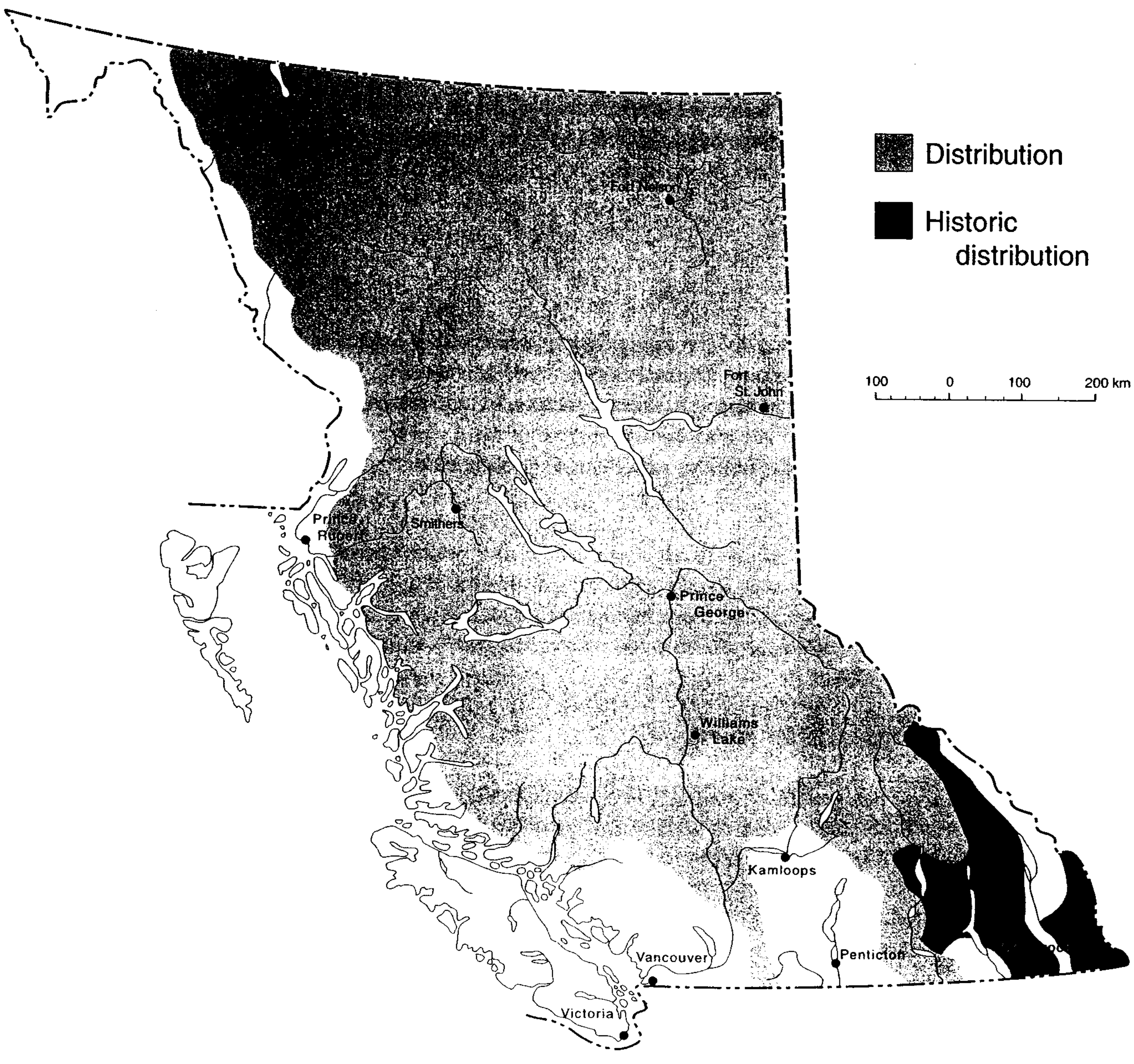
The reported home range of fisher ranges from 4–32 km^2 for females (mean 15 km^2) and 19–79 km^2 for males (mean 40 km^2). Because of their relatively large home range, 600 km^2 has been suggested as a minimum area necessary to manage for viable populations.

Distribution

Although fisher occur throughout B.C., they are rare in coastal ecosystems. Preferred habitat resembles that found in SBS, SWB and BWBS biogeoclimatic zones. The fisher is currently absent, but was historically present, in the CCM, EPM, MCR and BRR ecosections of the Southern Interior Mountains (SIM) ecoprovince.

Fisher

(*Martes pennanti*)



Ecoprovinces: Ecosections

COM:	KIR, NAB, NPR
CEI:	all
SBI:	all
SIM:	BOV, QUH, SHH, CAM, CCM, EPM, MCR, NKM, FRR, BRR, SFH, NPK, BBT, UFT
SOI:	LPR, PAR, SCR, SOH, HOR, OKR, NOH, NTU
BOP:	all
TAP:	all
NBM:	CAR, KEM, SBP, STP, TEP, TUR, HYH, LIP, MUF, EMR, WMR, TEB, THH

Biogeoclimatic units

BWBS, CWH, ESSF, ICH, IDF, MH, MS, SBPS, SBS, SWB

Habitat requirements

Broad ecosystem units

Broad ecosystem units of high value are CR, IH, SD, SF and RR (interior locations only). Those of medium value are BA, BP, DF, DL, ER, HB, IS, SA and SL.

Structural stage

Fisher forage within many structural stages. Structural stages 1a (non-vegetated), 1b (sparse), 2 (herb), 3a (low shrub), and 3b (tall shrub) are not utilized during winter. They may be used in other seasons providing sufficient forage and security cover is present. Most habitat use is associated with structural stages 6 (mature forest) and 7 (old forest) where structural characteristics of older forests are most developed. Resting and maternal denning habitat is typically associated with structural stages 6 and 7, and key features are availability of CWD, large wildlife trees and canopy cover in winter. Fisher will forage in a wider range of structural stages (particularly in summer) and habitat use may be influenced by population cycles of major prey species.

Critical habitats and habitat features

Riparian and riparian-associated habitats, particularly those with large spruce trees (minimum 25 cm dbh; recommended 40 cm dbh) with broom rust, and large (75 cm dbh) cottonwood or fir trees, are used as resting and maternal denning sites.

Coarse woody debris (decay class 2–6) is important for resting sites and as habitat for prey species. A continued supply of decay class 2 logs are required to provide denning sites. In the SBS zone maternal den sites are predominantly in large cottonwoods in cavities created by broken branches.

Riparian-riparian and riparian-upland connectivity is also important. The fisher uses habitats with generally greater than 30% canopy cover and a productive understorey that supports a variety of small and medium-sized prey species.

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GRIZZLY BEAR (*Ursus arctos horribilis*)

Status

Grizzly bears are BLUE-listed and classed as VULNERABLE in B.C. by COSEWIC and are considered EXTIRPATED in the prairies (part of Alberta, Saskatchewan and Manitoba). They are considered threatened where they still occur in the Southern Interior Ecoprovince. In addition, four cross-border populations are classed as THREATENED under the U.S. Endangered Species Act: the North Cascades, Selkirks, Cabinet–Yaak and Northern Continental Divide Grizzly Bear Ecosystems.

The provincial population estimate for grizzly bears is 10 000–13 000. Local population declines are occurring in many areas of the province, due primarily to area concentrated mortality, habitat loss and fragmentation. Sources of area-concentrated mortality include hunting, poaching for gall bladders and other body parts, and inadequate garbage management. These activities are associated with increased access stemming from forestry, mining, and oil and gas development, and represent a particularly significant threat when adult females are taken. Habitat loss and fragmentation occur on a broad scale as a result of forestry and fire suppression, and expanding human settlement. The latter, with its associated developments (agriculture, recreation, roads, hydro reservoirs and utility corridors) is concentrated in valley bottoms formerly used as spring habitats and movement corridors between mountain ranges; human population increase represents the greatest threat to grizzly bears in B.C. Unfortunately, several major protected areas contain poor quality grizzly habitat, and are inadequate to maintain viable populations of the species.

Ecology

Grizzly bears in B.C. have a wide range of life-history strategies to meet their nutritional, security, thermal, reproductive and "space" requirements. Body and home range sizes across the province are proportionate to food quality, quantity and distribution, and the length of the denning period. Home range sizes also vary by sex and age class; adult males vary from as little as 350 km^2 on the coast to over 2500 km^2 in the northern interior. Adult female home ranges may be as small as 25 km^2 in productive habitats. In B.C., grizzly bears are efficient predators and scavengers but rely more on a vegetative diet. A huge variety of plant, animal, fish and insect food sources are regionally important.

Reproductive rate is the lowest recorded among North American land mammals. First age of reproduction varies from age 4 upwards, cubs per litter from 1 to 4 (1.4–2.5 average), and litter interval is usually 3 years (cubs, born in winter dens, remain with their mothers until they are 26–28 months old). Population densities vary from approximately 5 up to 65 bears per 1000 km^2 with high seasonal variance (e.g., congregation on a salmon spawning channel). Adult female grizzly bears will tolerate their female offspring within their home ranges, especially when population densities are lower than the habitat can support. As a result, subadult female dispersal outside maternal home ranges is rare in much of B.C. Areas where all resident adult females have been killed are therefore not usually recolonized by dispersing subadult females. Transient males may continue to use such areas, but long-term local viability is unlikely.

Distribution

Grizzly bears historically occurred throughout B.C., with the exception of some coastal islands (e.g., Vancouver Island, the Queen Charlotte Islands, and others). They have been extirpated from much of south and south-central B.C. (e.g., lower elevations of the Okanagan, the lower mainland, and parts of the Cariboo), and population viability is in jeopardy in the Southern Interior Ecoprovince. The following are ecosections within which grizzly bears have been **extirpated**:

COM:	NWC, SPR (part), EPR (part)
GED:	GEL, FRL
CEI:	FRB, CAB
SOI:	SOB, SOH, OKR, NOB, NOH (part), NTU (part), STU, THB

The extreme southeast corner of the province appears to support a healthy population of grizzly bears, as do the Northern Boreal Mountains ecoprovince and the northern portion of the Sub-boreal Interior ecoprovince. Elsewhere in the province, distribution is highly variable. Population density is typically lowest near human settlement, areas with high human access and near agricultural activity unless abundant, high quality attractants are available (e.g., dumps). Figure 1 shows current grizzly bear habitat potential throughout B.C.

Biogeoclimatic units

AT, BWBS, CWH, ESSF, ICH, IDF, MH, MS, PP, SBPS, SBS, SWB

Habitat requirements

Grizzly bears in B.C. have such an enormous range of behavioural adaptations to diverse regional ecosystems that generalization about habitat requirements is difficult. Even within a region, individual bears may have vastly different approaches to meeting their requirements. Some bears — particularly males, adopt a highly mobile, seasonally "transient" strategy, whereas other bears are more "resident." Some bears rely more heavily on predation than others, and some use "high elevation" annual home ranges as opposed to migrating to lower elevations on a seasonal basis. Strategies are somewhat flexible; individuals adapt to annual variation in food supply and can learn to exploit newly available food sources. However, many of a grizzly bear's movements, habitat selection and foraging patterns are learned as a cub and are reinforced throughout their lives (20–30 years). Home range fidelity may be strong as a result, especially for females.

Although meeting nutritional requirements is the primary factor in habitat choice, selection is also based on thermal cover (e.g., dens/bedding sites), security (e.g., females protecting cubs), or access to potential mates during the breeding season. Habitat selection is also strongly influenced by intra-specific (social) interactions and the presence and activities of people.

Grizzly bear habitat requirements must be viewed at several spatial scales. Transients deliberately travel to specific landscapes in a subregion on a seasonal basis. Both residents and transients select specific patches of habitat or complexes of habitats within landscapes. Within patches they may only require specific food-producing microsites. Habitat requirements must also be viewed at various temporal scales; continually shifting seasonal food supplies, annual food variance (e.g., berry crop failure), and long term influences on habitat quality such as fire suppression must all be considered. Concurrent attention must be given to meeting the spatial requirements of individuals within and across landscapes and examining population-level habitat supply.

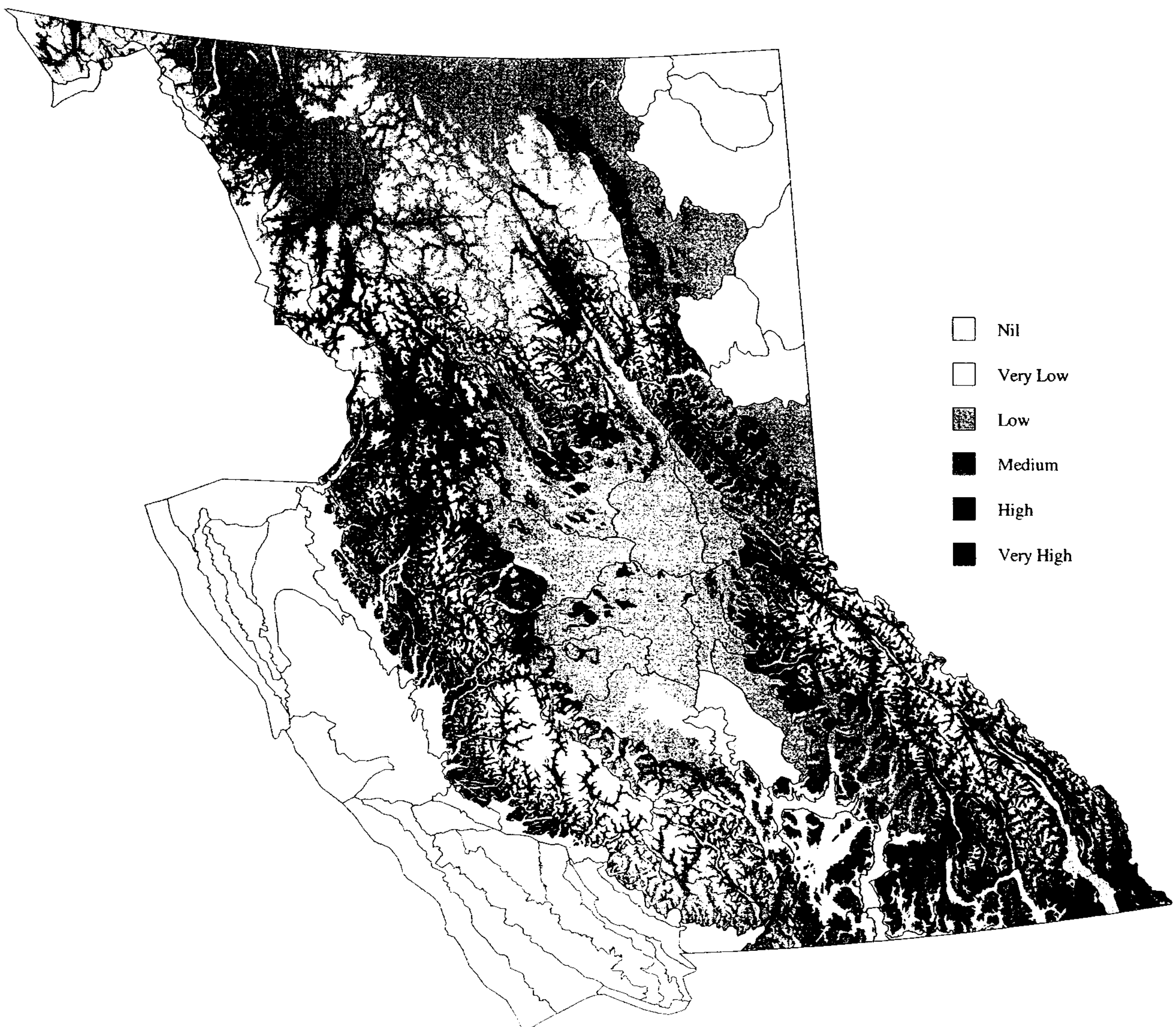

Figure 1. Current grizzly bear habitat potential throughout British Columbia.
(Source: A.N. Hamilton, D.A. Dermarchi, D. Leblanc, K. Karr, May 1997.)

Because grizzly bears are naturally found at low densities, it has been estimated that 20 000 to 50 000 km^2 of occupied and connected habitat is required to ensure their long term viability. To sustain habitat supply for populations, individuals must be able to move freely among valued habitats, without being restricted by human-caused blockages or being attracted to mortality sinks around human settlements.

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Mountain Goat (*Oreamnos americanus*)

Status

Mountain goats are considered to be REGIONALLY IMPORTANT because they require older age class forests for winter cover.

Ecology

Mountain goats are usually found in the most rugged mountainous areas of steep cliffs and rock bluffs, narrow ledges, rocky canyons, talus and rock slopes. They are considered non-migratory although there is often a vertical movement from high elevation summer ranges to lower elevations during winter. Suitable feeding areas border rough, steep escape terrain. Goats rarely move more than 400 m from this terrain except to visit mineral licks. In summer, diet consists of alpine and sub-alpine grasses, sedges, rushes and forbs. In winter, the grass/forb component of their diet is supplemented or even replaced by a variety of shrubs as well as conifers such as Douglas-fir, alpine fir, several pine species or juniper. Mosses and lichens are important for coastal populations in winter but are less important for interior populations. Natural mineral licks provide calcium, manganese, phosphorous and sodium, particularly during the spring and early summer. Mountain goats are considered moderately gregarious. In summer, females and kids may congregate in groups of 20–30. Adult males remain alone or gather together in small, loose aggregations. Breeding occurs in November and females give birth to their young in approximately 7 months. Ideally, kidding occurs on protected ledges in steep, rocky escape terrain with food and water near-by. Mountain goats are not territorial. Home ranges vary, depending on the degree of seasonal movement (tagged goats in Olympic National Park, USA are known to have made seasonal movements of up to 16 km).

Distribution

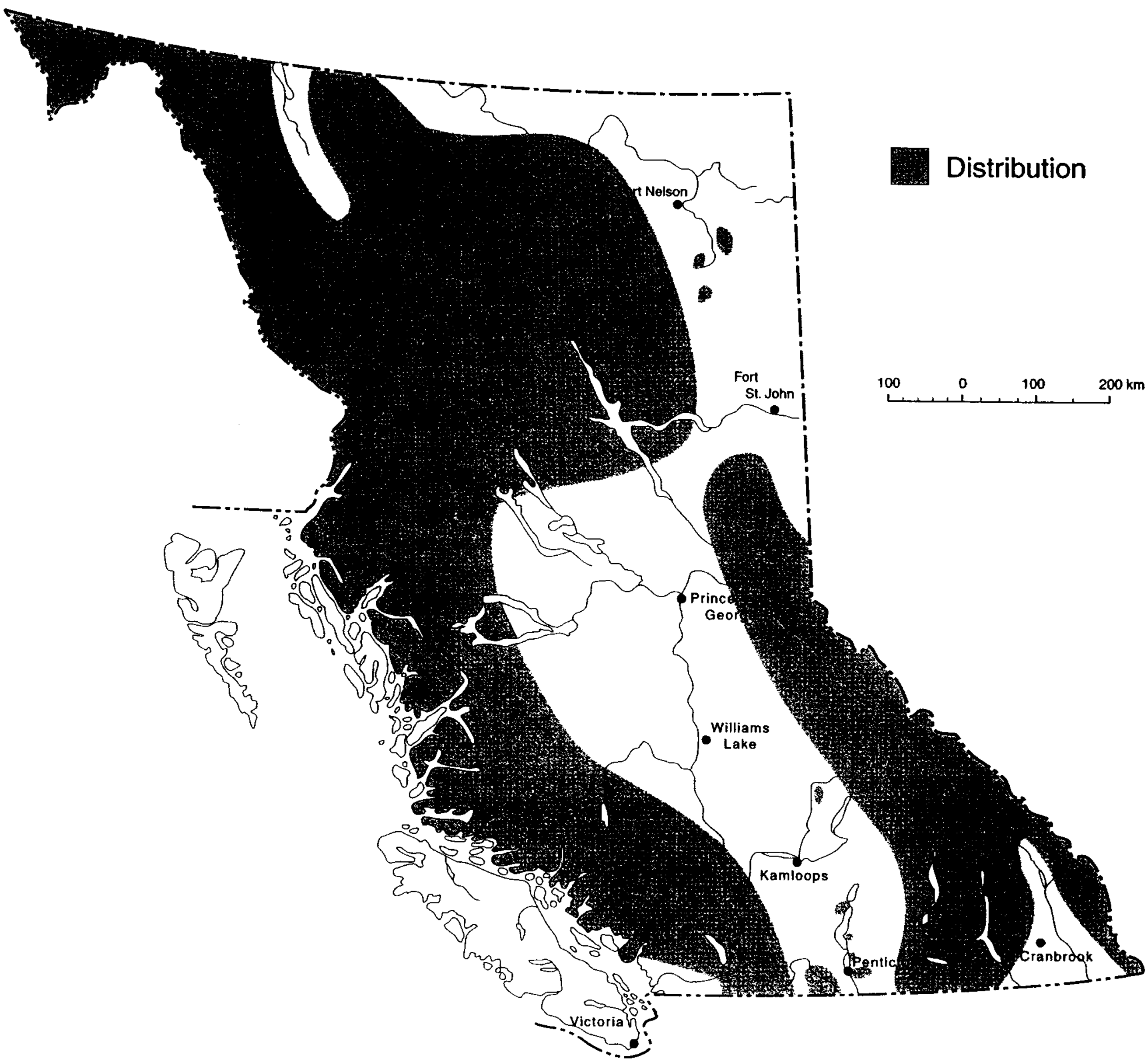
Mountain goats occur throughout much of the Rocky Mountains from the 49th parallel to the Yukon border, the Cassiar Mountains in north-central British Columbia, the Cariboo Mountains of the upper Fraser River system, the Purcell, Selkirk and Monashee Mountains of south-east British Columbia and the Coast Mountains from the lower Fraser River to the extreme northwest portion of the province.

Ecoprovinces: Ecosections

CAM:	NWC, KIR, NAB, NAR, APM, ALR, BOR, EPR, NPR, SPR
GED:	GEL
CEI:	BUR, CCR, WCR, NEU, WCU
SBI:	HAF, HAR, MIR, PEF, ESM, MAP, SOM, NSM, SSM
SIM:	CCM, EPM, NCM, QUH, SCM, SHH, FRR, BRR, COC, SFH, CPK, NPK, SPK
SOI:	LPR, SCR, SOH, OKR, NOB, NOH, STU
BOP:	MUF (sporadically)
TAP:	KIP (sporadically)
NBM:	TAB, MUF, EMR, WMR, CAR, KEM, SBP, STP, TEP, TUR, ICR, TAH, THH

Mountain goat

(*Oreamnos americanus*)



Biogeoclimatic units

AT, CWH, ESSF, ICH, IDF, MH, sometimes in MS, PP, SBS, SWB

Habitat requirements

Broad ecosystem units

AG, AH, AM, AS, AT, AU, AV, BK, CS, FB, FP, FY, GL, HB, HL, HP, HS, MF, RO, SD, SG, SM, SU, TA, WP

Structural stage

1: non-vegetated (escape terrain)
2: herb (summer foraging)
6: mature forest (winter foraging and thermal cover)
7: old forest (winter foraging and thermal cover)

Winter

Mountain goats generally avoid snow depths greater than 50 cm. In deep snow areas, they may have to winter in areas with 100 cm or more. In the interior mountains, many goats move from the alpine and sub-alpine meadows down to the upper areas of timber on steep south- and west-facing slopes, gaining protection from the severest winter conditions. Others seek high-elevation wind-blown ridges where forage is exposed or covered by little snow. Coastal goats generally winter below 1500 m on south and west facing, steep, rocky slopes and cliffs, often within timber stands, gaining protective cover from the forest canopy. Some coastal herds are forced by deep, wet snow to the bluffs, ledges and cliffs at sea level.

Summer

Most mountain goats move to higher elevations in the warmer months, usually between June and September, to forage in alpine tundra, alpine and sub-alpine meadows, talus shrublands, sub-alpine parkland, high elevation burns and grassy talus slopes.

Critical habitats and habitat features

Habitat preferences are tied to escape terrain: steep, rocky bluffs and cliffs. These areas can only produce limited forage, thus, undisturbed forage sites adjacent to the escape terrain are critical. Many wintering goats find forage and thermal cover within open, old growth or mature forests. If there is suitable cover nearby, goats may benefit substantially from burned or logged openings both during the winter and summer.

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