TABLE 4. Climatic characteristics for the biogeoclimatic zones of British Columbia

Zone	Range and reference station	Lat. (° ′)	Long. (° ′)	Elevation (m)	Mean annual precip. (mm)	Mean summer precip. (May-Sept) (mm)	Mean precip. of driest month (mm)	Mean precip. of wettest month (mm)	Driest month	Wettest month
AT	Old Glory Mtn.	49 09	117 55	2347	755.5	287.0	40.0	84.1	Jul	Dec
BG	Max			588	335.7	174.5	17.3	55.4		
	Min			297	205.6	98.0	8.0	27.3		
	Kamloops	50 40	120 20	379	241.7	111.4	8.0	36.1	Mar	Jan
BWBS	Max			840	503.7	305.3	24.3	879.0		
	Min			382	327.1	144.7	8.3	41.1		
	Fort Nelson A	58 50	122 35	382	451.8	297.9	16.7	84.3	Apr	Jul
CDF	Max			223	1262.6	238.3	38.6	232.9		
	Min			8	647.2	107.3	13.4	119.2		
	Victoria Int'l A	48 39	123 26	19	872.9	141.9	18.1	157.3	Jul	Dec
CWH	Max			671	4386.8	1162.0	151.0	625.4		
	Min			0	990.2	159.3	16.8	145.7		
	Haney UBC RF Admin	49 16	122 34	143	2140.1	467.8	65.5	331.7	Jul	Dec
ESSF	Max			1862	1995.4	424.5	64.8	297.4		
	Min			863	514.1	204.6	26.6	57.4		
	Boss Mountain	52 06	120 53	1532	1177.1	401.6	63.5	140.6	May	Dec
ICH	Max			1085	1419.0	439.3	57.2	224.3		
	Min			314	497.7	199.9	21.4	57.8		
	Revelstoke	51 00	118 12	456	1063.7	325.0	51.4	177.0	Apr	Jan
IDF	Max			1128	1198.9	290.7	37.6	208.8		
	Min			122	295.1	107.5	13.5	34.8		
	150 Mile House	52 07	121 56	738	414.2	214.0	15.8	60.7	Apr	Jun
MH	Hollyburn Ridge	49 23	123 12	930	2954.3	694.4	106.9	434.8	Jul	Dec
MS	Max			1554	663.8	252.1	38.5	108.1		
	Min			1128	380.8	158.2	17.9	45.2		
	Peachland Brenda Mines	49 52	120 00	1520	638.3	197.0	29.3	89.1	Apr	Dec
PP	Max			939	604.5	270.3	30.7	77.6		
	Min			244	319.5	86.3	11.0	34.5		
	Kelowna	49 54	119 28	354	332.2	136.3	15.3	45.1	Apr	Dec
SBPS	Max			1219	517.8	299.8	21.1	86.5		
	Min			914	464.1	242.6	20.8	36.4		
	Alexis Creek Tautri Creek	52 33	123 11	1219	464.1	242.6	20.8	57.6	Apr	Jun
SBS	Max			1245	1588.2	352.6	36.8	278.7		
	Min			488	438.9	188.9	15.2	49.8		
	Prince George A	53 63	122 40	676	628.3	300.8	27.4	68.2	Apr	Aug
SWB	Cassiar	59 17	129 50	1078	699.5	275.1	25.7	84.2	Apr	Oct

Zone key

AT Alpine Tundra
BG Bunchgrass
BWBS Boreal White and Black Spruce
CDF Coastal Douglas-fir
CWH Coastal Western Hemlock
ESSF Engelmann Spruce — Subalpine Fir
ICH Interior Cedar — Hemlock
IDF Interior Douglas-fir
MH Mountain Hemlock
MS Montane Spruce
PP Ponderosa Pine
SBPS Sub-Boreal Pine — Spruce
SBS Sub-Boreal Spruce
SWB Spruce — Willow — Birch

TABLE 5. Occurrence[a] of trees in the biogeoclimatic zones of British Columbia

Gymnosperms	BG	PP	IDF	ICH	MS	SBPS	SBS	BWBS	SWB	MH	CDF	CWH	ESSF	AT[b]
Abies amabilis (amabilis fir)	-	-	-	+	-	-	-	-	-	+++	-	+++	(+)	-
A. grandis (grand fir)	-	-	++	++	+	-	-	-	-	-	++	+	-	-
A. lasiocarpa (subalpine fir)	-	-	-	++	+++	(+)	+++	++	+++	++	-	+	+++	-
Chamaecyparis nootkatensis (yellow-cedar)	-	-	-	-	-	-	-	-	-	+++	-	++	(+)	-
Juniperus scopulorum (Rocky Mountain juniper)	+	+	++	-	-	-	+	(+)	-	-	++	(+)	-	-
Larix laricina (tamarack)	-	-	-	-	-	-	(+)	++	-	-	-	-	-	-
L. lyallii (alpine larch)	-	-	-	-	-	-	-	-	-	-	-	-	++	-
L. occidentalis (western larch)	-	+	+++	++	+++	-	-	-	-	-	-	-	+	-
Picea engelmannii (Engelmann spruce)	-	-	+	++	+++	-	-	-	-	+	-	-	+++	-
P. engelmannii x *glauca* (hybrid white spruce)	-	(+)	++	++	+++	+	+++	-	-	-	-	-	++	-
P. glauca (white spruce)	-	(+)	+	-	+	+++	++	+++	+++	-	-	-	+	-
P. glauca x *sitchensis* (Roche spruce)	-	-	-	++	-	-	-	-	-	(+)	-	++	-	-
P. mariana (black spruce)	-	-	-	+	-	-	++	+++	+	-	-	-	-	-
P. sitchensis (Sitka spruce)	-	-	-	-	-	-	-	-	-	+	+	+++	-	-
Pinus albicaulis (whitebark pine)	-	-	-	-	-	-	-	-	-	+	-	-	++	-
P. banksiana (jack pine)	-	-	-	-	-	-	-	(+)	-	-	-	-	-	-
P. contorta (lodgepole pine)	(+)	-	+++	++	+++	+++	+++	+++	++	+	++	++	+++	-
P. flexilis (limber pine)	-	-	(+)	-	-	-	-	-	-	-	-	-	(+)	-
P. monticola (western white pine)	-	-	+	++	+	-	-	-	-	+	+	++	+	-
P. ponderosa (ponderosa pine)	+	+++	+++	+	-	-	-	-	-	-	-	-	-	-
Pseudotsuga menziesii (Douglas-fir)	+	++	+++	++	+++	+	++	-	-	(+)	+++	+++	+	-
Taxus brevifolia (western yew)	-	-	+	++	-	-	-	-	-	-	++	++	-	-
Thuja plicata (western redcedar)	-	(+)	++	+++	+	-	+	-	-	+	++	+++	+	-
Tsuga heterophylla (western hemlock)	-	-	+	+++	+	-	(+)	-	-	++	+	+++	+	-
T. mertensiana (mountain hemlock)	-	-	-	+	-	-	-	-	-	+++	-	+	++	-

TABLE 5. Continued

Angiosperms	BG	PP	IDF	ICH	MS	SBPS	SBS	BWBS	SWB	MH	CDF	CWH	ESSF	AT[b]
Acer macrophyllum (bigleaf maple)	-	-	+	-	-	-	-	-	-	-	++	++	-	-
Alnus rubra (red alder)	-	-	-	-	-	-	-	-	-	-	+++	+++	-	-
Arbutus menziesii (arbutus)	-	-	-	-	-	-	-	-	-	-	++	+	-	-
Betula neoalaskana (Alaska paper birch)	-	-	-	-	-	-	-	++	-	-	-	-	-	-
B. occidentalis (water birch)	+	+	+	(+)	-	-	(+)	+	-	-	-	-	-	-
B. papyrifera (paper birch)	+	+	++	++	+	-	++	++	-	-	+	+	-	-
Cornus nuttallii (western flowering dogwood)	-	-	+	-	-	-	-	-	-	-	++	++	-	-
Populus balsamifera ssp. *balsamifera* (balsam poplar)	-	-	-	-	-	-	+	++	+	-	-	-	-	-
P. balsamifera ssp. *trichocarpa* (black cottonwood)	+	+	+	++	+	+	++	+	-	-	++	++	+	-
P. tremuloides (trembling aspen)	+	++	+++	++	++	+	+++	+++	+	-	+	+	+	
Prunus emarginata (bitter cherry)	-	-	+[c]	++[c]	-	-	+[c]	-	-	-	++	+	-	-
Quercus garryana (Garry oak)	-	-	-	-	-	-	-	-	-	-	++	(+)	-	-
Rhamnus purshiana (cascara)	-	-	-	++[d]	-	-	-	-	-	-	++	+	-	-

[a] Occurrence classes: +++(abundant); ++(common); +(present but uncommon); (+)(very rare); -(absent).
[b] Tree species occur only in krummholz form in the Alpine Tundra zone.
[c] *P. emarginata* occurs in these zones, but only rarely as a (small) tree.
[d] Rarely as a small tree.

Chapter 11: Interior Cedar — Hemlock Zone

by

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LOCATION AND DISTRIBUTION

The Interior Cedar — Hemlock zone (ICH) occurs at lower to middle elevations (400-1500 m) of southeastern British Columbia, ranging from 49° to 54° 15′N latitude (Figure 38). The zone also extends south into eastern Washington, Idaho, and western Montana. In southeastern British Columbia, the ICH occupies the lower slopes of the Columbia Mountains (where commonly called the Interior Wet Belt), the windward or western side of the continental divide along the Rocky Mountains, and much of the Shuswap and Quesnel highlands.

The ICH also occurs just east of the Coast Mountains in the Nass Basin and adjacent parts of the Hazelton and Skeena mountains of west central British Columbia. In this area the zone extends from 54° 45′ to 57° 30′N latitude, and ranges from 100 to 1000 m in elevation, occupying lower and middle elevations in the central to upper Skeena and Nass River drainages, and central portions of the Iskut and Stikine rivers. The Engelmann Spruce — Subalpine Fir zone (ESSF) is the subalpine zone above the ICH.

ECOLOGICAL CONDITIONS

The ICH has an interior, continental climate dominated by easterly moving air masses that produce cool wet winters and warm dry summers (Figure 39; Table 4). The zone is one of the wettest in the interior of the province; parts of the ESSF are wetter. Periodic inundation by dry, high-pressure, continental air masses results in a few very cold winter days and a few very hot summer days. Mean annual temperature ranges from 2 to 8.7°C, a range that reflects the wide latitudinal extent of the ICH. The temperature averages below 0°C for 2-5 months, and above 10°C for 3-5 months of the year. The mean annual precipitation is 500-1200 mm, 25-50% of which falls as snow.

Mean annual precipitation is significantly lower in the ICH than in most of the Coastal Western Hemlock zone (CWH). Greater snow melt in the ICH contributes considerably to the hydrologic regime, thereby minimizing summer soil moisture deficits. As a consequence, the two zones share many ecological features. Indeed, the ICH is the most productive forest zone in the interior of British Columbia, and second only to the CWH in all of Canada.

As in most British Columbia zones, upland coniferous forests dominate the ICH landscape. However, the ICH has the highest diversity of tree species of any zone in the province. Western redcedar and western hemlock dominate mature climax forests. Grand fir is a common component of climax stands in the extreme southern reaches of the zone. White spruce, Engelmann spruce, their hybrids, and subalpine fir are common and can form a part of climax stands with either western hemlock or redcedar, especially in areas of cold air drainage and ponding or of higher elevations. In northwestern British Columbia, an apparent white x Sitka spruce hybrid, also known as Roche spruce (*Picea* x *lutzii*), joins subalpine fir, western hemlock, and sometimes redcedar in many climax stands.

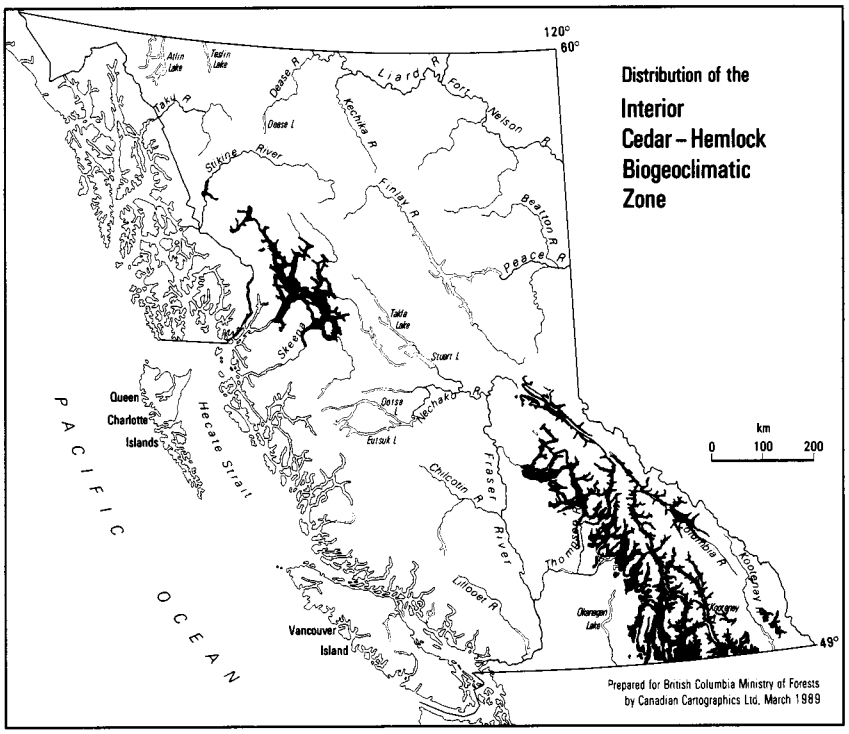


FIGURE 38. Interior Cedar — Hemlock zone.

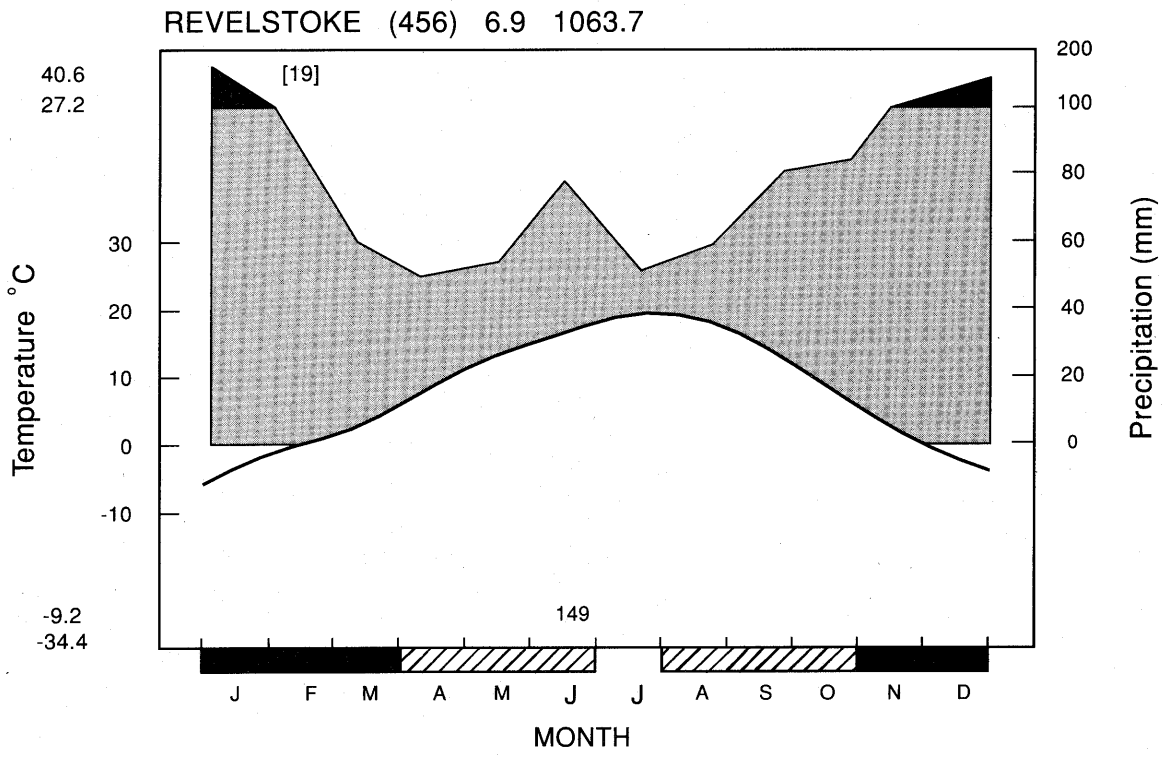


FIGURE 39. Representative climatic diagram for the Interior Cedar — Hemlock zone.

Throughout the ICH, tree species of successional stages and edaphic climaxes vary with geographic location and habitat. Western larch, Douglas-fir, and western white pine are common seral species in the central and southern portions of the zone, usually on mesic and drier sites. Ponderosa pine occurs on dry, warm slopes in some parts of the southern ICH. Engelmann spruce, white spruce, various spruce hybrids, subalpine fir, and black cottonwood are often edaphic climax species in moist to wet ecosystems. Lodgepole pine, trembling aspen, and paper birch are common seral species virtually throughout the zone, although in wetter parts of the ICH wildfires have been infrequent and large areas are dominated by very old climax stands. Forest fires play an important role in drier parts of the ICH, and successional stands are commonly interspersed with climax stands, particularly in climatically and edaphically drier parts of the zone.

Extensive wetlands are infrequent in the ICH due primarily to the steeply sloping mountainous terrain of much of the zone. Wetlands are usually restricted to small transitional bogs and fens, and to skunk cabbage swamps. However, associated with the many lakes, reservoirs, and waterways are abundant riparian and lakeshore marshes. The bogs and fens are generally non-forested or have only a few stunted lodgepole pine, western hemlock, hybrid white spruce, or black spruce. Characteristic understory species include *Carex* spp. (sedges), *Salix* spp. (willows), *Ledum groenlandicum* (Labrador tea), *Kalmia microphylla* (bog-laurel), *Betula glandulosa* (scrub birch), *Menyanthes trifoliata* (buckbean), *Oxycoccus oxycoccos* (bog cranberry), *Sphagnum* spp. (sphagnum mosses), *Tomenthypnum nitens* (golden fuzzy fen moss), and *Aulacomnium palustre* (glow moss). Skunk cabbage swamps are found along small drainage channels. Dominant vegetation includes western redcedar, western hemlock, hybrid white spruce, *Oplopanax horridus* (devil's club), *Lysichiton americanum* (skunk cabbage), *Athyrium filix-femina* (lady fern), *Gymnocarpium dryopteris* (oak fern), *Equisetum arvense* (common horsetail), *Mnium*, *Rhizomnium* and *Plagiomnium* spp. (leafy mosses), and *Sphagnum* spp.

Humo-Ferric Podzols represent the dominant soil development in zonal ecosystems. Brunisolic or Orthic Gray Luvisols are also common on mesic sites with finer textured parent materials. Ferro-Humic Podzols can be found in zonal ecosystems in wetter portions of the ICH. Drier sites in drier parts of the zone usually have brunisolic development, whereas with increasing soil moisture in the form of seepage or groundwater, there is a gradation from gleyed subgroups of Brunisols and Podzols, through Gleysols, to Organic soils on poorly and very poorly drained sites. Soil development usually extends to about 1 m in most ecosystems. Humus forms tend to be Hemimors and Mormoders.

NOTES ON CLASSIFICATION

Krajina (1969) originally called this zone the Interior Western Hemlock zone. Ministry of Forests ecologists changed the name to Interior Cedar — Hemlock to better reflect the areas that climax in western redcedar, but lack hemlock. The "outlier" of the ICH in northwestern British Columbia was classified by Krajina (1973) as a transitional part of the Coastal Western Hemlock zone. Ministry of Forests ecologists, however, have placed the area in the ICH because of its floristic characteristics and because the regional climate (which is a transitional cordilleran type, neither typically coastal nor interior) seems to fit best in the interior zone.

A subzone from the Montane Spruce zone (MSmm, MSe, or MSb3) was recently added to the ICHdm because of its similarity to this subzone.

SUBZONES

Eleven subzones are found in the ICH (Table 23). The vegetation on zonal ecosystems (Figure 40) shows considerable variation from the driest through to the wettest subzones. Douglas-fir, *Lonicera utahensis* (Utah honeysuckle), *Mahonia aquifolium* (tall Oregon-grape), and *Linnaea borealis* (twinflower) are common in the drier subzones; *Gymnocarpium dryopteris*, *Oplopanax horridus*, *Streptopus roseus* (rosy twistedstalk), *Dryopteris expansa* (spiny wood fern), and *Mnium* spp. are common in the wetter subzones. All zonal ecosystems have western redcedar, western hemlock, or both species as a major component of the mature forest. Hybrid white spruce, Roche spruce, grand fir, and subalpine fir can be significant components of zonal ecosystems in certain subzones.

The ICHxw is the only subzone considered to be "very dry." This subzone occurs in a few areas in extreme southeastern British Columbia, the largest area being in the Creston Valley. Several species are more abundant here (on zonal sites) than in any other ICH subzone — for example, *Corylus cornuta* (beaked hazelnut), *Physocarpus malvaceus* (mallow ninebark), and *Philadelphus lewisii* (mock-orange).

TABLE 23. Synopsis of subzones in the Interior Cedar — Hemlock zone (ICH)

Subzone	Code	Old code
Very Dry Warm ICH	ICHxw	(ICHd)
Dry Warm ICH	ICHdw	(ICHal)
Dry Cool ICH	ICHdk	(ICHe3)
Moist Warm ICH	ICHmw	(ICHa2/m1/m2)
Moist Mild ICH	ICHmm	(ICHj)
Moist Cool ICH	ICHmk	(ICHe1/e2/c/MSe)
Moist Cold ICH	ICHmc	(ICHg1/g2/g3)
Wet Cool ICH	ICHwk	(ICHw/h1/h2/k/b)
Very Wet Cool ICH	ICHvk	(ICHb/v/f)
Very Wet Cold ICH	ICHvc	(ICHg4/g5)

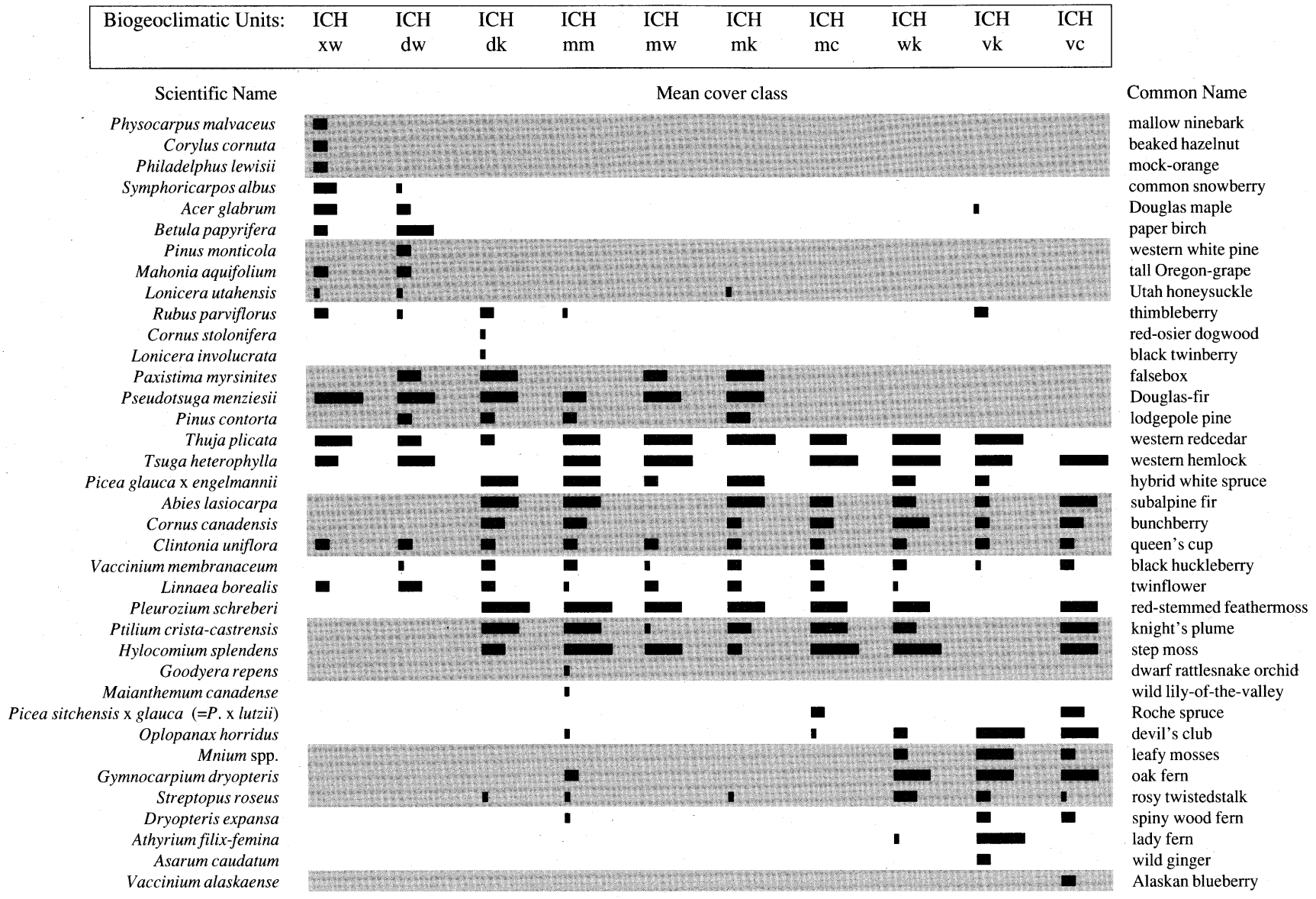


FIGURE 40. Zonal vegetation of subzones of the Interior Cedar — Hemlock zone.

The two dry subzones are scattered throughout the zone in south-central and southeastern British Columbia. The ICHdw is found in the valley bottoms and lower slopes of the upper Granby River, Lower Arrow Lake, Columbia River, Slocan and Kootenay river valleys, and the Goat and southern Moyie rivers. The ICHdk, one of the subzones that lacks hemlock, occurs near Canim Lake.

Four moist subzones occur in the zone; from the extreme southeast to the northwest, they vary from "warm" to "cold" climates, respectively. The ICHmw covers a large geographic area from the valleys of the southern Monashee, Selkirk, Purcell, and Rocky mountains, to the Shuswap Lake-Thompson River area. The ICHmm is located in the Rocky Mountain Trench from Hugh Allen Creek to McBride. The ICHmk occurs in the Rocky Mountains in the lower Bull and Elk river valleys, in the Golden area, in many valleys of the southern Purcell and Monashee mountains, and around the upper Shuswap — lower Quesnel highlands from near the North Thompson River to about Quesnel Lake. This is another subzone that lacks hemlock. The northernmost moist subzone is the ICHmc, located in northwestern British Columbia from near Hazelton to Meziadin Lake. Roche spruce is present here and western hemlock is particularly abundant.

The wet, cool ICHwk is found in the Columbia and Rocky mountains and Quesnel Highland from the Fraser River near Dome Creek, south through the Quesnel Lakes — upper Cariboo River areas to the North Thompson River — upper Adams Lake region and southeast to the lower Revelstoke Reservoir — upper Arrow Lake area.

Two "very wet" subzones are found in the ICH. The ICHvk is common in the Blue River — Mica Creek area and in the Rocky Mountain Trench near Dome Creek. The ICHvc is in the northwest along the Bell-Irving and middle Iskut and Stikine rivers. Both subzones are characterized by "devil's club" zonal associations, but the ICHvc has Roche spruce, rather than hybrid white spruce, more feathermosses, and no western redcedar. The absence of western redcedar in the ICHvc is perhaps a result of the lack of heat in the summer months. Subalpine fir is very productive here.

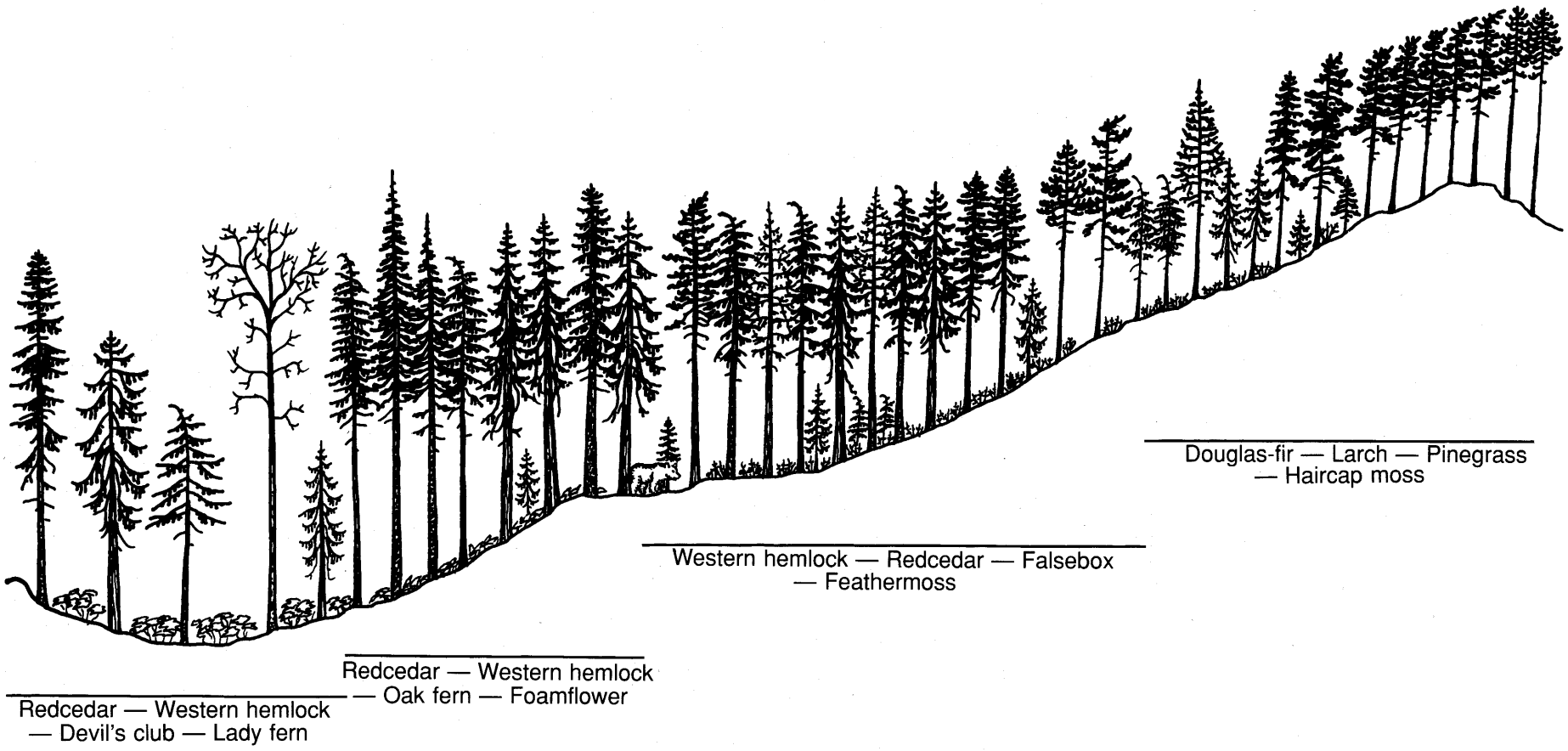
SOME REPRESENTATIVE SITE ASSOCIATIONS

Four common site associations in the ICH are described below. They form a typical sequence in the ICHmw (Figure 41).

Western hemlock — Redcedar — Falsebox — Feathermoss

The Western hemlock — Redcedar — Falsebox — Feathermoss association occurs on zonal sites throughout the ICHmw and on some drier than zonal sites in the ICHwk and vk. At climax, western hemlock and, to a lesser extent, western redcedar dominate these ecosystems and usually form a closed canopy. Douglas-fir and western white pine are common seral associates.

The climax understory has poorly to moderately developed shrub and herb layers. Typical shrubs are *Paxistima myrsinites* (falsebox), *Vaccinium membranaceum* (black



Shaded bar indicates growing-season soil moisture; darker shading symbolizes increasing moisture.

FIGURE 41. Simplified schematic diagram of topographic relationships among four common site associations of a moist, warm subzone of the Interior Cedar — Hemlock zone.

huckleberry), and *Taxus brevifolia* (western yew). Common herbs are *Cornus canadensis* (bunchberry), *Clintonia uniflora* (queen's cup), *Linnaea borealis*, *Chimaphila umbellata* (prince's pine), *Viola orbiculata* (round-leaved violet), *Tiarella unifoliata* (one-leaved foamflower), *Goodyera oblongifolia* (rattlesnake-plantain), and *Orthilia secunda* (one-sided wintergreen).

The very well-developed and continuous moss layer is characteristically dominated by *Pleurozium schreberi* (red-stemmed feathermoss) and usually contains *Hylocomium splendens* (step moss) and *Rhytidiopsis robusta* (pipecleaner moss). Soils are generally Orthic Humo-Ferric Podzols occurring on a wide variety of parent materials. Dystric Brunisols are occasionally found. Humus form is typically an Orthimormoder between 4 and 8 cm thick.

Douglas-fir — Larch — Pinegrass — Haircap moss

This site association is found on very dry, nutrient-very poor to -medium sites in the ICHmw. These sites occur around bedrock outcrops, on steep colluvial slopes, or on coarse-textured, excessively drained, glaciofluvial landforms. Dystric Brunisols are the most common soils, although Eutric, Melanic, and Sombric Brunisols also occur, depending largely on parent materials and the cover of grasses.

Douglas-fir, lodgepole pine, western larch, and western white pine usually occur with some poorly growing western redcedar and western hemlock. Forest stands are often open and have a poorly developed understory.

Characteristic shrubs are *Paxistima myrsinites*, *Penstemon fruticosus* (shrubby penstemon), *Juniperus communis* (common juniper), *Amelanchier alnifolia* (saskatoon), and *Spiraea betulifolia* (birch-leaved spirea).

The herb layer usually includes *Arctostaphylos uva-ursi* (kinnikinnick), *Achillea millefolium* (yarrow), and *Calamagrostis rubescens* (pinegrass).

Cladonia, *Cladina*, and *Peltigera* lichens are the most constant species in the poorly developed moss layer. Some mosses occasionally occur in abundance, such as *Pleurozium schreberi*, *Polytrichum* (haircap mosses), and *Rhacomitrium* species.

Redcedar — Western hemlock — Oak fern — Foamflower

The Redcedar — Western hemlock — Oak fern — Foamflower site association is found on fresh, nutrient-poor to -rich sites in the southern ICH — typically in the ICHmw and vk. Stands are dominated by western redcedar and western hemlock with a component of spruce (Engelmann and white x Engelmann hybrids) and subalpine fir.

The moderately developed shrub layer typically includes *Paxistima myrsinites*, *Lonicera utahensis*, *Taxus brevifolia*, *Vaccinium ovalifolium* (oval-leaved blueberry), and some *Oplopanax horridus*.

Gymnocarpium dryopteris (oak fern), *Clintonia uniflora*, *Cornus canadensis*, *Smilacina racemosa* (false Solomon's-seal), *Tiarella unifoliata* (one-leaved foamflower), *Rubus pedatus* (five-leaved bramble), *Streptopus roseus*, *S. amplexifolius* (clasping-leaved twistedstalk), and *Athyrium filix-femina* form much of the moderately to well-developed herb layer.

The moss layer is usually well developed, ranging from a carpet of *Rhytidiopsis robusta* and *Pleurozium schreberi* with minor amounts of *Hylocomium splendens* and *Ptilium crista-castrensis* (knight's plume), to patchier mixtures of these four species with clumps of *Mnium* spp. (including *Plagiomnium* and *Rhizomnium* spp.) and *Brachythecium* spp.

Soils are most commonly gleyed subgroups of Humo-Ferric Podzols and Dystric Brunisols on a variety of parent materials. Temporary seepage characterizes these sites. Mormoders are the most common humus form and are generally 6-12 cm thick.

Redcedar — Western hemlock — Devil's club — Lady fern

This site association occurs on moist sites, generally in moisture-receiving positions at the bases of slopes or along rivers and streams. This is a common site association throughout the ICH, with the exception of the ICHxw, dm, dk, and vc. In the ICHvk, this association occurs on zonal sites as well as on lower slopes.

Stands are generally dominated by western redcedar with some western hemlock. Spruce (Engelmann and hybrids), subalpine fir, and occasionally black cottonwood can also be abundant, depending on the amount of cold air drainage to, and periodic flooding of, the site. Individual trees are often large but widely spaced so the tree canopy is typically irregular and open. Hence, the shrub layer is well developed and often very dense. *Oplopanax horridus* (devil's club) is the dominant shrub, often with minor amounts of *Ribes lacustre* (black gooseberry), *Acer glabrum* (Douglas maple), *Rubus parviflorus* (thimbleberry), and *Cornus stolonifera* (red-osier dogwood).

The herb layer is moderately to well developed, depending on the density of the overlying shrub layer. Characteristic herbs include *Athyrium filix-femina* (lady fern), *Gymnocarpium dryopteris*, *Streptopus roseus*, *Tiarella unifoliata*, *Dryopteris expansa*, *Clintonia uniflora*, *Circaea alpina* (enchanter's nightshade), and *Viola glabella* (stream violet).

The moss layer is moderately to well developed and can consist only of patches of *Mnium* spp. (including *Plagiomnium* and *Rhizomnium* spp.) or of a more complete moss cover including *Ptilium crista-castrensis*, *Hylocomium splendens*, and *Rhytidiadelphus triquetrus* (electrified cat's-tail).

Soils can be Gleysols, gleyed subgroups of Podzols and Brunisols, or Regosols.

WILDLIFE HABITATS

Important ecological factors that influence the wildlife species in this zone (Table 24) are the cool, long, snowy winters and the warm, dry summers, the dense conifer forests of primarily western hemlock and/or western redcedar, and — except for the Nass Basin — the narrow, deep valleys. Except for the ICHxw subzone in extreme southeastern British Columbia, most forests quickly regenerate after forest fire or clearcut logging.

TABLE 24. Selected wildlife habitats and species in the Interior Cedar — Hemlock zone (adapted from Wildlife Branch 1989)

Habitat	Habitat distribution	Representative wildlife species	Wildlife species at risk[a]
Old-growth and mature coniferous forests	Common, dwindling	Moose, Rocky Mountain Elk, Mule Deer, White-tailed Deer, Black Bear, Wolverine, Marten, Red Squirrel, Southern Red-backed Vole	♦ Caribou, Grizzly Bear, Red-tailed Chipmunk, Northern Long-eared Myotis
		Barred Owl, Boreal Owl, Great Gray Owl, Great Horned Owl, Northern Pygmy Owl, Long-eared Owl, Saw-whet Owl, Pileated Woodpecker, Steller's Jay, Gray Jay, Varied Thrush, Golden-crowned Kinglet, Townsend's Warbler, Bohemian Waxwing, Red Crossbill, Winter Wren, Mountain Chickadee	∇ Townsend's Big-eared Bat
South aspect forests	Common	Moose, Mule Deer, White-tailed Deer, Rocky Mountain Elk, Mountain Goat, Black Bear, Cougar, Yellow-bellied Marmot, Golden-mantled Ground Squirrel	♦ Grizzly Bear
		Golden Eagle, Ruffed Grouse, Great Horned Owl	
		Rubber Boa	
Young seral forests	Extensive	Moose, Rocky Mountain Elk, Mule Deer, White-tailed Deer, Black Bear, Cougar, Coyote	♦ Northern Long-eared Myotis
		Ruffed Grouse, Downy Woodpecker, Steller's Jay, American Robin, Dusky Flycatcher	
Clearcuts and burns	Limited areal extent	Moose, Mule Deer, White-tailed Deer, Rocky Mountain Elk, Cougar	♦ Lewis' Woodpecker, Northern Long-eared Myotis
		Golden Eagle, Ruffed Grouse, Black-backed Woodpecker, Three-toed Woodpecker, Olive-sided Flycatcher, Western Bluebird, Townsend's Solitaire	
Riparian areas, wetlands, meadows, and floodplains	Common, not extensive	Moose, Caribou, Mule Deer, Grizzly Bear, Black Bear, Gray Wolf, Lynx, Badger, Beaver, Muskrat, Columbian Ground Squirrel	∇ Forster's Tern
		American Kestrel, Blue Grouse, Ruffed Grouse, Mountain Bluebird	♦ Caribou, Grizzly Bear, Northern Long-eared Myotis, Great Blue Heron, Coeur d'Alene Salamander
		Western Terrestrial Garter Snake, Northern Alligator Lizard, Rubber Boa, Western Skink, Western Toad, Pacific Treefrog, Spotted Frog, Wood Frog	
Lakes and streams	Common	Moose, Beaver, Muskrat, Little Brown Myotis, Water Shrew	∇ Forster's Tern
		Bald Eagle, Tundra Swan, Canada Goose, Common Loon, Bonaparte's Gull, Red-necked Grebe, Eared Grebe, American Avocet	♦ Northern Long-eared Myotis, Great Blue Heron, Western Grebe, Coeur d'Alene Salamander, Tailed Frog
		Painted Turtle, Spotted Frog, Wood Frog	

TABLE 24. Continued

Habitat	Habitat distribution	Representative wildlife species	Wildlife species at risk[a]
Avalanche tracks	Common in mountains	Rocky Mountain Elk, Black Bear, Badger, Columbian Ground Squirrel	♦ Grizzly Bear, Caribou
Rocky cliffs and talus	Limited areal extent	Mountain Goat, Yellow-bellied Marmot, Golden-mantled Ground Squirrel, Columbian Ground Squirrel, Common Pika	♦ Red-tailed Chipmunk
Agricultural areas	Limited areal extent	Mule Deer, White-tailed Deer, Rocky Mountain Elk, Black Bear, Columbian Ground Squirrel Northern Harrier, Red-tailed Hawk, American Kestrel, Sandhill Crane, Eastern Kingbird, Western Kingbird, Mountain Bluebird	♦ Grizzly Bear

[a] Wildlife species and subspecies at risk are those on the preliminary Red and Blue Lists proposed in the Provincial Wildlife Strategy, B.C. Ministry of Environment (October 1989 draft).

∇ Red-listed wildlife species. These are being **considered** by the Wildlife Branch for designation as endangered or threatened in British Columbia.

♦ Blue-listed wildlife species. The Wildlife Branch considers these species "sensitive" and/or deserving of management attention. Population viability is a concern for these species because of (a) major declines in population numbers; or (b) major changes in habitat that will further reduce existing distribution. Species that are generally suspected of being vulnerable, but for which information is too limited to allow designation in another category, are included in this category.

Wildlife that inhabit this zone are adapted either to survive or avoid the deep snows of winter. Grizzly Bear and Black Bear are the most common large mammals, and the ICH as well as the ESSF are the most productive zones in the interior of British Columbia for these species. Bears are well adapted to survive the long winters with deep snow. Their hibernation period of 5-7 months means that they can avoid most of the winter period. In the Columbia Mountains, the ICH provides the necessary high-protein and high-energy diet for the bears' growth, in the form of lush herbaceous vegetation and abundant huckleberry and blueberry patches. In the Nass Basin, lush vegetation, huckleberries, blueberries, and spawning salmon are summer and fall bear foods.

Large ungulates such as Mule Deer, White-tailed Deer, and Rocky Mountain Elk occur in the drier subzones in the southern portion of the province. Where possible these species only use this zone during the summer and fall and migrate to the adjacent Interior Douglas-fir zone for the winter. Caribou, while never very common, occur throughout much of the ICH in the late summer and early fall before they move up in winter to ESSF forests with a deeper, denser snowpack. Moose are scattered throughout this zone in the winter, but are only common in the Nass Basin, Fraser River section of the Rocky Mountain Trench, Shuswap Highland, and Quesnel Highland. They are able to tolerate the deep snows because of the protection that the forest canopy provides and the abundant supply of browse.

Many species of birds rely on conifer seeds, bark-inhabiting insects, or other birds, for food. Pileated Woodpecker inhabit mature and old-growth forests, while Lewis' Woodpecker and Black-backed Three-toed Woodpecker are more abundant in the burned-over forests and clearcuts with remnant snags. Some wood-boring birds, such as Yellow-bellied Sapsucker, Hairy Woodpecker, and Downy Woodpecker, prefer the mixed coniferous/deciduous forests. Other bird species that inhabit the mature conifer forests are the Great Horned Owl, Northern Pygmy Owl, Long-eared Owl, Saw-whet Owl, Gray Jay, Steller's Jay, Winter Wren, Varied Thrush, Golden-crowned Kinglet, Bohemian Waxwing, Townsend's Warbler, and Red Crossbill.

Mature forests with mixed deciduous and coniferous species offer a variety of insects and seeds for breeding populations of Western Wood-Pewee, Gray Jay, Black-capped Chickadee, Red-breasted Nuthatch, House Wren, Veery, Yellow-rumped Warbler, Evening Grosbeak, Pine Grosbeak, Pine Siskin, and White-winged Crossbill.

Burned-over patches and clearcuts with standing snags and stumps are the preferred breeding habitats of the Olive-sided Flycatcher, Western Bluebird, and Townsend's Solitaire.

Wetlands, especially in the Nass Basin, provide excellent habitat for waterbird production, including sandpipers, dabbling and diving ducks, and loons. The Kootenay River floodplain in the Creston Valley produces substantial numbers of diving and dabbling ducks, Western Grebe, Red-necked Grebe, Great Blue Heron, and Forster's Tern. The Creston Valley wetlands are also an important migratory staging area for the Canada Goose, Tundra Swan, and other waterfowl.

Most of the amphibian and reptile species occur in the warmer valley bottoms, commonly adjacent to riparian areas, but they often spend long periods in damp forest litter or moist forest clearings. In the Columbia Mountains and adjacent highlands are found the Long-toed Salamander, Western Toad, Pacific Treefrog, and Spotted Frog, but in the Nass Basin only the Spotted Frog, Wood Frog, and Western Toad are found. Reptile distribution is even more restricted in this zone. Only the Common Garter Snake is widespread, in riparian areas and damp forest litter in the major valleys. The Western Terrestrial Garter Snake is found only in wetlands and riparian areas in the southern portion of the Columbia Mountains and Okanagan Highland. The Western Skink, Northern Alligator Lizard, Rubber Boa, and Painted Turtle are found along the valley bottoms in the southernmost portion of the ICH.

Agricultural areas are limited in extent, and restricted to lower elevations and riparian areas in the southern portion of this zone. Introduced species such as Ring-necked Pheasant and Wild Turkey are adapted to these modified habitats. However, large mammals such as Grizzly Bear, Black Bear, Rocky Mountain Elk, Mule Deer, and White-tailed Deer are considered pests in agricultural areas. Some species of birds, such as the Eastern Kingbird, Western Kingbird, and Mountain Bluebird, benefit from the opening of the forest canopy and the increase in the number of insects.

RESOURCE VALUES

Forestry is the primary economic activity in this zone. The tree species diversity of the ICH has allowed it to weather some insect infestations and diseases better than adjoining zones, although both western hemlock and western redcedar are prone to heart rot throughout the zone (after about age 90-100, where studied).

The ICH is the most productive zone in the interior of the province for fibre production. In southern subzones, site indices at 100 years for western white pine on slightly dry to moist sites are around 38 m. Western larch and Douglas-fir site indices are only slightly less than those of white pine on most sites. The best growth is in rich alluvial ecosystems where site indices at 100 years can be over 40 m for both spruce and white pine. In northern subzones, Douglas-fir, hybrid white spruce, and subalpine fir are the most productive species.

Most areas of the zone have a low potential for agriculture because of topographic constraints. One major exception is the Creston Valley, which has favourable climate, topography, and soils for agriculture. Some of the most productive and accessible agricultural, wildlife, and forestry land has been flooded by hydro-electric reservoirs.

Because of the lack of suitable forage in most ICH forests, range use is restricted to cutblocks and road right-of-ways. Range use is common in the drier subzones; however, it is much less than in the Interior Douglas-fir, Montane Spruce, and Ponderosa Pine zones. Administrative decisions also have an impact on range use. For example, the Kamloops Forest region seeds cutblocks in many ICH subzones to provide summer forage; the same subzones in adjacent Regions are not used to the same extent. Orchardgrass (*Dactylis glomerata*), timothy (*Phleum pratense*), and clovers (*Trifolium* spp.) are commonly seeded. Native forage and browse include *Calamagrostis rubescens*, *Carex* spp., *Epilobium angustifolium* (fireweed), *Amelanchier alnifolia*, *Vaccinium* spp., and *Salix* spp.

This zone is also important for fur harvesting.

Recreational activities include hiking, skiing, fishing, and hunting. Abundant lakes, pondages, and waterways provide ample boating and fishing opportunities.

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4.5 Interior Cedar - Hemlock Zone (ICH)

The ICH is one of the largest zones in the Nelson Forest Region along with the ESSF and AT. The zone occupies the lower slopes of the Rocky Mountains, north of Golden and around Fernie and the Columbia Mountains. Zonal sites in the ICH typically have Cw and Hw with an understory of black huckleberry, queen's cup, and bunchberry. The ICH has the greatest tree species diversity of all the zones in British Columbia.

There are eight ICH subzones/variants in the Nelson Forest Region. The ICHxw, ICHdw, ICHmk1, ICHmw1, ICHmw2, and ICHmw3 (Table 4.1) are located in the moist climatic region, while the ICHwk1 and the ICHvk1 are located in the wet climatic region.

The ICHxw is the smallest and driest ICH subzone in the Nelson Forest Region. It is located in the Pend D'Oreille Valley and on western and southern exposures on lower slopes above Kootenay Lake south of Boswell and along the Goat River from Creston to Kitchener.

The ICHdw occurs in a band below the ICHmw2 in the valley bottoms and lower slopes of the southern Columbia Mountains.

The ICHmw2 is the largest ICH subzone/variant in the Nelson Forest Region and occurs above the ICHdw on lower slopes of the southern Columbia Mountains. It can be found in valley bottoms north of the ICHdw.

The ICHmw1 is found on lower to mid-slopes in the Rocky Mountains from Golden to the Sullivan River and in the northern Selkirks from Parson to Gold River.

The ICHmk1 occurs on lower to mid-slopes of the southwestern Monashees northwest of Grand Forks, the southern Rockies around Fernie, and the Rocky Mountain Trench from Parson to Donald.

The ICHwk1 and ICHvk1 variants are located in the more northern parts of the Nelson Forest Region in the wet climatic region. The ICHwk1 is located in the valley bottoms and lower slopes of the upper Duncan River and the Columbia River drainages from Revelstoke to Goldstream River and along the west shore of Kinbasket Lake from Gold River north to the regional boundary. The ICHvk1 is located in the valley bottoms and lower slopes in the Selkirk and Monashee Mountains from the Goldstream River to Mica Creek.

4.6 Engelmann Spruce - Subalpine Fir Zone (ESSF)

The ESSF is the largest zone in the Nelson Forest Region. The ESSF occurs at higher elevations (above the MS or ICH) throughout the region. Closed canopy forests of Se and Bl are common at lower and middle elevations of the ESSF. Subalpine parkland, consisting of tree islands interspersed with herb-dominated meadows, is found commonly at upper elevations. Vegetation on zonal sites characteristically includes black huckleberry and white-flowered rhododendron and/or false azalea. Seral Pl stands are common in subzones/variants with a frequent fire history. Deciduous trees are uncommon in the ESSF.

There are seven ESSF subzones/variants in the Nelson Forest Region. The ESSFdc1 and ESSFdk are located in the dry climatic region; ESSFwc1,