Forest / Forêt **Association CNVC00036**

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum

Western Hemlock - Pacific Silver Fir / Deer Fern - Three-leaved Foamflower - Western Sword Fern

Pruche de l'Ouest - Sapin gracieux / Blechnum en épi - Tiarelle trifoliée - Fougère épée

Subassociations: 36a typic, 36b *Picea sitchensis*
CNVC Alliance: not yet determined
CNVC Group: not yet determined

Type Description

Concept: CNVC00036 is a mature to old, Pacific coast, coniferous forest association that is found on well-drained, colluvial and fluvial materials in very wet maritime to hypermaritime climates. The soils are mesic to moist, and in most cases nutrient-rich to very rich. Western hemlock (*Tsuga heterophylla*) is the leading species in the closed coniferous canopy, followed by Pacific silver fir (*Abies amabilis*). However, very old stands are dominated by western redcedar (*Thuja plicata*). On Haida Gawii (Queen Charlotte Islands), Pacific silver fir is absent and Sitka spruce (*Picea sitchensis*) often plays a more important canopy role. The shrub layer often features Alaskan blueberry (*Vaccinium alaskaense*), red huckleberry (*V. parvifolium*), and salmonberry (*Rubus spectabilis*). Common herb species include western sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*), five-leaved dwarf bramble (*Rubus pedatus*), spreading wood fern (*Dryopteris expansa*) and three-leaved foamflower (*Tiarella trifoliata*). Lanky moss (*Rhytidiadelphus loreus*) and stairstep moss (*Hylocomium splendens*) are the leading mosses. Two subassociations are recognized: typic and *Picea sitchensis*.

Vegetation: *Tsuga heterophylla* is generally the leading species in the closed coniferous canopy of this productive forest association, followed by *Abies amabilis*, *Thuja plicata* and *Picea sitchensis*. CNVC00036 is a mature to old-forest condition that has experienced extensive or frequent windthrow or other tree mortality. *Picea sitchensis* is more important on Haida Gwaii where *Abies amabilis* is absent. *Thuja plicata* dominates very old stands where disturbance is rare and, over the course of many centuries, a structurally more complex uneven-aged forest develops. The moderately developed to dense shrub layer is dominated by tree regeneration but also includes *Vaccinium alaskaense*, *V. parvifolium*, *Rubus spectabilis*, *Menziesia ferruginea* and *Oplopanax horridus*. Common species in the variably developed herb layer include *Polystichum munitum*, *Blechnum spicant*, *Rubus pedatus*, *Gymnocarpium dryopteris*, *Tiarella trifoliata* (see the Comments section), *Dryopteris expansa*, *Maianthemum dilatatum*, *Athyrium filix-femina* and *Streptopus amplexifolius*, the majority of which are rich-site indicators. *Rhytidiadelphus loreus* is normally the leading species in the typically moderately well-developed moss layer, followed by *Hylocomium splendens*. Additional mosses of lower coverage include *Rhizomnium glabrescens*, *Eurhynchium oreganum* and *Plagiothecium undulatum*. Two subassociations are recognized: typic and *Picea sitchensis*. *Picea sitchensis* and a number of bryophyte species are more prominent in the subassociation of this name.

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum CNVC00036

Type Description (cont'd)

Environment: CNVC00036 extends from sea level to more than 1,100 mASL. The overwhelming influence of the very wet maritime to hypermaritime climate, as well as mineral soil lithology, tends to override the significance of aspect, slope gradients and slope positions, which vary widely. Adequate soil drainage is also critical, given the abundance of rain and seepage. For the most part, this association develops on colluvial and fluvial materials, which tend not to be extensive on the landscape. The fluvial deposits are often fans or cones. Hybrid terrain conditions also form through various combinations of colluvial and fluvial processes. The soils are mesic to moist, in most cases nutrient-rich to very rich, with mostly skeletal or fragmental (> 35% to > 70% coarse fragments by volume) sandy loam, loam and silty loam textures. Regardless of the higher productivity and good soil nutrient regime, mor humus forms still prevail over moders, perhaps due in large part to an abundance of acidic western hemlock litter. The prominence of coarse woody debris-loving species like *Tsuga heterophylla*, *Vaccinium parvifolium* and *Dryopteris expansa* in the understory is a reflection of the abundance of this substrate in such a productive, high biomass forest.

Dynamics: In this old-growth forest association, stand-replacing disturbances are neither frequent nor large because of the maritime climate. Fire is a natural occurrence in the southern range of CNVC00036, but fire suppression activities have mostly eliminated it as a significant disturbance agent. Small-scale disturbances can result from wind, flooding, or mass-wasting (e.g., landslides). In most cases, stand replacement is the result of gradual cumulative tree replacement, through gap-phase processes. Older *Abies amabilis* and *Tsuga heterophylla* are prone to heart and butt rots. Windthrow and breakage create canopy gaps which are filled by the release of understory trees due to improved light conditions. The result is a multi-aged stand condition with considerable vertical structure. Hemlock dwarf mistletoe (*Arceuthobium tsugense*) is widespread and can be very damaging to *Tsuga heterophylla*, significantly reducing growth, stressing the trees and thereby making them more susceptible to other forest pests or pathogens. Balsam woolly adelgid (*Adelges piceae*) is a moderate threat to the health of *Abies amabilis* in the southern regions, mainly in areas around the Strait of Georgia. As a widespread, relatively productive forest type, CNVC00036 is under harvesting pressure where it is accessible.

Range: CNVC00036 occurs on the windward slopes of the Coast Mountains and outer coastal lowlands from the southern Alaska Panhandle southward to the north slopes of the Fraser River valley, and including windward slopes of the Vancouver Island Ranges, and lowlands on the outer coast of Haida Gwaii (Queen Charlotte Islands). It is also found in northwestern Washington including the Olympic Peninsula. The typic subassociation occurs over much of the windward side of the Coast Mountains in maritime areas from sea level to approximately 1200 mASL. The Picea sitchensis subassociation is located on the outer coast of the mainland, Vancouver Island and Haida Gwaii, in hypermaritime areas characterized by more fog, from sea level to approximately 600 mASL.

Conservation Status (NatureServe)

Global Conservation Rank: GNR
National Conservation Rank: not yet determined
Subnational Conservation Rank: no applicable rank

Forest / Forêt **Association CNVC00036**

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum

Western Hemlock - Pacific Silver Fir / Deer Fern - Three-leaved Foamflower - Western Sword Fern

Pruche de l'Ouest - Sapin gracieux / Blechnum en épi - Tiarelle trifoliée - Fougère épée

Distribution

Countries: Canada

Provinces / Territories / States: British Columbia

Terrestrial Ecozones and Ecoregions of Canada: Pacific Maritime: Coastal Gap, Eastern Vancouver Island, Lower Mainland, Pacific Ranges, Queen Charlotte Ranges , Western Vancouver Island

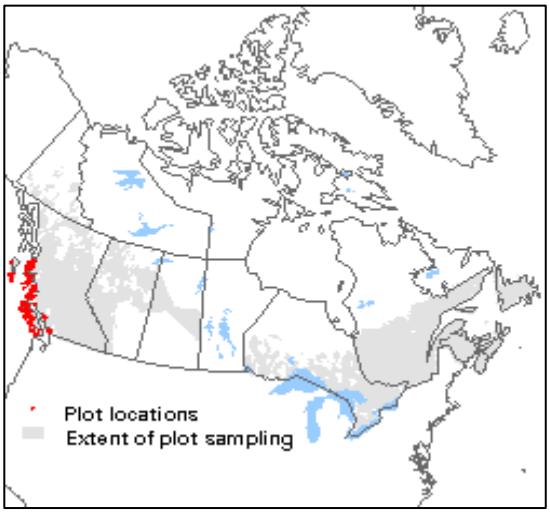
Rowe's Forest Regions and Sections of Canada: Coast: Northern Pacific Coast, Queen Charlotte Islands, Southern Pacific Coast

NAAEC CEC Ecoregions of North America (Levels I & II): Marine West Coast Forests

Nature Conservancy of Canada Ecoregions: North Cascades and Pacific Ranges, Pacific Northwest Coast,Puget Trough-Willamette Valley-Georgia Basin, Coastal Forests and Mountains of Southeast Alaska and B.C.

Biogeoclimatic Ecosystem Classification of British Columbia (zones and subzones): CWHvh, CWHvm

British Columbia Ecoregion Classification (ecoregions and ecosections): Pacific Ranges: Northern Pacific Ranges, Central Pacific Ranges, Southern Pacific Ranges; Coastal Gap: Hecate Lowland, Kitimat Ranges; Eastern Vancouver Island: Leeward Island Mountains, Nanaimo Lowland; Western Vancouver Island: Nahwitti Lowland, Northern Island Mountains, Windward Island Mountains; Gwaii Haanas: Queen Charlotte Ranges



Corresponding Types and Associations

36a typic	British Columbia	CWHvm 1 /05	Amabilis Fir - Western Redcedar - Foamflower
		CWHvm 1 /07	Amabilis Fir - Western Redcedar - Salmonberry
		CWHvm 2 /05	Amabilis Fir - Western Redcedar - Foamflower
		CWHvm 2 /07	Amabilis Fir - Western Redcedar - Salmonberry
36b *Picea sitchensis*	British Columbia	CWHvh 1 /06	Western Redcedar - Sitka Spruce - Foamflower
		CWHvh 2 /06	Western Redcedar - Sitka Spruce - Foamflower

Forest / Forêt **Association CNVC00036**

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum

Western Hemlock - Pacific Silver Fir / Deer Fern - Three-leaved Foamflower - Western Sword Fern

Pruche de l'Ouest - Sapin gracieux / Blechnum en épi - Tiarelle trifoliée - Fougère épée

Vegetation Summary*

	Association CNVC00036 304 plots		Subassociation 36a typic 207 plots		Subassociation 36b *Picea sitchensis* 97 plots	
Species Name†	% Cover±	% Presence^	% Cover±	% Presence^	% Cover±	% Presence^
Overstory Trees						
Tsuga heterophylla	**42**	**98**	**41**	**98**	**45**	**98**
Abies amabilis	**30**	**68**	**31**	**76**	**26**	**49**
Thuja plicata	23	50	21	45	26	62
Picea sitchensis	17	35	19	20	**15**	**67**
Tree Stratum Cover (P_{10} P_{25} Mean P_{75} P_{90})‡	**(52 65 73 85 94)**		**(53 65 73 80 94)**		**(50 65 73 85 90)**	
Understory Woody Shrubs and Regenerating Trees						
Tsuga heterophylla	17	93	15	93	21	94
Vaccinium parvifolium	7	86	7	86	6	87
Vaccinium alaskaense	11	75	12	82	8	62
Rubus spectabilis	5	65	5	73	3	49
Abies amabilis	12	61	12	69	10	44
Menziesia ferruginea	4	57	2	46	7	79
Oplopanax horridus	4	38	4	41	3	32
Vaccinium ovalifolium	6	34	7	36	5	30
Gaultheria shallon	6	33	6	37	4	25
Thuja plicata	5	30	4	27	6	35
Sambucus racemosa	3	17	3	21	2	8
Picea sitchensis	2	17	1	9	3	34
Shrub Stratum Cover (P_{10} P_{25} Mean P_{75} P_{90})‡	**(6 18 41 63 80)**		**(8 20 43 65 80)**		**(4 12 37 60 80)**	
Understory Herbs and Dwarf Shrubs						
Blechnum spicant	**9**	**90**	**10**	**91**	**7**	**88**
Tiarella trifoliata	**6**	**79**	**7**	**80**	**3**	**77**
Dryopteris expansa	5	70	6	71	2	68
Polystichum munitum	**9**	**63**	**11**	**67**	**5**	**55**
Athyrium filix-femina	3	56	3	57	1	54
Streptopus amplexifolius	1	53	1	53	1	52
Cornus canadensis	4	43	4	45	5	37
Rubus pedatus	8	42	8	48	6	30
Maianthemum dilatatum	4	40	4	33	5	56
Gymnocarpium dryopteris	7	37	8	31	6	48
Streptopus lanceolatus	3	37	4	37	1	38
Listera cordata	2	34	2	26	1	53
Moneses uniflora	1	30	1	26	1	38
Coptis aspleniifolia	3	26	3	25	3	29

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum CNVC00036

Vegetation Summary (cont'd)*

	Association CNVC00036		Subassociation 36a typic		Subassociation 36b *Picea sitchensis*	
Species Name†	% Cover±	% Presence^	% Cover±	% Presence^	% Cover±	% Presence^
Listera caurina	1	25	1	22	1	32
Luzula parviflora	1	19	1	22	1	13
Huperzia haleakalae	1	18	< 1	10	1	34
Viola glabella	4	16	4	22	2	4
Phegopteris connectilis	3	15	2	8	3	30
Herb Stratum Cover (P_{10} P_{25} Mean P_{75} P_{90})‡	**(5 11 34 50 75)**		**(6 15 38 60 80)**		**(3 7 25 40 52)**	
Bryophytes and Lichens						
Rhytidiadelphus loreus	21	85	15	79	32	96
Plagiothecium undulatum	5	76	6	80	3	68
Hylocomium splendens	11	68	8	60	14	86
Rhizomnium glabrescens	8	60	7	47	8	86
Eurhynchium oreganum	7	57	7	53	8	66
Pellia neesiana	4	38	3	29	5	56
Sphagnum sp.	6	36	6	30	7	48
Polytrichastrum alpinum	3	34	2	23	4	56
Scapania bolanderi	6	29	6	23	6	41
Hookeria lucens	1	28	1	21	1	42
Plagiochila asplenioides	2	9	2	3	2	21
Bryo-Lichen Stratum Cover (P_{10} P_{25} Mean P_{75} P_{90})‡	**(14 30 55 80 90)**		**(10 21 48 75 87)**		**(39 60 71 90 95)**	

* species present in > 20% of sample plots are listed

† see **Botanical Nomenclature** link at http://cnvc-cnvc.ca for botanical sources, synonyms and common names

± average percent cover of a species within the plots in which it occurs (i.e., characteristic cover)

^ percent frequency occurrence for a species within the total plots

‡ $P_x = X^{th}$ percentile (e.g., $P_{10} = 10^{th}$ percentile)

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Pruche de l'Ouest - Sapin gracieux / Blechnum en épi - Tiarelle trifoliée - Fougère épée

Site / Soil Characteristics

	Association CNVC00036 **304 plots**	Subassociation 36a typic **207 plots**	Subassociation 36b *Picea sitchensis* **97 plots**
Elevation Range (min–mean–max meters)			
	1–259–1150	1–330–1150	5–119–585
	missing data (7)	missing data (9)	missing data (1)
Slope Gradient (% frequency)			
	very steep (15)	very steep (16)	very steep (12)
	steep (25)	steep (19)	**steep (37)**
	moderately steep (18)	moderately steep (14)	moderately steep (27)
	moderate (6)	moderate (7)	moderate (4)
	gentle (17)	**gentle (20)**	gentle (10)
	level (12)	level (14)	level (7)
	missing data (7)	missing data (10)	missing data (2)
Aspect (% frequency)			
	north (20)	north (18)	north (25)
	east (19)	east (16)	east (27)
	south (14)	south (14)	south (16)
	west (22)	west (22)	west (22)
	level (7)	level (8)	level (6)
	missing data (16)	missing data (22)	missing data (4)
Meso Topoposition (% frequency)			
	crest / upper (5)	crest / upper (3)	crest / upper (8)
	mid (19)	mid (13)	mid (34)
	lower / toe (23)	lower / toe (15)	lower / toe (41)
	depression (1)	depression (1)	depression (1)
	level (8)	level (7)	level (8)
	missing data (44)	missing data (61)	missing data (7)
Moisture Regime (% frequency)			
	dry (2)	dry (0)	dry (7)
	mesic (32)	mesic (13)	**mesic (71)**
	moist (55)	**moist (72)**	moist (18)
	wet (2)	wet (3)	wet (0)
	missing data (9)	missing data (12)	missing data (4)
Nutrient Regime (% frequency)			
	poor (2)	poor (1)	poor (4)
	medium (14)	medium (15)	medium (12)
	rich (59)	**rich (48)**	**rich (81)**
	missing data (25)	missing data (35)	missing data (2)

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum CNVC00036

Site / Soil Characteristics (cont'd)

	Association CNVC00036	Subassociation 36a typic	Subassociation 36b *Picea sitchensis*
Soil Parent Material (% frequency)			
	bedrock (1)	bedrock (1)	bedrock (0)
	colluvium (20)	colluvium (17)	colluvium (27)
	moraine / till (4)	moraine / till (5)	moraine / till (2)
	fluvial (10)	fluvial (11)	fluvial (9)
	glaciofluvial (2)	glaciofluvial (3)	glaciofluvial (0)
	lacustrine (0)	lacustrine (0)	lacustrine (0)
	glaciomarine (0)	glaciomarine (0)	glaciomarine (1)
	organic (3)	organic (1)	organic (5)
	anthropogenic (1)	anthropogenic (1)	anthropogenic (0)
	missing data (58)	missing data (60)	missing data (54)
Soil Rooting Zone Substrate (% frequency)			
	non-soil (21)	non-soil (18)	non-soil (27)
	sandy (7)	sandy (8)	sandy (6)
	coarse loamy (29)	**coarse loamy (27)**	**coarse loamy (32)**
	fine loamy (9)	fine loamy (9)	fine loamy (10)
	silty (2)	silty (2)	silty (3)
	clayey (2)	clayey (1)	clayey (3)
	organic (8)	organic (5)	organic (12)
	missing data (22)	missing data (29)	missing data (6)
Root Restricting Depth (% frequency)			
	0 – 20 cm (3)	0 – 20 cm (2)	0 – 20 cm (6)
	21 – 99 cm (21)	21 – 99 cm (21)	21 – 99 cm (21)
	≥ 100 cm (2)	≥ 100 cm (1)	≥ 100 cm (2)
	missing data (74)	missing data (76)	missing data (71)
Humus Form (% frequency)			
	mor (49)	**mor (44)**	**mor (60)**
	moder (19)	moder (18)	moder (23)
	mull (1)	mull (1)	mull (0)
	peatymor (1)	peatymor (1)	peatymor (0)
	missing data (30)	missing data (36)	missing data (18)

Forest / Forêt **Association CNVC00036**

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum

Western Hemlock - Pacific Silver Fir / Deer Fern - Three-leaved Foamflower - Western Sword Fern

Pruche de l'Ouest - Sapin gracieux / Blechnum en épi - Tiarelle trifoliée - Fougère épée

Additional Characteristics

Species of High Conservation Concern:

Non-native Species:

Management Issues:

Type Statistics

Internal Similarity:

Confidence: high

Strength:

Related Concepts

Similar CNVC Associations: CNVC00005 *Tsuga heterophylla (Picea sitchensis - Abies amabilis) / Rubus spectabilis / Polystichum munitum*; CNVC00028 *Tsuga heterophylla - Abies amabilis / Oplopanax horridus / Gymnocarpium dryopteris*

Related United States National Vegetation Classification Associations:

Relationships with Other Classifications:

Comments

Where CNVC00036 occurs on Haida Gwaii (Queen Charlotte Islands), it is influenced by intense browsing by Sitka black-tailed deer (*Odocoileus hemionus sitkensis*), which were introduced in the early 1900s. Browsing is now so intense that understory shrub- and herb-layer vegetation is either absent, or is at best poorly developed.

CNVC00036 is similar to CNVC00005 [*Tsuga heterophylla (Picea sitchensis - Abies amabilis) / Rubus spectabilis / Polystichum munitum*] but has much less *Rubus spectabilis* and more *Vaccinium alaskaense*. Where they occur in the same area, CNVC0005 occupies wetter sites.

CNVC00028 [*Tsuga heterophylla - Abies amabilis / Oplopanax horridus / Gymnocarpium dryopteris*] can occur on moist, rich sites within the range of CNVC00036, but is characterized by much greater cover of *Oplopanax horridus* and *Gymnocarpium dryopteris*, and less *Polystichum munitum*.

Tiarella trifoliata (three-leaved foamflower) may include *T. trifoliata* var. *laciniata* (cut-leaved foamflower), *T. trifoliata* var. *trifoliata* (three-leaved foamflower) and/or *T. trifoliata* var. *unifoliata* (one-leaved foamflower).

Source Information

Number of source plots for CNVC00036: 304
Number of source plots for 36a typic: 207
Number of source plots for 36b P*icea sitchensis*: 97
Information Sources: British Columbia Ministry of Forests and Range, Research Branch BECMaster database, October 2007 (304 plots)

Concept Authors: D. Meidinger, C. Chappell, C. Cadrin, G. Kittel, C. McCain, K. Boggs, J. Kagan, G. Cushon, A. Banner and T. DeMeo
Description Authors: A. Inselberg, D. Meidinger, and K. Baldwin
Date of Concept: November, 2005
Date of Description: April, 2011

Tsuga heterophylla - Abies amabilis / Blechnum spicant - Tiarella trifoliata - Polystichum munitum CNVC00036

Classification References:
British Columbia Ministry of Forests and Range, Research Branch. 2007. Vegetation classification hierarchy: BECMaster database (October 2007). B.C. Min. For., Victoria, BC.

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The information contained in this factsheet is based on data and expert knowledge that is current to the date of description. As new information becomes available, the factsheet will be updated.

For more information about the contents of this factsheet and definitions of attribute names and data classes, see the **Understanding the Factsheet** link at http//cnvc-cnvc.ca.

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