Cowichan Region
State of the Environment Report
Update 2014

Landbase

Contents

The 2014 State of Environment Update Report has been prepared by the Cowichan Valley Environment Commission's State of Environmental Reporting Subcommittee, chaired by Scott Akenhead.

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Figures and Tables

Introduction

The Cowichan Valley Regional District (CVRD) is located in a temperate coastal rainforest, and forests define the landbase of this region. The diversity of forests within the CVRD is more diverse than in most other regions of comparable size in North America and includes forest types ranging from some of the driest in British Columbia to some of the wettest in North America.

Understanding the state of forests and forest biodiversity is hugely complex. The numbers of individual species is enormous and measuring the real ecological integrity of a system requires consideration of the amount, distribution and functioning of forests, species and landscapes. In order to simplify and understand the broad condition of the ecological landbase, key elements of ecosystems can be compared to their natural condition to give a relative measure of risk or health. In general, systems that are closer to a natural condition for a number of characteristics are more likely to be fully functioning than those further from natural condition. The rate of change of systems is also important, as populations are more likely to adapt if the timeframe of change is longer compared with populations responding to rapid change.

European settlement in the southern Vancouver Island is some of the longest in the province. Significant commercial harvesting of forests began early in the 1800s and continues today. Accessible areas along the coastline were harvested first, resulting in some of these areas already being on their third harvest rotation, while primary undisturbed forest remains in some of the more remote areas of the CVRD. In addition to forest management, significant human settlement, agriculture and industry have affected ecosystem condition in southern Vancouver Island, primarily in the drier parts of the regional district on the east side of the CVRD.

Landbase condition is a 'coarse filter' indicator – and can be considered as a surrogate or indicator for many values including reflecting the condition of biodiversity overall, older forest associated species in particular, maintaining values such as healthy fish habitat, maintaining ecosystem processes such as hydrologic functioning and landscape connectivity, as well as relating to ecosystem services for humans such as providing clean and moderated water sources, buffering the effects of climate change, and providing spiritual health for humans.

Measuring Condition of the Landbase

Landbase condition can be measured and assessed at many different scales. In 2010, the larger context of Vancouver Island was provided by looking at broad forest condition for the whole Island. These data were current to 2002 and no additional data updates are available at this time.

Since there are no updated Vancouver Island-wide data on forest condition, the data presented in 2010 are used to provide context in this report.

The updated landbase indicator provided for this report is the condition of the CVRD landbase with a forest change analysis from 2009 – 2014 including:

- Amount of area harvested 2009 – 2014 for each biogeoclimatic zone
- Amount of old forest remaining in each biogeoclimatic zone
- Amount of provincial protected areas in each biogeoclimatic zone

Together, these data provide an estimate of the condition of the forested landbase and give an insight into the trend for each zone in the last five years.

Findings

Condition of Vancouver Island

In 2010, the overall state of the landbase of Vancouver Island was presented. At the time it was noted that these data were significantly out of date and this remains the case in 2014. Harvest has continued throughout most ecosystems, so the data presented are likely to be overestimates of the amount of older forest remaining across Vancouver Island. The broad patterns remain however and continue to provide relevant context for the CVRD.

Table 1: Estimate of the percent of forest >140 years in age, organized by biogeoclimatic zones and ecosections on Vancouver Island.

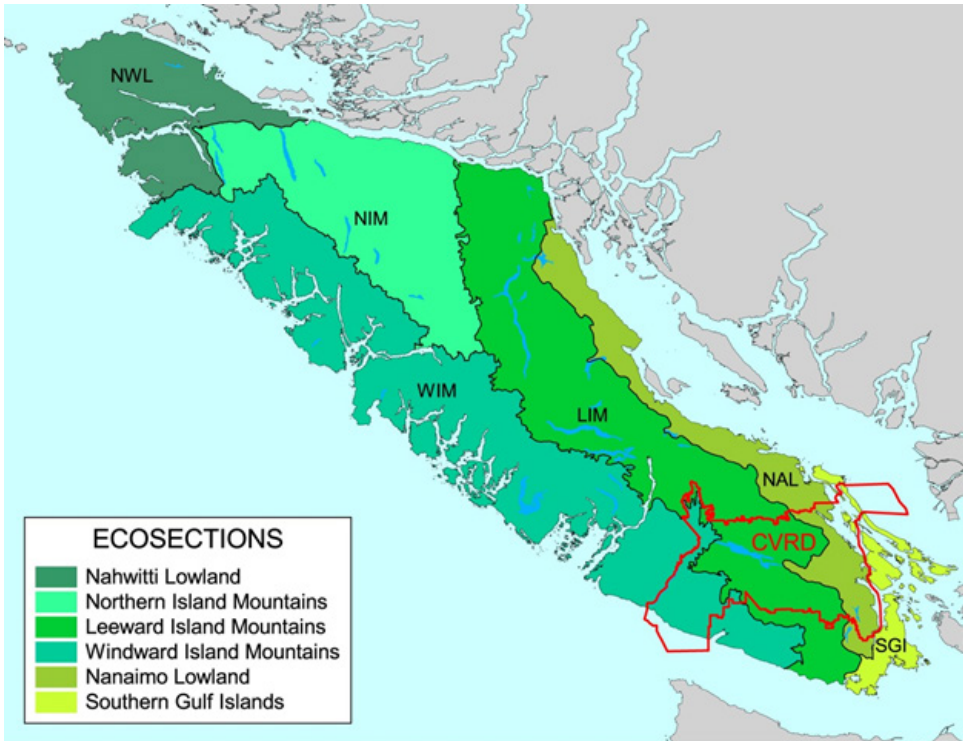
Ecosection	Zone	Percent forest >140 years	Total for ecosection
Nanaimo Lowland	CDF	0.3	2.5%
	CWH	3.4	
Northern Island Mountains	CWH	18.1	21.9%
	MH	48.5	
Leeward Island Mountains	CWH	39.6	40.2%
	MH	46.7	
Windward Island Mountains	CWH	56.0	54.5%
	MH	41.0	

CDF = Coastal Douglas-fir zone; CWH = Coastal Western Hemlock zone; MH = Mountain Hemlock Zone.

The summary of data in Table 1 suggests that over the full extent of its range, the ecological functions of the Coastal Douglas-fir zone are at significant risk, with only a very small fraction of the original old forest remaining in this zone. Limited strategies are underway to protect and restore some older forest on the Crown portion of this zone, but much of the zone is held as private land and the Province manages only a very small portion of it (less than 10% is on Crown land).

In addition, the other lower-elevation forested zones on the eastern side of Vancouver Island are also at risk, especially the Coastal Western Hemlock forests in the Leeward Island Mountains where a potential 18% old forest remains (the actual percentage in 2014 will be lower than that reported since as at least 12 years of harvest have occurred since the BTM data were updated). Forests on the lower western slopes of the Island are in better condition overall than those in the east, but remain with significantly less old forest than occurred naturally. Highest elevation

Figure 1: The distribution of ecosections on Vancouver Island



forests are at lowest risk on Vancouver Island, as they are less accessible and have seen overall lower harvesting activity and are better represented in provincial park systems.

These trends set the context for the analysis of landbase condition within the CVRD.

Landbase Condition of the CVRD

Within the CVRD, data on forests are difficult to access. Unlike the vast majority of British Columbia, the CVRD has a significant percentage of its forested lands held within private managed forest land and Tree Farm Licenses. These data are considered proprietary and are generally unavailable to the public, even those relating to Crown land (for Tree Farm Licenses).

General land status data for the CVRD landbase are available from a provincial dataset (BTM), but these data have not been updated since 2002.

Table 2: Percent breakdown of the CVRD landbase into broad land use zones.

Land Use Type	Percent total landbase
Agriculture	2.6
Urban	3.5
Residential / agricultural	1.5
Old Forest	18.4
Young Forest	43.9
Recently logged	25.8

Data from BTM and updated to 2002 only.

Source: Analysis of BTM generated from Hectares BC.

Although the total percent of forest conversion to other land uses is relatively small in terms of the whole landbase, the distribution of the conversion is primarily on the east side of the Island, so affecting significant portions of some biogeoclimatic zones.

The condition of the different forested zones in the CVRD was presented in 2010. In that analysis it was seen that landbase condition differed significantly by biogeoclimatic zone. The Coastal Douglas-fir zone had no old forest remaining—and 50% of that zone has been converted to residential/ agricultural or urban use. This matches the broader pattern of this ecosystem being at high risk throughout its range on Vancouver Island.

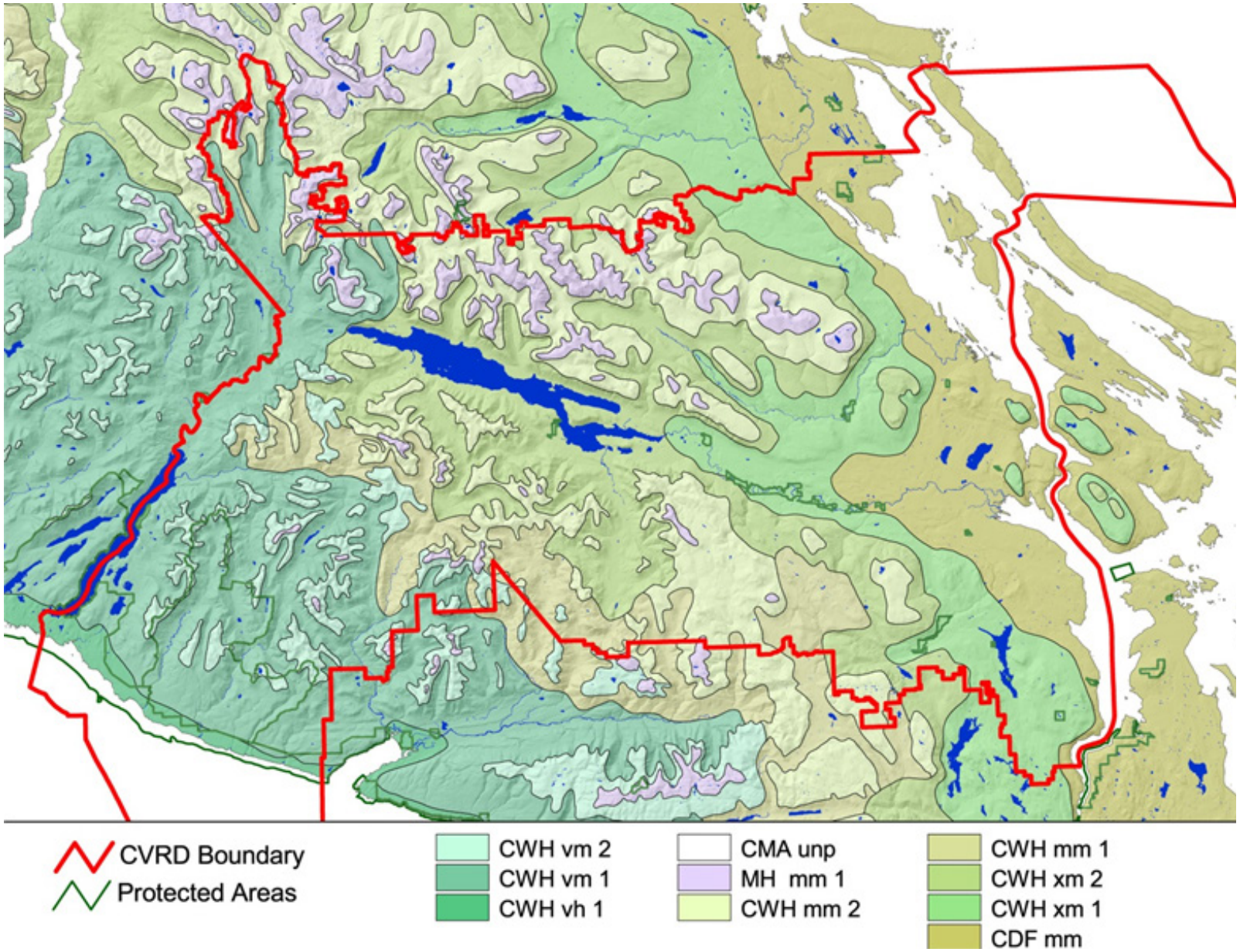
The two driest Coastal Western Hemlock zones (xm1 and xm2) within the CVRD also have extremely low levels of forest >140 years in age remaining (around 2% and 4% in 2010), compared to the natural level of approximately 50% which would have been present prior to large-scale industrial development. As a result both of these two zones were also noted as being in poor condition in 2010. The mid-elevation zones (CWHmm1 and mm2) had somewhat higher levels of old forest in 2010 (7% and 12% respectively), but compared with the predicted natural level of old forest of around 50% these remain a small percentage of the natural condition. However, other development issues are much lower in these zones, and forest conversion here is much less of an issue.

The percentage development (forest and general land use) declines towards the west of the region and the level of old forest is highest on the west of the region, however, overall the level of older forests still remained lower than that would occur under natural disturbance conditions.

Protected Areas

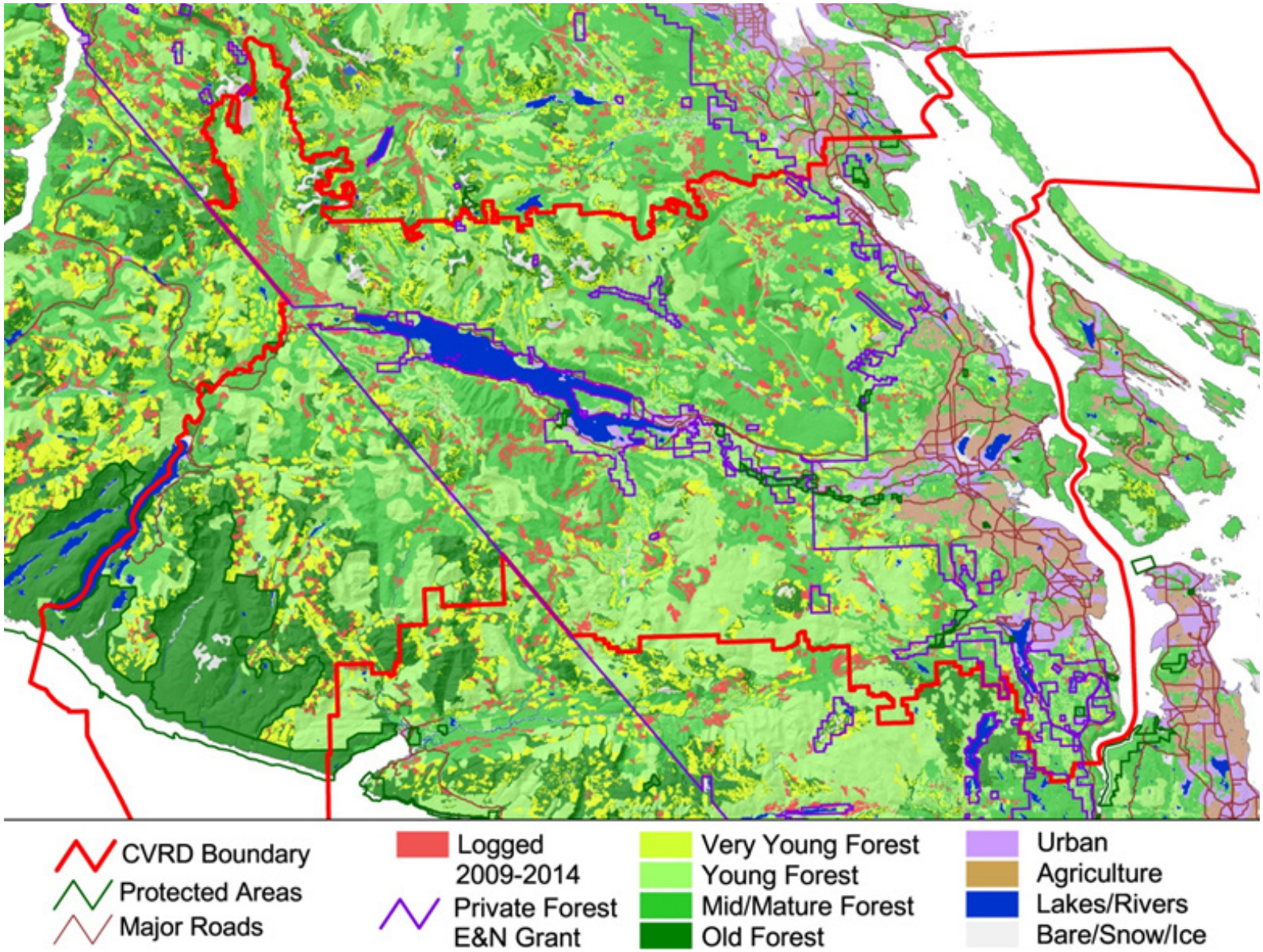
The level of protected areas in a region contributes to the potential ecological integrity of that zone. Areas with high levels and large unfragmented lands managed for conservation are likely to be more ecologically resilient overall than regions with a limited amount or fragmented patches of land areas managed for conservation. The area of provincial protected areas (not including regional parks) by biogeoclimatic zone is shown in Table 3. Only one biogeoclimatic zone is well represented by parks: the hypermaritime CWH zone on the west side of CVRD, where Walbran and Carmanah provincial parks are located. This zone has 88% of its area within the CVRD in protection. In stark contrast, the dry CDF and drier CWH zones on the east side of the CVRD all have very low to zero percent provincial protection within the CVRD. This status, combined with the high levels of conversion and harvest result in these drier ecosystems being at high risk today (Table 3).

Figure 2: Distribution of biogeoclimatic zones in the CVRD



CDF = Coastal Douglas-fir, CWH = Coastal Western Hemlock, MH = Mountain Hemlock; CMA = Alpine forests.

Figure 3: Forest Condition of the CVRD in 2014 .



Change from 2009 to 2014 from harvesting is highlighted in red. The extent of private forest management land is delineated in purple (see the straight line running northwest through the area for western boundary). Approximate age group categories: very young = less than 10 years old, Young = less than 40 years old; Mid/ Mature = 41 – 140 years; Old >140 years.

Table 3: Area and percent of the CVRD in provincial protection by Biogeoclimatic Ecosystem Classification (BEC) zone.

BEC zone	Area in Parks (ha)	Total Area (ha)	Percent in Parks
CDF mm	429	42,581	1.0
CMA unp		67	0.0
CWH mm 1		26,207	0.0
CWH mm 2		60,178	0.0
CWH vh 1	4,269	4,831	88.4
CWH vm 1	16,195	68,770	23.5
CWH vm 2	2,067	16,549	12.5
CWH xm 1	1,075	46,056	2.3
CWH xm 2	65	75,065	0.1
MH mm 1		14,908	0.0
Grand Total	**24,102**	**355,217**	**6.8**

Landbase Condition Change

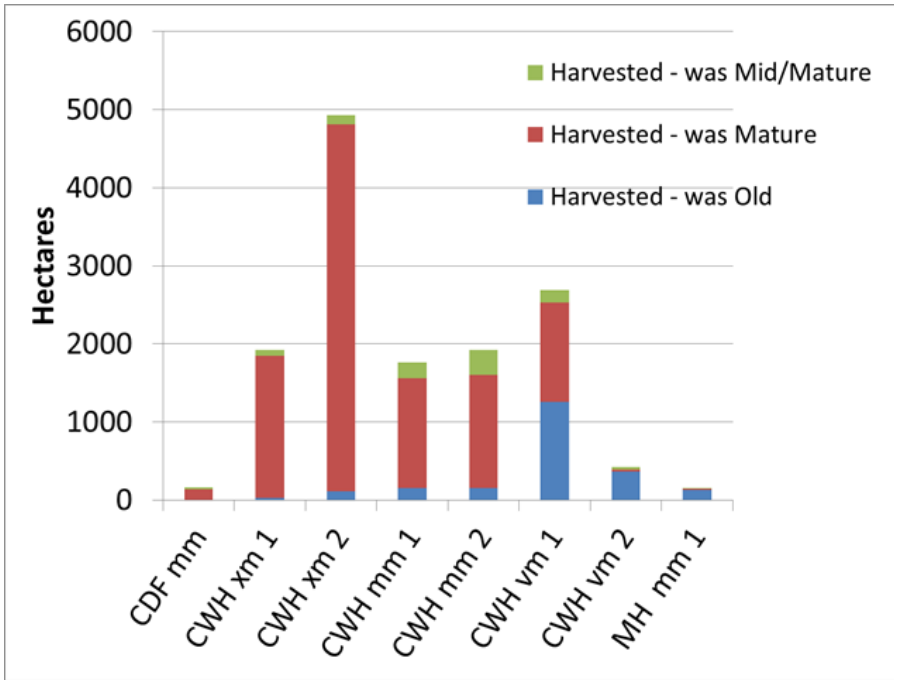
To understand the directional trend for ecosystem condition—towards better or worse condition—the patterns of change for the CVRD in terms of forest condition were assessed by comparing 15-metre pixel Landsat 8 images from September 6, 2014 to the previous 2009 Landsat image. New harvest areas were identified using image analysis software, and new blocks were manually identified and incorporated into the existing database (Figure 3). Data are summarized by biogeoclimatic zone (Table 4).

Figure 3 shows the condition of the landbase of CVRD in 2014. Most recent harvest areas (within the last five years) are shown in red. The images show the distribution of harvest to be throughout the CVRD region.

Interpretation from this analysis shows that approximately 13,991 ha of forest were harvested in the period 2009–2014. Of this, 2,220 ha was older forest prior to harvest (>140 years in age), representing 4% of the old forest that was remaining in 2009. In addition, approximately 10,828 ha of mature forest was harvested—representing 9% of the mature forest present in 2009. In addition, 944 ha of mid-seral forest (around 40 years of age) was harvested in this same period of time.

These data are shown in Figure 4 below, and organized by the biogeoclimatic zone and the age of the forest that was harvested.

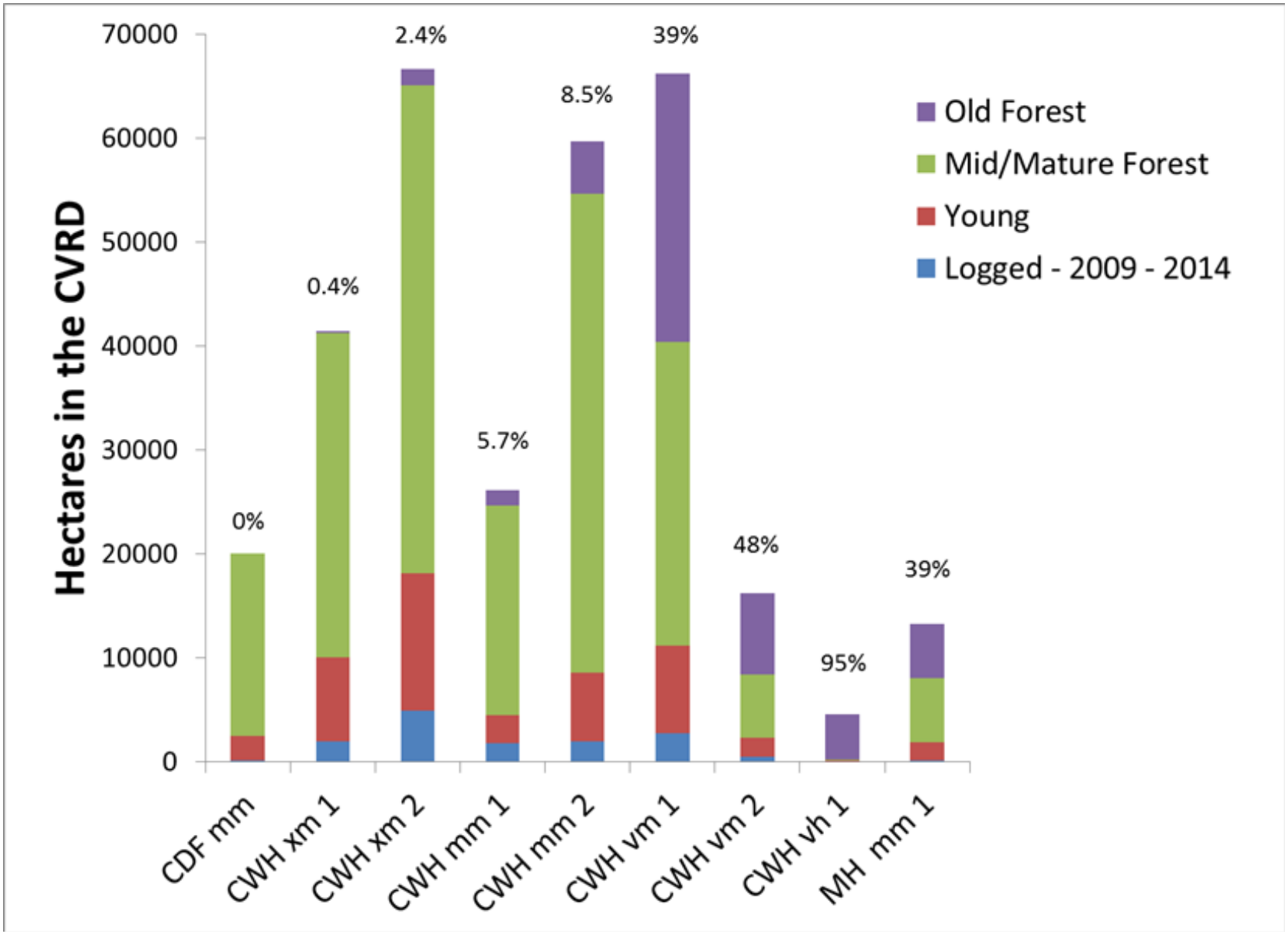
Figure 4: Area of harvest by biogeoclimatic zone 2009 – 2014



Data are shown based on the age of the forest stand in 2009, prior to harvest.

Harvest of old forest has occurred primarily at high elevations (e.g. the CWHvm1 – see Figure 4), since there is very little old forest remaining at lower elevations and less than 1% in the CDF zone. However, significant areas of mature forest have been harvested particularly in the lower dry zones of the CWHxm2 and xm1—both of which had extremely low levels of old forest remaining in 2010 (Figure 5). Harvest of mature forest affects the rate and extent of recovery of these forest types with extremely low levels of old forest remaining.

Figure 5: Area and seral stage distribution of forests in the CVRD



Percent remaining old is highlighted above each column. Harvest highlighted on Figure 3 (2009 – 2014) is shown.

The total area and seral stage distribution for each biogeoclimatic zone in 2014 is shown in Figure 5.

Overall condition can be assessed in relation to the amount of older forest remaining (shown in Figure 5) For the CWHxm1, xm2, mm1, and mm2 – a significant portion of the CVRD landbase, the level of old forest was already very low in 2010, yet harvest of old and mature forest has continued in these zones in the last five years. As a result, condition in these biogeoclimatic zones continues to decline and recovery or restoration of older forest is more and more difficult as mature forests are harvested.

Table 4: Area and percent of total BEC zone found in private (E&N) lands within the CVRD.

Biogeoclimatic Zones	Total area in CVRD (ha)	Percent of total BEC zone on private land in CVRD %	Area on private (E & N) Lands (ha)
CDF mm	42,582	1	554
CWH mm 1	26,207	59	15,466
CWH mm 2	60,179	95	57,094
CWH vh 1	4,832	0	
CWH vm 1	68,770	17	12,018
CWH vm 2	16,549	12	2,011
CWH xm 1	46,057	56	25,583
CWH xm 2	75,065	77	57,684
MH mm 1	14,909	94	13,973
Total	**355,218**	**52**	**184,450**

Figure 3 also shows the distribution of private managed forest land within the CVRD area (purple boundary), and the total area in each biogeoclimatic zone held in the E&N Lands (Table 4). A significant portion (50%) of the CVRD is located in these private E&N lands, with some biogeoclimatic zones having significant proportions of their extent located there. For the CWHmm1, mm2, CWHxm1 and xm2, and the MHmm1 there is significant responsibility held by the private landowners for the condition of the landbase, since the majority of the extent of these zones is held in this private land (Table 4). These private lands are not subject to the government's requirements to maintain or restore old forest. All of these ecosystems are at high or very high risk and have continued to see a declining trend in condition based on amount of older forests present, in the last five years.

On Crown land, mainly on the west coast of the CVRD, the area is primarily Tree Farm License—notably TFL 44 and TFL46 are subject to the government's biodiversity requirements, including some level of old growth protection. The condition of the forests in this part of the CVRD tends to be higher today because of lower historic harvest pressure and significant areas of provincial parks for these ecosystems. Arrowsmith TSA covers the remainder of the forest management lands, and is subject to old growth requirements, but the total area of land involved is very small and these low elevation ecosystems are at high risk and are under considerable pressure. Continued harvest of mature CDF reduces the rate at which this highly impacted ecosystem can recover.

Data Gaps

General forest condition data were out of date in 2010, and continue to be so for this update. This data issue makes it very difficult to report out on the state of forests and biodiversity across the whole of British Columbia, and has been highlighted by the Auditor General in a recent report.[1] Within the CVRD itself, this issue is further exacerbated by the extent of Tree Farm Licenses and private lands where there are no data available to the public.

1 BC Auditor General Report 2013: http://www.bcauditor.com/pubs/2013/report10/audit-biodiversity-bc-assessing-effectiveness-key-tools

Table 5: Summary of condition within the CVRD by biogeoclimatic zone, and condition trend for 2009 – 2014 relating to recent harvest patterns.

Biogeoclimatic Zone	Forest Type	Permanent Conversion	Percent >140 years in 2014	Percent Protected Area in CVRD	Ecological Condition	Trend 2009 - 2014
CDF	Dry	49%	<<1%	1%	Very poor	Neutral
CWHxm1	Dry	7%	0.4%	2.3%	Very Poor	Declining
CWHxm2	Dry	2%	2.4%	0.1%	Very Poor	Declining
CWHmm1	Moist		5.7%	0%	Poor	Declining
CWHmm2	Moist		8.5%	0%	Poor	Declining
MHmm1	Moist/ wet		39%	0%	Moderate	Neutral
CWHvm1	Very wet		39%	23.5%	Moderate / Good	Neutral / Declining
CWHvm2	Very wet		48%	12.5%	Moderate/ Good	Neutral
CWHvh1	Very wet		95%	88.4%	Very Good	Neutral