



Multiple Resource Value Assessment Report

COAST MOUNTAINS NATURAL RESOURCE DISTRICT

PREPARED BY:

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Ministry of Forests, Lands, Natural Resource Operations and Rural Development**



FREP
Forest & Range
Evaluation Program

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Cover Photo: Skeena valley looking upstream towards Lakelse confluence from Dasque area (2017)

Data collected, analyzed, and report written by the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. For details on assessment protocols please visit the FREP Website at:
<https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program>.

For more specific questions or comments please contact FLNRORD Coast Mountains Natural Resource District stewardship staff at 250-638-5100.

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BACKGROUND

All natural resource development activities have the ability to impact the condition of ecosystem values. In British Columbia, the *Forest and Range Practices Act (FRPA)* lists 11 resource values essential to sustainable forest management in the province; biodiversity, cultural heritage, fish/riparian and watershed, forage and associated plant communities, recreation, resource features, soils, timber, visual quality, water, and wildlife. FRPA requires the forest industry to develop results and strategies that are consistent with Objectives set by Government for the conservation of these values. The Forest and Evaluation Program (FREP) uses effectiveness evaluations to monitor the effects of forest activity on the condition of the FRPA values. The results of these evaluations are used to determine if FRPA objectives are being met, and if practices and legislation are meeting government's broader intent for sustainable use of resources. Effectiveness evaluations do not assess compliance with legal requirements. Instead, these evaluations assess the effects of development activities and natural influences on the condition of *Forest and Range Practices Act (FRPA)* values, often using comparisons with baseline data, regardless of whether practices are in compliance with legislation. These evaluations are meant to help resource managers in the following ways:

- assess whether resource development is done sustainably;
- provide transparency and accountability for the management of public resources;
- balance decision making in consideration of environmental, social, and economic factors; and
- guide ongoing improvement of resource management practices, policies, and legislation.

This Multiple Resource Value Assessment (MRVA) report is a summary of the available field-based assessments conducted within the Coast Mountains Natural Resource District. Field assessments are generally conducted on, or near, recently harvested cut blocks and therefore are only evaluating the impact of industrial activity at the site level, and not the overall condition of the value. This report concludes with a district manager commentary on the key strengths and opportunities for improvement of natural resource management in the Coast Mountains Natural Resource District (CMNRD). MRVA reports allow decision makers to communicate expectations for sustainable resource management of public resources and identify opportunities to improve stewardship.



Example of timber harvesting landbase terrain in Coast Mountains District near the Copper Valley

MRVA METHODS, CLASSIFICATIONS, AND MEANINGS

Impact Ratings and Methods

The site-level “impact ratings” presented here are based on assessments conducted within the working land base (e.g. areas where forest development activities take place). The ecological contributions of parks, protected areas, and other conservancy areas (approximately 21% of the provincial land base and 23% in the Coast Mountains Natural Resource District) are not covered in this report. Where possible, impact ratings reflect both resource development and the effects of natural impacts, such as those related to pest infestations, fire, or wind disturbances.

Monitoring results are summarized using four impact ratings: **very low, low, medium, and high**.

- **Very low and low** impact are considered consistent with the government’s goal of sustainable management of the resource values within *FRPA*
- **Medium** impact is considered borderline, and
- **High** is generally considered unsustainable.

Site-level resource value trends are provided when there is sufficient data to compare sites impacted over time. Much of the information presented in this report is focused on the ecological state of the values and provides useful information to resource managers and professionals on the outcomes of plans and practices. For a description of the methodologies used in this report, see Appendix 1.

The presentation of this report is similar to that used in previous Multiple Resource Value Assessments.¹ The “Impact Ratings” diagram indicates the effect of resource development on the resource value, from “very low” to “high” impact. The “Summary” presents a descriptive outline of the monitoring results. The “Causal Factors” for the impact ratings are derived from the field-based data. The “Opportunities for Improvement” are based on practices that resulted in the best outcomes and (or) expert knowledge.

Harvest Era Comparison

This report compares old versus new forestry practices (harvesting, road building) for each value to gauge whether practices are improving over time. All sites assessed are randomly selected from a cutblock list, with cutblocks being 1-3 years old. At least one growing season must have passed since harvesting in order to ensure that the effects from harvesting (if any) are expressed. Harvest area comparisons and assessment methods differ for each value depending on the following factors:

Cultural Heritage Resources: Assessments on Cultural Heritage Resource (CHR) are compared based on new versus old harvest era. Sampling sites can have a minimum of 50% randomly selected sites and up to 50% targeted sites based on recently harvested cut-blocks with known cultural heritage resource values. The mixture of random versus selected sites is due to the need to incorporate requests from local Indigenous Peoples and/or licensees. In the case of CMNRD, the new harvest era (cutblocks harvested between 2014-2018) is compared to the older harvest era (cutblocks harvested between 2007-2013).

Riparian Condition: The new harvest era (cutblocks harvested between 2013-2017) is compared to the older harvest era (cutblocks harvested between 1997-2012). The old harvest era pertains to all evaluations on cutblocks harvested before 2014. Streams are assessed within the randomly selected cutblock, therefore we can directly compare the condition of streams in the modern versus old harvest era.

¹ See <https://www2.gov.bc.ca/gov/content?id=3404A95D195C48A5BAE6DA51462014A0>. The methodology is described in FREP Technical Note No. 6 (https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/frep/frep-docs/frep_technical_note_06.pdf).

Stand-level Biodiversity: Three harvest eras are compared: 1) cutblocks harvested from 1997-2004, 2) cutblocks harvested 2005-2010 and 3) cutblocks harvested from 2011-2015. While the summary below represents data collected between 2007 and 2017, the latest sampled block was harvested in 2015. The sample population consists of randomly-selected cutblocks.

Visual Quality: Assessments for visual quality compare data by years sampled. The evaluations consist of landforms that include randomly selected, recently harvested cutblocks. Sampling results obtained over the last five years (2014-2018) compared all DKM sampling results before that time, from 2007-2013. Starting in 2019, a modified sample design is now being used, whereby only blocks within the most sensitive visual quality classes (Visual Sensitivity Classes 1-3) are sampled. Due to this new *stratified* sampling design, the 2019 data cannot be compiled with the older data, and is analyzed separately.

Water Quality: Water quality data collected within the last 5 years (2015 to 2019) is compared to all data collected prior to that time (2008-2014). This is assumed to reflect a comparison of old versus new forestry practices. The randomly selected cutblock is used as a starting point for site selection; with a focus on stream crossings installed on the in-block and access roads. Therefore the roads themselves are not necessarily associated with a harvest year, and as such, data collection year is used as a basis for comparison.



Mountainous Hemlock-Balsam timber profile typical in the Coast Mountain District (No-Gold drainage)

ENVIRONMENTAL AND STEWARDSHIP CONTEXT

CMNRD includes the Kalum, Nass, Cascadia, Pacific and Great Bear Rainforest North Timber Supply Areas (TSAs). This report is specific to the area encompassed by CMNRD boundary. The TSAs and associated TFLs in

the CMNRD cover approximately 2.3 million hectares. In addition, Nisga'a Lands, under the *Nisga'a Final Agreement*, are adjacent to CMNRD boundaries. There are several large protected areas including the Gitnadiox River Park, Foch Gilttoyes Park, Hanna-Tintina Conservancy and the Kitlope Heritage Conservancy.

This diverse forested environment provides habitat for a wide variety of wildlife species including: grizzly, black and kermode bears, deer, fisher, northern goshawk, moose, marten, raptors and owls. Salmonids are inherent in all coastal, Skeena and Nass watersheds and are a priority in resource management considerations.

Forestry, Oil and gas transportation infrastructure (LNG), public sector, mining and tourism are the major employment sectors, with construction, fishing and trapping contributing to the local economy. Historically, the district supported two lumber mills and two pulp mills. Mill closures in the late 1990s and 2000s resulted in a downturn in timber harvesting. In the years following, harvesting for export markets began to increase involving the sale of sawlogs to Asian markets. In 2012 Skeena Sawmills in Terrace reopened and has since invested in improvements to their mill and the addition of a pellet facility in 2019.

CMNRD boundaries fall within the traditional territories of many Indigenous groups including: Gitga'at, Gitanyow, Gitxaala, Gitksan, Haisla, Heiltsuk, Kitasoo, Kitselas, Kitsumkalum, Lax Kw'alaams, Metlakatla, Wet'suwet'en, Tahltan, and Tsetsaut Skii Km Lax Ha. Under the Nisga'a Final Agreement, the Nisga'a Nation have treaty interests in the Nass Area and Nass Wildlife Area, which includes parts of CMNRD.

During the last five years of FREP sampling, local First Nations and the Nisga'a Nation have completed training and assisted district staff with sampling of several FREP values. Working together in the field to co-monitor resource values provided the opportunity to share experiences and knowledge. Developing these positive working relationships on stewardship initiatives will benefit both parties into the future.

Each TSA in the CMNRD has unique characteristics and operational challenges. The purpose of the following paragraphs is to outline some of those challenges for licensees in managing the resource objectives set by government.

Steep terrain with numerous small streams combined with high levels of precipitation require significant investments in road engineering, construction and maintenance. Storm events increase the potential for landslides and mass wasting. High fisheries values are found across the region and salmon and fish bearing streams are predominant throughout the TSAs. As a result, fish stream assessments and careful road construction and maintenance practices are necessary. Sediment generated from roads represents the highest risk to riparian values in the district.

In October 2017, the Kalum TSA experienced a major storm event where precipitation levels totaled approximately 35 cm of rain over 2 weeks in coastal and inland areas of the district. The storm washed out numerous roads, bridges and flooded susceptible low lying areas. The effects are still evident although some of the damage to critical infrastructure has since been repaired. FREP water quality evaluations documented some of the washouts from this storm where hundreds of cubic meters of material from roads were deposited into fish bearing creeks. Many new landslides can be attributed to this natural event that occurred primarily in coastal areas but also affected some interior watersheds.

Another important resource value includes Cultural Heritage Resources which are abundant in the district and require archaeological impact assessments and collaborative management with Indigenous groups. Scenic areas and Visual Quality Objectives have been established in the district since 1997. The viewscapes in the district are highly sensitive to forest harvesting and often require visual impact assessments and visual

design. A high risk of windthrow can often frustrate attempts to establish screening buffers which is common throughout the district.

In coastal areas of the district, timber harvest operations utilize drop zones, log dumps or barge ramps to manage log handling in an often sensitive marine environment.

Currently, no significant forest health concerns are prevalent within CMNRD, likely as a result of species diversity of the coastal and transitional forests. Endemic levels of bark beetles have been seen in Fir, Spruce and Pine stands over the last decade. Sporadic outbreaks of Dothistroma needle blight have been seen in regenerating pine stands during warm and wetter growing seasons. In coastal areas, decline of Yellow Cedar has been noted. This is consistent with the trends reported by the US Forest Service in the southeastern panhandle of Alaska resulting from declining snowpack levels. A drought cycle was also observed in 2018 and impacted Cedar stands with shallow root systems growing over bedrock and other well drained areas.



Coastal areas comprise a significant portion of the Coast Mountains district and require marine based access (MV Canoe Forest anchored at Moore Cove)

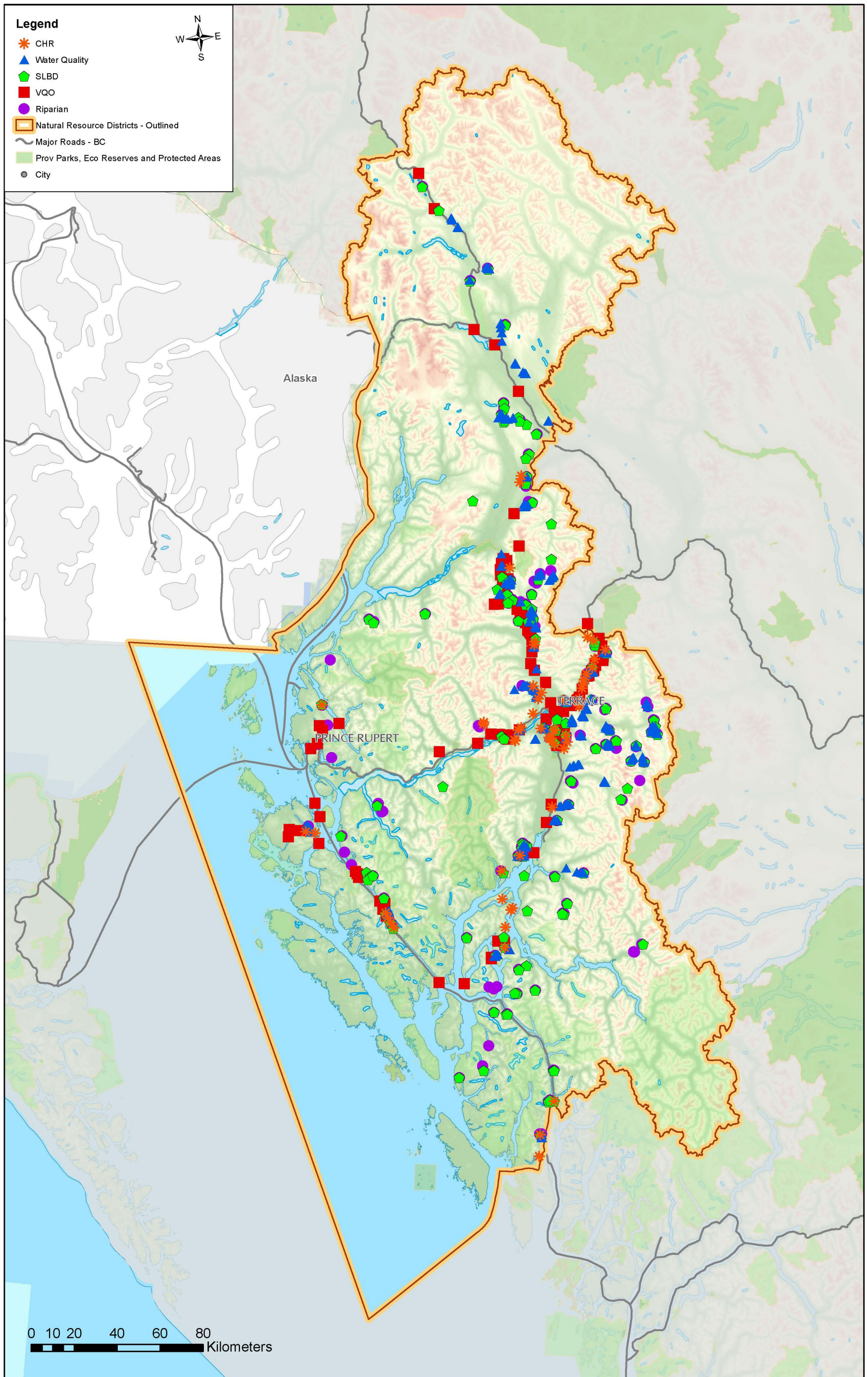


Figure 1: Coast Mountains Natural Resource District, showing FREP sample locations collected up to 2019.

MONITORING IN BRIEF

This report summarizes routine FREP monitoring conducted in the CMNRD. The methodology for routine monitoring of each value follows the monitoring protocols described on FREP website

(<https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program/frep-monitoring-protocols>).

The following chart is a compilation of the individual bar charts presented for each resource value in the pages following. The bar charts compare the impact of resource development (or in the case of Riparian and Water Quality also includes the impact of natural events) over the different harvest or data collection eras. Note that Stand Level Biodiversity is not included in the bar chart below because an impact rating had not been formulated at the time this MRVA report was being prepared.

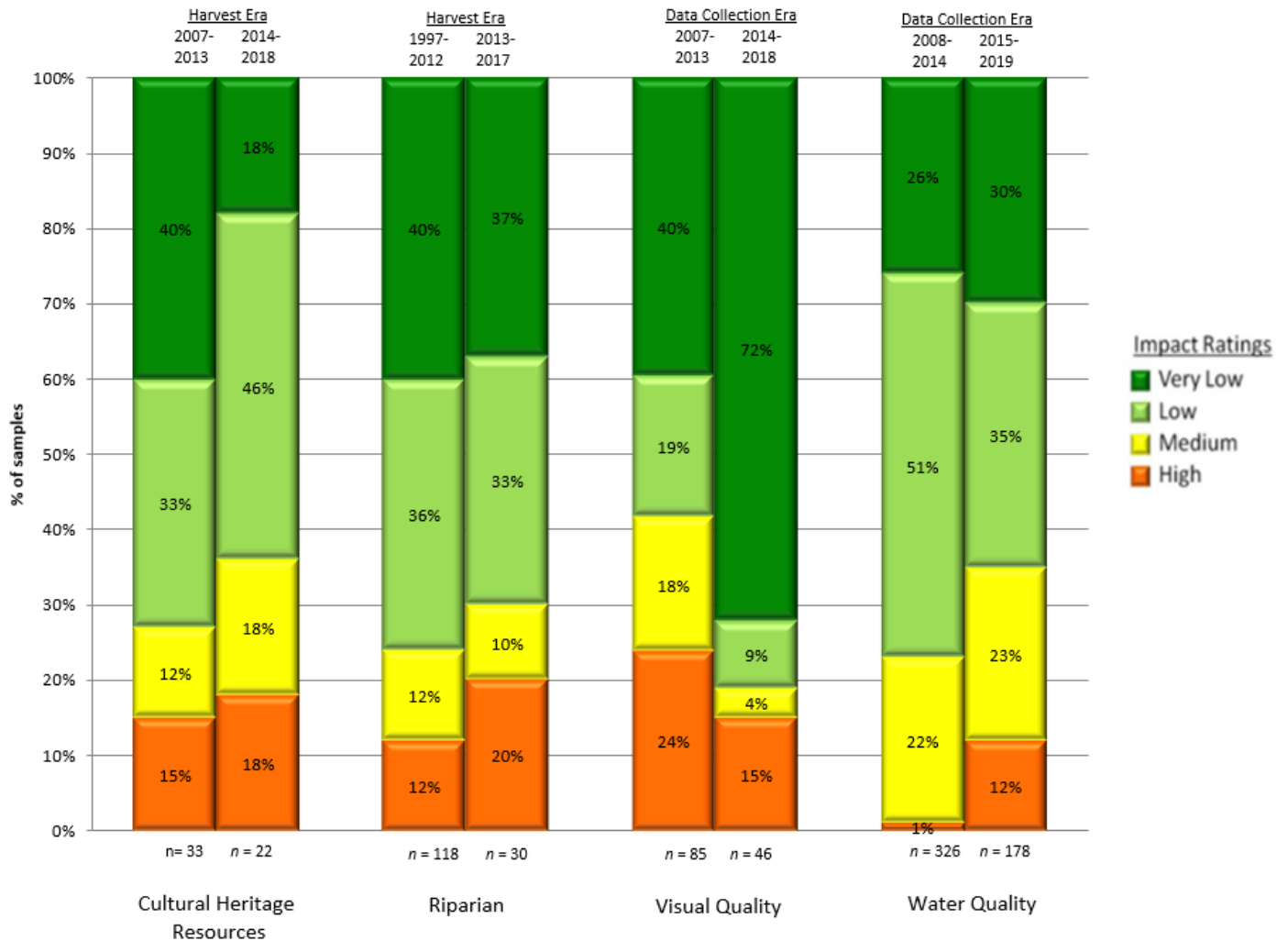


Figure 2: Coast Mountains Natural Resource District stewardship impact ratings by resource value with trends

KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

Cultural Heritage: Resource Development Impacts on Cultural Heritage Resources



Figure 1: Coast Mountains Natural Resource District, showing Cultural Heritage Resource Effectiveness Evaluation sample locations collected up to 2019.

Cultural Heritage: Resource Development Impacts on Cultural Heritage Resources

Priority Question: Are cultural heritage resources being conserved and where necessary protected for First Nations cultural and traditional activities? Sites are assessed for evidence and extent of damage to features, operational limitations, management strategies, and type and extent of features.

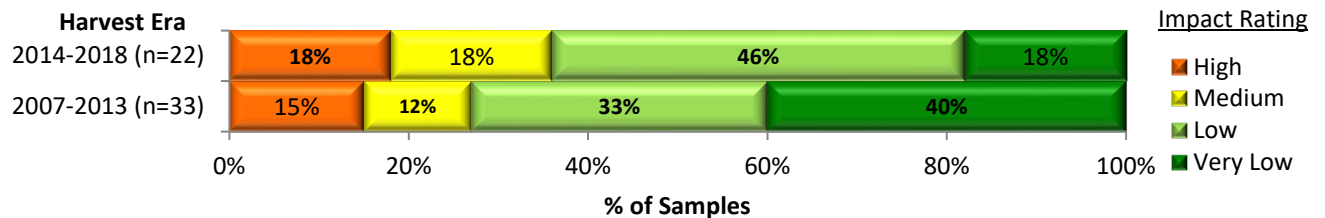


Figure 4: Cultural Heritage Resource impact rating by harvest era.

Data Source: Cultural heritage assessment data was collected by ministry field staff, often with the assistance of local First Nations/Nations and Forest Licensees. Sampling sites can have a minimum of 50% randomly selected sites and up to 50% targeted sites (targeted by First Nations/Nations and/or licensees) based on recently harvested cut-blocks with known cultural heritage resource values. There were 11/55 blocks (20%) targeted for sampling. Data presented was collected from 2009 through 2019 from cut blocks harvested from 2007 to 2018 (Note: The *Harvest Era* of the last 5 years only has samples that were harvested between 2014-16).

Summary: The number of samples to date is 55, and the District will continue to sample annually to be able to analyze the data by Licensee or by First Nations territory/Nation Treaty Interest Areas. Of the cutblocks harvested in the Harvest Era 2014-2018, 22 cut-blocks assessed, 64% were rated as “low” and “very low” impact to cultural heritage features. Most of these features were pre-1846 culturally modified trees (CMTs) for bark stripped cedar and trap-set trees. Of 58 CMT sites, 11 were pre-1846 archaeological site CMTs for kindling, plank trees, aboriginally logged stumps, canoe blanks, and test holes.

Causal Factors: At the CHR individual feature level, out of a total of 101 CHR features across the 55 blocks sampled, 69% were intact, while 31% had some level of damage. These CMT features were mostly affected by harvesting and/or windthrow, but damage was also attributed to road building where operational constraints prevented an alternate route. Twenty-three (23) of the blocks had no First Nations/Nations management recommendations, however, 18 of these 23 had AIA’s completed that would have at least been referred to First Nation’s informing them of the archaeologists’ recommendations. Eight (8) of the blocks had no management strategy for CHR within the Site Plan.

Effective Practices: The effective management strategies and/or practices that were particularly effective in managing for CHR values included the following:

- Effective marking of CMTs for visibility to logging contractors;
- The prescribed retention level maintained the integrity of the CHR features;
- The high level of retention with heli-harvest to meet other values, such as VQOs, was also effective protection of CHR;
- Retention of CHR within WTPs adjacent to mature timber protected the CHR from windthrow more effectively;

- Redesigning the block boundary to provide a buffer to CHR was effective;
- Variable retention harvesting practices likely contributed to lower windthrow levels around CMT's left standing; and
- Modifying the block boundary to avoid the CHR features was effective.

In some cases, licensees preserved as much CHR as possible despite having a Site Alteration Permit (SAP) for the full removal of CHR's.

Opportunities for Improvement:

- Improve wind-throw management to sufficiently protect CHR features within windfirm retention buffers
- Improve communications with First Nations to increase the level of inclusion of their management recommendations for CHR in all Harvest Plans.
- Improve communications between licensees and archaeologists to collaborate on effective implementable operational management strategies for CHR.
- Ensure site plans contain specific directions for management of CHR features.
- Conduct a pre-work with all timber harvest operators pre-harvest to ensure on-block and adjacent CHR features, locations and management strategies are known and understood.
- Reserving CHR within WTPs is preferred to protect longer term (a rotation) rather than exclusion from the block.
- Consider designating reserves for heavy concentrations of CMTs instead of logging 100% under Site Alteration Permit.



Metlakatla Stewardship Society member David Doolan recording a CMT during a FREP CHR evaluation

Riparian: Resource Development Impacts on Stream Function

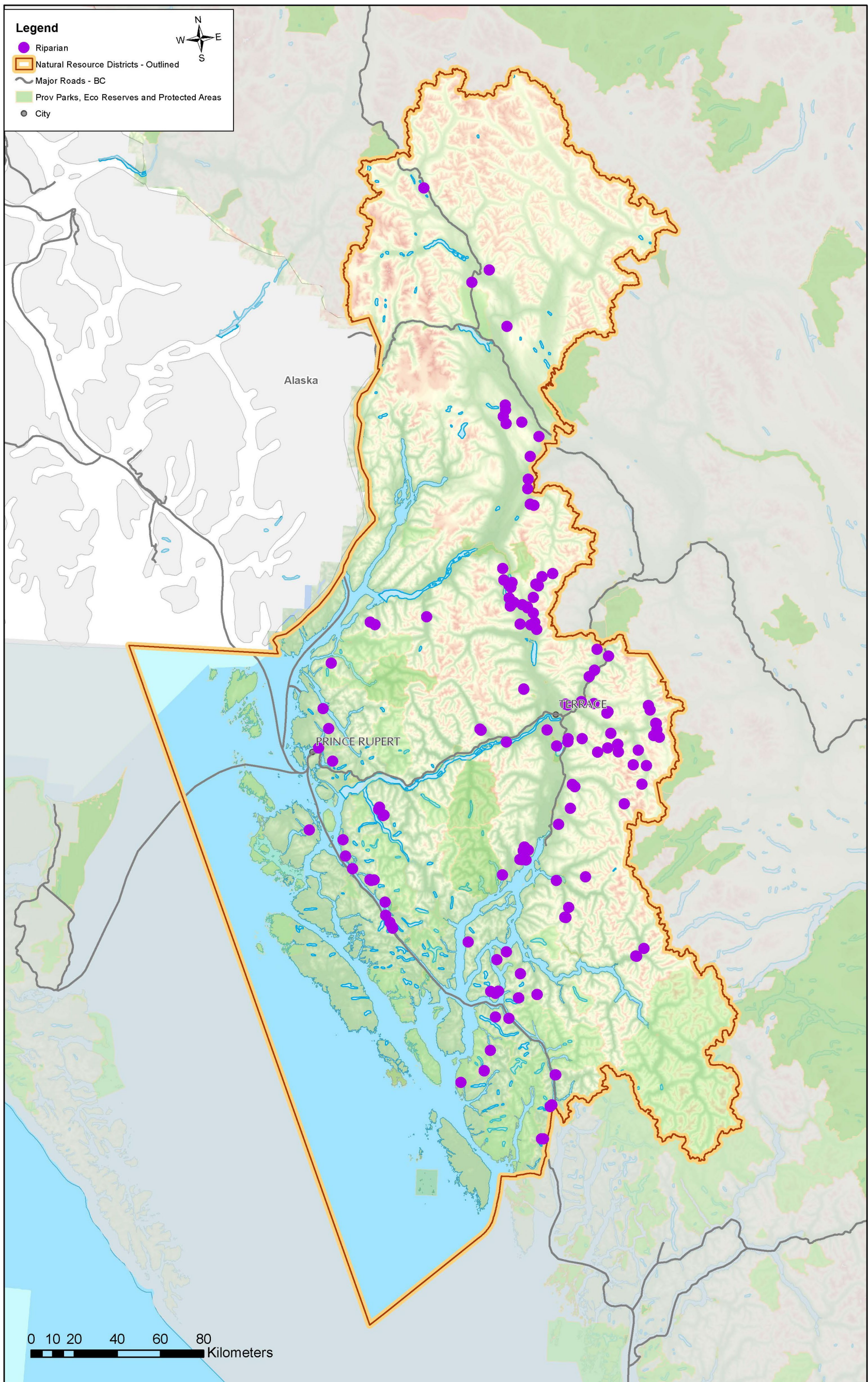


Figure 5: Coast Mountains Natural Resource District, showing Riparian Effectiveness Evaluation sample locations collected up to 2019.

Riparian: Resource Development Impacts on Stream Function

Priority Question: Are riparian forestry and range practices effective in maintaining the structural integrity and functions of stream ecosystems and other aquatic resource features over both short and long terms? Riparian indicators such as moss abundance, invertebrate diversity, and fish cover attributes are assessed to determine the “health” or “functioning condition” of the stream. Point indicators are measured at 6 sites along the stream, while continuous indicators are recorded between the sites along the stream reach.

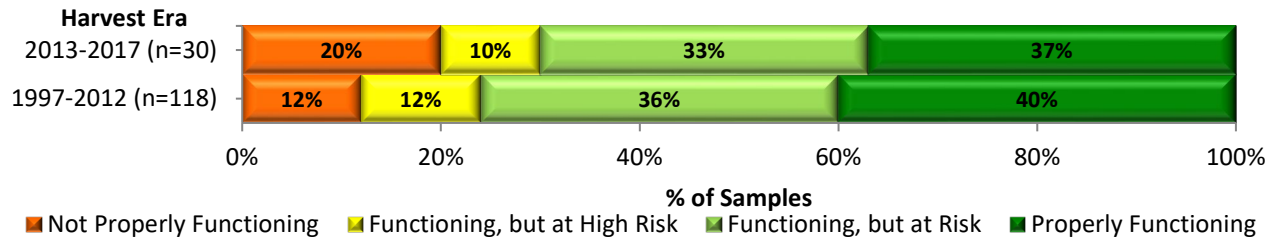


Figure 6. Riparian Resource impact rating by harvest era.

Data Source: The assessment data was collected by FLNRORD staff using the FREP riparian evaluation protocol. The sample population consists of randomly-selected cutblocks with streams in or adjacent to block boundaries. The guidance for site selection is to wait until 1-2 years after harvest to ensure effects such as sediment mobilization and windthrow have had a chance to manifest. Therefore, while this district summary represents data collected to 2019, the streams are associated with blocks harvested up to and including 2017. The total random sample size in this analysis was 148, with 30 sites represented in the more recent harvest era.

Summary

Streams sampled at 21 out of the 30 recently-harvested blocks (logged 2013-2017 inclusive) were in *properly functioning condition* or *functioning, but at risk*. Together, this was a lower percentage of sites in the top two categories compared to the older harvesting era. The percentage of streams with required reserve zones (S1-S3) was higher in the recently harvested sample size (37%) compared to the previous harvest era (13%), which suggests that results should be better, but effects from logging activity combined with other causes of impacts to streams and riparian areas have become more prevalent. Sample sites in the bottom two functioning condition categories included three S3 reaches (Table 1), which are defined as fish-bearing streams between 1.5-5m in channel width. S3 streams are required to have a 20 m reserve with a 20 m management zone for a total 40 m Riparian Management Area (RMA).

Table 1. Condition of recently-harvested sites by stream class.

Class	Properly Functioning	Functioning, but at risk	Functioning, but at high risk	Not Properly Functioning	Total
S1	1	1	-	-	2
S2	1	-	-	-	1
S3	2	3	1	2	8
S5	4	2	1	-	7
S6	3	4	1	4	12
Total	11	10	3	6	30

Causal Factors

Natural events were the most common causal factor linked to the negative responses to the indicator questions at the recently-harvested sites (Table 2). Negative responses are indicative of impacts to a stream and riparian area and the number of them out of a total 15 questions determines the functioning condition outcome for a sample reach.

Negative responses caused by logging and roads were also notable with close to 30% of the impacts related to each of these two factors.

Table 2. Causal factors of impacts to streams at recently-harvested sites.

Factor	% of recorded impacts
Natural events	36%
Logging	31%
Roads	28%
Upstream (unknown)	3%
Animal Disturbance (Beaver damming)	2%

The average number of negative responses associated with logging has been variable over the entire range of harvest years, but there was a steady decline from 2008 to 2014 (Pearson’s $r = -0.82$) followed by an increase after 2014 (Figure 7). The average number of negative responses caused by *all* factors since 2013 is 4.3, which equates to a borderline *high risk* condition. These impacts are likely related to the contribution of natural events and road issues in addition to logging noted in Table 2.

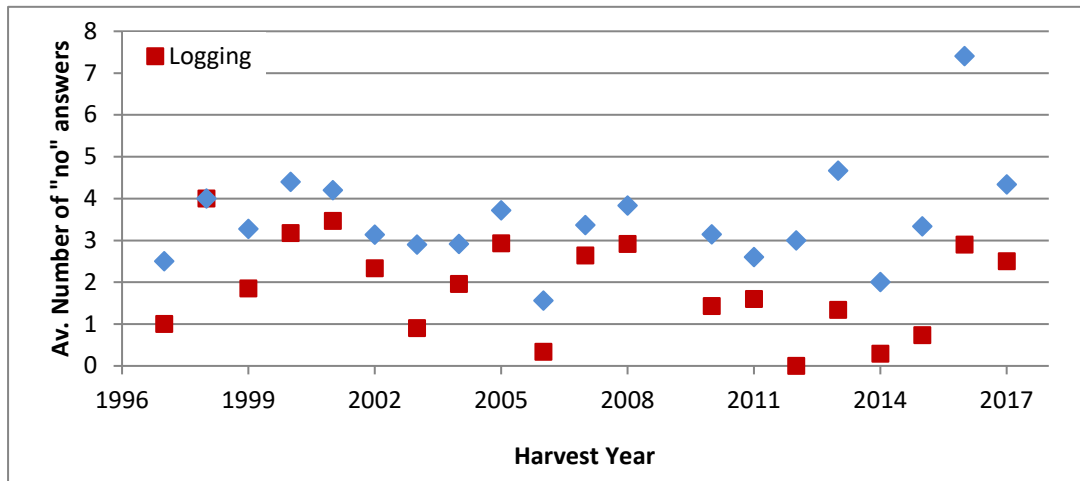


Figure 7. Average number of “no” answers attributed to logging as a proportion of all causal factors.

Specific factors that contributed to indicator impacts were identified at each site. The top specific natural factors at recently harvested sites were related to high natural background levels of fine sediment, wind, and mass wasting. Top logging related factors were associated with windthrow, low retention and falling and yarding. Impacts from old logging, machine disturbance and debris blockages were also noted, but less frequently. Erosion, crossing structure issues and encroachment on the RMA were the most common influencing factors associated with roads. The S3 streams that were in the bottom two functioning condition categories were described as being impacted by roads and mass wasting, but also low retention in the riparian management zone (RMZ), which led to windthrow effects in the riparian reserve zone (RRZ) (data not shown).

Table 3. Top specific factors observed to contribute to impacts at recently-harvested sites.

Causal factor	Specific factors (Percentage of sites where observed n=30)
Natural events	High natural background levels of fine sediment (29%)
	Wind (24%)
	Mass wasting (19%)
Logging	Windthrow (32%)
	Low retention (26%)
	Falling and yarding (21%)
Roads	Erosion from road, ditches, cut/fill slopes (42%)
	Crossing structure issues (25%)
	Encroachment on RMA (17%)

Suggested best practices:

- 1) Retain appropriate treed retention within the RMZ of streams with RRZs in moderate or high windthrow hazard areas to protect the timber reserve from windthrow;
- 2) Consider placing wildlife tree patches or other treed retention within the RMZ of all streams that do not have an RRZ, with greater retention around fish-bearing small streams or perennial non-fish reaches that make significant contributions to downstream fish habitats. This retention will regulate water temperatures, provide nutrients/invertebrates to downstream reaches, supply sediment-trapping LWD, and buffer the stream from increases in overland flow while filtering sediments and maintaining bank stability; and
- 3) Recognize the risk of erosion in areas that are naturally high in fine sediments. Plan, maintain, and deactivate roads to minimize the transport of sediments to stream channels.



2016 Riparian evaluation of Thomas creek resulted in a properly functioning rating due to intact RMZ

Stand-Level Biodiversity: Resource Development Impacts on Stand-Level Biodiversity

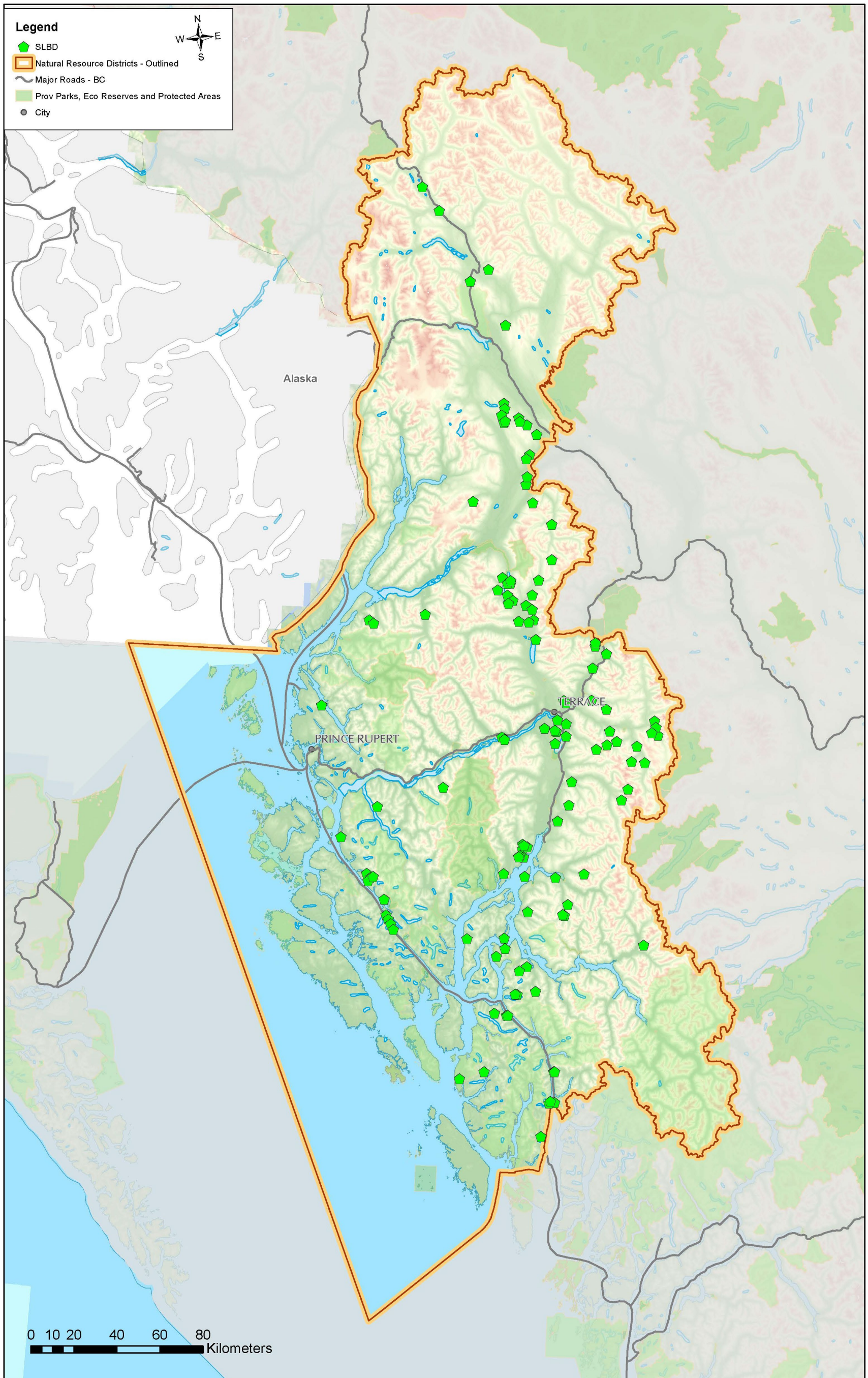


Figure 8: Coast Mountains Natural Resource District, showing Stand-Level Biodiversity Effectiveness Evaluation sample locations collected up to 2019.

Stand-Level Biodiversity: Resource Development Impacts on Stand-Level Biodiversity

Priority Question: Is stand-level retention providing the range of habitat with the structural attributes understood as necessary for maintaining the species dependent on wildlife trees and coarse woody debris (CWD)? The SLB assessment collects data on several biodiversity indicators to determine how well they are being maintained. The indicators include reserve size, windthrow, CWD and tree species/size/decay class, ecological anchors (ex. hibernacula, large stick & cavity nesting), invasive plants, and harvesting constraints (ex. wet site, sensitive terrain or soil).

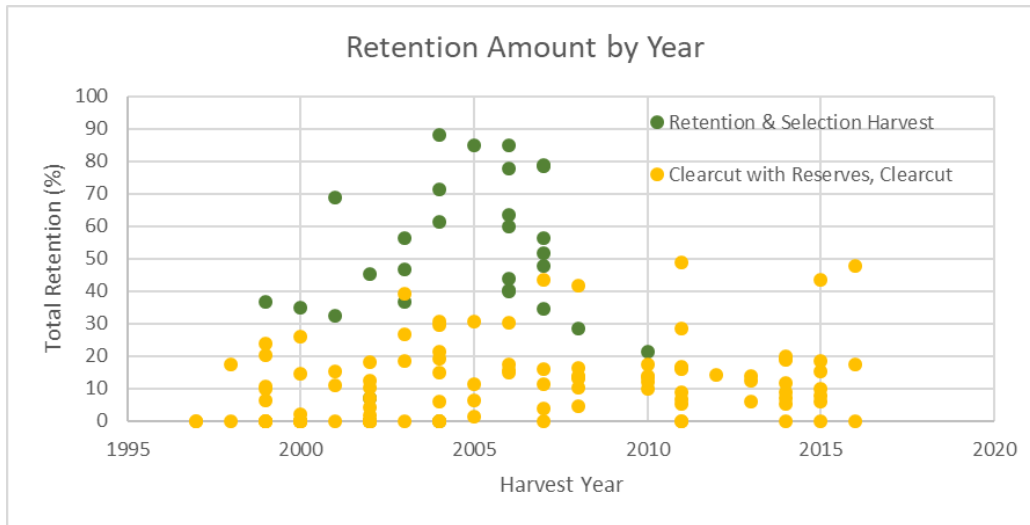


Figure 9. Individual cutblock retention totals for Retention and Selection Harvest stands (green dots) and Clearcut and Clearcut with Reserve Harvest (yellow dots) for all Stand-level Biodiversity samples by harvest year. Data shown includes 140 sampled cutblocks harvested in the Coast Mountains District between 1997 and 2016.

Data Source: The assessment data was collected by FLNRORD staff using the FREP Stand Level Biodiversity protocol. The sample population consists of randomly-selected cutblocks. The guidance for site selection is to wait until 1-2 years after harvest. Therefore, while this district summary represents data collected between 2007 and 2018, the sampled blocks were harvested between 1997 and 2016. The total random sample size in this analysis was 140, with 83 samples for cutblocks harvested from 1997-2006, 35 for 2007-2011 and 22 cutblocks harvested from 2012-2016, representing the more recent harvest era. All sampled blocks were reported as clearcut, clearcut w/reserves, retention, or selection silviculture system in RESULTS data.

Stand-Level Retention Summary

Average stand-level retention varied between harvest eras with average annual total retention at 19.6% for cutblocks harvested from 1997-2006, 22.8% for the years of 2007-2011 and 13.8% for 2012-2016 (Figure 10). Higher retention levels in the 1997-2006 and 2007 to 2011 periods are associated with a greater percentage of samples in Retention and Selection Harvests in CWH vh and vm ecosystems on the North Coast. Most cutblocks sampling occurred in the Coastal Western Hemlock (CWH) zone (117), the Interior Cedar Hemlock (19), and Mountain Hemlock (MH) zones (4). The CWH zone had higher average stand-level retention across all sampled years (21%) compared to the ICH zone (10%) and MH zone (12%) (Data not shown). Portions of sample populations lacking retention were as follows; 1997-2006 (35%); 2007-2011 (8%); 2012-2016 (13%). Wildlife tree retention areas (WTRAs) were recorded in approx. 64% of sampled cutblocks in 1997-2006, 89% for 2007-2011, and >86% for 2012-2016 (Data not shown- WTRAs recorded as Temporary Patches (PT) were not included). On average, most WTRAs (>60%) were associated with edge patches, with the remaining WTRAs as internal patches. The proportion of edge to internal patches has increased in each of the more recent harvest eras (Data not shown).

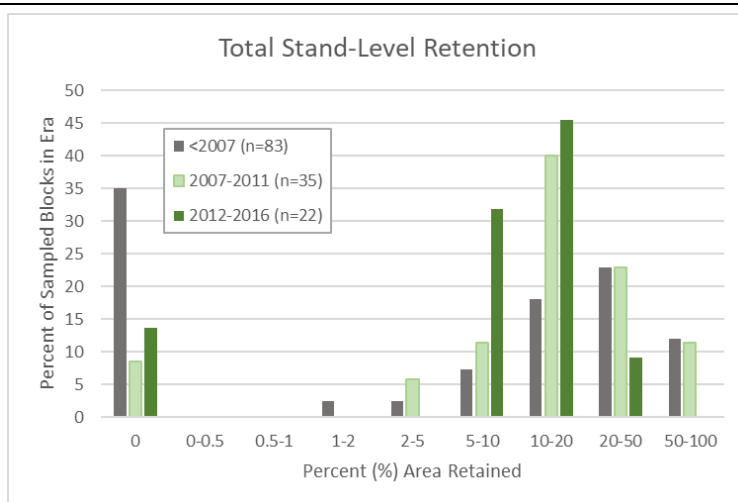


Figure 10. Distribution of total stand-level retention (Percent area retained) for three harvest eras from sampled cutblocks in the Coast Mountains Natural Resource District.

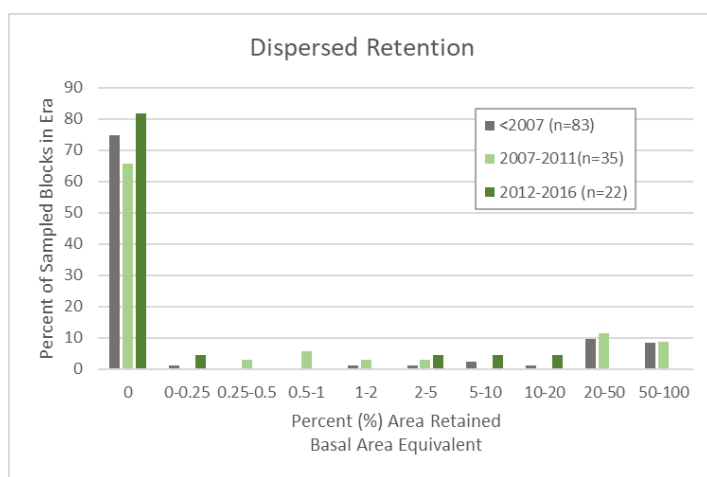


Figure 11. Distribution of Dispersed retention (Percent area retained- basal area equivalent) for three harvest eras from sampled cutblocks in the Coast Mountains Natural Resource District.

In all harvest eras, except the 2007-2011 period, 15 to 25% of sampling recorded dispersed retention in cutblocks (Figure 11). Volumes ranged from <math><1\text{ m}^2/\text{ha}</math> to over

Wildlife Trees

Overall, the diameter, height, and wildlife tree class distribution of retained wildlife trees was comparable between harvested dispersed retention areas and WTRAs (Data not shown). Across all major biogeoclimatic zones, stand-level retention in both dispersed tree retention areas and patch retention associated with WTRAs and riparian areas captured a broad diversity of tree species (Fig. 12). No discernible differences in tree species retention between dispersed and patch retention was identified, as shown in Figure 12 below.

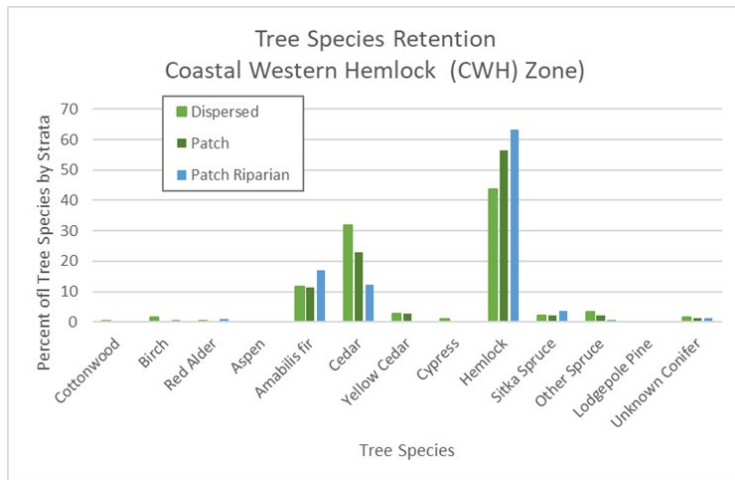


Figure 12. Tree Species representation by retention type from sampled cutblocks in the Coast Mountains Natural Resource District

Coarse Woody Debris

The distribution of coarse woody debris (CWD) larger than 7.5cm diameter varied between cut-blocks, and ranged from as low as 100 m³/ha to greater than 800 m³/ha (Figure 13). In general, the volume of CWD > 7.5cm diameter and >30cm diameter (not shown) in harvested stratum (Figure 13; Harvest) was greater compared to amounts measured in forested plots (patch retention; WTRAs) (Figure 13; Forest). CWD diameter was also comparable on transects in both Harvested and Forest strata (Data not shown). Harvested stratum had a higher proportion of Decay Class 1 due to slash from logging (elevated, firm bark, branches), and Decay Class 2 (non-elevated, loose bark), while more decayed logs (Class 3 and 4) were less abundant. CWD length was also generally shorter in harvested compared to forested stratum due to mechanical breakage and compaction from machinery during timber harvesting operations (Figure 14). In harvested areas, logs with more decay, especially Decay Class 4, were generally larger diameter (Data not shown).

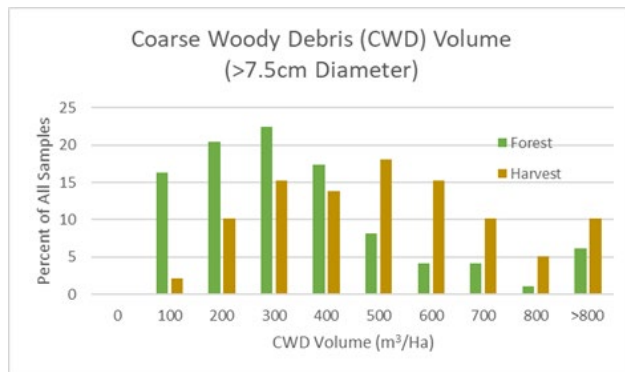


Figure 13. Comparison of coarse woody debris (CWD) volume in harvested and retention patches in all sampled cutblocks in the Coast Mountains Natural Resource District.

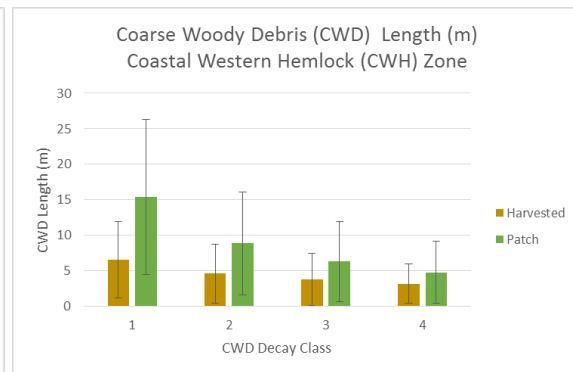


Figure 14. Comparison of average and variation in CWD length (error bars = 1 standard deviation) between harvest and forested patch retention strata from sampled cutblocks in CWH zone the Coast Mountains Natural Resource District.

Suggested best practices

- 1) Maintain or increase current stand-level retention levels, or increase stand-level retention in larger harvested openings or where new cutblocks are adjacent to previously logged or disturbed areas that may have limited retention;
- 2) Utilize dispersed retention and focus WTRAs on ecological anchors (riparian, rocky outcrops, etc.) to retain tree species diversity on the site. These practices will also help maintain a diverse range of plant communities

and microclimatic conditions that provide refugia for different plants and wildlife and assist in re-colonization of the regenerating stand;

3) Increase use of dispersed tree retention, retention of small aggregates or clumps of wildlife trees, and wildlife tree retention areas (WTRAs) internal to the block boundary where possible, to enhance structural complexity and assist landscape connectivity in the post-harvest regenerating stand. These practices are particularly important in larger harvested openings or where harvested openings are adjacent to previously logged or disturbed areas;

4) To help maintain CWD in harvested areas, avoid running machinery over downed wood, utilize debris piles and windrows; and

5) To allow improved tracking of dispersed retention, identify its use in site plans (including maps) as a management tool to improve biodiversity over prescribed areas. Where dispersed retention is incidental to plans, documenting it creates challenges which may affect resource monitoring data.

Coast Mountains District Evaluator Opinion Ratings

The Stand-Level Biodiversity protocol provides an opportunity for evaluators to record their opinion of how well practices observed in the cutblock maintained stand level biodiversity. Evaluators are asked to rate how well stand level biodiversity is maintained as “Poorly”, “Moderately”, “Well” and “Very Well”. Evaluators also provided comments to specify factors that contributed to their ratings.

In the Coast Mountains District, of the 140 samples collected, 18 were rated as “Very Well”, 67 as “Well”, 48 as “Moderately” and 6 as “poorly” relating to how well practices maintained stand-level biodiversity. Several factors contributed to evaluators assigning higher ratings (“Well” and “Very Well”) including; 1) high levels of stand-level retention, 2) placement of WTRAs to anchor retention to features such as riparian areas or to protect features such as culturally modified trees or ecological anchors, 3) low levels of observed windthrow and 4) good CWD retention practices such as good levels of CWD and retention of large logs (Figure 15).

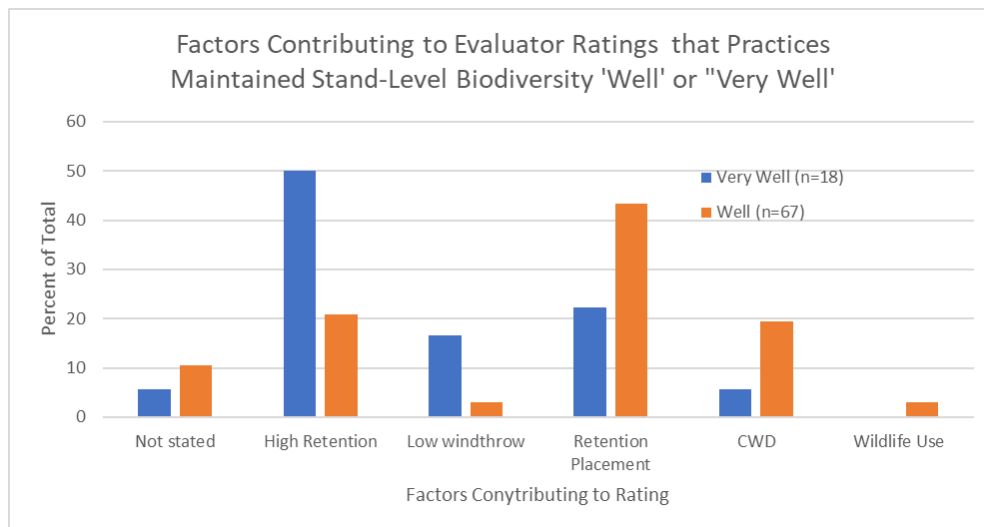


Figure 15. Factors contributing to evaluator ratings that practices maintained stand-level biodiversity either “Well” or “Very Well”.

Two key factors were identified by evaluators as playing a role in lower ratings (“Moderately” or “Poorly”) including; 1) retention practices such as low in-block retention levels, large distances between WTRAs and adjacent forest or that retention was not representative of pre-harvest conditions, and 2) high levels of observed windthrow (Figure 16). For example, in 7 blocks rated “Moderately”, average windthrow in WTRAs in each block exceeded 25% of the WTRA area.

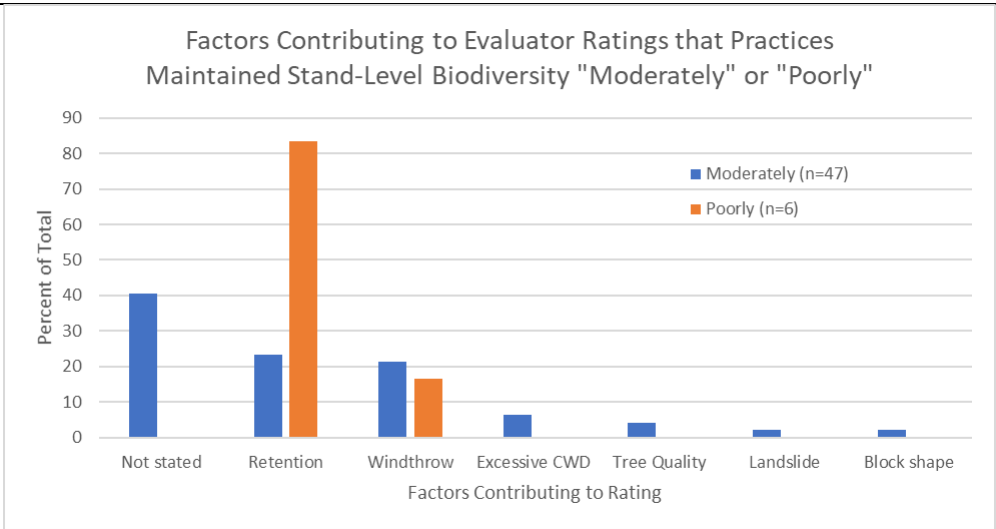


Figure 16. Factors contributing to evaluator ratings that practices maintained stand-level biodiversity either "Moderately" or "Poorly".



Stand Level Biodiversity evaluation of clearcut harvesting with reserves near Kiteen river. Dispersed retention is not usually compatible with cable harvesting systems.

Visual Quality: Are visual quality objectives (VQO's) being achieved on landforms?

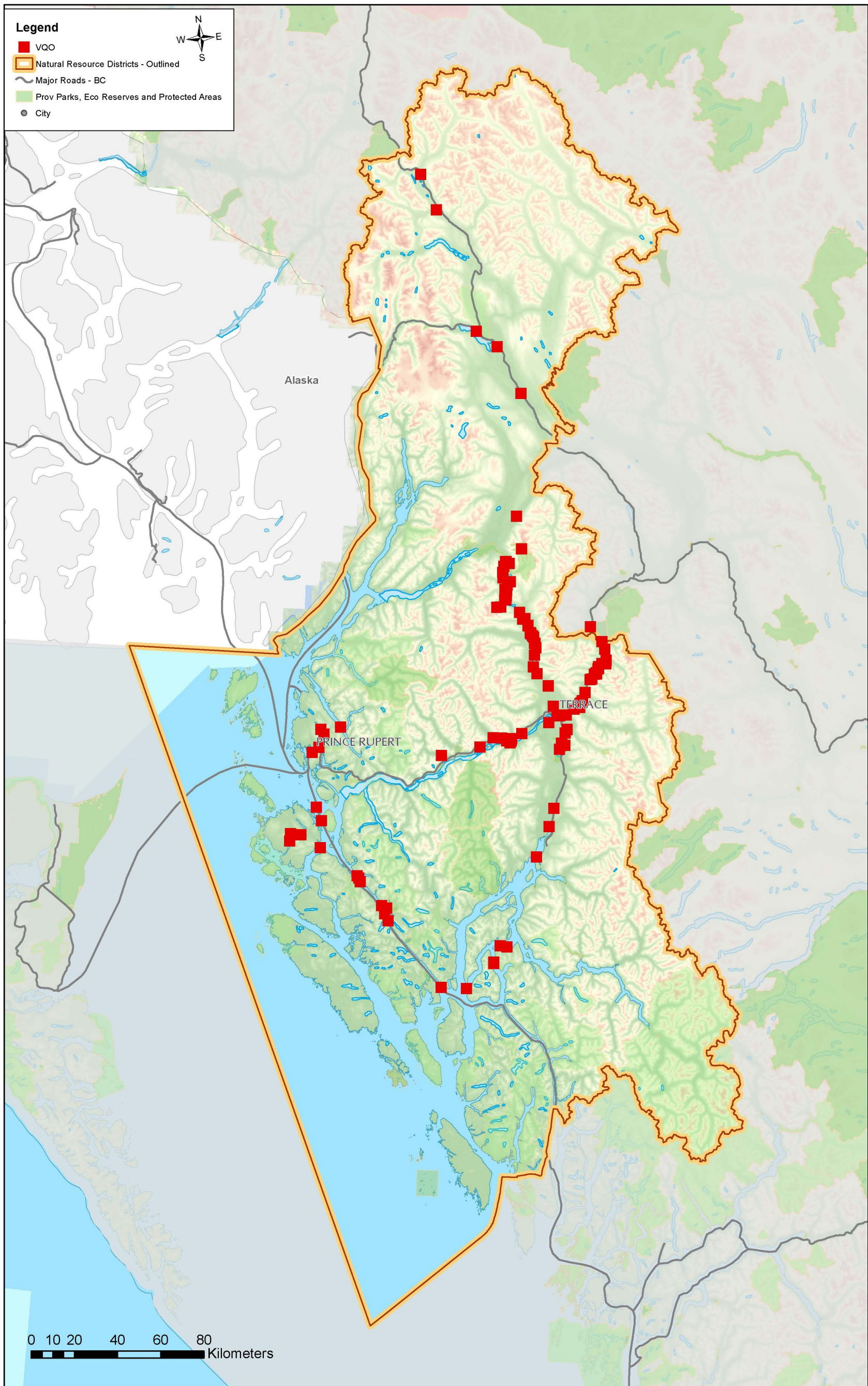


Figure 17. Coast Mountains Natural Resource District, showing Visual Quality Effectiveness Evaluation (VQEE) sample locations collected up to 2019.

Visual Quality: Are visual quality objectives (VQO's) being achieved on landforms?

Priority Question: Are established visual quality objectives (VQO's) being achieved? A VQO defines the extent of alteration that is deemed acceptable in a given viewscape. The VQO's are established to reflect the public's desired level of visual quality based on the physical characteristics and social concern for an area. There are five levels of management prescribed: Preservation, Retention, Partial Retention, Modification and Maximum Modification. Preservation allows very little visual impact while Maximum Modification allows for considerable visual impact.

Visual Quality Class	Alteration percent of landform in perspective view
P – Preservation	0
R – Retention	0 – 1.5
PR – Partial Retention	1.6 – 7.0
M – Modification	7.1 – 18.0
MM – Maximum Modification	18.1 – 30.0

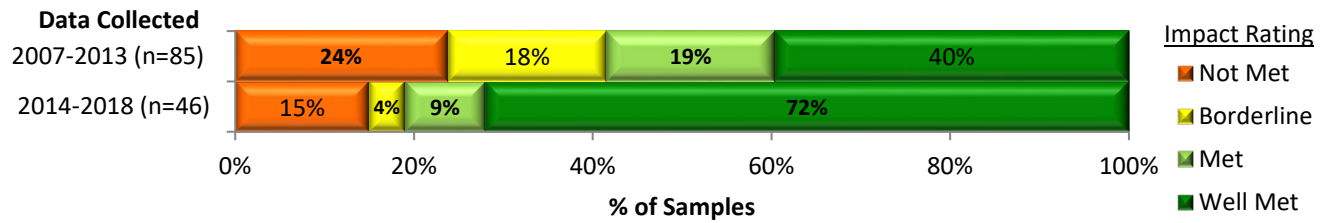


Figure 18: Visual quality impact ratings by data collection era.

Data Source: Effectiveness evaluations were conducted by trained personnel from 2006 to 2019 using the FREP visual quality monitoring (VQEE) protocol to evaluate whether legally established visual quality objectives (VQOs) in designated scenic areas are being achieved. The sample population consists of landforms (distinct three-dimensional topographic features defined in perspective view) that include randomly selected, recently harvested cutblocks. Below, sampling results obtained over the period 2014-2018 are compared with sampling results from 2006-2013.

The data presented in the bar chart above represents all data collected in the Coast Mountains Natural Resource District up to 2018, and represents the average condition across this District. However, starting in 2019, a modified sample design is now being used, whereby only blocks within the most sensitive visual quality classes (VSC 1-3) are sampled. Due to this new **stratified** sampling design, the 2019 data cannot be compiled with the older data, and must be analyzed separately. Additionally, due to the small sample size of data with the new stratified sampling approach, the 2019 data cannot be used to make statistical inferences at this time.

1. Summary – Recent Sampling Era (2019)

In 2019, sample design was stratified in order to select randomly from the most visually sensitive sample sites according to visual sensitivity class (VSC). All 2019 samples [n=7] were drawn from VSC class 1-3. No samples were selected from VSC classes 4-5 (less visually sensitive) in 2019.

Table 4. Percentage of recently evaluated landforms by visual quality objective (VQO) and effectiveness evaluation (EE) rating category (2019).

Visual Quality Objective	Effectiveness Evaluation Rating Category				
	Not Met	Borderline	Met	Well Met	Grand Total
Modification				2	2
Partial Retention				3	3
Retention	1			1	2
Total	1	0	0	6	7
Total EE Ratings (% total)	14%	0%	0%	86%	100%

Notably, 86% [n=6] were *well met*. The lone sample that was assessed as *not met* was on a landform with a Retention VQO.

The *initial percent alteration* metric is an assessment of the visual quality class (VQC) that has been achieved based **only** on the scale of the alteration(s) relative to the landform. Initial percent alteration exceeded the upper limit of the range for the established VQO for 14% [n=1] of the landforms recently assessed. This sample was in an area with a Retention VQO (highlighted in Table 5). This assessment indicates that the scale of the opening was too large relative to the landform for the Retention VQO to be achieved. In this case the percent alteration was 2.65%; the maximum allowable for Retention is 1.5%.

Table 5. Initial percent alteration assessment results.

VQO	VQC achieved based on initial % alteration only		
	PR	R	Total
Modification	2		2
Partial Retention	0	2	2
Retention	1	2	3
Grand Total	3	4	7

Table 6. Visual Design assessment results (2019).

EE Assessment	Sample quantity	Percent
Good Visual Design	1	14%
Neutral Visual Design	4	57%
No or Poor Visual Design	2	29%

Visual condition was negatively influenced by poor use of visual landscape design elements for 29% [n=2] of the landforms (Table 6). Three of the assessed landforms were rated Neutral (57%). Visual condition was positively influenced by good use of visual landscape design elements for 14% [n=2] of the landforms.

Summary – 2014-2018 Sampling Era

Table 7. Percentage of recently evaluated landforms by visual quality objective (VQO) and effectiveness evaluation (EE) rating category (2014-2018).

Visual Quality Objective	Effectiveness Evaluation Rating Category				
	Not Met	Borderline	Met	Well Met	Grand Total
Modification	1	2	3	17	23
Partial Retention	6		1	13	20
Retention				3	3
Total	7	2	4	33	46
Total EE Ratings (% total)	15%	4%	9%	72%	100%

Overall, 81% [n=37] of the evaluated landforms achieved (*met or well met*) the VQO (Table 7). 19% [n=9] of landforms did not achieve the objective (*borderline / not met / clearly not met*).

Initial percent alteration exceeded the upper limit of the range for the established VQO for 13% (n=6) of the landforms assessed in the 2014-2018 sampling era. These six samples are highlighted in Table 8.

Table 8. Initial (field portion only) percent alteration assessment results (2014-2018).

VQO	Initial VQC assessment results (based on initial % alteration only)					Total
	M	MM	P	PR	R	
Modification	7	3	4	7	2	23
Partial Retention	3		3	8	6	20
Retention			3			3
Grand Total	10	3	10	15	8	46

Visual condition was negatively influenced by poor use of visual landscape design elements for 28% of the landforms (Table 9). Visual condition was positively influenced by good use of visual landscape design elements for 37% of the landforms. A considerable number of assessed landforms were rated Neutral (35%).

Table 9. Design assessment results (2014-2018).

EE Assessment	Percentage	Sample quantity
Good Visual Design	37%	17
Neutral Visual Design	35%	16
No or Poor Visual Design	28%	13

2. Summary – All sampling prior to 2014

Table 10. Percentage of recently evaluated landforms by visual quality objective (VQO) and effectiveness evaluation (EE) rating category (2007-2013).

Visual Quality Objective	Effectiveness Evaluation Rating Category				
	Not Met	Borderline	Met	Well Met	Grand Total
Modification	3	6	6	18	33
Partial Retention	15	5	7	13	40
Retention	2	2	3	3	10
Preservation		2			2
Total	20	15	16	34	85
Total EE Ratings (% total)	24%	18%	19%	40%	100%

Overall, 59% [n=50] of the evaluated landforms achieved (*met or well met*) the VQO (Table 10). 42% [n=35] of landforms did not achieve the objective (*borderline / not met /clearly not met*).

Table 11. Initial (field portion only) percent alteration assessment results (2007-2013).

VQO	Initial VQC assessment results (based on initial % alteration only)					Total
	M	MM	P	PR	R	
M	15	4	2	12		33
PR	17	1	2	14	6	40
R			2	4	4	10
P				2		2
Grand Total	32	5	6	32	10	85

Initial percent alteration exceeded the upper limit of the range for the established VQO for 28% (n=24) of the landforms assessed in the 2007-2013 sampling era. These 24 samples are highlighted orange in Table 11 above.

Table 12. Design assessment results (2007-2013).

EE Assessment	Percentage	Sample quantity
Good Visual Design	45%	38
Neutral Visual Design	20%	17
No or Poor Visual Design	35%	30

Visual condition was negatively influenced by poor use of visual landscape design elements for 35% of the landforms (Table 12). Visual condition was positively influenced by good use of visual landscape design elements for 45% of the landforms. A number of assessed landforms were rated Neutral (20%).

3. Comparison of Sampling Periods

The small quantity of samples in 2019 makes it difficult to identify meaningful trends. However, the 86% VQO achievement rate in 2019 indicates a slight improvement over the 82% in the 2014-2018 sampling era.

VQO achievement in 2014-2018 was considerably improved when compared to the 59% achievement rate in the 2007-2013 sampling era.

Initial percent alteration was generally within the allowable range for the VQO recently (87% of samples were within the range in 2014-2018), a significant improvement over the earlier sampling period (only 72% of samples were within the range). Good use of Visual Landscape Design techniques decreased somewhat in the more recent sampling eras when compared to the 2007-2013 era.

The positive trend in VQO achievement over time appears to be due to a notable trend in reduction of the scale of alterations relative to the landform. The percentage of “well met” samples more than doubled, from 34% to 72%, from the 2007-2013 era to the 2014-2018 era, further indicating that the scale of openings was often well within the allowable range for the VQO.

4. Suggested Best Practices to Manage for Visual Quality

- Require those working on VIAs are sufficiently trained and qualified to employ visual design concepts and principles in the planning and design of cut block layout in scenic areas. Ensure standard of quality by conducting peer reviews of assessments;
- Use qualified registered professionals for completing Visual Impact Assessments (VIA) and ensure the VQO analysis data inputs used for modelling reflect actual site conditions (tree heights, crowns).
- Monitor visual impacts during harvest to compare actual results to projected results and adjust practices as required. As a guide, ensure total landform percent alteration is within range recommended for the VQO;
- Use appropriate block size, natural shapes, lower/lateral location on landform, and strategic retention within blocks to limit visual impacts;
- Avoid angular corners, rectilinear edges, or creating skyline gaps; and
- Ensure highest rated viewpoints (communities, public use areas, etc.) are considered when performing visual impact assessments.



Verney Pass, 2018. EVQO: Partial Retention. Assessment: Well Met.

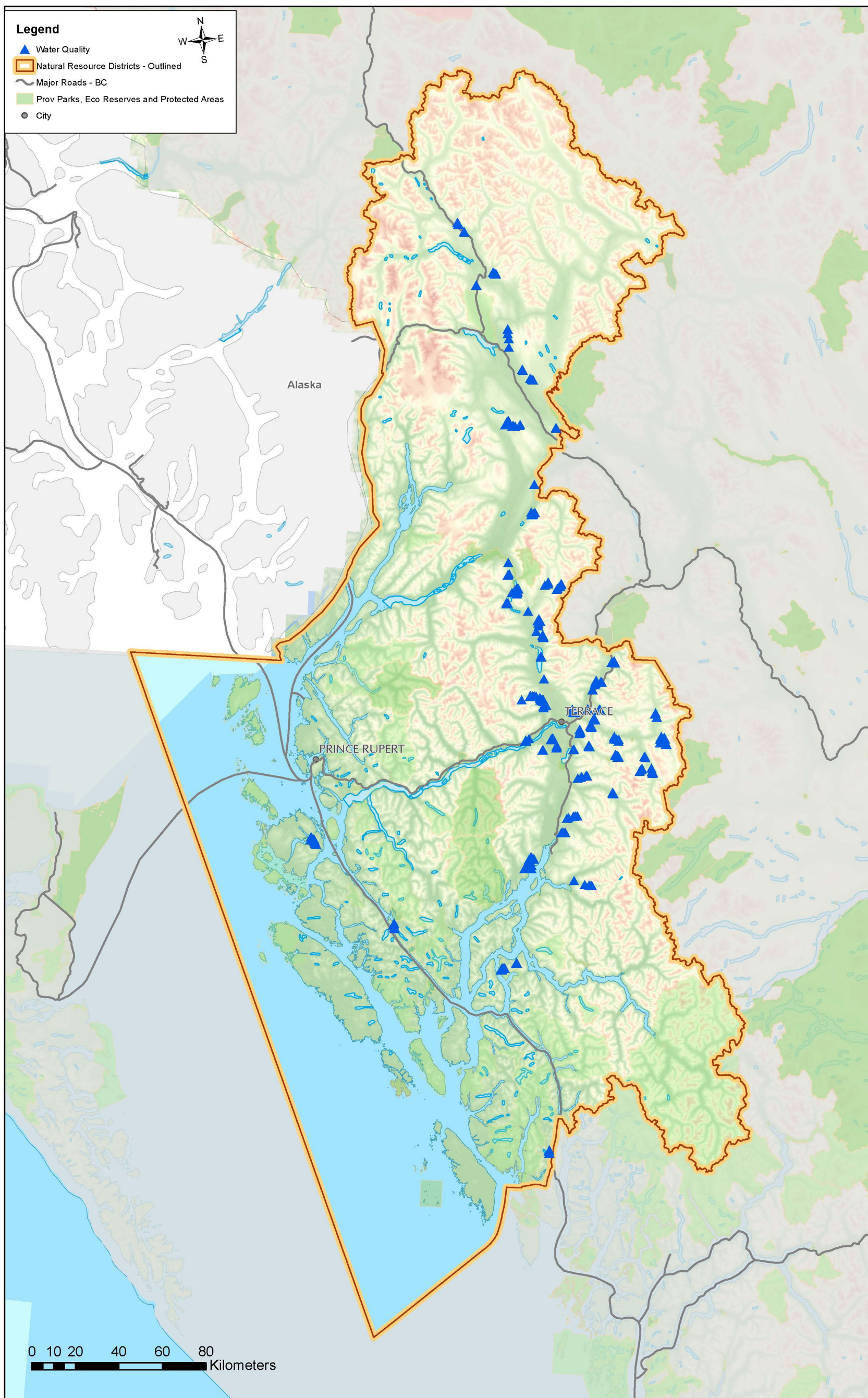


Figure 19. Coast Mountains Natural Resource District, showing Water Quality Effectiveness Evaluation (WQEE) sample locations collected up to 2019.

Water Quality (potential to generate fine sediment): Resource Development Impacts on Water Quality

Priority Question: Are the *Forest and Range Practices Act* policies effective in protecting water quality?

The WQ evaluation was developed to assess the amount of fine sediment generated from forest and range related site disturbances and the effect on water quality. At each site, attributes such as connectivity, exposed soil, and the amount of erodible material present, are used to assess potential water quality degradation. A total fine sediment volume calculation is made to determine if the site fits into a “Very Low”, “Low”, “Moderate”, “High”, or “Very High” impact class. The classes rate the severity of water quality impact that a site may have on a watershed.

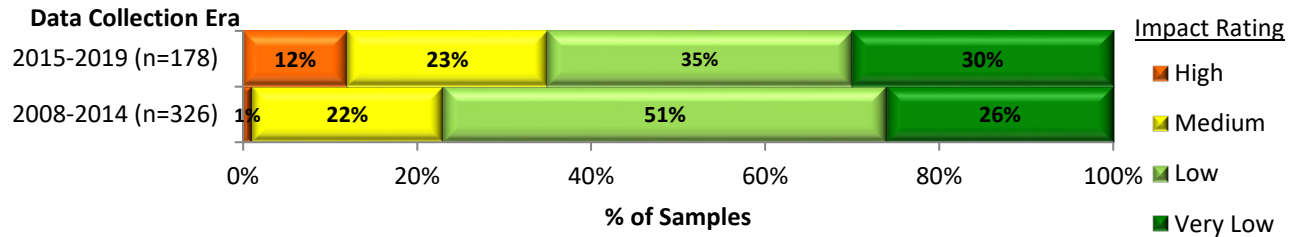


Figure 20. Coast Mountains District Sites (n=504) with given water quality ratings in 2008-2014 and 2015-2019 (WQEE, 2018)

Data source

The 504 sites evaluated for water quality assessments in the Coast Mountains District (DKM) were collected by FLNRO staff using the Forest and Range Evaluation Program water quality monitoring protocol. All data was collected between 2008 and 2019. The sampling transects for water quality evaluations originate at randomly selected, recently harvested openings and follow the route that logging trucks would travel to bring wood from the cutblock to the mill, log dump or dry sort. Stream crossings and areas where roads parallel streams are targeted for sampling. Volumes of fine sediment delivered to streams are estimated for each site which is then assigned a water quality impact rating ranging from ‘Very Low’ to ‘High’.

The samples provide a cross section of the types and magnitudes of disturbances to water quality one might expect from disturbances associated with an industrial gravel road and the effects of storm events. Individual licensees were not targeted and the sites along any given transect may or may not be managed by the company that actually harvested the block. Licensees typically have no authority over non forestry uses of road and much of the traffic may be generated by recreation users, oil and gas and mining exploration. Consequently, care must be used in assigning responsibilities to specific water quality impacts.

Results

Out of the 504 sites evaluated in CMNRD, 326 were evaluated in 2008-2014, and 178 were evaluated in 2015-2019. In 2008-2014, 26% of sites were rated ‘Very Low’, 51% were rated ‘Low’, 22% were rated ‘Medium’ and 1% were rated ‘High’. In 2015-2019 30 % of sites were rated ‘Very Low’, 35% were rated ‘Low’, 23% were rated ‘Medium’, and 12% were rated ‘High’ (Figure 20).

The nature of water quality sampling, and the dispersal of samples within the district, prevent the statistical analysis of trends over time. However, there is value in consistency with the rest of the presented data being grouped by date in this way. See Figure 20.

Summary of recommendations to reduce water quality impact for evaluated sites

Opportunities for improvement of sediment management are related to all stages of a road's life: its location, design, construction, maintenance and/or road deactivation. Upon reviewing the provincial data base for all road sediment related issues, the management recommendations on BC's forest roads are listed in Table 13.

Table 13. Nature of management issues impacting water quality from provincial data base (WQEE, 2018)

Issue of road concern leading to Water Quality Impact	Portion of cases associated with given issue	Most common example within each class of management recommendations
Location	10%	Avoid stream crossings
Design	11%	Avoid deeply dug ditches and plan for sufficient number of appropriately sized culverts
Construction	23%	Grass seeding, rock/debris armouring
Maintenance	22%	Remove grader berms
Deactivation	17%	Install strategically placed cross ditches

The single most commonly noted recommendation from Coast Mountains Natural Resource District was given at 96 sites on non-operational roads where the absence or failure of cross ditches was impacting water quality. Installation of more and better designed cross ditches to manage water from road surfaces could improve this shortcoming. The second-most mentioned recommendation noted at 46 sites was associated with newly constructed roads and the absence of protective cover on bare soils. Reducing area of disturbance and/or grass seeding, armouring with rock, or spreading of logging debris on such ground could have substantially reduced the sediment load from sampled sites. The third-most mentioned recommendation given at 31 sites was associated with removing grader berms and the channeling of road water towards rather than away from stream channels. Training grader operators to become sensitive to water impacts of their operations could markedly improve this shortcoming.

Further information

For those interested in obtaining more information about the methodology used to evaluate sites, please visit the FREP Water Quality Website at <https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program/frep-monitoring-protocols/water-quality>

All data collected has been placed on an internet server and can be made available to interested users.

DISTRICT MANAGER COMMENTARY²

FREP monitoring in CMNRD has been evaluating the results of forest operations under the FRPA model of professional reliance since 2006. Effectiveness evaluations form the foundation of the model construct and provide results based feedback to forest licensees to inform how the objectives set by government are being met. Licensees are to be commended for improvements to harvesting and road building practices that have been made and are encouraged to implement sustainable practices and careful management of the resource values listed under FRPA. Partnerships with Indigenous groups in resource monitoring on their territories is an important success towards their future role as land managers.

Water Quality

Salmon stocks have experienced a dramatic decline in the last decade which has elevated concerns from all sectors. Protection of habitat is the most effective tool available to land managers to influence their recovery. FREP Water Quality evaluations provide an opportunity to measure primary user performance in how they manage sediment from roads which can impact fish bearing watersheds.

The WQ data from 2014-18 shows an 8% increase in high impact sites and a 4% increase in moderate impact sites when compared with the 2008-13 data. The trend is a concern and warrants follow-up with licensees. 2014-18 data analysis identified 21 samples in the High and Very High categories. The storm event in early September 2017, delivered ~140 mm of precipitation and directly influenced 5 out of 21 of these sites. However, of the majority of High and Very High impact sites in this period, 9 out of 21 were sampled in the year prior (2016) and are not attributed to that storm event.

The samples include multiple licensees and locations and are representative of conditions in the TSAs. The data indicates the higher impacts are resulting from problems in maintenance practices and road design. These sites were a result of connectivity between road surface runoff and exposed cut/fill slopes to watercourses. Crowning roads to direct water off road surfaces, strategic placement of water bars directing water away from streams and removing grader berms that channel water towards crossings would reduce sediment contribution in most cases. Licensees are encouraged to continue diligent annual inspections and maintenance of the road systems they manage. Ensuring the capacity of crossing structures to handle flood events will also reduce the incidence of washouts and mass wasting. Plugged culverts were identified as the root cause of failed crossing structures resulting from the 2017 storm. Licensees are encouraged to monitor the integrity of road systems and crossing structures soon after (and potentially during) storm events to prevent damage where possible. Training in road surface water management for construction and maintenance operators is a low cost and effective tool for improving practices.

Riparian

Riparian ecosystems are critically important in providing habitat and food for aquatic organisms and the wildlife that depends on them. They are also key in stabilizing soils and maintaining forest biodiversity. FREP

² Commentary supplied by Barry Dobbin, District Manager, Coast Mountains Resource District

effectiveness evaluations of licensee performance in managing and protecting riparian ecosystems provides an indicator of their overall health following timber harvest.

As observed in the data, S3 and S6 streams bore the highest impacts which were caused most often by natural events, roads and logging. Debris flows and channel sedimentation from storm events often contributed in combination with road crossings and slash deposition from harvesting operations to impact channel integrity. Not properly functioning and high risk categories have increased by 8% in the last 5 years of data collection. While some of these impacts can be attributed to natural events, more than half were a result of harvesting and road practices. Licensees are encouraged to improve water management at stream crossings to prevent road sediment from reaching streams and protect the integrity of S6 streams by minimizing the deposition of slash materials into stream channels during harvesting operations. Where a high risk of windthrow exists, narrow retention strips to protect S6 features may not be enough to protect banks from damage by upturned root wads. Licensees should consider increasing buffer size to ensure streambank stability or remove dominant/co-dominant trees in the RMZ to lower the risk of bank disturbance. Inconsistencies in stream classification in site plans were also noted which may result in inappropriate application of riparian management strategies in reserves and buffer zones.



Example of properly functioning S3 stream where RMZ was preserved in proximity to clearcut harvesting

Visual Quality

In CMNRD, the importance of Visual Quality has been emphasized by Indigenous groups, the Kalum Land and Resource Management Plan (LRMP) Plan Implementation Committee, the tourism sector, local governments and the general public.

Resource stewardship monitoring data of visual resource management by licensees showed an improvement of 31% in the *Met & Well Met* categories between the 2007-13 and 2014-2018 reporting periods. This positive result is a credit to forest licensees who are increasing their efforts to meet VQOs by utilizing effective buffers and screening when developing harvest areas. Effectiveness evaluations of samples that did not meet visual quality objectives fell to 15% from 24% in the previous reporting period. The trend is encouraging as good visual design elements are more frequently implemented by licensees. Some constructive observations made during effectiveness evaluations found that licensees omitted important viewpoints (I.e., residences, boating areas and parks) during Visual Impact Assessments. As well, screening buffers were sometimes compromised by windthrow. In addition, monitoring visual quality during harvesting operations may prevent exceeding VQOs.



Example of clearcut harvesting in Modification polygon near Gitaus/Kleanza/Gossen subdivisions

Stand-Level Biodiversity

Trends in the SLBD dataset indicate licensees are maintaining average retention levels above the 7% minimum threshold in harvest areas as required in the *Forest Practices and Planning Regulation*. Of concern are the 13% of samples lacking retention in the most recent harvest era (2012-16) as the regulation requires a minimum of 3.5% retention for individual cutblocks. According to the dataset, licensees are performing well at ensuring retention areas contain tree species and comparable levels of coarse woody debris representative of the stands harvested. The data also indicates an increasing trend of site plans containing edge reserves rather than internal reserves. While at higher risk of windthrow, internal reserves promote wildlife use of

harvested areas by minimizing dash distances to cover and can be particularly effective when anchored to ecological features. Licensees are also encouraged to increase the use of dispersed retention in harvesting practices as a 17% decline is noted in the 2012-2016 sampling era. The practice is especially beneficial to avian species that utilize the remnant vertical structures for resting, refuge, nesting and hunting. While licensees may already be improving this harvesting practice, site plans and harvest plan maps often fail to document dispersed retention which can be easily missed by evaluators during monitoring. Describing it in site plans and labelling it on maps would enable stratification prior to sampling and properly capture it in the dataset.



Over mature Hemlock retained in WTP. Potential wildlife tree (ecological anchor) for cavity nesting, hibernaculum and feeding.

Cultural Heritage Resources

Managing Cultural Heritage Resources is of primary importance to numerous First Nations (listed on page 8) whose territories encompass the Coast Mountains Natural Resource district. Connecting with them to jointly monitor impacts incurred from forest harvesting has highlighted the need to preserve and protect this resource.

The current dataset indicates medium and high impact ratings for Cultural Heritage Resources have increased by 9% in the 2014-18 harvest era. This is a concern and can be attributed to missed opportunities to preserve CHR features (mostly CMTs) where they previously existed in harvest units. While site alteration permits

generally allow broad discretion in managing features, the assigned ratings consider the licensee's efforts to minimize impacts and how well they maximized opportunities to preserve CHR features. Licensees are encouraged to continue diligent tracking and preserving CMTs where operationally feasible, especially along harvesting boundaries in cases of non-interference with harvest operations. Where they occur in groups, licensees should consider establishing windfirm reserves to ensure their protection. Dispersed retention can also be utilized although it has the highest rate of windthrow which can result in damage to features and affect performance ratings.

Conclusion

The trends shown in the last 5 years of FREP data indicate improved licensee performance in managing Visual Quality (22%). Declining performance is noted for Cultural Heritage Resources (9%), Riparian (6%), Stand Level Biodiversity (9%) and Water Quality (9%). Licensees are encouraged to continue practices that meet FRPA objectives and to implement the best management practices recommended in this report to improve outcomes where objectives are not being met.

Individual reports and sharing of FREP monitoring data is available through the Coast Mountains district and Resource Planning and Assessment branch for licensees to evaluate their specific results. Licensee participation in FREP training courses is also highly encouraged and will equip forest practitioners to achieve lower impact ratings when carrying out forest management activities.

Indigenous group participation in resource monitoring has expanded beyond the Cultural Heritage Value and now includes all resource values being monitored by the district. By conducting monitoring cooperatively through formal agreements with First Nations, the program is building relationships and broadening the resource management perspectives of both the provincial government staff and the indigenous groups engaged.



Metlakatla and Ministry staff enjoying Exstew waterfalls after successful day of FREP CHR evaluation

APPENDIX 1. SUMMARY DESCRIPTION OF RESOURCE DEVELOPMENT IMPACT RATING CRITERIA

Table A1.1 shows the criteria used to determine the resource development impact ratings for each resource value. Detailed rating criteria, methodology, and definition of terms used are described in the companion document *FREP Technical Note #6: Methodologies for Converting FREP Monitoring Results to Multiple Resource Value Assessment (MRVA) Resource Development Impact Ratings* (https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/frep/frep-docs/frep_technical_note_06.pdf). The ratings of “very low,” “low,” “medium,” and “high” are “technical ratings” based on best available science.

Table A1. 1: Criteria for determining resource development impact rating outcomes for each resource value.

Resource Value	Evaluation Question	Indicators	Resource Development Impact Rating Criteria	Very low	Low	Medium	High
Riparian	Are riparian forestry and range practices effective in maintaining the proper functioning of riparian areas?	Fifteen key questions (e.g., intact channel banks, fine sediments, riparian vegetation)	Number of “no” answers on assessment questions of channel and riparian conditions	0–2	3–4	5–6	> 6
Water Quality (sediment)	Are forest practices effective in protecting water quality?	Fine sediment potential	Fine sediment (m ³) due to expected surface erosion or past mass wasting	< 0.1	< 1	1–5	> 5
Visual Quality	How are we managing views in scenic areas and achieving visual quality objectives?	Visual evaluation of block, design of block, percent of landform altered, impact of roads, tree retention and view point importance	Basic visual quality class (determined using the VQC definitions) is compared with the Adjusted VQC (derived using percent alteration measurements and adjustment factors) to determine if VQO is achieved.	VQO achieved, and % alteration low or mid-range	VQO achieved, but % alteration for one or both close to alteration limit	Only one method indicates VQO achieved	Both methods indicate VQO not achieved
Stand-level Biodiversity	Is stand-level retention providing the range of habitat and attributes understood as necessary for maintaining species dependent on wildlife trees and coarse woody debris?	Quantity and type of retention (percent of within-block retention, average patch size, presence of within-patch ecological anchors, and presence of dispersed retention)	**Under development				
Cultural Heritage Resources	Are cultural heritage resources being conserved and where necessary protected for First Nations cultural and traditional activities?	Evidence and extent of damage to features, operational limitations, management strategies, and type and extent of features	Combined overall cutblock assessment results with consideration of individual feature assessment results	Block rated very well & no features rated poor/very poor. Practices put in place are additional to the recommendations and/or CHR very well preserved for long term (rotation) traditional use, or conservation of the site.	Block rated well & ≥1 feature rated poor/very poor. The impact to CHR is minor as it is in abundance. Where harvest is deferred or temporary protection provided. OR A Site Alteration Permit with FN’s consent allowed for CHR impact.	Block rated moderate & ≥1 feature rated poor/very poor. Recommendations followed but were ineffective or operational constraints limited options for CHR protection or recommendations not practicable, or were only partially implemented or practices were insensitive (spray paint used on CMT’s).	Block rated poor/very poor CHR partially intact. Or damage is reversible. Or serious impact to CHR where no longer intact for traditional use. Or irreversibly damaged or removed or destroyed to the extent that it cannot be found on site.

In addition to MRVA reports, the FREP Dashboard spatially displays the results of monitoring carried out for Riparian, Water Quality, Stand Level Biodiversity and Visual Quality across the province and is publicly available here [FREP Dashboard](#).

APPENDIX 2. DISTRICT MANAGER LETTER OF EXPECTATIONS REGARDING FSPS



File: 18045-01

June 30, 2016

To: Forest Licensees and BC Timber Sales operating in the
Coast Mountains Natural Resource District

**Re: Coast Mountains Natural Resource District Manager Letter of Expectations
Regarding Forest Stewardship Plans (FSP)**

Dear Forest Licensees:

At the direction of the Minister's March 2016 letter and Chief Forester (CF) March 2016 Forest Stewardship (FSP) Guidance to Delegated Decision Makers (DDM), and in response to the Skeena Region FSP Workshop May 2016, the following expectations are intended to provide transparency regarding what I believe is necessary to consider when preparing and adjudicating a replacement FSP in the Coast Mountains Natural Resource District (CMNRD).

In the decade since FSPs were first approved within CMNRD, the pressures on the land base have changed as a result of global markets, increased natural resource development activities, heightened pressure for fibre utilization, new land use orders, and increased progress in First Nation reconciliation with the Crown. As a result, I expect that licensees will develop replacement FSPs to ensure that their FSP content considers the current condition of the landscape.

In preparing FSPs on a licensee's behalf, I expect that the forest professionals apply the experience they have gained since the initial FSPs were drafted, feedback provided to licensees over the term of their FSP, and that the collaborative knowledge of forest professionals and licensees is incorporated into results or strategies to ensure that government objectives continue to be achieved. Additionally, I expect that forest professionals collaborate with each other and subject matter experts who have intimate knowledge of best management practices, monitoring results and emerging initiatives within their forest development units. I encourage deliberate, early dialogue with the DDM, district review team, and overlapping FSP holders operating within a similar boundary prior to development of plan content.

As the DDM, it is my responsibility to consider the representations from those who may be affected by decisions and address the adequacy of First Nations consultation and stakeholder/public engagement. I expect that FSP holders are engaging First Nations early in the development of their FSP to ensure First Nations are informed of the operational aspects that may impact their Aboriginal interests. Additionally, I expect that FSP holders will develop results or strategies to work with affected parties throughout the duration of the proposed FSP. First Nations, stakeholders and the public should be able to identify areas

where the FSP relates to their area(s) of interest through appropriate scale, descriptions, and/or use of common place names. With respect to Treaty Nations, I expect plan preparers to appropriately reflect the established treaty title and rights and explain any impact thereto.

I rely upon forest professionals to provide supporting information to demonstrate that “results” or “strategies” are consistent with all legal requirements. For each result or strategy, I expect that:

- each “result” in an FSP is comprised of *measurable* or *verifiable outcomes in relation to the prescribed extent* to objectives set by government and other objectives established under FRPA;
- each “strategy” in an FSP is comprised of *measurable* or *verifiable* steps or practices that will be carried out in respect to objectives set by government and other objectives established under FRPA;
- clear descriptions of the *situations and circumstances that determine where in a forest development unit (FDU) the “result” or “strategy” will be applied; and,*
- default practices listed in the Forest Planning and Practices Regulation (FPPR), where used, must be either followed, or alternative results or strategies that better meet local conditions are proposed. Self-exemption scenarios or situations where default practices or results/strategies will not be followed are not acceptable.

In addition to current legislative requirements, I consider the following factors to be significant and worthy of consideration in the development of results and strategies for replacement FSPs.

- The interests of the public and other affected stakeholders. The Northwest is subject to increasing industrial development activities and proposals on the land base. I expect licensees to consider opportunities to make timely information readily available to the public and all stakeholders on site level development plans, as supplemental information to FSP’s (e.g. current operating plans publically available on the district website).
- First Nations Aboriginal interests and Government’s objective of reconciliation. In addition to Nisga’a, there are First Nations actively involved in treaty and /or strategic engagement agreement negotiations, including two that have reached an Agreement in Principle for Treaty. I expect that licensees and ministry staff will continue to be proactive in following all government to government engagement agreements and consultation protocols for meaningful consultation to occur.
- New monitoring information provided through Forest and Range Evaluation Program (FREP) and Multiple Resource Value Assessments (MRVA) applicable to the values listed under FRPA. I expect the FSP supporting documentation to outline how these findings were considered when developing results and strategies for replacement FSPs.
- The effect of climate change on forest ecosystems. I expect licensees will consider how stocking standards could incorporate anticipated ecosystem changes and species migration.
- Cumulative Effects. In response to the Auditor General’s review of cumulative effects management in this region, the Skeena Region is developing a cumulative effects

framework. As the DDM, I will consider the cumulative effect of operations going forward and factor this consideration into my decisions.

- The ability of overlapping tenure holders to exercise their rights and meet obligations. Currently, an Operating Area Agreement assists signatory licensees to share 5-year operating plans and there has been good work by licensees to jointly develop some FSP results and strategies. While I encourage licensees to continue to do this, in the interest of efficiency, I urge licensees to seriously explore developing one multi-signatory FSP per management unit(s).
- Land use plans have been developed for most of the district and I expect that the legal and non-legal elements of these plans to be reflected in FSPs, as appropriate.
- Factors in timber supply reviews that influence Allowable Annual Cut. I expect licensees will consider these factors, such as decadent stands with high percentage of pulpwood without market, as well as the district's second growth and cedar management strategies in designing FSP results and strategies.
- Species at Risk requirements in federal recovery strategies and provincial implementation plans. I expect that licensees will design results and strategies for legally established objectives for species at risk, and where objectives are not yet established to consider best management practices where available in managing for these species.
- Research papers on species and ecosystems relative to the CMNRD. I expect plan preparers to continue to stay current with research documents relevant to their areas of operation and incorporate research findings as appropriate into results and strategies related to objectives set by government.

Furthermore, I am receptive to considering new and innovative results and strategies that achieve higher level objectives as long as it is based on science and a professional rationale is provided. I expect forest professionals to consider the above noted and other factors that may impact resource management, including, but not limited to, the sources of information listed in this letter.

In closing, I look forward to the continued success of the relationships you have established with district staff, the public, First Nations, and stakeholders within CMNRD. I encourage you to build upon your strengths in the areas of collaboration, innovation, and leadership.

Yours truly,



Barry Dobbin, RPF
District Manager
Coast Mountains Natural Resource District
Ministry of Forests, Lands and Natural Resource Operations

Source of information:

- Steve Thomson Minister Letter “Re: The renewal of forest stewardship plans” (March 8, 2016)
- Dianne Nicholls, CF “Re: Guidance on the replacement of forest stewardship plans” (March 2015)
- The Forest Practices Board Report – Forest Stewardship Plans: Are they Meeting Expectations, August 2015
- Minister letter Re: Direction on approval of Forest Stewardship Plans (FSPs) in the Great Bear Rainforest plan area (January 2016)
- Kalum Resource District: Guiding principle and considerations when planning the harvest of second growth (June 28, 2011)
- District Manager Policy - Utility Corridors Impacts to Visual Quality Polygons (2014)
- Land Use Plans and/or Sustainable Resource Management Plans (Kalum LRMP, Kalum SRMP, MAPP, Nass SRMP, Cranberry SRMP, Kalum (Kiteen) SRMP)
- Long-term recovery of forest structure and composition after harvesting in coastal temperate rainforests in northern British Columbia (LePage and Banner, 2013)
- MRVA Report <<https://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm>>
- FREP Report <<https://www.for.gov.bc.ca/hfp/frep/index.htm>>
- Kalum TSR, Nass TSR, North Coast TSR, Pacific TSR, TFL #1 TSR, TFL #41 TSR
- Regional Executive Director Goshawk Expectations Letter (May 2016)

APPENDIX 3. A SUMMARY OF THE FOREST AND RANGE EVALUATION PROGRAM AND RESOURCE VALUE MONITORING

Background of the Forest and Range Evaluation Program (FREP)

The *Forest and Range Practices Act* (FRPA) implements a results-based approach to forest management in British Columbia. Under this approach the forest tenure holders develop results and strategies or use specified default results and strategies to address impacts to the resource value objectives identified under FRPA. The role of the Ministry of Forests, Lands, Natural Resource Operations and Rural Development is to ensure approved results and strategies are consistent with FRPA objectives, and other practice requirements, and to evaluate the effectiveness of forest and range practices in achieving FRPA objectives.

The Forest and Range Evaluation Program (FREP) is a multi-agency program that evaluates whether practices under FRPA are meeting the intent of the current FRPA objectives, and also to determine whether the practices and legislation are meeting government's broader intent for the sustainable use of natural resources.

Monitoring and Evaluation

The Ministry of Forests, Lands, Natural Resource Operations and Rural Development's Resource Planning and Assessment Branch leads overall FREP program management, training, data management and reporting, and expertise for the development of monitoring protocols for most values. Stewardship staff across the 23 Natural Resource Districts conduct most of the field sampling and engage First Nations and forest and range tenure holders in sampling and/or discussion of findings, using the monitoring protocols. Finally, the Resource Practices Branch leads the evaluation of provincial timber objectives, and periodic review of FREP results to consider the need for FRPA regulatory improvements.

There are 11 resource values currently identified under the *Forest & Range Practices Act*. For each resource value protocol documents have been created to provide background information and instructions for FREP sampling. All protocols can be found online here:

<https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program/frep-monitoring-protocols>

The following information summarizes the five resource value protocols assessed in the Forest and Range Evaluation Program Multiple Resource Value Assessment Report - Coast Mountains Natural Resource District: Cultural Heritage Resources (CHR), Riparian, Stand-level Biodiversity, Visual Quality, and Water Quality.

Resource Value Monitoring Protocol Summaries

Cultural Heritage Resources (CHR) Value Monitoring

Legal Objective

The *Forest Act* defines a cultural heritage resource as, "an object, a site or the location of a traditional societal practice that is of historical, cultural or archaeological significance to British Columbia, a community or an

aboriginal people". The *Forest Planning & Practices Regulation* (FPPR) states that the objective of government is to conserve or protect cultural heritage resources that are:

1. The focus of a traditional use, by an Aboriginal people, and that are of continuing importance to that people
2. Not regulated under the Heritage Conservation Act

Cultural heritage resources may include specific traditional use areas, sites or features on the landscape. Within the CHR protocol, there are seven general categories of CHR's on which to focus, and other CHR may also be assessed:

- Culturally modified trees (CMTs)
- Cultural trails
- Traditional, ceremonial, and spiritual use sites or areas
- Cultural plants
- Ecological features with cultural significance
- Archaeological resources (e.g. pre-1846 CMTs, cultural depressions, lithics etc.)
- Monumental cedar

Purpose of monitoring

CHR value monitoring is undertaken to help answer the following questions:

1. How are known CHRs actively managed and what strategies are used?
2. How has conservation or protection maintained the site integrity and (or) value?
3. Are results on the ground consistent with First Nations' expectations?
4. Do site planning documents contain information about CHR management?
5. Are results on the ground consistent with site planning and site alteration permit commitments or requirements?
6. Is/was site damage due to unavoidable operational factors?
7. What management practices are resulting in adequately protecting, managing and/or conserving CHR values?
8. What management options may have improved CHR management on the site?
9. In what format, and how readily available, is CHR information?

Brief Summary of Monitoring Protocol

- Sampling sites from FREP Master list are identified, up to half of the sites can be target, the rest must be randomly selected.
- A review of documented and undocumented CHR is conducted (recorded or identified by a First Nation).
- Information on cutblock and CHR feature identification, feature description and assessment, feature management effectiveness is recorded (any damage, causes of damage, future value?),
- Observations are summarized and questions answered (any limitations to management, effective management, did practices maintain CHR values?)
- Photos are taken and additional comments are entered.

Riparian Value Monitoring

Legal Objective

Water and fish are identified as objectives in FRPA and regulation in the *Forest Planning and Practices Regulation* through practice requirements around stream riparian classes, wetland classes, lake classes, reserves, temperature sensitive streams, fans, stream crossings, fish passage, protection of fish habitat and livestock use of riparian areas.

Purpose of monitoring

The goal of monitoring the condition of streams, wetlands, and their adjacent riparian management areas is to determine whether FRPA standards and practices governed by regulation are achieving the desired result of protecting water quality, fish habitat, wildlife habitat and biodiversity associated with riparian areas. Riparian monitoring asks: Are riparian forestry and range practices effective in maintaining the structural integrity and functions of stream and wetland ecosystems and other aquatic resource features over both short and long term? Overall stream and riparian health is measured using the concept of “properly functioning condition”.

The properly functioning condition of a stream and its riparian area is the ability to:

- withstand normal peak flood events without experiencing accelerated soil loss, channel movement or bank movement;
- filter runoff;
- store and safely release water;
- maintain connectivity so that fish habitat is not lost or isolated;
- maintain an adequate root network and supply of large woody debris; and
- provide shade and reduces microclimate change.

Brief Summary of Monitoring Protocol

- All riparian sites are selected using random sampling. Each district is provided with a list of 200 cutblocks that are randomly generated. For each cutblock assessed, staff must confirm that there is at least one stream within or adjacent to it and that the stream is long enough to qualify (riparian management extends 100 meters along one bank or 30 channel widths).
- Riparian features are sampled in order to answer 15 questions about the characteristics of healthy streams and their riparian habitats. General themes are: channel bed and bank disturbance, large wood presence, habitat connectivity (culverts, debris jams etc.?), fish cover, moss, aquatic invertebrates, vegetation in the RMA, bare erodible ground or soil compaction, root networks and large wood inputs, shade and bank microclimate, noxious weeds or invasive plants, riparian plant community.
- Causes of disturbance and notable management practices are recorded.

Visual Quality Monitoring

Legal Objective

The *Forest & Range Practices Act* (FRPA) sets objectives for visual quality. Visual quality is a resource value that is managed in designated scenic areas. All scenic area designations and visual quality objectives (VQOs) in

effect on December 31, 2004 were grand parented into the new legislative framework and are continued under FRPA (Sections 180-181).

The three types of pre-FRPA scenic area designations are:

- Scenic areas with Recommended Visual Quality Classes assumed to be “current management” by district managers;
- Scenic areas with VQOs established by the district manager under the Code; and
- Scenic areas with VQOs designated as part of higher-level plans, such as Land and Resource Management Plans.

Purpose of monitoring

The focus of visual quality monitoring is on measuring viewing conditions for clearcut, patch-retention and partial cut alterations in mid-distance view, i.e. 1–8 km from the viewpoint, which account for the majority of current alterations in scenic areas in British Columbia. Visual quality monitoring seeks to answer the general question “How well are we managing and conserving views in designated scenic areas?” and also the more specific question “Did recently harvested units achieve the established visual quality objective?” The evaluation is not intended to answer questions such as “Were the pre-harvest visual impact assessments accurate?” or “Were the planned and approved prescriptions carried out?”

Brief Summary of Monitoring Protocol

- The general survey area and the number of harvest units to be sampled are selected.
- Information is recorded pertaining to harvest units, locations, VLI and VQO data and select viewpoints.
- Viewpoints are visited, GPS coordinates recorded, photos taken, visual quality category is determined and visual design elements are recorded.
- Field observations are compiled to determine the degree to which visual quality objectives were met.

[Water Quality Monitoring](#)

Legal Objective

The *Forest & Range Practices Act* (FRPA) sets objectives for water quality as contained in the *Forest Planning & Practices Regulation*.

Purpose of monitoring

The water quality protocol estimates fine sediment delivered to streams from mass failures and surface erosion. When forestry related disturbances generate fine sediment that is then transported to a stream, turbidity pulses occur which degrade water quality. Any process that transports fine sediment is also capable of carrying any other pollutants that might be on site. Although the evaluation methodology focuses on fine sediment generating turbidity, it also acts as an indicator for other potential contaminants. Water quality monitoring asks the questions: Are forest practices effective in protecting water quality? Are forest and range practices increasing the risk of drinking water health hazards?

Brief Summary of Monitoring Protocol

- Sampling areas are selected from randomly selected cutblocks (areas must have been harvested within 2 years and have a riparian feature within the cutblock).
- Samples sites are visited, characterized and finalized with respect to sediment generating sample sites within sampling area.
- The relative impact of different magnitudes of fine sediment being introduced into the stream is assigned. This includes collecting stream characteristics data in order to be able to evaluate impact to water quality immediately downstream.
- Management practices associated with the site are assessed.

[Stand-level Biodiversity Monitoring](#)

Legal Objective

The term biodiversity in British Columbia is used to refer to life in all its forms and the habitat and natural processes that support life. A component of this biodiversity definition is species diversity, meaning the number of different plants, animals, fungi and simple organisms such as bacteria and protozoa. Government sets out in the *Forest Planning and Practices Regulation*, management objectives for both stand-level and landscape-level biodiversity.

Purpose of monitoring

The goal of stand-level biodiversity monitoring is to determine if the present policy of retaining wildlife tree patches and riparian reserves is achieving the desired levels and types of structures to maintain species diversity. Stand-level biodiversity monitoring asks: “Is stand-level retention providing the range of habitat with the structural attributes understood as necessary for maintaining the species dependent on wildlife trees and CWD?”

Brief Summary of Monitoring Protocol

- Sites are selected from the random list of cutblocks generated (should be greater than 2 hectares).
- Plot locations are randomly chosen and marked for both patches and cutblocks.
- Sites are visited and plots established. Information on coarse woody debris and patch site is collected.
- Questions are answered pertaining to how well the cutblock retained stand structural attributes that existed prior to harvest, how well retention represented the stand conditions present in the area, and whether retention was distributed in a way that benefited biodiversity.