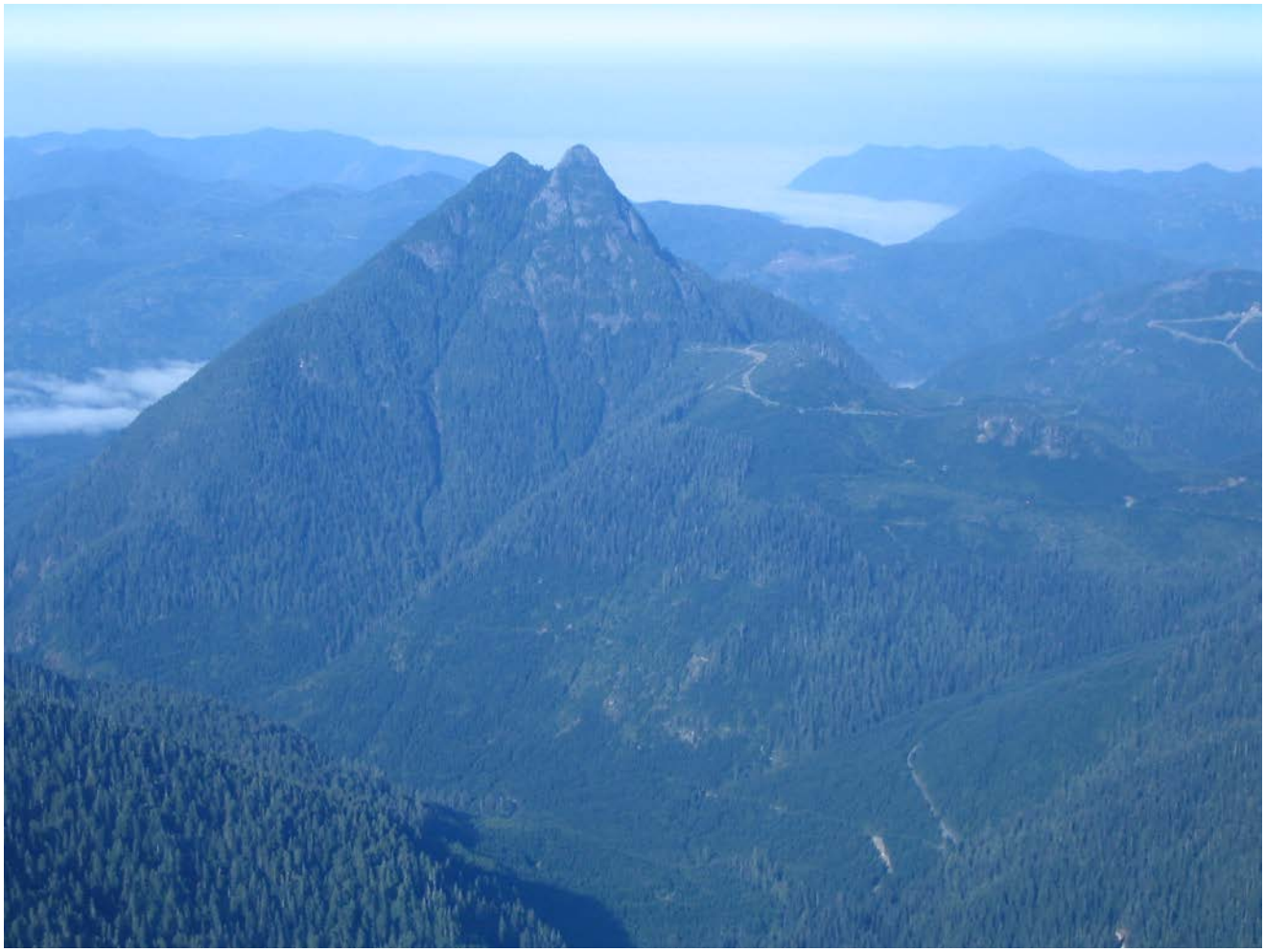
Forest and Range Evaluation Program
Multiple Resource Value Assessment Report
Campbell River District
November 2015



CONTEXT FOR UNDERSTANDING THIS REPORT

All natural resource development will have an impact on ecosystem condition. The role of effectiveness evaluations is to assess the status and trends of British Columbia's natural resource values, and to identify related causal factors and opportunities for improvement. The site-level "impact ratings" presented here are based on assessments conducted within the working land base (e.g., areas where resource extraction takes place). The ecological contributions of parks, protected areas, and other conservancy areas (approximately 21% of the provincial land base (20% in the Campbell River 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 the mountain pine beetle infestation and fire or wind disturbances.

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 *FRPA* values, regardless of whether practices are in compliance with legislation. These evaluations are meant to help resource managers:

- 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.

Multiple Resource Value Assessment (MRVA) reports reflect the results of monitoring carried out under the Forest and Range Evaluation Program (FREP). This is generally stand/site-level monitoring which is conducted on forestry cutblocks or resource roads. As such, these evaluations provide a stewardship assessment of site-level resource development practices.

RESOURCE VALUE ASSESSMENT CLASSIFICATIONS AND MEANINGS

Monitoring results are summarized using four impact ratings.

1. very low
2. low
3. medium
4. high

"Very low" and "low" impact ratings are considered consistent with the government's goal of sustainable management of the resource values within the *Forest and Range Practices Act*. The "medium" impact rating is considered borderline and the "high" rating 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 style 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"

[1] See http://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm. The methodology is described in FREP Technical Note No. 6 (http://www.for.gov.bc.ca/ftp/HFP/external/!publish/frep/technical/FREP_Technical_Note_06.pdf).

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.

Where sufficient data is available, the "Overall Stewardship Trend" shows trends between time periods. A chi-squared test, which determines a probability value, is used to determine trends between sampling eras for riparian, water quality, stand-level biodiversity, and visual quality results. *P*-values are used to help assess the likely significant difference between two populations (e.g., 2005–2012 and 1997–2004 eras). Because many of the evaluations conducted by FREP are exploratory, a critical *p*-value of 0.1 is used; this is higher than the standard for significance in more powerful studies. Setting the critical value at this level balances the likelihood of committing a Type 1 versus a Type 2 error (i.e., accepting something as significant when it isn't, as opposed to missing a significant effect because the trial was not powerful enough to detect it).

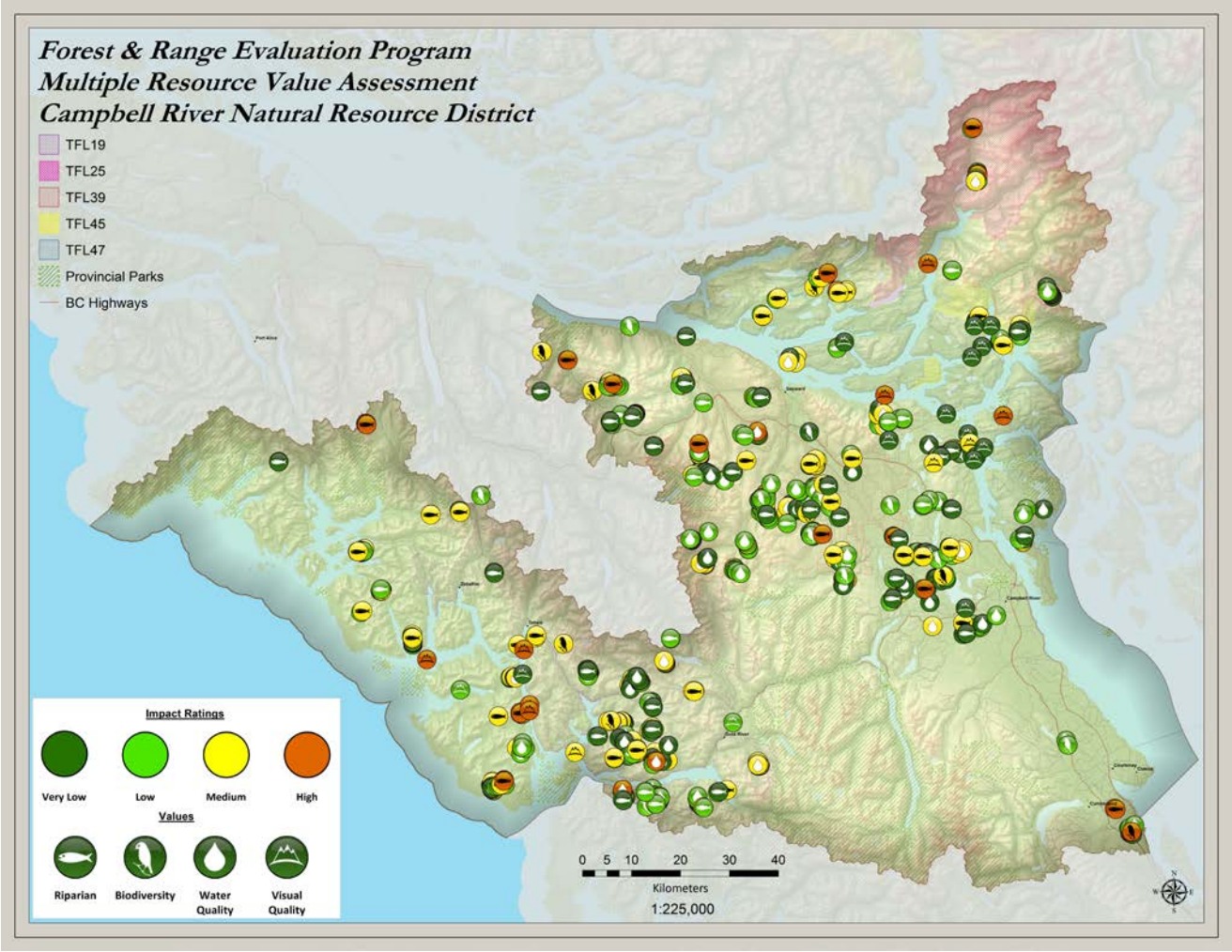
CAMPBELL RIVER – ENVIRONMENTAL AND STEWARDSHIP CONTEXT

This report covers the Strathcona TSA and adjacent TFLs (figure 2) that make up the Campbell River Natural Resource District (CRNRD). The Strathcona TSA, the Pacific TSA, Woodlots, TFLs 19, 39, 47 and 25 extend across central Vancouver Island from the west coast (Nootka Sound to the Brooks Peninsula) to the east coast (Fanny Bay to Sayward) and adjacent areas on the coastal mainland and islands of British Columbia. With a population of over 100,000 between 8 cities/towns, CRND spans 2 million hectares of which 87% is Crown land. Seventeen First Nations claim traditional territory within this district. The district handles permitting for an allowable annual cut (AAC) of approx. 4,500,000 m^3; provides authorizations and inspections on 75 active scale sites and 18 timber processing facilities. There are 3 major forestry companies, 41 Woodlots and 14 First Nation's tenures.

Forest resource management has been active in the Campbell River Area since before the 1900's. The Beaver Lodge Forest Lands were planted in 1931 as a reforestation experiment and represent the first forest plantation in the province. The Sayward Forest was planted during the 1940's and 50's. A wide ranging road network has been developed in this forest providing access to forest management opportunities as well as an extensive network of lakes for outdoor and recreational activities.

The main sources of employment are public sector, tourism and forestry, mining, commercial recreation and recreational fishing. Fifteen First Nations have traditional territory in the district, with ten of these having reserve lands. The ten with reserve lands are Wei Wai Kum First Nation, We Wai Kai First Nation, Ehattesaht Tribe, Homalco First Nation, Ka:'yu:'k't'h/Che:k:tles7et'h' First Nation, K'omoks First Nation, Kwiakah First Nation, Mowachaht/Muchalaht First Nation, Nuchatlaht Tribe, Tlowitsis Tribe. The other five First Nations with traditional territory are Da'naxda'xw First Nation, Klahoose First Nation, Mamalilikulla-Qwe'Qwa'Sot'em First Nation, Namgis First Nation and the Sliammon First Nation.

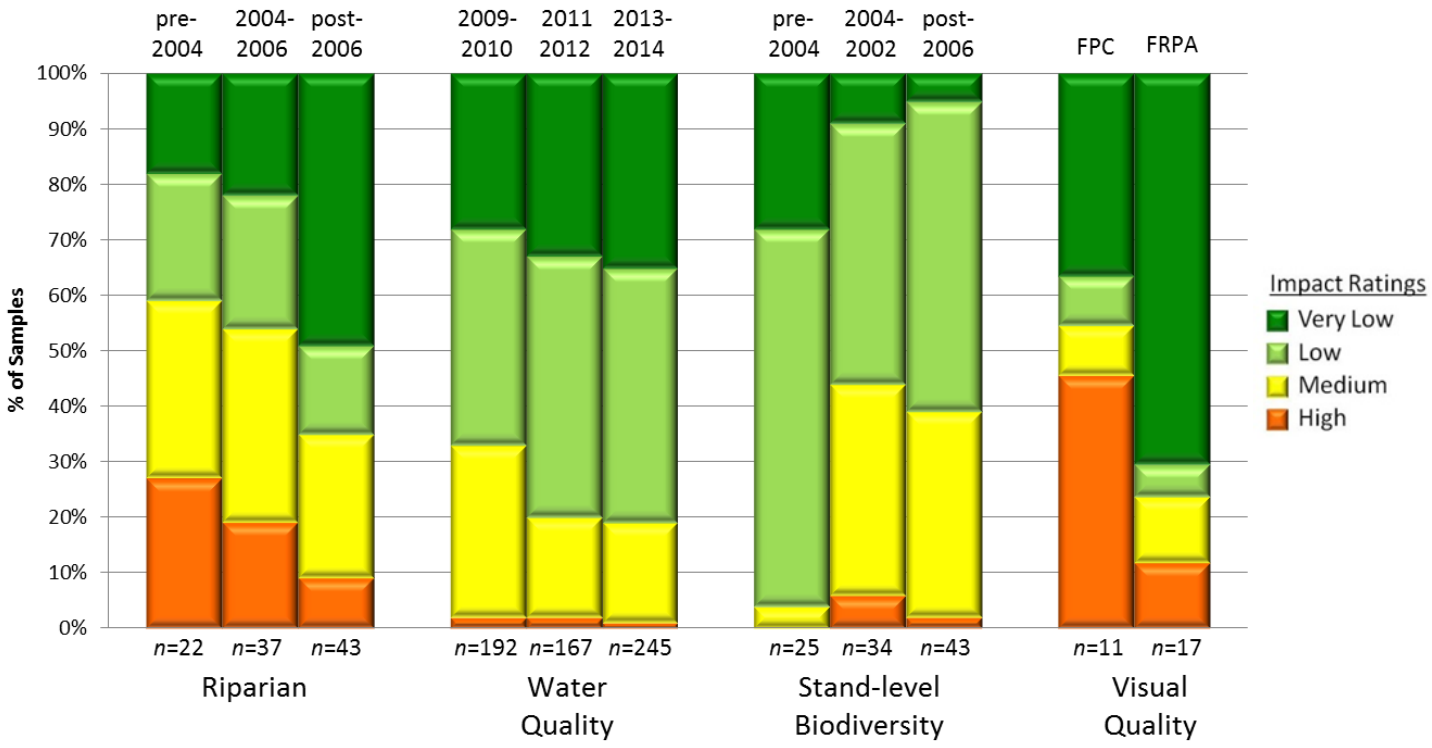
Figure 1: Campbell River Natural Resource District, showing FREP sample locations and results



CAMPBELL RIVER NATURAL RESOURCE DISTRICT — MONITORING IN BRIEF

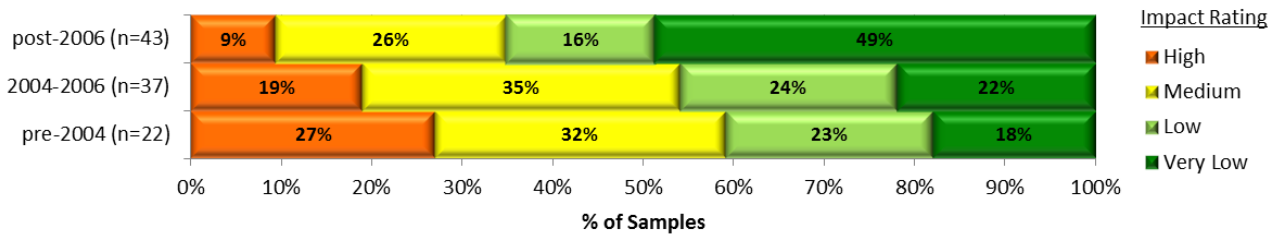
This report summarizes monitoring conducted in the Campbell River Natural Resource District. MRVA reports allow decision makers to communicate expectations for sustainable resource management of public resources and identify opportunities to improve stewardship. This report concludes with a district manager commentary on the key strengths and opportunities for improvement of natural resource management in the area.

Figure 2: Campbell River stewardship impact ratings by resource value with trends



KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

Riparian: Resource Development Impacts on Stream Function



Data: The data for riparian stream assessments was collected by Forests, Lands and Natural Resource Operations (FLNR) staff using the FREP riparian monitoring protocol. The sampling population for stream assessment is randomly selected cutblocks with streams in or adjacent to cutblock boundaries harvested 1997 to 2013 (sampled from 2006 to 2014). The largest stream in, or adjacent to, the block is assessed.

Summary: Of the 102 streams monitored (all years), 32% rated as having "very low" impact, 21% are "low" impact, 30% are "medium" impact and 17% are "high" impact.

Samples by Stream Class and Impact Rating:

Class	High	Medium	Low	V.low	Total
S2		3	3	7	13
S3	1	1	2	3	7
S4	1	1	1		3
S5	2	5	4	13	24
S6	13	21	11	10	55
Total	**17**	**31**	**21**	**33**	**102**

Causal Factors:

Cause of impact, % of total	Most common specific impacts
Logging 80% *falling and yarding* *low retention* *old logging* *windthrow*	• stream or riparian blockages increased • riparian vegetation decreased • large woody debris supply decreased
Natural events 11% *wind*	• stream or riparian blockages increased
Upstream factors 4% *logging* *natural events*	• moss levels decreased
Other manmade 3% *hydro diversion* *stream cleaning*	• stream or riparian blockages increased
Roads 1% *erosion causing sedimentation*	• stream or riparian blockages increased

Near-stream human actions (logging, roads, other) caused on average 84% of the negative impacts on the streams.

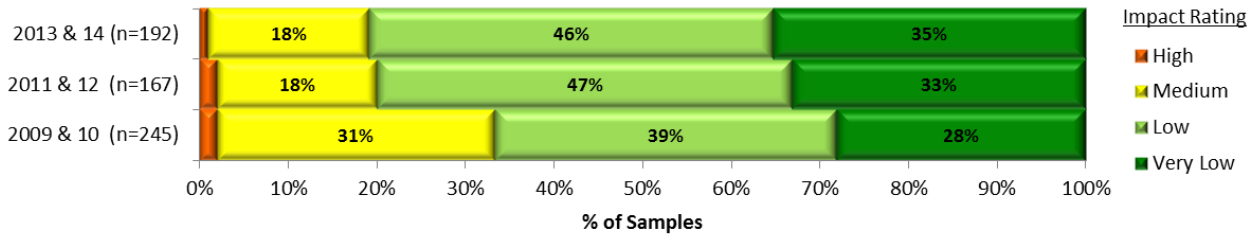
Stewardship Trend: There is a statistical difference between sampling eras (p=0.10), with an improving trend particularly in the later harvest years.

The amount of bare erodible ground decreased, and LWD supply increased from earlier to later harvest years.

Opportunities for improvement (and/or continuation) based on streams with the best outcomes:

- Continue improvement to minimize near-stream bare erodible ground and thus decrease in-stream sediments
- Maintain natural drainage patterns by keeping streams clear of logging slash.
- Maintain deep rooted vegetation near stream banks.
- Increase retention generally on small streams, especially the wider, perennial small streams that make significant contributions of water, sediments, debris, nutrients, etc. to downstream fish habitats and watershed function.

Water Quality (fine sediment): Resource Development Impacts on Water Quality



Data Source: Data for water quality assessments was collected by FLNR staff using the Forest and Range Evaluation Program water quality monitoring protocol between 2009 and 2014. The sampling sites for water quality (potential for fine sediment generation) are roads (and/or mass wasting (landslides)) connected to fish habitat and/or drinking water sources that originate at randomly selected recently harvested cutblocks.

Summary:
Of the 604 road segments assessed 32% were rated "very low" impact, 43% "low", 24% "medium", 1% "high" impact regarding fine sediment generation potential.

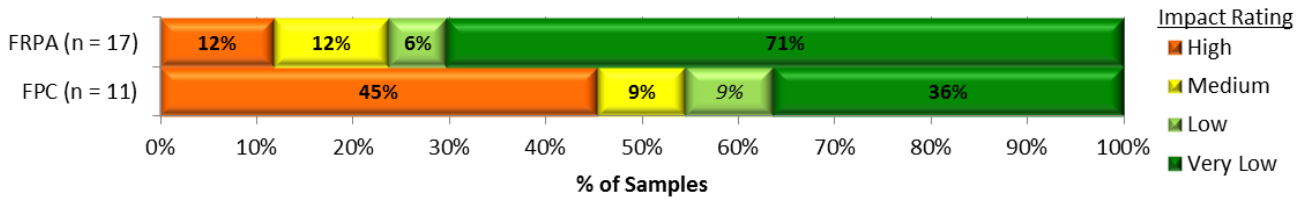
Causal Factors:
See opportunities for improvement for "medium" or "high" impacted road segments. Some opportunities will apply to ongoing maintenance issues, while others apply mainly to new road construction.

Overall Stewardship Trend:
There is a statistical difference between sampling eras (p=0.01) with slightly better outcomes in the later (2013 and 14) sample years.

Opportunities For Improvement:
The most common recommendations resulting from the water quality monitoring assessments were:

- use cross ditches and kickouts
- increase the number of strategically located culverts;
- remove roadside berms that channel water and allow sediment build-up
- avoid long gradients approaching streams.

Visual Quality: Resource Development Impacts on Achievement of Visual Quality Objectives (VQO)



Data Source: Data for visual quality assessments was collected by FLNRO field staff between 2008-2012 using the Forest and Range Evaluation Program visual quality monitoring protocol. The sampling population for visual quality is landforms with visual quality objectives, randomly selected based on recently harvest cutblocks.

Summary: The limited sample of 28 landforms assessed precluded conclusions of trends for the 11 *FPC* and 17 *FRPA* cutblocks. Collectively, 57% were rated with "very low" harvest-related impacts on achieving the Visual Quality Objectives, 7% were "low" impact, 11% were "medium" impact and 25% were "high" impact.

Number of *FPC* Samples by VQO and Impact Rating:

VQO[1]	High	Medium	Low	Very Low	Total
M		1		2	**3**
PR	4			2	**6**
R	1		1		**2**
Total	**5**	**1**	**1**	**4**	**11**

[1] M = modification, PR = partial retention, R = retention

Number of *FRPA* Samples by VQO and Impact Rating:

VQO[1]	High	Medium	Low	Very Low	Total
M				3	**3**
PR	1	2	1	9	**13**
R	1				**1**
Total	**2**	**2**	**1**	**12**	**17**

Causal Factors:

For the five Partial Retention (established VQO) landforms where VQOs were not achieved ("high" impact):

- 4 had "no or poor design" (1 had "good" design)
- 5 had low retention within openings.
- 3 had high (8.2% to 12.6%) landform alteration

For the two Retention (established VQO) landforms where VQOs were not achieved ("high" impact):

- both had "good" design
- both had moderate levels of retention within openings
- both had high (2.9% and 5.2%) landform alteration.

The 3 landforms that had "good" design yet still did not meet VQO's had % landform alteration that was too high even after considering the adjustment for design (the Partial Retention blocks), and design plus tree retention (the Retention blocks).

Overall Stewardship Trend:

There is no statistical difference between sampling eras (p=0.21) with the low sample size likely influencing this statistical outcome. There is better use of design to meet VQO's for the *FRPA* blocks compared to the *FPC* blocks, higher levels of tree retention and lower % alteration. Additional sampling will identify whether the noted trend to improvement is statistically valid.

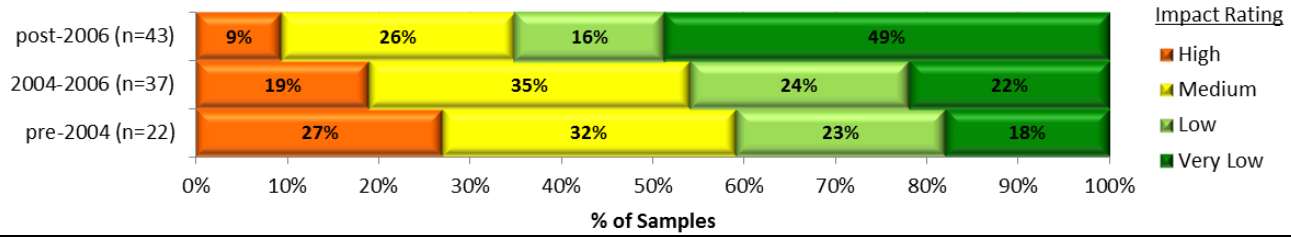
Opportunities for Improvement based on viewscapes that meet visual quality objectives:

When in viewscapes

- Decrease opening sizes
- Utilize visual landscape design techniques to better blend openings into the landscape
- Increase the amount of in-block retention

Biodiversity

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



Data Source: The data for stand-level biodiversity assessments was collected by FLNR field staff using the FREP stand-level biodiversity monitoring protocol. Sampling sites are randomly selected recently harvested cutblocks. The data was collected from 2006 to 2014.

Summary:
Of the 102[2] cutblocks sampled (all harvest years), 68% were rated as "very low" or "low" harvest-related impact, considering total retention, retention quality, and coarse woody debris quantity and quality. The table below shows the percent of blocks and average cutblock size by impact category.

	High	Medium	Low	Very low
% of blocks	3%	29%	56%	12%
Ave gross (ha)	5	21	28	26
% of area	1%	25%	63%	12%

Causal Factors:
Average retention is 14.6%, decreasing over time from a high of 19.6% in pre-2004 harvest-era to 13.1% in the 2004 to 2006 era and 12.7% in the post-2006 era. Dispersed retention was used in the pre-2004 era but not in later years. 96% of the sampled cutblocks had over 3.5% retention, with a range of zero to greater than 50% retention. All of the blocks harvested before 2004 and after 2006 had 3.5% or higher retention. The three "high" impact blocks were small, under 5 hectares, and had limited retention (2% and 0%).

Overall Stewardship Trend: There is a statistical difference between sampling eras (p=0.01) with more "very low" impact cutblocks in the pre-2004 harvest era.

Total percent retention decreased over time. Tree retention quality was highest in the pre-2004 harvest-era. The amount and quality of coarse woody debris left on harvested areas was fairly consistent through harvest-eras.

Opportunities For Improvement and/or continuation of practices that effectively manage stand-level biodiversity:

- Continue the trend to leave at least low levels of retention on every cutblock.
- Retain some of the largest trees for the site.
- Look for opportunities, particularly on CWHxm cutblocks, to safely leave large snags as ecological anchors in retention patches.

[2] 2 additional blocks were sampled and assessed for some indicators but could not be categorized since retention was present but no plots established, likely due to safety issues.

RESOURCE VALUE STEWARDSHIP RESULTS COMPARISON

Table 2 provides ratings of stewardship effectiveness at varying scales. Effectiveness is determined by the percentage of samples with a "very low" or "low" resource development impact rating. Appendix 2 shows results by resource value for the North, South and Coast Areas and the province as a whole.

Table 2: Stewardship effectiveness within the West Coast Natural Resource Region as determined by resource development impact rating (ID = Insufficient Data; sample sizes in brackets).

Resource Value	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + Low Resource Development Impact Rating				
	West Coast Region Comparison				
	Campbell River	North Island Central Coast	South Island	Haida Gwaii	West Coast
Riparian – all data	**53%** (102)	**54%** (85)	**62%** (61)	**57%** (61)	**57%** (309)
post 2006	65% (43)	59% (27)	76% (21)	33% (18)	61% (109)
2004-2006	46% (37)	53% (30)	41% (22)	82% (17)	53% (106)
pre 2004	41% (22)	50% (28)	72% (18)	65% (26)	56% (94)
Water quality – all data	**73%** (604)	**80%** (348)	**88%** (211)	**92%** (191)	**81%** (1354)
2013–2014 samples	81% (192)	76% (119)	74% (77)	ID (18)	79% (406)
2011–2012 samples	80% (167)	90% (88)	ID (56)	85% (62)	86% (373)
2008 -2010 sample year	67% (245)	78% (141)	95% (78)	95% (111)	79% (575)
Stand-level biodiversity –all data	**69%** (105)	**87%** (85)	**75%** (71)	**63%** (65)	**74%** (323)
post 2006	63% (43)	100% (28)	89% (28)	75%(20)	80% (119)
2004-2006	56% (34)	97% (29)	60% (20)	71% (17)	71% (100)
pre 2004	96% (25)	64% (28)	70% (23)	50% (28)	69% (104)
Visual Quality					
FRPA	**76%** (17)	**85%** (54)	**61%** (23)	**60%** (10)	**76%** (104)
FPC	**45%** (11)	**85%** (13)	**ID** (0)	**ID** (0)	**67%** (24)

DISTRICT MANAGER COMMENTARY[3]

FREP monitoring in the Campbell River District has been ongoing since 2005. Monitoring samples are widely distributed across the district, 4 of the 11 FRPA values have been evaluated to date.

I am satisfied to see an improving trend in practices since the transition from the *Forest Practices Code* to the *Forest and Range Practices Act*.

However, the results indicate there is room for innovative improvements. Within the Visual Quality and Riparian Area resource values, results show "high" and "moderate" impact ratings where practices have not met government's objective of sustainable resource management and need to be improved. Management of Stand Level Biodiversity will require particular attention to maintain values as the harvest transitions into second-growth stands.

To help outcomes progress, I see an opportunity for licence holders to:

Riparian:
The condition of the smaller streams upstream is important for the entire district and I am pleased to see that S6 streams continue to show improvement in condition. In particular there are fewer S6's in *FRPA* years that have impacted channel banks and high fine sediment levels. I encourage licensees to continue this improving trend for the condition of smaller streams.

- Minimize logging slash and debris inputs to streams particularly S6,
- Maintain higher levels of riparian vegetation within 10 metres of stream edges,
- Locate harvesting boundaries so as to minimize risks of windthrow in the Riparian Areas.

Water Quality:
The condition of roads impact many factors including fine sediments entering water bodies. The riparian results discussed above have shown improvement partly due to decrease in fine sediments found in the sampled stream reaches. This is also showing in the water quality assessment of potential fine sediments making their way into streams from our roadways. In general ensure ongoing regular maintenance to avoid long stretches above water bodies where water can flow and pick up sediment.

- Increase the use of cross ditches to direct water away from streams,
- Remove road edge berms and strategically place culverts so as to direct road water away from streams.

Stand-level Biodiversity:
The average stand-level retention has decreased from the *FPC* to *FRPA*-era. A quality indicator that I ask you to pay attention to is large trees for the site. Trees of 70 cm dbh or larger are the current and/or future valuable wildlife trees, care in selection of retention patches to include these trees is particularly important as second or third pass logging progresses.

- Retain large trees and snags in Wildlife Tree Retention Areas in similar densities to that of the pre-harvest condition to function as ecological anchors.

Visual Quality:
There seems to be a significant improvement in meeting VQO's from *FPC* to *FRPA* blocks – In particular there has been much more use of design to meet the VQO's on the *FRPA* blocks, an excellent trend.
Techniques to maintain these improvements include:

[3] Commentary supplied by Campbell River Natural Resource District Manager, Romona Blackwell

- Increase effective levels of tree retention in scenic areas,
- Use visual design techniques to create more natural looking openings,
- Use partial cutting or reduce opening sizes in areas where the VQO is Retention or Partial Retention.

District staff will continue to monitor forest resource values, and communicate the results to licence holders and Forest Professionals. I also expect Forest Professionals to place a greater reliance on these monitoring results when preparing, reviewing and implementing plans and practices. I look forward to Forest Professionals developing innovative ways to manage the forest resource.

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* (http://www.for.gov.bc.ca/ftp/HFP/external/!publish/frep/technical/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	*FREP* 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
Stand-level Biodiversity	Is stand-level retention providing the range of habitat and attributes understood as necessary for maintaining species dependant on wildlife trees and coarse woody debris?	% retention, retention quality (e.g., big patches, density of large diameter trees), coarse woody debris volume, coarse woody debris quality (e.g., density of pieces ≥ 10 m and 20 cm, and volume of large diameter pieces).	Cumulative score. A 60/40 weighting is used for tree retention versus coarse woody debris, recognizing the longer-term ecological value of standing retention.	> 70%	55–70%	40–55%	< 40%
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