



Multiple Resource Value Assessment (MRVA)

Sea to Sky District

December 2013

FOREWORD

Forest management in British Columbia is governed by a hierarchy of legislation, plans and resource management objectives. For example, federal and provincial acts and regulations, Land Use and forest stewardship plans, and protected areas and reserves collectively contribute to achieving balanced environmental, social and economic objectives. Sustainable forest management is key to achieving this balance and a central component of forest management certification programs. The purpose of Multiple Resource Value Assessment (MRVA) reports is to provide resource professionals and decision makers with information about the environmental component of this 'balance' so that they can assess the consistency of actual outcomes with their expectations.

The *Forest and Range Practices Act (FRPA)* lists eleven 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. The MRVA report is a summary of the available field-based assessments of the conditions of these values. Field assessments are generally conducted on or near recently harvested cut blocks and therefore are only evaluating the impact of industrial activity and not the condition of the value overall (e.g., they don't take into account protected areas and reserves). Most of the information is focused on the ecological state of the values and provides useful information to resource managers and professionals on the outcomes of their plans and practices. This information is also valuable for communicating resource management outcomes to stakeholders, First Nations and the public, and as a foundation for refining government's expectations for sustainable resource management in specific areas of the province.

I encourage readers to review the full report and direct any questions or comments to the appropriate district office.

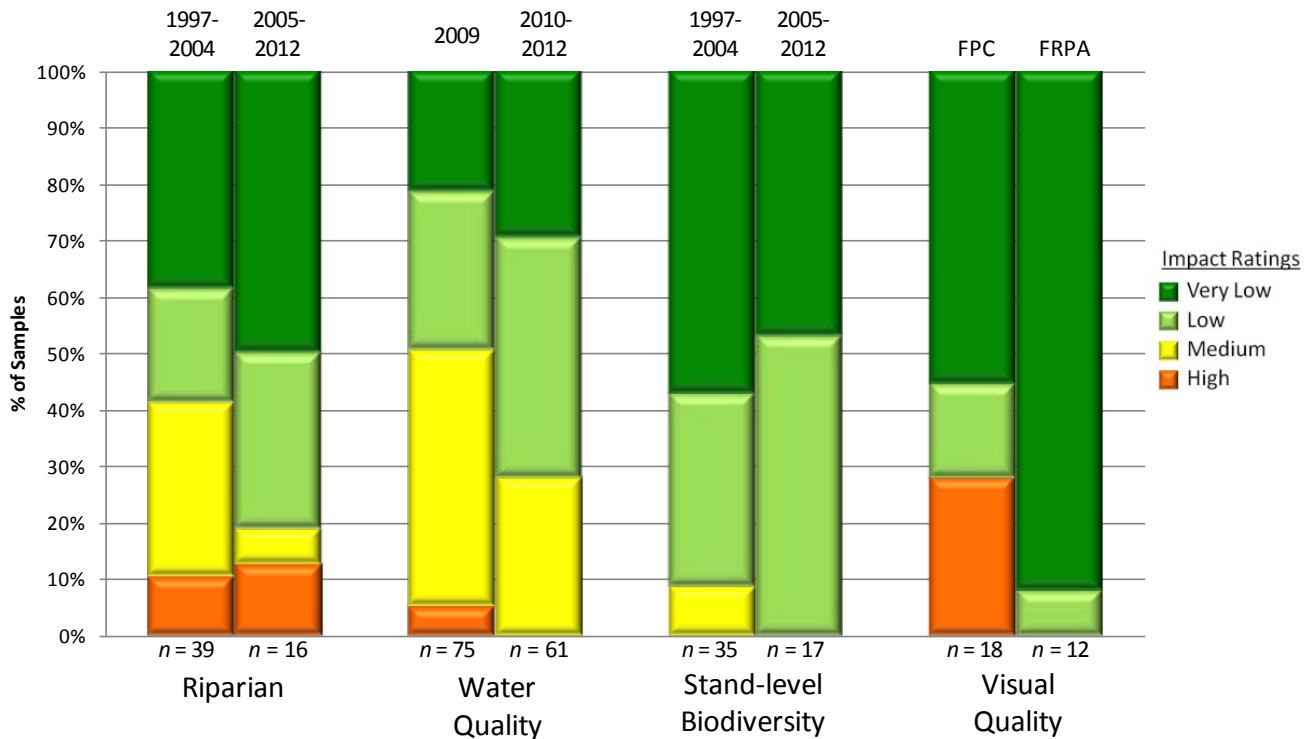
A handwritten signature in black ink, appearing to read "Tom Ethier". The signature is stylized and cursive.

Tom Ethier
Assistant Deputy Minister
Resource Stewardship Division
Ministry of Forests, Lands and Natural Resource Operations

MULTIPLE RESOURCE VALUE ASSESSMENTS—IN BRIEF

Multiple resource value assessments document the results of stand and landscape-level monitoring carried out under the Forest and Range Evaluation Program (FREP). This report summarizes results for riparian, water quality (sediment), biodiversity (stand and landscape level), and visual quality monitoring conducted in the Sea to Sky District and includes a district manager commentary of key strengths and weaknesses. Through MRVA reports, decision makers communicate expectations for sustainable resource management of public resources and identify opportunities for continued improvement.

Figure 1: Sea to Sky District site-level resource development impact rating by resource value with trend (Riparian, stand-level biodiversity and visual quality trend by harvest year/era. Water quality trends by evaluation year.)



Important Context for Understanding this Assessment

The extraction and development of natural resources, along with natural factors (e.g., insects, wind, floods), influence and impact ecological condition. The goal of effectiveness evaluations is to assess these impacts on the state of public natural resource values (status, trends, and causal factors); such evaluations *do not assess compliance with legal requirements*. These evaluations help resource managers:

- assess whether the impacts of resource development result in sustainable resource management
- provide transparency and accountability for the management of public resources
- support the decision-making balance between environmental, social, and economic factors
- inform the ongoing improvement of resource management practices, policies, and legislation.

The resource development impact ratings contained in this report are based on assessments conducted within the areas where resource extraction takes place and do not reflect the ecological contributions of parks, protected areas, or other conservancy areas.

Although this report focuses on forestry-related activities, FREP monitoring protocols have also been applied to other resource sector activities, including mining (roads) and linear developments (hydro and pipelines). Procedures are being adapted to expand monitoring into these resource sectors over time.

INTRODUCTION

The development of the *Forest and Range Practices Act (FRPA)* had several key objectives, including:

- simplifying the forest management legal framework
- reducing operational costs to both industry and government
- allowing “freedom to manage”
- maintaining the high environmental standards of the *Forest Practices Code of British Columbia Act (FPC)*.

As part of the results-based *FRPA* framework, the provincial government committed to conducting effectiveness evaluations and publically reporting the monitoring results. The science-based information provided by these evaluations will be used to determine whether *FRPA* is achieving the government’s objectives of maintaining high environmental standards and ensuring sustainable management of public resources. If those objectives are not being met the monitoring results will be used to help inform the necessary adjustments to practices, policies, and legislation. Government is delivering its effectiveness evaluation commitment through the Forest and Range Evaluation Program (FREP; for details, see <http://www.for.gov.bc.ca/hfp/frep/>). The 11 *FRPA* resource values monitored under FREP include: biodiversity, cultural heritage, fish/ riparian & watershed, forage and associated plant communities, recreation, resource features, soils, timber, visual quality, water and wildlife.

Multiple Resource Value Assessments (MRVAs) reflect the results of stand- and landscape-level monitoring carried out under FREP. The program’s stand-level monitoring is generally conducted on forestry cutblocks, resource roads, or other areas of industrial activity. As such, these evaluations provide a stewardship assessment of resource development practices. Landscape-level monitoring of biodiversity, visual quality, and wildlife resource values is more broadly an assessment of the overall landscape. Reports on MRVAs are designed to inform decision making related to on-the-ground management practices, statutory decision-maker approvals, and data for the assessment of cumulative effects.

This report summarizes FREP monitoring results for the Sea to Sky District. MRVA reports clarify resource stewardship expectations, and promote the open and transparent discussion needed to achieve short- and long-term sustainable resource management in British Columbia.

MRVA reports are intended for those interested in the status and trends of resource values at the timber supply area (TSA) or natural resource district scale, such as natural resource managers and professionals, government decision makers, and First Nations. These reports are also useful in communicating resource management outcomes to the public.

Government managers and decision makers are encouraged to consider this information when:

- discussing district or TSA-level resource stewardship with staff, licenced stakeholders, tenure holders and First Nations
- clarifying expectations for sustainable resource management of public land
- integrating social and economic considerations into balanced decision making
- reviewing and approving forest stewardship plans
- developing silviculture strategies for TSAs
- assessing Timber Supply Reviews and their supporting rationale
- informing decision making at multiple scales.

Natural resource professionals are encouraged to consider this information, along with other FREP information such as reports, extension notes, protocols, and monitoring data to:

- maintain current knowledge of the resources they manage
- inform professional recommendations and decisions, particularly when balancing environmental, social, and economic values
- enhance resource management, consultation, and treaty rights discussions between First Nations, government, and licensees.

Published FREP reports and extension notes contain detailed findings for each resource value. These documents are available on the FREP website at:

<http://www.for.gov.bc.ca/hfp/frep/publications/reports.htm>. Licensees can request data collected on their operating areas. FREP staff will assist licensees with the analysis of their data and the preparation of licensee-specific MRVA reports.

Although this MRVA report documents monitoring results at the district or TSA level, the MRVA concept is scalable. Reports for individual licensees, treaty settlement areas, or landscape units can be produced when sufficient monitoring data is available. Reports can also be prepared at the regional or provincial levels. This report provides site-level resource value assessments and trends through comparisons of cutblocks harvested before 2005 with those harvested in 2005 or later (where data is sufficient). FREP's site assessment monitoring results on each resource value are categorized by impact (very low, low, medium, or high). This classification reflects how well site-level practices achieve government's overall goal of sustainable resource management. Site-level practices that result in "very low" or "low" impact are consistent with sustainable management objectives. Practices resulting in "high" impact are seen as inconsistent with government's sustainability objectives. For a description of the MRVA methodology see Appendix 1.

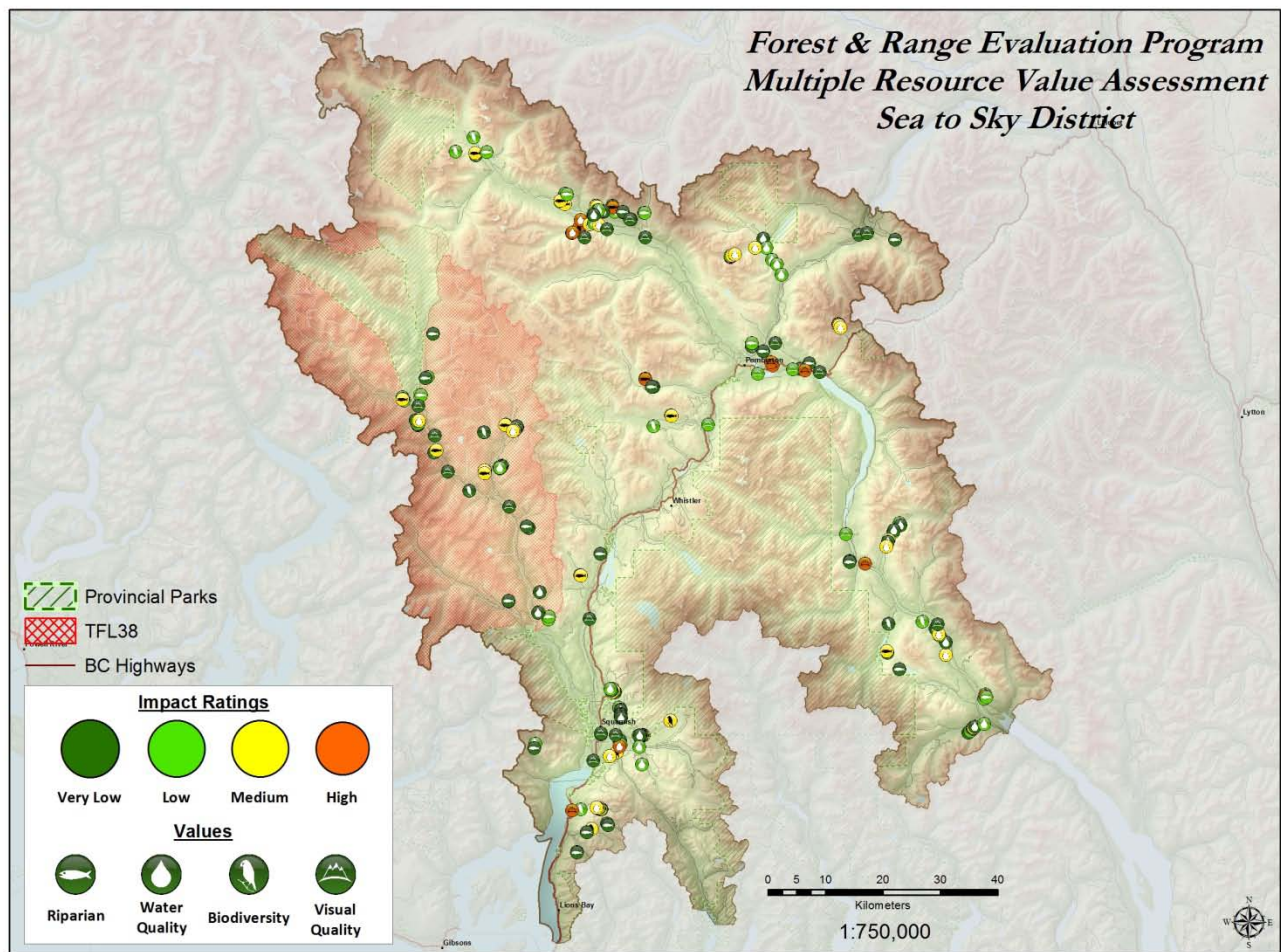
SEA TO SKY DISTRICT – ENVIRONMENTAL AND STEWARDSHIP CONTEXT

This report covers the Sea to Sky District encompassing the Soo TSA and Tree Farm Licence (TFL) 38 (figure 2). It is bounded on the west by TFL 38 and the Sunshine Coast TSA; on the north by the Lillooet TSA; and on the south and east by the Fraser TSA and is immediately north and west of Vancouver. The district covers approximately 1.1 million hectares of which only 93 152 hectares is within the timber harvesting landbase. The district includes many parks and protected areas, including most of Garibaldi Provincial Park, Clendinning Provincial Park and several conservancy areas. Wildlands, a designation restricting most resource development, were established as part of the Land and Resource Management Plan (LRMP), and account for another 348 000 hectares, totaling 32 percent of the District. The public sector, forestry and tourism are the major employment sectors, with agriculture, construction and mining also contributing to the local economy. The mature forests of this district support about 130 wildlife species that depend on the characteristics of older forests, including two bird species at risk: northern spotted owl and marbled murrelet. Other species at risk that depend on or benefit from forests are bull trout, coastal tailed frog, red-legged frog, great blue heron, fisher, Pacific water shrew, Keen's long-eared myotis, grizzly bear, and wolverine. Numerous First Nations have asserted traditional territory that includes all or a portion of the district: Bridge River Indian Band, Coldwater Indian Band, Cooks Ferry Indian Band, Douglas (Xa'xtsa) First Nation, In-SHUCK-ch Nation, Lil'wat First Nation, Musqueam Nation, N'Quatqua First Nation, Seabird Island, Shxw'owhamel First Nation, Siska Indian Band, Skawahlook First Nation, Soowahlie Indian Band, Squamish Nation, St'at'imc / Lillooet Tribal Council, Sto:lo Nation, Sto:lo Tribal Council, Sts'ailes Indian Band, T'it'q'et Administration, Toosey Indian Band, Tsilhqot'in Nation, and Tsleil-Waututh Nation.

The mountainous terrain limits accessibility and commercially viable forest area. Other factors that restrict harvesting include the high proportion of land designated as protected, high-value habitat for species at risk, and high recreational and residential values for the 2.3 million residents that live or regularly recreate in the district, which put pressure on forest management, particularly with respect to views and access. The district is a model of multiple-use land management where forestry is a relatively small but important component of the activity on the land base compared to the past. There are no major lumber or pulp manufacturing facilities any longer in the district and high-value timber that supported a sizeable forest industry historically is becoming more difficult and costly to access. There is a mix of old-growth and second-growth being harvested, depending on the area. The district has several woodlots and one community forest agreement with the dominant forest licensees comprised of smaller to medium sized independent companies that are owned and operated locally and through First Nations partnerships.

The Sea to Sky District includes highly productive coastally influenced ecosystems in the south and west, dominated by western redcedar, hemlock, and Douglas-fir with lesser components of red alder, western white pine and black cottonwood at low elevations, shifting to montane stands of amabilis fir and mountain hemlock with yellow cedar at montane elevations within the commercial forested landbase. In the maritime part of the district, fire is uncommon and usually small in scale; disturbance is dominated by gap dynamics, windthrow, pathogens, and storms. In the north, east and sub-maritime areas of the district, transitional ecosystems reflect drier and more continental conditions with disturbance driven by more frequent, lower-severity stand maintaining and occasionally stand-replacing fires. Dominant species include Douglas-fir and birch, with lodgepole pine and some ponderosa pine on drier sites, redcedar on wetter sites, and mature hemlock is typically rare or absent at lower elevations. Montane sites support western redcedar, amabilis fir, subalpine fir, and western hemlock. Spruce budworm and mountain pine beetle have had localized but severe impacts in drier areas of the District; root pathogens such as armillaria, phellinus, and tomentosus root rot are endemic and widespread. These pests are expected to increase in severity and frequency with projected climate change. Other anticipated effects are increasing growing season duration and drought as snowpack melts earlier, more concentrated and earlier peak flows with associated impacts on fish values, and tree species shifts favouring more drought-tolerant species such as Douglas-fir and pine at the expense of western hemlock and western redcedar.

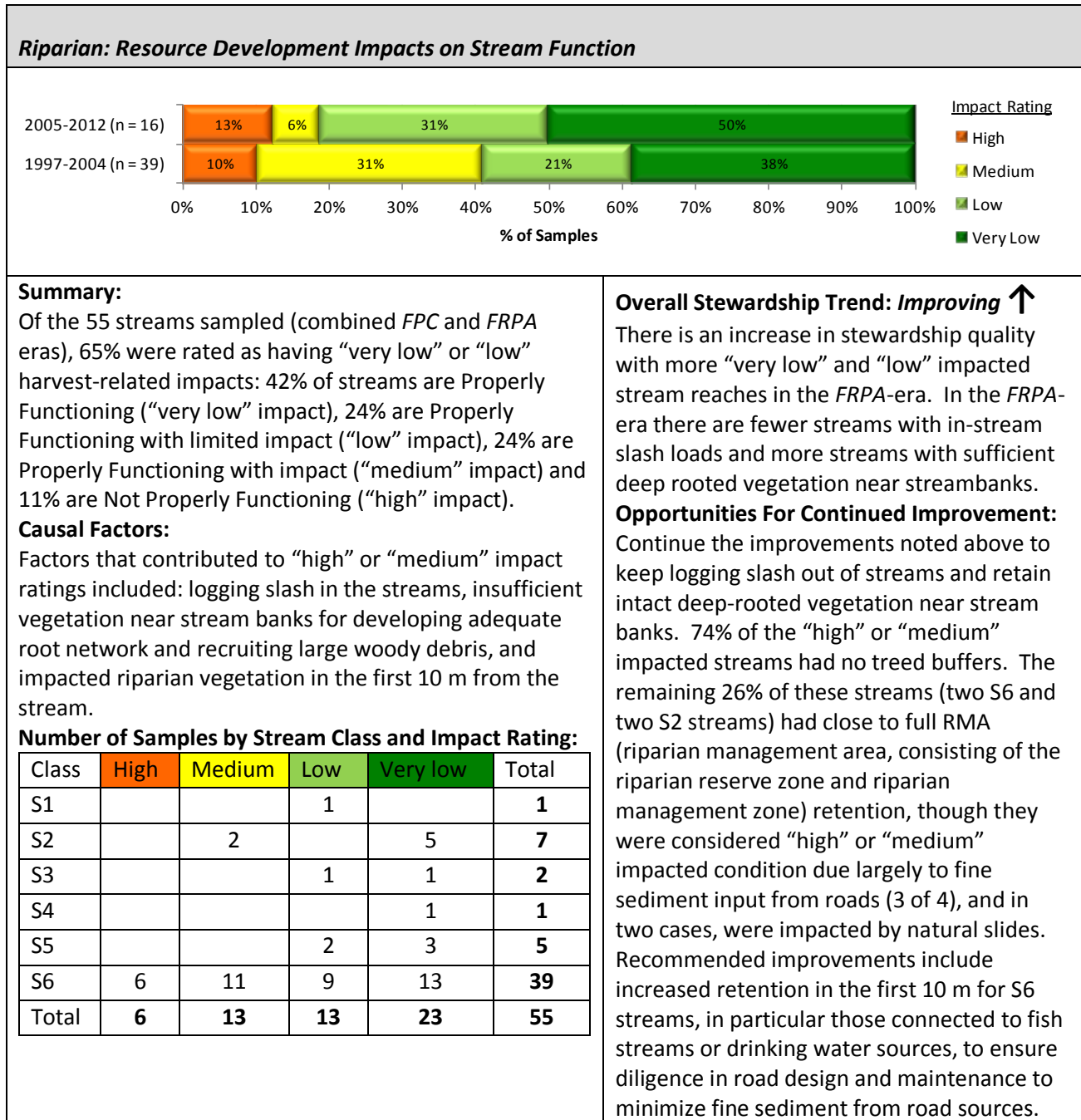
Figure 2: Sea to Sky District, showing FREP sample locations and results (see <http://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm> for a high-resolution version of this map).



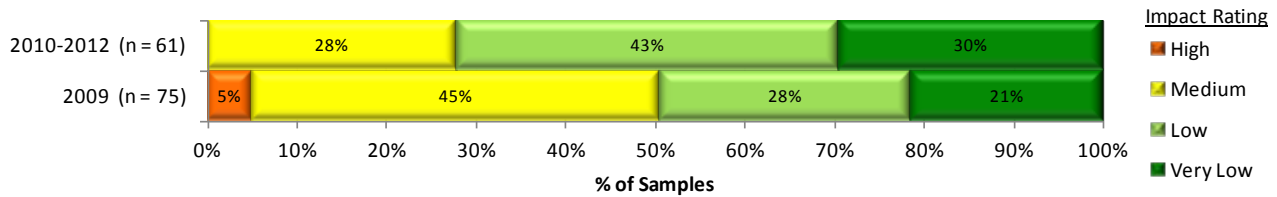
KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

Table 1 describes the resource values assessed for the Sea to Sky District, and includes a summary of key findings, causal factors, trends, and opportunities for continued improvement. Data are presented for *FPC*-era samples at sites harvested before 2005 and *FRPA*-era samples at sites harvested in 2005 or later, only approximating the *Forest and Range Practices Act* (*FRPA*) era, but allowing for a comparison between earlier and later stewardship practices. The impact rating indicates the effect of the resource development on the resource value, from “very low” to “high” impact.

Table 1: Resource development impact rating, key findings, and opportunities for improvement by resource value for the Sea to Sky District.



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



Summary:

Of the 136 road segments assessed from 2009 to 2012, 60% were rated as having “very low” or “low” road-related impact. Site assessments show the range for potential sediment generation as 25% “very low” (equivalent to “very low” impact on water quality), 35% “low” (“low” impact), 38% “moderate” (“medium” impact), 1% “high” and 1% “very high” (2 categories of sediment generation make up the “high” impact rating).

Causal Factors:

See opportunities for improvement for “high” or “medium” impacted road segments. Some opportunities will apply to ongoing maintenance issues, while others would mainly apply to new road construction.

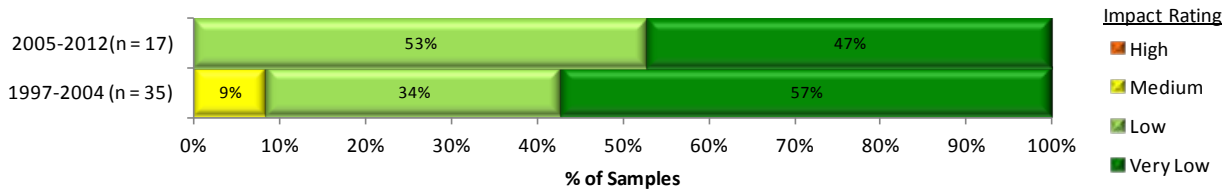
Overall Stewardship Trend: Improving ↑

Trending for water quality is based on survey years, to capture impact of road traffic and maintenance.

Opportunities For Continued Improvement:

The most frequent suggested improvements are: armouring; maintaining natural drainage channels; increase the number of culverts and ensure they are in appropriate locations; and avoid long gradients approaching streams where practicable.

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



Summary:

Of 52 cutblocks sampled (combined *FPC* and *FRPA* eras), 94% of sites were rated “very low” or “low” harvest-related impact. Considering total retention, retention quality, and coarse woody debris quantity and quality, 54% sites are rated as “very low” impact on biodiversity, 40% as “low” impact, 6% as “medium” impact, and 0% as “high” impact. Seven additional cutblocks were sampled but could not be rated due lack of baseline data in two biogeoclimatic ecosystem classification subzones.

Causal Factors:

93% of all blocks had more than 3.5% tree retention, increasing to 100% in the *FRPA*-era. Average retention was 23.1% in the *FPC*-era and 16.2% in the *FRPA*-era. Large snag retention is lower than the baseline for comparable ecosystems in both eras, as was the density of ≥70 cm dbh trees. The number of tree species retained improved in the *FRPA*-era and is similar to expected (baseline) values. Average coarse woody debris volume was 344m³/ha in the *FPC*-era and 386 m³/ha in the *FRPA*-era, with a range skewed to the higher baseline values.

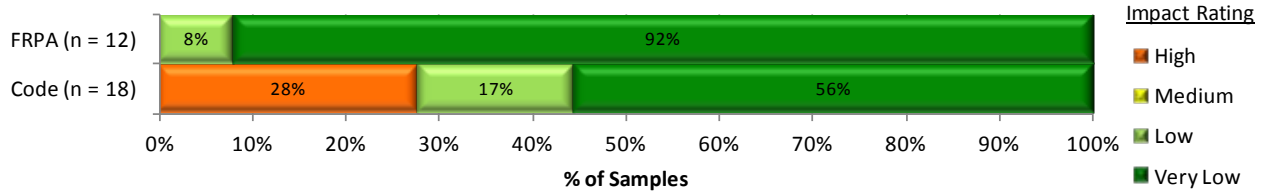
Overall Stewardship Trend: *Neutral*

Much of the high levels of retention from the *FPC*-era came from a subset of samples, where 19.5% of cutblocks (8 blocks) had >30% retention, compared to 5.5% (1 block) in the *FRPA*-era. *FRPA*-era sampling also had fewer blocks with under 3.5% retention. Average retention quality was similar in both eras, but *FRPA* blocks had smaller average patch sizes and fewer larger (>2 ha) retention patches.

Opportunities For Continued Improvement:

Continue leaving retention on every cutblock. Continue trend to good quality coarse woody debris (i.e., big pieces). Increase retention quality by retaining large trees (e.g., ≥ 70 cm dbh) and big snags (e.g., ≥10 m tall and ≥30 cm dbh) in densities similar to pre-harvest conditions.

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



Summary:

Nearly 22% of the district total area has established VQOs. Of the 30 samples assessed (18 harvested using Forest Development Plans under the *FPC* and 12 harvested using Forest Stewardship Plans under the *FRPA*), 70% were rated “very low” or “low” impact of harvesting to achieving the VQO, with 100% meeting these criteria under *FRPA*. Two landforms were sampled more than once because of random block selection, so 30 openings were sampled on 28 landforms. Visual Quality Objectives (VQOs) were “well met” (“very low” impact on achieving the VQO) on 70% of landforms, “met” (“low” impact) on 13%, “not met” (“medium” impact) on 13%, and “clearly not met” (“high” impact) on 3%.

Causal Factors:

13% of the openings contained visually effective levels of tree retention (> 22% by volume or stem count) and 43% of landforms sampled had good visual quality design (cutblock shaping).

Number of Samples by VQO and Impact Rating:

VQO ¹	High	Medium	Low	Very Low	Total
M			1	10	11
PR	5		3	9	17
Total	5	0	4	19	28

¹ M = modification, PR = partial retention

Overall Stewardship Trend: Improving ↑

There are more landforms rated “very low” or “low” harvest impact to achieving the VQO in the *FRPA*-era and none rated “high” impact, though take caution with interpretation of data due to small sample size. *FRPA*-era openings had better tree retention and better cutblock design.

Opportunities For Continued Improvement:

Use existing visual design techniques to create more natural-looking openings and better achieve VQOs. Use partial cutting to retain higher levels of volume/stems. Reduce opening size in retention and partial retention VQO areas.

Soils: Resource Development Impacts on Soil Productivity and Hydrologic Function

There are currently only four soils samples in the Sea to Sky District. Analysis will be completed in subsequent years when more samples are available.

Landscape-level Biodiversity: Is the forested matrix at the landscape-level providing the range of habitat understood as necessary for maintaining ecosystem function and old and mature forest dependant species?

In development

RESOURCE VALUE STEWARDSHIP RESULTS COMPARISON

Tables 2 and 3 provide ratings of stewardship effectiveness at varying scales, with Table 2 presenting site-level results, and Table 3 landscape-level results. Effectiveness is determined by the percentage of samples with a “very low” or “low” resource development impact rating. The three primary landscape-level biodiversity indicators are: (1) site index by leading species (ecosystem representativeness); (2) percent of TSA by age class (young, mid-, mature, and old forest); and (3) percent interior habitat of old forest. Each indicator is categorized by percent in non-commercial land base, timber harvesting land base, and protected areas. Data for these indicators is derived from Hectares BC and other spatial databases. All other data is derived from FREP field assessments. 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 South Coast 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 (sample size in brackets)			
	South Coast Region Comparison			South Coast Region ^a
	Sea to Sky District	Chilliwack District	Sunshine Coast District	
Riparian – all data	65% (55)	59% (66)	63% (65)	62% (186)
FRPA-era data	81% (16)	69% (26)	63% (38)	69% (80)
FPC-era data	59% (39)	53% (40)	63% (27)	58% (106)
Water quality – all data	60% (136)	55% (212)	81% (230)	66% (578)
2010–2012 samples	72% (61)	55% (133)	83% (157)	70% (351)
2008–2009 samples	49% (75)	54% (79)	77% (73)	60% (227)
Stand-level biodiversity –all data	94% (52)	81% (58)	75% (72)	82% (182)
FRPA-era data	100% (17)	86% (22)	89% (35)	91% (74)
FPC-era data	91% (35)	78% (36)	62% (37)	77% (108)
Visual Quality				
FRPA	100% (12)	100% (20)	65% (20)	86% (52)
FPC	83% (18)	73% (22)	ID (0)	73% (40)

^aIncludes the Sea to Sky, Chilliwack and Sunshine Coast Natural Resource Districts.

Table 3: Landscape-level stewardship within the South Coast Region.

Components of Landscape Biodiversity	Interim indicators without ranking ^a	
	Sea to Sky District	South Coast Region ^b
% district old & mature ^c	73%	63%
% district protected ^d	35%	23%
% district as OGMA	5%	4%
% OGMA as Interior old ^e	30%	27%

^a Landscape-level ranking criteria are in development. Indicators above are an example without ranking.

^b Includes the Chilliwack, Sea to Sky and Sunshine Coast Natural Resource Districts

^c Proportion based on the component of district with age class data publically available, 41% for Sea to Sky district.

^d Based on protected area (OGMA legal and non legal, parks, and fully protected UWR and WHA) as proportion of full district area. Does not include wildlands, which are another 32% of the Sea to Sky District, 24% when overlaps with OGMA, WHAs, and other designations are removed.

^e Proportion of OGMA (legal and non-legal with age class data) that is old age class, buffered in 100 m from intermediate or young age classes (no buffering if bordered with 100 m of mature, or natural area).

DISTRICT MANAGER COMMENTARY¹

In general, I am pleased to see that forest stewardship values are generally well met in this district, and are improving under the *FRPA*. Visual quality is a key resource objective for this district, and although the sample is limited, the results are excellent. Stand-level biodiversity stewardship values are high due generally to good levels of retention and coarse woody debris quantity and quality. The high volume of coarse woody debris, however, may be more reflective of operational factors than stewardship objectives. Improvements for stand-level biodiversity will come from retaining large snags and live tree sizes and a range of patch sizes within cutblocks. Water quality is showing moderately good results, and I look forward to continued improvement as licensees follow the opportunities for improvement described in this report. Riparian function has improved considerably under the *FRPA* with approximately 80% of streams showing good or very good forest stewardship and sustainability (impact ratings of “very low” or “low”), and there are simple practices that can bring this number to 100%. Most of the “high” or “medium” impacted streams were S6 streams which have no mandatory retention within the riparian management area. The low retention and outcome on these streams indicate to me that though practices on these streams are consistent with the *FRPA* minimums, the results may not meet the *FRPA* government objective of maintaining high environmental standards and ensuing sustainable management of public resources. It is for that reason that I have suggested that practicing professional foresters consider increased levels of retention along these streams where practicable.

A “medium” or “high” resource development impact rating shows that licensee performance is not achieving government stewardship objectives of sustainable resource management, and there may be risks to stewardship values associated with these types of practices. Based on the findings of this report, I expect licensees will:

- Carefully consider the various elements of stand-level biodiversity in planning and field operations, both at the stand-level, and also across stands;
- Minimize fine sediment delivery on all roads and at stream crossings and other structures;
- Retain vegetation, established woody debris, and minimize soil disturbance in the riparian management zone and avoid creating stream blockages during or after harvest; and
- Continue to use good visual block design and consider landforms when planning cutblocks in visually sensitive areas, and always consider the very high tourism and recreation values in the district.

District staff should continue to monitor forest and resource practices for all *FRPA* values to track ongoing changes over time.

Forest professionals should consider monitoring results when preparing, reviewing, and implementing forest stewardship plans and operational plans.

¹ Commentary supplied by Sea to Sky District Manager, Dave Southam.

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 maintain 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?	Percent retention, retention quality from nine key attributes (e.g., big patches, density of large diameter trees), coarse woody debris volume, coarse woody debris quality from two key attributes (e.g., density of pieces \geq 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
Soils	Are forest practices preventing site disturbance that is detrimental to soil productivity and hydrologic function?	Amount of access, restoration of natural drainage patterns, road side work area soil disturbance, amount of mature forest and coarse woody debris and restoration of natural drainage patterns	Overall assessment of practices on cutblock to maintain soil productivity and hydrologic function	Well	Moderately		Poor
Cultural Heritage	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	See methodology report			
Timber: Stand Development Monitoring	What is the overall health and productivity of managed 20-40 year stands?	Impacts of forest health factors on stand stocking (ratio of total and well spaced)	Forest health damaging agent (% level of incidence) and level of stocking (well spaced stems per hectare)	\geq 1.7	0.8–1.69	0.3–0.79	0–0.29
Landscape-level Biodiversity	Is the forested matrix at the landscape-level providing the range of habitat understood as necessary for maintaining ecosystem function and old and mature forest dependant species?	Ecosystem representativeness , age class and interior old	Overall ranking: within protected and non-protected areas	Ranking under development			
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

APPENDIX 2. COMPARATIVE FREP RESULTS BY RESOURCE VALUE FOR OTHER AREAS

Table 2 in the main body of the document describes overall ratings for the Sea to Sky District as compared to adjacent TSAs or districts. The table below describes the same results but by the North, South and Coast areas and the province as a whole. The three operational areas represent combined natural resource regions.

Table A2.1: FREP monitoring results by resource value for the North, South and Coast Areas and the province as a whole compared to the Sea to Sky District.

Resource Value	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + Low resource development impact rating (sample size in brackets)				
	Sea to Sky District	Forests, Lands and Natural Resource Operations Areas			Province
		North	South	Coast	
Riparian – all data	65% (55)	71% (654)	69% (678)	58% (451)	67% (1783)
FRPA-era data	81% (16)	71% (257)	68% (277)	62% (198)	67% (732)
FPC-era data	59% (39)	71% (394)	70% (401)	55% (253)	67% (1048)
Water quality – all data	60% (136)	66% (992)	70% (1515)	76% (1526)	71% (4033)
2010–2012 samples	72% (61)	67% (505)	70% (823)	79% (1021)	73% (2349)
2008–2009 samples	49% (75)	64% (487)	70% (692)	70% (505)	68% (1684)
Stand-level biodiversity –all data	94% (52)	42% (655)	54% (780)	77% (455)	56% (1890)
FRPA-era data	100% (17)	49% (270)	61% (347)	84% (201)	63% (818)
FPC-era data	91% (35)	38% (385)	49% (433)	72% (254)	50% (1072)
Visual Quality					
FRPA	100% (12)	73% (122)	54% (136)	78% (153)	69% (411)
FPC	83% (18)	56% (96)	65% (85)	62% (68)	61% (249)