



Multiple Resource Value Assessment (MRVA)

Golden & Revelstoke Timber Supply Areas

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 the Multiple Resource Value Assessment (MRVA) report 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 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. 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.

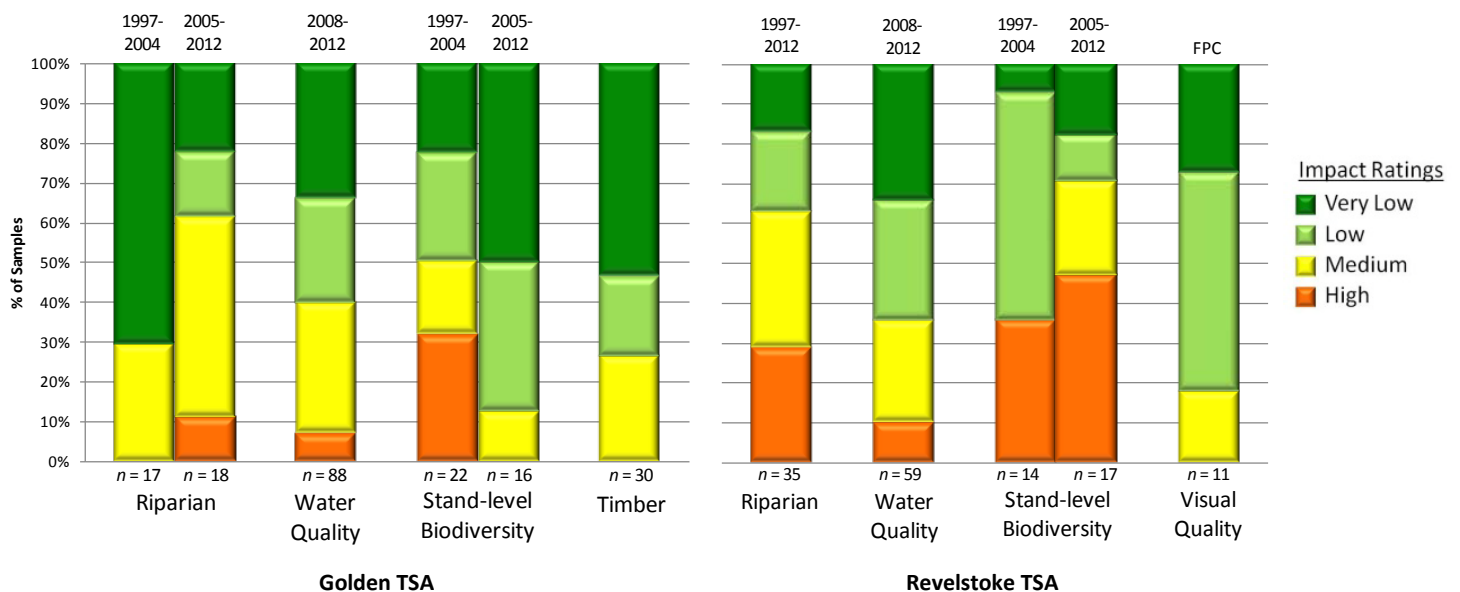
I encourage readers to review the full report and direct any questions or comments to the appropriate district office.

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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, biodiversity (stand and landscape level), water quality (sediment), visual quality and timber (stand development) monitoring conducted in the Golden and Revelstoke Timber Supply Areas 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: Golden and Revelstoke Timber Supply Areas 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. Timber samples are all post-free growing.)



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 Golden and Revelstoke Timber Supply Areas. 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, licensed 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.

ENVIRONMENTAL AND STEWARDSHIP CONTEXT

Golden Timber Supply Area

The Golden Timber Supply Area straddles the Rocky Mountain Trench and the upper Columbia River Valley northward to the Big Bend area near Mica Dam; and is bounded to the west by the Selkirk and Purcell Mountains and the Revelstoke TSA, to the north by the Robson Valley TSA, to the south by the Invermere TSA, and to the east by the Rocky Mountains and the province of Alberta. The TSA covers approximately 1.3 million hectares. Five national parks Yoho, Banff, Jasper, Kootenay and Glacier and the Hamber provincial park border the TSA. The Cummins provincial park lies within its borders. Large mammal species include black and grizzly bear, moose, elk, mule deer, bighorn sheep and mountain goat. The northern part of the Golden TSA also overlaps the range of one of only three viable populations of mountain caribou in western Canada. Seven First Nations have asserted that their traditional territory includes all or a portion of Golden TSA: the Ktunaxa Nation Council, the Akisq'nuk First Nation, the Shuswap Indian Band, the Shuswap Nation Tribal Council, the Simpcw First Nation, the Okanagan Nation Alliance, and the Okanagan Indian Band. The Ktunaxa Nation (Ktunaxa Kinbasket Treaty Council) has submitted a comprehensive land claim that covers the southeast corner of the province and includes the Golden TSA. There are no First Nations reserves or communities within the Golden TSA.

Approximately 16 per cent of the TSA is available for timber harvesting. Terrain is not as steep and narrow as the Revelstoke TSA, inoperability, environmentally sensitive areas, unstable and environmentally sensitive soils, low timber productivity, problem forest types and accessibility are key issues for timber extraction.

The forests are dominated by western red cedar, western hemlock, Douglas-fir and lodgepole pine at the lower elevations and Engelmann spruce and subalpine fir at higher elevations. Biogeoclimatic zones include the Interior Cedar Hemlock, Engelmann Spruce-Subalpine Fir, Montane Spruce, and Interior Douglas-fir.

Important non-timber values include access management, biodiversity, caribou, riparian habitat, visuals, controlled recreation areas, ungulate winter range, identified wildlife and domestic watersheds. The tourism sector is Golden's biggest employer, followed by the forestry and public sectors.

Bark beetles active in the Golden TSA that are considered significant include mountain pine beetle, Douglas-fir beetle and spruce beetle. The mountain pine beetle outbreak of the last several years has subsided, though infestations are still being monitored and harvested in the forest stands in the valleys to the north and south of Golden. Douglas-fir beetle and spruce beetle infestations are sporadic throughout the TSA and are found where trees are weakened from natural occurrences, i.e., fire, windthrow and slide events.

Revelstoke Timber Supply Area

For the purpose of this report, this Revelstoke includes a portion of the Cascadia TSA and tree farm licences (TFLs) 55 and 56 (figure 2). The TSA is bounded by the Monashee Mountains to the west and the Selkirk Mountains to the east, and straddles the Columbia River valley from the Mica Dam in the north to Monashee Provincial Park and Arrowhead in the south. The TSAs and associated TFLs cover approximately 800 000 hectares. Nearby are Mount Revelstoke National Park, a portion of Glacier National Park, and several smaller provincial parks. There are neither Aboriginal communities nor Indian Reserves in the TSA. The following First Nations have claimed traditional territory within all or part of the TSA: Ktunaxa Nation Council (KNC), Neskonlith Indian Band, Akisq'nuk First Nation, Adams Lake Indian Band, Shuswap Nation Tribal Council (SNTC), Simpcw First Nation, Shuswap Indian Band, Okanagan Nation Alliance (ONA), Little Shuswap Indian Band, Okanagan Indian Band, Splatshin, and Lower Similkameen Indian Band.

Approximately 11 per cent of the TSA is available for timber harvesting. It is made up of steep narrow valleys which limit harvesting opportunities due to operability constraints, environmentally sensitive areas, unstable slopes, problem forest types and low timber productivity.

The forests are dominated by western red cedar and western hemlock, at lower elevation and Engelmann spruce and subalpine fir at higher elevations. Biogeoclimatic zones include Interior Cedar Hemlock (ICH) and Engelmann Spruce-Subalpine Fir (ESSF).

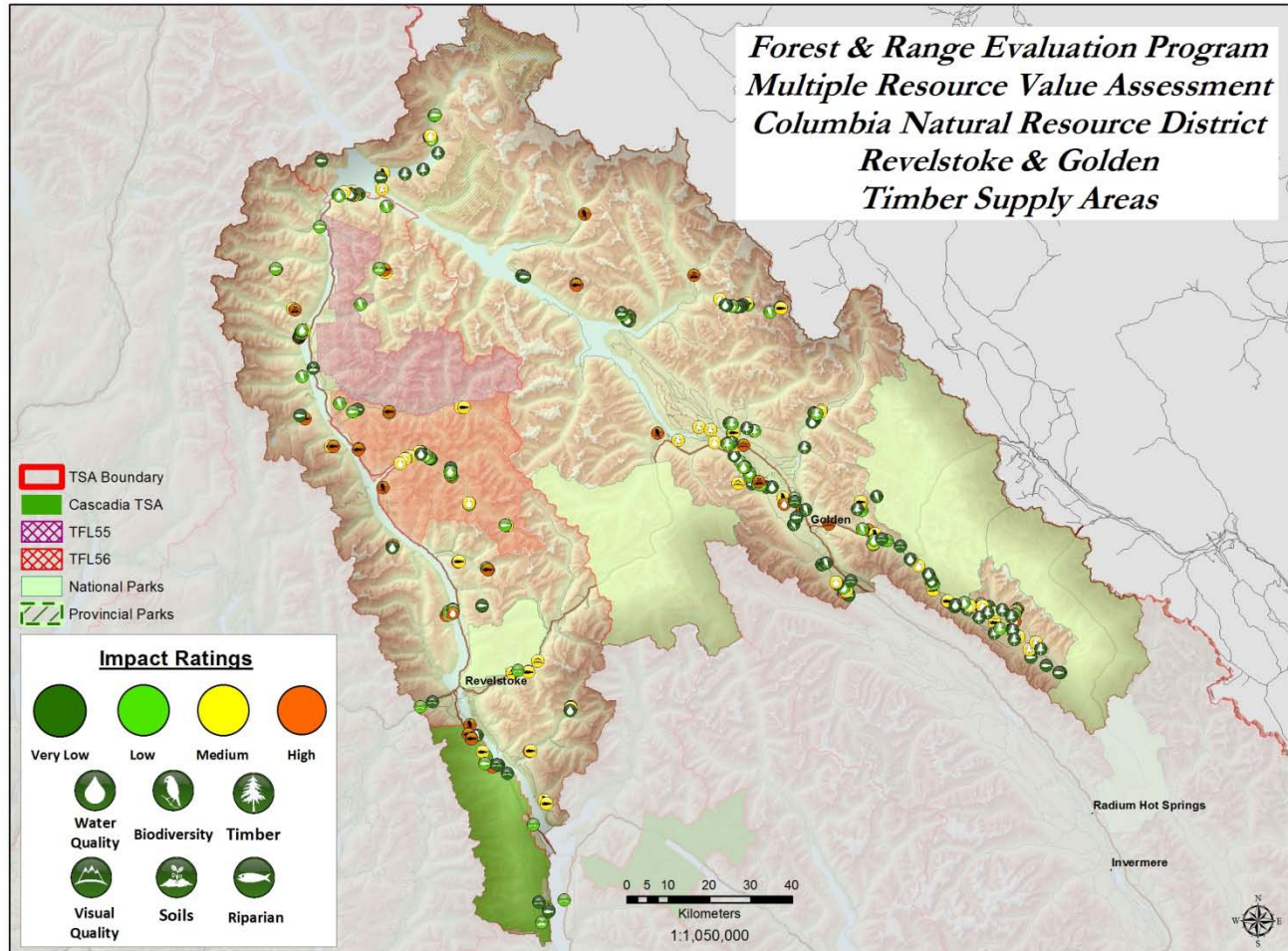
Important non-timber values include access management, biodiversity, caribou, riparian habitat, visuals, controlled recreation areas, ungulate winter range, identified wildlife and domestic watersheds.

The public sector, followed by forestry, are the main sources of employment in the Revelstoke TSA. However, recreational values and uses of forests in these areas are high due to proximity of national and provincial parks, exceptional natural scenery, and the presence of highway and rail transportation. Consequently, tourism is becoming an increasingly important economic sector in the area's economy.

Bark beetle and defoliator pests have posed a threat to management objectives for many of these resources. Western hemlock looper is considered the highest priority forest health pest, with Douglas-fir beetle and spruce bark beetle to a lesser extent in the TSA. Western hemlock looper populations have been increasing over the last 2 to 3 years, an aerial spray program with Btk in 2012 knocked down the looper and the populations have subsided. Populations are being monitored yearly to watch for any population changes. The last outbreak of Western hemlock looper occurred in 2002-2003, defoliating approximately 16 000 hectares of forest land north of Revelstoke.

New legal caribou requirements (GAR Order #U-3-005) provide for spatially explicit reserves that include incremental reserves beyond what was previously required under the Revelstoke Higher Level Plan Order. Excluding these reserves from the THLB has caused a reduction in timber harvesting land base area, although only the incremental reserves are likely to result in true timber supply impacts.

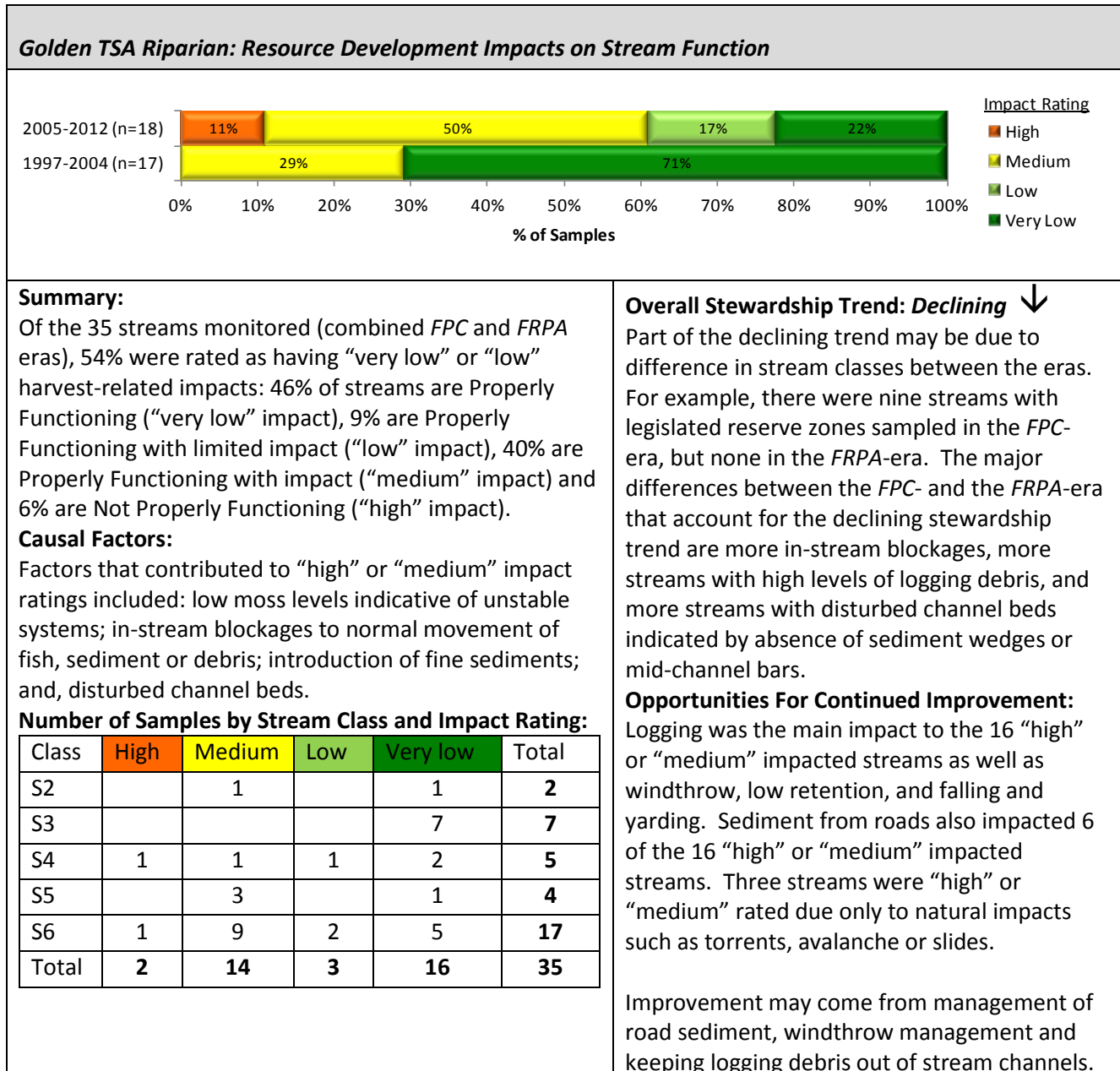
Figure 2: Golden & Revelstoke TSAs, showing FREP sample locations and results (see <http://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm> for a high-resolution version of this map).



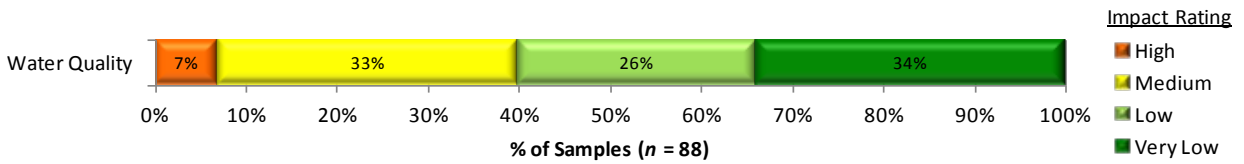
KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

Tables 1 and 2 describe the resource values assessed for the Golden and Revelstoke TSAs (presented separately by TSA), 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 Golden Timber Supply Area.



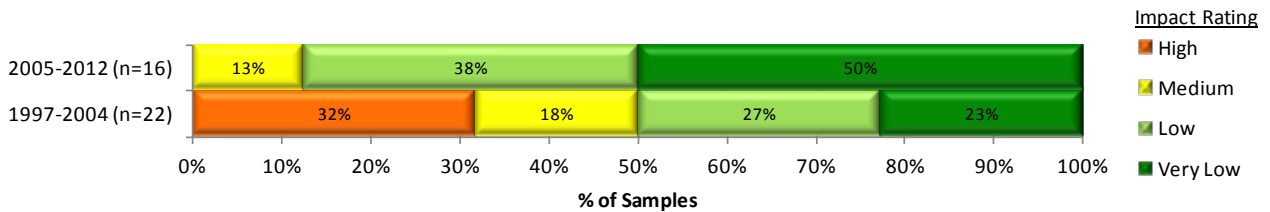
Golden TSA Water Quality (fine sediment): Resource Development Impacts on Water Quality



Summary:
 Of the 88 road segments assessed from 2008 to 2012, 60% were rated as having “very low” or “low” road-related impact.
 Site assessments show the range for potential sediment generation as 34% “very low” (“very low” impact), 26% “low” (“low” impact), 33% “moderate” (“medium” impact), 7% “high” or “very high” (“high” impact).
Causal Factors:
 See opportunities for improvement for “medium” or “high” impacted road segments. Some opportunities will apply to ongoing maintenance issues, while others would mainly apply to new road construction.

Overall Stewardship Trend: *Insufficient data*
 Trending for water quality is based on survey years, to capture impact of road traffic and maintenance. There is insufficient data in later survey years to allow for trending.
Opportunities For Improvement:
 The most frequent suggested maintenance issues are: armour, seed and protect bare soil; use better quality material; crown roads; and avoid road use when wet or thawing.

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



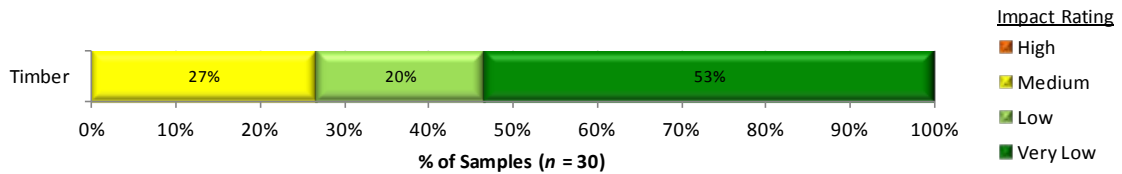
Summary:
 Of 38 cutblocks sampled (combined *FPC* and *FRPA* eras), 66% of sites were rated “very low” or “low” harvest-related impact.
 Considering total retention, retention quality, and coarse woody debris quantity and quality, 34% sites are rated as “very low” impact on biodiversity, 32% as “low,” 16% as “medium,” and 18% as “high” impact.
 Two additional cutblocks were sampled, but could not be categorized due to lack of baseline for one biogeoclimatic ecosystem classification subzone and no plot data for patch retention when a patch existed for the other (likely due to a safety issue).
Causal Factors:
 77% of all blocks had more than 3.5% tree retention, increasing to 94% in the *FRPA*-era. Percent retention increased from 11.2% in the *FPC*-era to 20.1% in *FRPA*-era. Large patches (≥2 ha) are more prevalent in the *FRPA*-era compared to the *FPC*-era.

Overall Stewardship Trend: *Improving* ↑
 There is increase in stewardship ratings between the *FPC*-era to the *FRPA*-era. The biggest improvement is due to fewer “very low” impacted retention blocks in the *FRPA*-era. Retention quality increased in the *FRPA*-era considering large patches, large snags (≥30 cm and ≥10 m), large diameter trees (≥40 or 50 cm dbh dependent on ecosystem) and number of tree species retained, though further improvement in number of tree species would be beneficial.
Opportunities For Continued Improvement:
 Continue trend to leave at least low levels of retention on every cutblock and maintain large snags and big trees for the site. Increase retention quality by retaining a wide variety of tree species.

Golden TSA Visual Quality: Resource Development Impacts on Achievement of Visual Quality Objectives

There are only eight FPC-era and three FRPA-era Visual Quality samples in the Golden TSA. Analysis will be completed in subsequent years when more samples are available.

Golden TSA Timber Resource Value: Resource development impacts on the overall health and stocking of managed 20-40 year stands



Summary:

Of the 30 polygons sampled (2009-2011) the weighted average well-spaced density over the three biogeoclimatic ecosystem classification (BEC) subzones achieved 84% of target stocking standard (TSS).

Percent of target stocking standard by BEC

BEC	MS	ESSF	ICH	Average
TSS	87%	100%	81%	84%

73% of the polygons were rated “very low” or “low” impact to health and stocking; 27% “medium” and 0% “high”.

A draft Stand Development Monitoring TSA data summary report was produced for the Golden TSA. The mean age of all the stands was 26.5 years. The four leading stand damaging agents were: Unknown (U); tree competition (VT); Western gall rust (DSG); Comandra blister rust (DSC).

Agent	U	VT	DSG	DSC
300 plots	80/300	74/300	56/300	53/300

The average total stems/ha (for all BECs) at declaration was 4194 and 3708 at the time of stand development monitoring. Well-spaced at declaration was 1091 and 1052 at the time of stand development monitoring. There was no shift in leading species from declaration to the time of stand development monitoring in 83% of the polygons sampled (n=23).

Causal Factors:

The major contributing factor to the eight “medium” impact rated polygons was a combination of relatively low total and well-spaced stems/ha. It is unclear whether there was low stand density was a result of spacing. If these low densities are attributed to spacing their productivity should be re-evaluated. Half of the “medium” impact rated polygons were missing the total and well-spaced stems/ha data at declaration. If the low stand density existed at declaration then a further investigation of why may help provide recommendations for increasing planting density or species mix. Of the polygons assessed to-date the stands appear to be very healthy and productive.

Overall Stewardship Trend:

No trend can be established at this time

Opportunities For Continued Improvement:

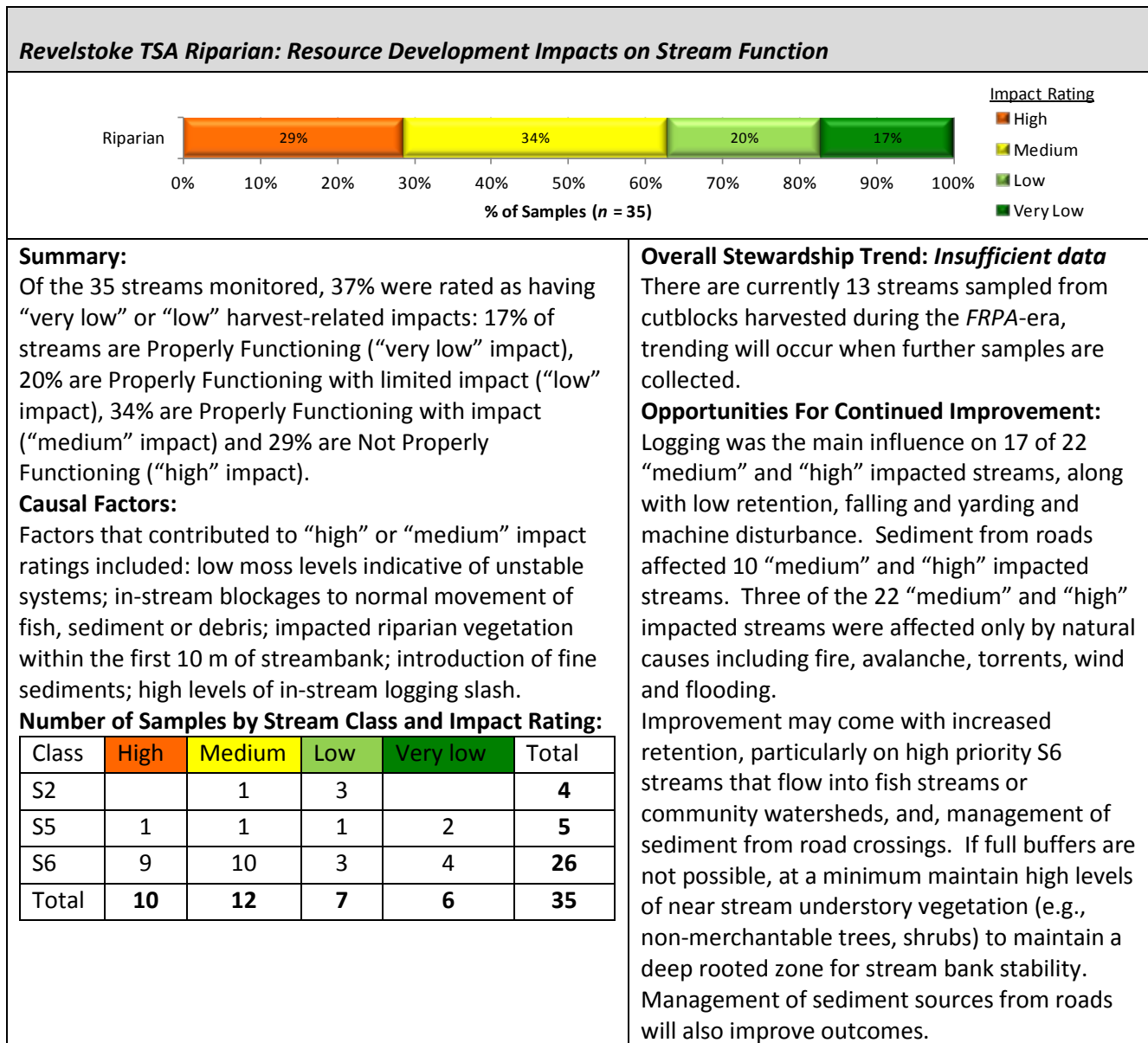
A closer investigation is needed of the “medium” impact rated stands to see if they were spaced. A complete set of declaration and stand development monitoring data would provide a clearer picture of the polygons sampled.

NOTE: Completing the Stand Development Monitoring Polygon Cover sheet will provide a clearer picture why some stands have such low stocking

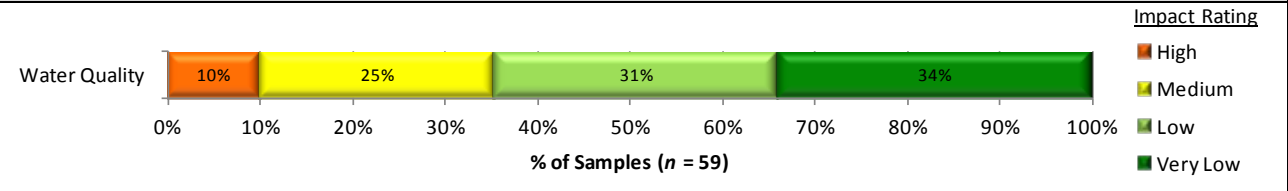
Golden TSA Soils: Resource Development Impacts on Soil Productivity and Hydrologic Function

There are currently only six soils samples in the Golden TSA. Analysis will be completed in subsequent years when more samples are available.

Table 2: Resource development impact rating, key findings, and opportunities for improvement by resource value for the Revelstoke Timber Supply Area.



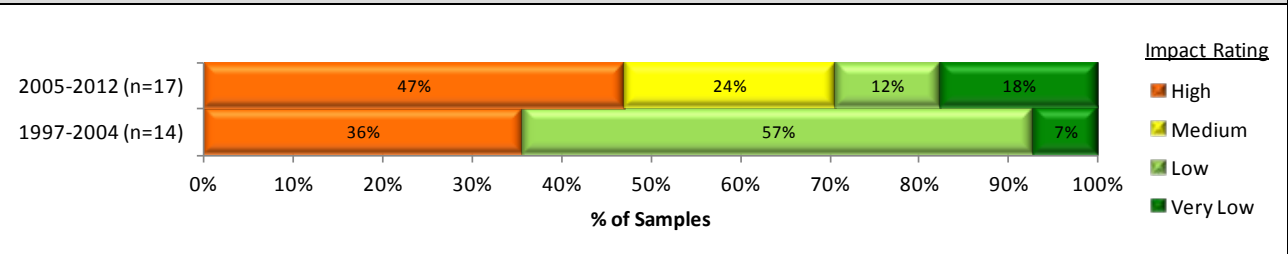
Revelstoke TSA Water Quality (fine sediment): Resource Development Impacts on Water Quality



Summary:
 Of the 59 road segments assessed, 64% were rated as having “very low” or “low” road-related impact. Site assessments show the range for potential sediment generation as 34% “very low” (“very low” impact), 31% “low” (“low” impact), 25% “moderate” (“medium” impact), 10% “high” or “very high” (“high” impact).
Causal Factors:
 See opportunities for improvement for “medium” or “high” impacted road segments. Some opportunities will apply to ongoing maintenance issues, while others would mainly apply to new road construction.

Overall Stewardship Trend: *Insufficient data*
 Trending for water quality is based on survey years, to capture impact of road traffic and maintenance.
Opportunities For Improvement:
 The most frequent suggested maintenance issues are: avoid road use when wet or thawing; armour, seed and protect bare soil; and, increase the number of strategically located culverts.

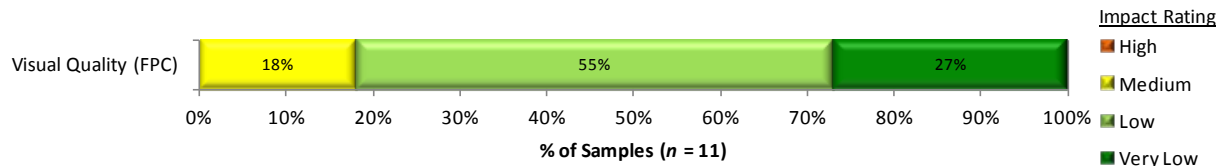
Revelstoke TSA Stand-level Biodiversity: Resource Development Impacts on Stand-Level Biodiversity



Summary:
 Of 31 cutblocks sampled (combined *FPC* and *FRPA* eras), 45% of sites were rated “very low” or “low” harvest-related impact. Considering total retention, retention quality, and coarse woody debris quantity and quality, 13% sites are rated as “very low” impact on biodiversity, 32% as “low,” 13% as “medium,” and 42% as “high” impact. There were four other blocks sampled that could not be categorized at this time due to lack of baseline, though individual indicators are assessed. Tree indicator baseline is from timber cruise plot data from the same subzone.
Causal Factors:
 57% of all blocks had more than 3.5% retention, decreasing to 41% in *FRPA*-era. For all samples, that meant 27% of the sampled area had low levels of retention (15 cutblocks <3.5%). Average retention is 14.9%. Retention quality indicators (e.g., density of large snags, big diameter trees, number of tree species) were low in both eras compared to that expected from baseline.

Overall Stewardship Trend: *Declining* ↓
 The driver for much of this decrease is the higher numbers of blocks with zero retention in the *FRPA*-era. The sample size is small in the *FPC*-era so take caution with any extrapolation of this data.
Opportunities For Continued Improvement:
 Leave at least low levels of retention on every cutblock. Increase retention quality by retaining the full range of tree species as present in pre-harvest conditions.

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



Summary:

Of the 13 landforms assessed (11 FPC and 2 FRPA cutblocks), 84% were rated with “very low” or “low” harvest-related impacts on achieving the Visual Quality Objectives.

VQOs were “well met” (“very low” impact on achieving VQO) on 38% of landforms, “met” (“low” impact) on 46%, and “borderline” (“medium” impact) on 15%.

Causal Factors:

None of the openings contained visually effective levels of tree retention (> 22% by volume or stem count) and 23% of landforms sampled had good visual quality design (cutblock shaping). Average percent alteration was low, at 4.7%.

Number of Samples by VQO and Impact Rating:

VQO ¹	High	Medium	Low	Very Low	Total
M			3	4	7
PR		2	2		4
R			1	1	2
Total	0	2	6	5	13

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

Overall Stewardship Trend: *Insufficient data*

There are only two landforms assessed under FRPA. Future trending analysis will use year of assessment.

Opportunities For 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.

Revelstoke TSA Timber Resource Value: Resource development impacts on the overall health and stocking of managed 20-40 year stands

There are currently only seven Timber samples in the Revelstoke TSA. Analysis will be completed in subsequent years when more samples are available.

Revelstoke TSA Soils: Resource Development Impacts on Soil Productivity and Hydrologic Function

There are currently only four Soils samples in the Revelstoke TSA. 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. 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.

RESOURCE VALUE STEWARDSHIP RESULTS COMPARISON

Tables 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 Kootenay Boundary 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)						
	Kootenay Boundary Region Comparison						Kootenay Boundary Region ^a
	Golden TSA	Revelstoke TSA	Cranbrook TSA	Invermere TSA	Kootenay Lake TSA	Arrow Boundary TSAs	
Riparian – all data	54% (35)	37% (35)	72% (25)	92% (25)	86% (14)	73% (48)	66% (182)
FRPA-era data	39% (18)	ID (13)	ID (9)	ID (4)	ID (8)	ID (10)	61% (62)
FPC-era data	71% (17)	36% (22)	69% (16)	90% (21)	ID (6)	71% (38)	68% (120)
Water quality – all data	60% (88)	64% (59)	78% (132)	77% (71)	ID (48)	73% (95)	73% (493)
2010–2012 samples	ID (35)	ID (28)	ID (51)	ID (52)		ID (8)	78% (222)
2008–2009 samples	ID (53)	ID (31)	74% (81)	ID (19)		76% (87)	68% (271)
Stand-level biodiversity –all data	66% (38)	45% (31)	55% (31)	31% (39)	36% (42)	42% (59)	45% (240)
FRPA-era data	88% (16)	29% (17)	69% (16)	25% (20)	50% (16)	50% (14)	52% (99)
FPC-era data	50% (22)	64% (14)	40% (15)	37%(19)	27% (26)	40% (45)	41% (141)
Visual Quality							
FRPA	ID (3)	ID (2)	20% (19)	ID (4)	ID (1)	45% (11)	39% (36)
FPC	ID (8)	82% (11)	ID (0)	ID (0)	62% (26)	ID (5)	68% (50)
Timber (stand development monitoring)	73% (30)	ID (7)	82% (28)	ID (0)	ID (0)	90% (29)	81% ^b (87)

^a Includes the Selkirk and Rocky Mountain Natural Resource Districts.

^b This does not include the Revelstoke TSA

DISTRICT MANAGER COMMENTARY¹

The evaluation criteria in this report is based upon stewardship objectives (e.g., sustainable resource management practices) and do not always correspond with the minimum standards set in legislation. A rating of “high” resource development impact does not necessarily mean that a practice has not met the legislation or the results and strategies contained within a forest licensee’s forest stewardship plan (FSP). The monitoring results reported in this document contain a mix of impact ratings, a number of the resource values still need more samples before a conclusion can be drawn.

Revelstoke TSA

Stand-level biodiversity assessments show a declining trend (higher percentages of blocks with “high” and “medium” impact to biodiversity) for blocks harvested 2005 and later compared to before 2005. This can be attributed to licensees harvesting and processing all timber felled at the landings to improve economic efficiencies of the timber removed. I encourage licensees to leave at least low levels of retention in every block with a range of retained tree species similar to pre-harvest conditions to improve this trend.

Riparian assessments potentially assess the cumulative effects of forestry practices and natural impacts on a stream reach. The majority of samples to date show “high” or “medium” impact to streams. More assessments are needed to confirm if this is a trend. Contributing factors are the introduction of fine sediments and logging slash. Licensees should be cognizant of yarding and machine disturbance around streams and ensure tree buffers remain intact.

The majority of water quality assessments are rated as “very low” or “low” impact, indicative of low levels of potential sediment generation. Though again the sample size is small and requires more samples to confirm if this is a trend. Issues noted are to avoid road use when wet or thawing, armour, seed and protect bare soil and increase the number of strategically located culverts and cross ditches.

Visual quality assessments are a majority of “very low” and “low” impact, with no “high” impact samples indicating that the majority have met the visual quality objectives. More assessments are needed to confirm if this is a trend.

Golden TSA

Stand-level biodiversity assessments show an increasing trend (more “very low” or “low” impact to biodiversity blocks) for blocks harvested after 2004. Retention quality has increased in the *FRPA*-era blocks due to fewer blocks with very low retention and to licensees considering larger patches, leaving large snags, large diameter trees left on site and an increased number of tree species retained on site. To continue this trend licensees are encouraged to leave at least low levels of retention on every cutblock by retaining a wide variety of tree species.

Riparian assessments show a decreasing trend (more “medium” to “high” impacted streams) after 2004. Contributing factors are largely due to logging slash and sediment entering streams which scours moss and causes in-stream blockages. Licensees should be cognizant of yarding and machine disturbance around streams and ensure buffers remain intact.

Water quality assessments show the majority of the samples rated as “very low” and “low” impact, indicative of low sediment generation potential. However, more samples are required to confirm if this is a trend. Issues regarding new construction and maintenance will help to improve water quality. Licensees are encouraged to

¹ Commentary supplied by Selkirk Natural Resource District Manager, Garth Wiggill

avoid road use when wet or thawing, armour, seed and protect bare soil and increase the number of strategically located culverts and cross ditches.

Timber is assessed through the Stand Development Monitoring protocol. Thirty samples have been collected and summarized in this report. No full conclusion can be established at this time as further information is needed on the “medium” impact samples. Of the polygons assessed to date the stands appear to be very healthy and productive.

District staff should continue to monitor practices for all values with an emphasis on those related to riparian, water quality and visual quality to gain sufficient samples so that trends can be established for these values.

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?	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 Columbia Natural Resource District as compared to adjacent TSAs or districts. Table A2.1 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 Golden and Revelstoke Timber Supply Areas.

Resource Value	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + Low resource development impact rating (sample size in brackets)					
	Columbia District		Forests, Lands and Natural Resource Operations Areas			Province
	Golden TSA	Revelstoke TSA	North	South	Coast	
Riparian – all data	54% (35)	37% (35)	71% (654)	69% (678)	58% (451)	67% (1783)
FRPA-era data	39% (18)	ID (13)	71% (257)	68% (277)	62% (198)	67% (732)
FPC-era data	71% (17)	36% (22)	71% (394)	70% (401)	55% (253)	67% (1048)
Water quality – all data	60% (88)	64% (59)	66% (992)	70% (1515)	76% (1526)	71% (4033)
2010–2012 samples	ID (35)	ID (28)	67% (505)	70% (823)	79% (1021)	73% (2349)
2008–2009 samples	ID (53)	ID (31)	64% (487)	70% (692)	70% (505)	68% (1684)
Stand-level biodiversity –all data	66% (38)	45% (31)	42% (655)	54% (780)	77% (455)	56% (1890)
FRPA-era data	88% (16)	29% (17)	49% (270)	61% (347)	84% (201)	63% (818)
FPC-era data	50% (22)	64% (14)	38% (385)	49% (433)	72% (254)	50% (1072)
Visual Quality						
FRPA	ID (3)	ID (2)	73% (122)	54% (136)	78% (153)	69% (411)
FPC	ID (8)	82% (11)	56% (96)	65% (85)	62% (68)	61% (249)