



# Multiple Resource Value Assessment (MRVA)

Thompson Rivers Natural Resource 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 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.

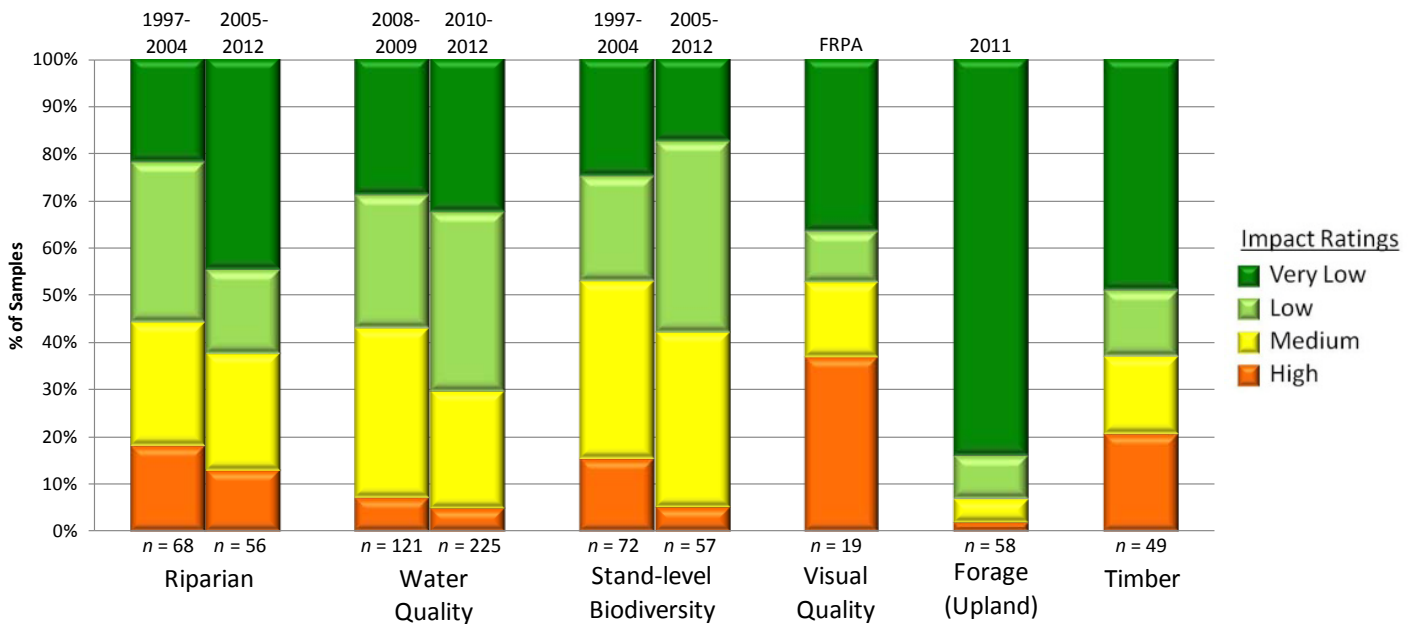
I encourage readers to review the full report and direct any questions or comments to the appropriate district office.

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

## MULTIPLE RESOURCE VALUE ASSESSMENTS—IN BRIEF

Multiple resource value assessments show 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, water quality (sediment), visual quality, forage and timber (stand development) monitoring conducted in the Thompson Rivers Natural Resource 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: Thompson Rivers Natural Resource District site-level resource development impact ratings by resource value with trend (Riparian, stand-level biodiversity and visual quality trend by harvest year/era. Water quality and forage trend 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 Thompson Rivers Natural Resource 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.

## THOMPSON RIVERS NATURAL RESOURCE DISTRICT – ENVIRONMENTAL AND STEWARDSHIP CONTEXT

This report covers the Thompson Rivers Natural Resource District encompassing the Kamloops TSA and Tree Farm Licences (TFL) 18 and 35 (figure 2). It ranges from Logan Lake in the south to Wells Gray Park in the north-west, including the Blue River area, and is bounded by the Columbia Mountains to the east and the Cariboo area to the west. The TSA and associated TFLs cover approximately 2.88 million hectares. The public sector, forestry and tourism are the major employment sectors, with agriculture, construction and mining also contributing to the local economy. Wells Gray Provincial Park encompasses a large section of the district, but several other provincial parks are also found within the district including Bonaparte Provincial Park, Tunkwa Provincial Park, Dunn Peak Protected Area and Lac Du Bois Grasslands Protected Area. Grizzly bear, black bear, mule deer, moose, bighorn sheep and many smaller furbearers, as well as many species of birds and amphibians, are common. The district includes portions of the range of three herds of mountain caribou. Ten First Nations reside in communities located within the district, including the Adams Lake Indian Band, Bonaparte Indian Band, Kamloops Indian Band, Simpcw First Nation, Neskonlith Indian Band, Skeetchestn Indian Band, Whispering Pines/Clinton Indian band, Little Shuswap Indian Band, Ashcroft Indian Band and Oregon Jack Indian Band. Nine First Nations communities have traditional interests within the Thompson Rivers district, but reside outside the TSA. These communities include: High Bar, Splat's in (Spallumcheen), Lower Nicola, Upper Nicola, Xaxl'ip (Fountain), Ts'kw'aylaxw (Pavilion), Cook's Ferry, Lheidli T'enneh and Canim Lake.

Located in south central BC, the Thompson Rivers Natural Resource District is represented by a variety of ecosystems including grasslands, low elevation dry Douglas-fir forest types, wet interior cedar hemlock and high elevation cold and wet Engelmann spruce subalpine fir. The district offices are located in Kamloops (2011 pop of 87 654), with 38 staff, and Clearwater (2011 population of 2 314), with 8 staff. Also included are the communities of Ashcroft, Barriere, Blue River, Cache Creek, Chase, Little Fort, Logan Lake, Savona, and Vavenby.

### *Thompson Rivers Natural Resource District Statistics (July 2012):*

#### **Land Base (ha):**

Gross Area	2,769,417
Total Crown Range	1,057,000
Grazed Crown Range	1,004,160
Timber Harvesting Land Base (Kamloops TSA only)	949,474

#### **Range:**

Range Act tenures:	150
Animal Unit Months (1 cow/calf)	105,000
Livestock under tenure	22,000
Grazing lease tenures	114
Grazing lease hectares	69,286

**Allowable Annual Cut (m<sup>3</sup>/yr):**

Non-Pine Leading	1,700,000
Pine Leading	1,994,000
Cedar/Hemlock Leading	200,000
PA 16	86,000
Deciduous Leading	<u>20,000</u>
<b>Total</b>	<b>4,000,000</b>

**Forest Tenures (m<sup>3</sup>/yr):**

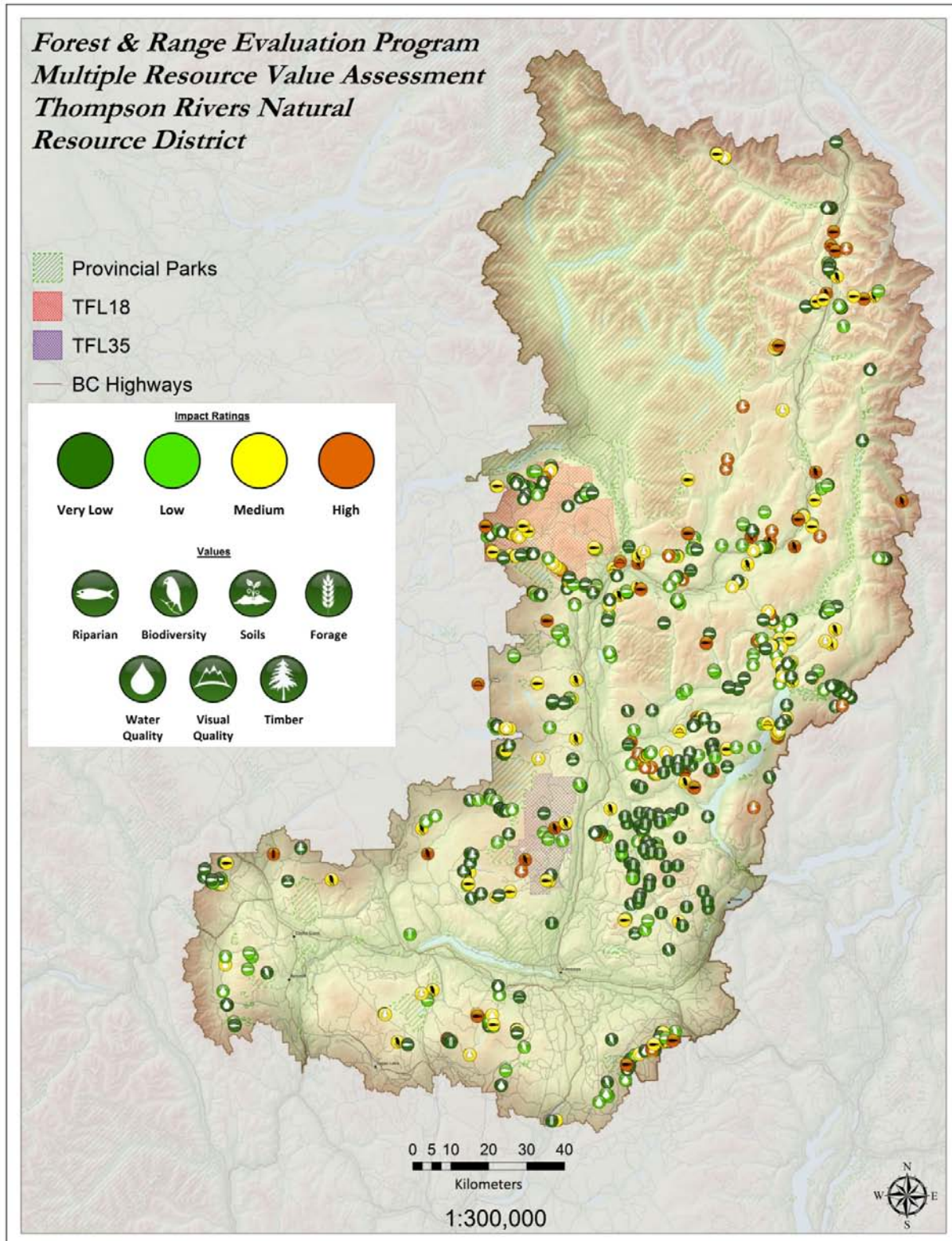
TFL 18 (Canadian Forest Products Ltd.)	279,500
TFL 35 (West Fraser Mills Ltd.)	125,000
Non- Replaceable Forest Licenses (21)	842,106
Renewable Forest Licences (9) (Canfor, Tolko, Gilbert Smith, Interfor, Stella-Jones, West Fraser)	1,570,637
BCTS	764,476
Pulpwood Agreement (Ainsworth Lumber Co. Ltd.)	86,000
3 Community Forest Agreements (Logan Lake, North Thompson and Wells Gray)	73,000
50 Woodlots	96,900
2 Timber Licences (Gilbert Smith and Interfor)	21,537 ha

Since the Mountain pine beetle (IBM) outbreak, significant effort has been made to salvage the lodgepole pine (Pli). Area affected by IBM includes not only over mature and mature Pli, but also some of the 25+ year old Pli in plantations. Mature Pli is no longer a significant presence in the forests of the Thompson Rivers Natural Resource District and there is an operational shift occurring to harvest spruce/balsam and Douglas-fir forests.

The diversity of ecosystems and a broad range of values over the landbase require complex management and monitoring strategies.



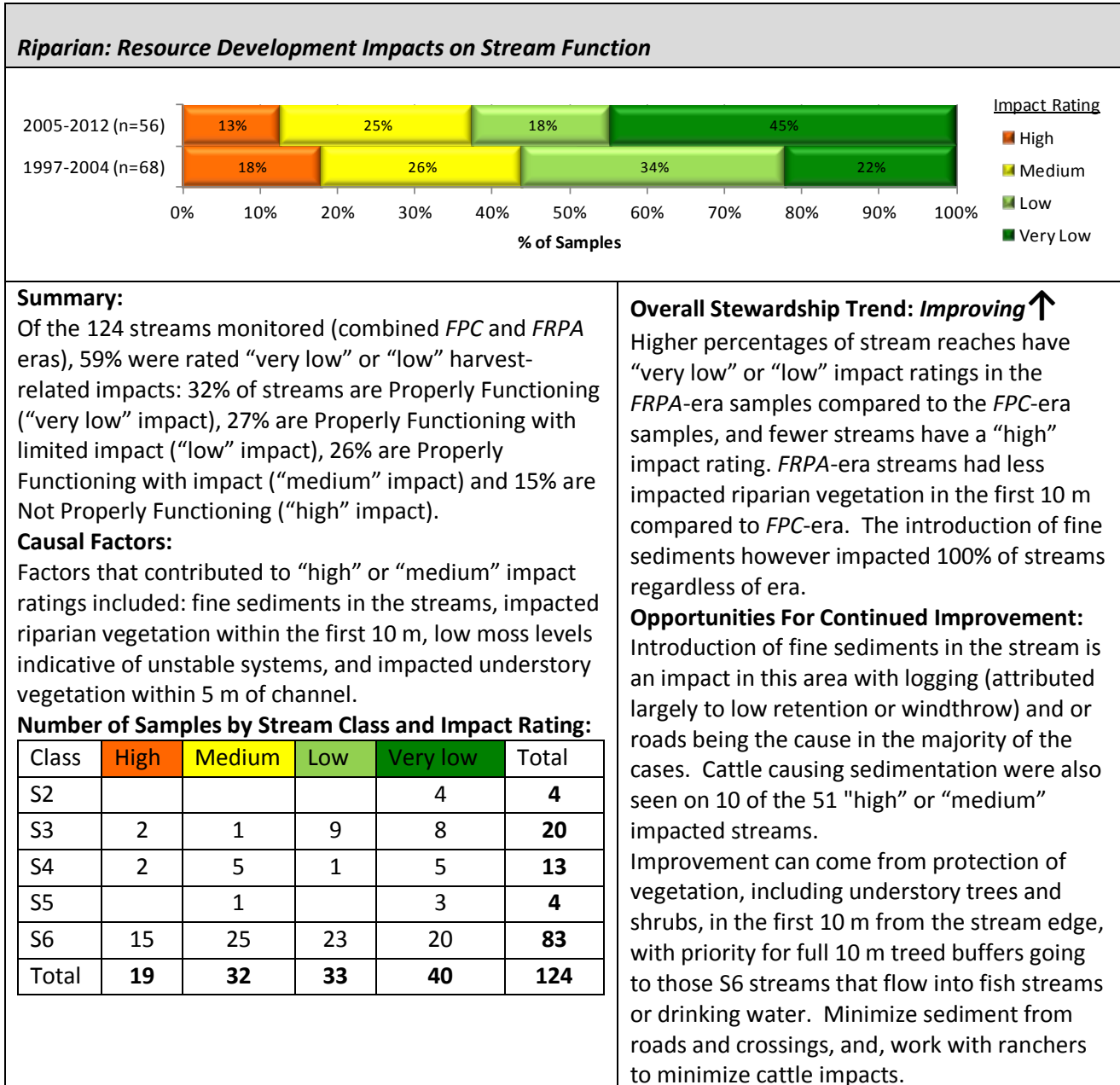
Figure 2: Thompson Rivers Natural Resource District, showing FREP sample locations and results (see <http://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm> for a high-resolution version of this map).



## KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

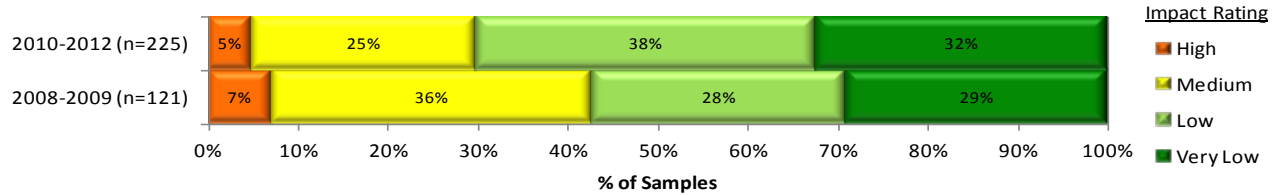
Table 1 shows the resource values assessed for the Thompson Rivers Natural Resource District, and includes a summary of key findings, causal factors, trends, and opportunities for continued improvement. Data are presented for *FPC*-era samples at sites harvested before 2005 and *FRPA*-era samples at sites harvested in 2005 or later. This approximates the *Forest and Range Practices Act* (*FRPA*) era, and allows for a comparison between earlier and later stewardship practices. The impact rating indicates the effect of 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 Thompson Rivers Natural Resource District.**





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



**Summary:**

Of the 346 road segments assessed from 2008 to 2012, 66% were rated as “very low” or “low” road-related impact.

Site assessments show the range for potential sediment generation as 31% “very low” (“very low” impact), 34% “low” (“low” impact), 29% “moderate” (“medium” impact), 5% “high” and 0% “very high” (“high” impact).

**Causal Factors:**

See opportunities for improvement. Some opportunities will apply to ongoing maintenance issues, while others would mainly apply to new road construction.

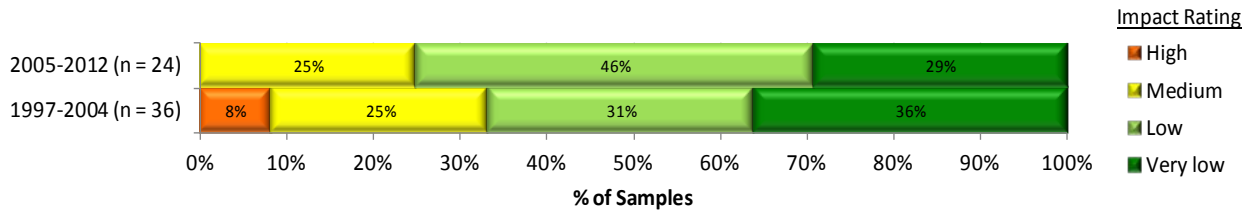
**Overall Stewardship Trend: *Increasing* ↑**

Trending for water quality is based on survey years, to capture impact of road traffic and maintenance. There has been large improvement in recent years

**Opportunities For Improvement:**

The most frequent suggested maintenance issue is use cross ditches and kickouts to move sediment away from the road into the surrounding forest. Other opportunities are removal of grader berms that channel sediment, armour seed and protect bare soil, and, use good quality materials and crown roads.

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



**Summary:**

Of 129 cutblocks sampled (combined *FPC* and *FRPA*-eras), 52% of sites were rated as “very low” or “low” harvest-related impact. Considering total retention, retention quality, and coarse woody debris quantity and quality, 22% sites are rated as “very low” impact on biodiversity, 30% as “low,” 37% as “medium,” and 11% as “high.” Two additional blocks were sampled but could not be ranked due to insufficient baseline though individual indicators are assessed.

**Causal Factors:**

Coarse woody debris volume in harvested areas increased from the *FPC*-era (average: 125 m<sup>3</sup>/ha) to the *FRPA*-era (average 196 m<sup>3</sup>/ha). Coarse woody debris quality (i.e., volume from ≥20 or 30 cm dbh pieces, and density of big coarse woody debris ≥20 cm dbh and ≥10 m long) improved. 73% of all blocks had more than 3.5% treed retention.

Retention decreased from an average 15.6% in the *FPC*-era to 11.0% in *FRPA*-era. Retention quality decreased.

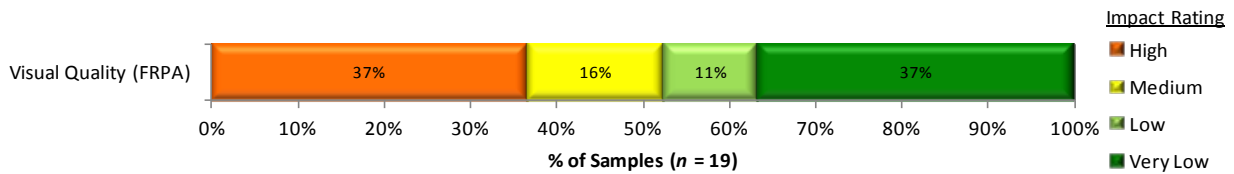
**Overall Stewardship Trend: *Neutral***

There is a decrease in % treed retention and a decrease in retention quality, and an increase in coarse woody debris quality.

**Opportunities For Continued Improvement:**

A large improvement will come from leaving >3.5% retention on every cut block. During the *FPC*-era, 28% of cutblocks had <3.5% retention. This decreased to 23% in the *FRPA*-era but should still be improved. Continue trend to good quality coarse woody debris (i.e., big pieces). Increase retention quality by retaining large trees (e.g., ≥40 or 50 cm dbh) in densities similar to pre-harvest conditions. Leave the full range of tree species available. Look for more opportunities to leave large retention patches (>2 ha).

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



**Summary:**

Of the 19 landforms assessed (all *FRPA* cutblocks), 48% were rated with “very low” or “low” harvest-related impacts on achieving the Visual Quality Objectives.

VQOs were “well met” (“very low” impact) on 37% of landforms, “met” (“low” impact) on 11%, “borderline” (“medium” impact) on 16%, “not met” on 11%, and “clearly not met” (“high” impact) on 26%.

**Causal Factors:**

11% of the openings contained visually effective levels of tree retention (> 22% by volume or stem count) and 26% of landforms sampled had good visual quality design (cutblock shaping).

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

VQO <sup>1</sup>	High	Medium	Low	Very Low	Total
M			1	3	4
PR	5	3	1	4	13
R	2				2
Total	7	3	2	7	19

<sup>1</sup> M = modification, PR = partial retention, R = retention

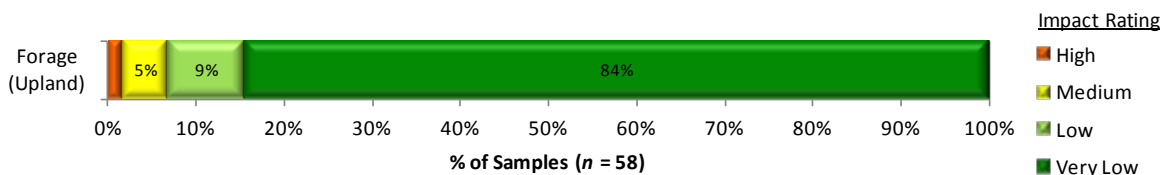
**Overall Stewardship Trend: *Insufficient data***

No data for *FPC* cutblocks to allow for trending. Future trend analysis will use year of harvest.

**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.

**Forage: Resource Development Impacts on Desired Plant Succession and Water Cycle/Hydrologic Function**



**Summary:**

Range staff conducted 58 upland health assessments, 13 wetland health assessments, and 11 stream health assessments in 2011. Upland assessments rated 84% as “very low” impact, 9% as “low”, 5% as “medium”, and 2% in the “high” category.

**Causal Factors:**

Most livestock grazing is within an acceptable level of use. However, livestock grazing does affect ecosystem function where inadequate distribution allows animals to overgraze an area or when a tenure is licensed to graze more animals than it has the capacity to sustain. In-growth of trees or initial overestimation of carrying capacity contributes to this overstocking in some areas. Lack of management or lack of fencing also contributes to poor distribution.

**Overall Stewardship Trend: *Insufficient data***

There was no *FPC*-era sampling. Future trend analysis will use year of assessment.

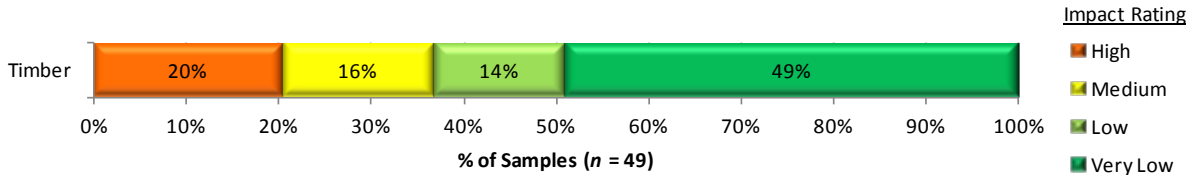
**Opportunities for Improvement:**

Range tenure holders can improve rangeland health by increasing riding on their tenure and improving salting practices. Range staff promotes the construction of fences where appropriate and when funds allow to replace lost natural range barriers or where distribution problems occur. Staff review licences prior to renewal to ensure tenures are not overstocked. Comprehensive analyses of carrying capacity on tenures that appear to be overstock are completed with the goal to reduce animals on overstocked tenures. Forest licencees can help reduce grazing effects by increasing tree retention, which acts to restrict or impede cattle access near fish bearing and/or drinking water sources.

**Soils: Resource Development Impacts on Soil Productivity and Hydrologic Function**

There are currently only eight Soils samples in the Thompson Rivers Natural Resource District (two rated “low” impact and six rated “very low” impact to soil productivity and hydrologic function. Analysis will be completed in subsequent years when more samples are available.

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



**Summary:**

Of the 50 polygons sampled (2009-2011) only 49 were use in this summary. The excluded polygon only had 800 total and 420 well spaced stems/ha. The weighted average well spaced density over the three biogeoclimatic ecosystem classification (BEC) zones (MS, ESSF, ICH, IDF) achieved 81% of Target Stocking Standard (TSS).

**Percent of target stocking standard by BEC**

BEC	IDF	ESSF	ICH	MS	Ave
TSS	82%	75%	79%	91%	81%

63% of the polygons were rated “very low” or “low” impact to health and stocking, 16% “medium” and 20% “high”. All nine “high” impacted polygons were a result of low total and well spaced stems/ha. A draft Stand Development Monitoring TSA Data Summary report was produced for the Kamloops TSA. The mean age of all the stands was 22.8 years. The five leading stand damaging agents were: snow press (NY); Western gall rust (DSG); tree competition (VT); unknown (U);, and Armillaria root disease (DRA).

Agent	NY	DSG	VT	U	DRA
500 plots	91/500	86/500	70/500	62/500	61/500

The average total stems/ha (all BECs) at declaration was 4971 and 3733 at the time of stand development monitoring. Well spaced at declaration was 1086 and 1060 at the time of stand development monitoring. There was no shift in leading species from declaration to the time of stand development monitoring in 18 (78%) of the polygons sampled (n=23).

**Causal Factors:**

The major contributing factor to the “medium” and “high” impacted polygons was a combination of either relatively low total and/or low 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 would be re-evaluated.

**Overall Stewardship Trend:**

No trend can be established at this time

**Opportunities For Continued Improvement:**

A closer investigation is needed of the “medium” and “high” impacted stands to see if they were spaced. A complete set of declaration and stand development monitoring data would provide a more clear 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.

**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?**

This protocol is 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

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 stewardship effectiveness results by resource value for the North, South and Coast Areas and the province as a whole.

**Table 2: Stewardship effectiveness within the Thompson Okanagan 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)				
	Thompson Okanagan Region Comparison				Thompson Okanagan Region <sup>a</sup>
	Thompson Rivers District	Merritt TSA	Lillooet TSA	Okanagan-Shuswap District	
Riparian – all data	<b>59%</b> (124)	<b>64%</b> (47)	<b>55%</b> (11)	<b>80%</b> (65)	<b>65%</b> (247)
FRPA-era data	63% (56)	55% (22)	ID (7)	78% (37)	66% (122)
FPC-era data	56% (68)	72% (25)	ID (4)	82% (28)	65% (125)
Water quality – all data	<b>65%</b> (346)	<b>41%</b> (84)	<b>39%</b> (18)	<b>67%</b> (230)	<b>62%</b> (678)
2010–2012 samples	70% (225)	42% (77)	39% (18)	62% (109)	62% (429)
2008–2009 samples	57% (121)	ID (7)	ID (0)	70% (121)	63% (249)
Stand-level biodiversity –all data	<b>52%</b> (129)	<b>55%</b> (60)	<b>ID</b> (8)	<b>40%</b> (77)	<b>49%</b> (274)
FRPA-era data	58% (57)	71% (31)	ID (4)	44%(45)	57% (137)
FPC-era data	47% (72)	38% (29)	ID (4)	34% (32)	42% (137)
Visual Quality					
FRPA	<b>47%</b> (19)	<b>39%</b> (23)	<b>ID</b> (0)	<b>82%</b> (22)	<b>56%</b> (64)
FPC	<b>ID</b> (0)	<b>ID</b> (0)	<b>ID</b> (0)	<b>ID</b> (4)	<b>ID</b> (4)
Timber (stand development monitoring)	<b>63%</b> (49)	<b>78%</b> (22)	<b>ID</b> (0)	<b>ID</b> (10)	<b>67%</b> <sup>2</sup> (71)

<sup>a</sup> Includes the Thompson Rivers, Cascades and Okanagan-Shuswap Natural Resource Districts.

<sup>b</sup> Does not include Okanagan-Shuswap

## DISTRICT MANAGER COMMENTARY<sup>1</sup>

The monitoring results presented in this document show that impacts from forest practices under the *FRPA* can be rated as “low” or “very low” on half or more of the sites sampled for: Riparian, Water Quality, Stand Level Biodiversity, Forage and Stand Development Monitoring. Visual Quality impacts are rated as “low” or “very low” on slightly less than half of the sites sampled. Results from the indicators being monitored generally show a positive trend from *FPC*-era management to *FRPA* management, with more sites having “low” or “very low” impacts from resource development under the *FRPA*.

I acknowledge that the environmental, social and economic conditions in the Thompson Rivers Natural Resource District provide many challenges for forest management. In particular, the mountain pine beetle (MPB) epidemic has focused timber harvesting on the extraction of dead and dying lodgepole pine while it retains its value. It is challenging to identify areas for improvement in a broad brush manner given the diverse environmental conditions throughout the district. As the Kamloops TSA exits the salvage harvesting of beetle-infested pine, a more balanced perspective of the competing values will be the expected norm. To achieve this new state may require some refresher training for forest practitioners as during the salvage period, management practices were in the back-country and, in general, less complex to the front-country where the mid-term timber supply will be found.

Although not all of the comments and suggestions below will apply in every circumstance, they should be considered, as there are always opportunities to improve management practices as new and better information becomes available.

### *Riparian Management*

The impact on streams of all classes in the Kamloops TSA has decreased under the *FRPA*, meaning that there are more streams in the “low” and “very low” impact categories. One consistent issue identified throughout the district and all stream classes is sediment delivery. There are a number of reasons for the delivery of fine sediments but opportunities for improvement include: ensuring the retention of deeply rooted understory vegetation in the riparian area, limiting the introduction of logging debris into the channel, minimizing road or skid crossings of the stream and preventing/minimizing cattle use of the stream. In areas where cattle are present, consider natural range barriers to minimize cattle impacts as well as off site water. Continue to follow the Range document *2013 communication best practices* available through Thompson Rivers Natural Resource District Range staff.

### *Water Quality Management*

The impacts from resource development on water quality are lower under the *FRPA* than under the *FPC*. Ensuring this trend continues requires that attention is paid to the following practices that reduce the impact to water quality when building new roads; use good quality road materials, design roads to avoid long gradients approaching streams, increase the number of strategically located culverts, and crown road surfaces. On existing roads, good road maintenance is critical to maintaining the flow of water and reducing sediment delivery to streams. Best management practices to ensure this are: remove berms that channel sediment into water bodies, increase the use of cross ditches, armour, and seed and protect bare soil.

### *Stand-level Biodiversity Management*

A component of stand level biodiversity is improving under the *FRPA* - increase in coarse woody debris quality and abundance; while the other component is not improving - lower quality and abundance of dispersed and patch retention. MPB salvage harvesting has led to species discrepancies between harvested trees and

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<sup>1</sup> Commentary supplied by Thompson Rivers Natural Resource District Manager, Rick Sommer.



retention trees. In many lodgepole pine leading stands, the retention is focused on Douglas-fir and aspen. Effort needs to be made to leave representative retention (minimum 3.5%), both patch and single tree, on every cut block including large trees, snags and multiple tree species similar to the range of species found in pre-harvest conditions. Increasing the size and frequency of wildlife tree patches will help to meet the retention and species diversity objective. Leaving large pieces of coarse woody debris (>10 cm dbh and >10 m long) over many blocks will further improve biodiversity value. As harvesting moves from lodgepole pine dominated stands, more consideration should be given to appropriate harvesting and retention strategies in different forest types.

### **Visual Quality Management**

Over the last number of years, salvage of MPB affected stands has been the focus of harvesting. During that time, there has been a dramatic effect on the visual quality of the landscape due to the relaxation in achieving the VQOs in partial retention and retention landscapes. Now that, for the most part, the Kamloops TSA has moved out of the MPB era, there needs to be a re-emphasis on achieving VQOs. Provincially, in the *FRPA*-era, the proportion of openings containing good and moderate amounts of retention has dropped, as blocks with retention of 15% or less stems has risen from 48% to 73% (*A Snapshot in Time – Visual Evaluation Progress Report, March 6, 2012*). Greater consideration needs to be put on visual design techniques, in block retention and cut block size. While it is recognized that under some circumstances exemptions from meeting VQOs will be necessary, a more balanced approach to visual quality management is necessary. Where expertise has been lost, opportunities for Visual Quality training or re-training should be pursued.

### **Upland Forage**

In general, results indicate that upland forage use is in the good and fair categories. Information has been collected in Thompson Rivers Natural Resource District for a number of years with the number of assessments increasing. The data reflects the average use of upland sites through targeted sampling over that same period. Due to the nature of the range business, with cattle ranging over broad areas, it has been found that selecting uplands with average use in primary and secondary range areas provides representative data. Trend information is not possible at this time. Preliminary data has been collected for Riparian and Wetland forage, but too few sites have been sampled for results.

### **Stand Development Monitoring**

Although trends aren't yet available, preliminary information indicates that stands that were spaced were more attractive to MPB than un-spaced stands which appears to have negatively impacted some of the oldest Lodgepole pine plantations in the south portion of the district. In the northern portion of the district, evidence that lodgepole pine is not an appropriate leading species is becoming apparent as forest health issues on the lodgepole pine have eliminated it from many stands causing a leading species conversion. Data collection is ongoing for managed stands and data summaries in the future will help statutory decision makers and operational foresters make informed decisions on stand development, Timber Supply Review data package inputs, Forest Stewardship Plan renewals and Forests for Tomorrow activity priorities.

## 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](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 Thompson Rivers 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 Thompson Rivers Natural Resource District.**

Resource Value	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + low resource development impact rating (sample size in brackets)				
	Thompson Rivers District	Forests, Lands and Natural Resource Operations Areas			Province
		North	South	Coast	
Riparian – all data	<b>59%</b> (124)	<b>71%</b> (654)	<b>69%</b> (678)	<b>58%</b> (451)	<b>67%</b> (1783)
FRPA-era data	63% (56)	71% (257)	68% (277)	62% (198)	67% (732)
FPC-era data	56% (68)	71% (394)	70% (401)	55% (253)	67% (1048)
Water quality – all data	<b>65%</b> (346)	<b>66%</b> (992)	<b>70%</b> (1515)	<b>76%</b> (1526)	<b>71%</b> (4033)
2010–2012 samples	70% (225)	67% (505)	70% (823)	79% (1021)	73% (2349)
2008–2009 samples	57% (121)	64% (487)	70% (692)	70% (505)	68% (1684)
Stand-level biodiversity all data	<b>52%</b> (129)	<b>42%</b> (655)	<b>54%</b> (780)	<b>77%</b> (455)	<b>56%</b> (1890)
FRPA-era data	58% (57)	49% (270)	61% (347)	84% (201)	63% (818)
FPC-era data	47% (72)	38% (385)	49% (433)	72% (254)	50% (1072)
Visual Quality					
FRPA	<b>47</b> (19)	<b>73%</b> (122)	<b>54%</b> (136)	<b>78%</b> (153)	<b>69%</b> (411)
FPC	<b>ID</b> (0)	<b>56%</b> (96)	<b>65%</b> (85)	<b>62%</b> (68)	<b>61%</b> (249)