



Multiple Resource Value Assessment (MRVA)

Kalum Timber Supply Area

Coast Mountains 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.

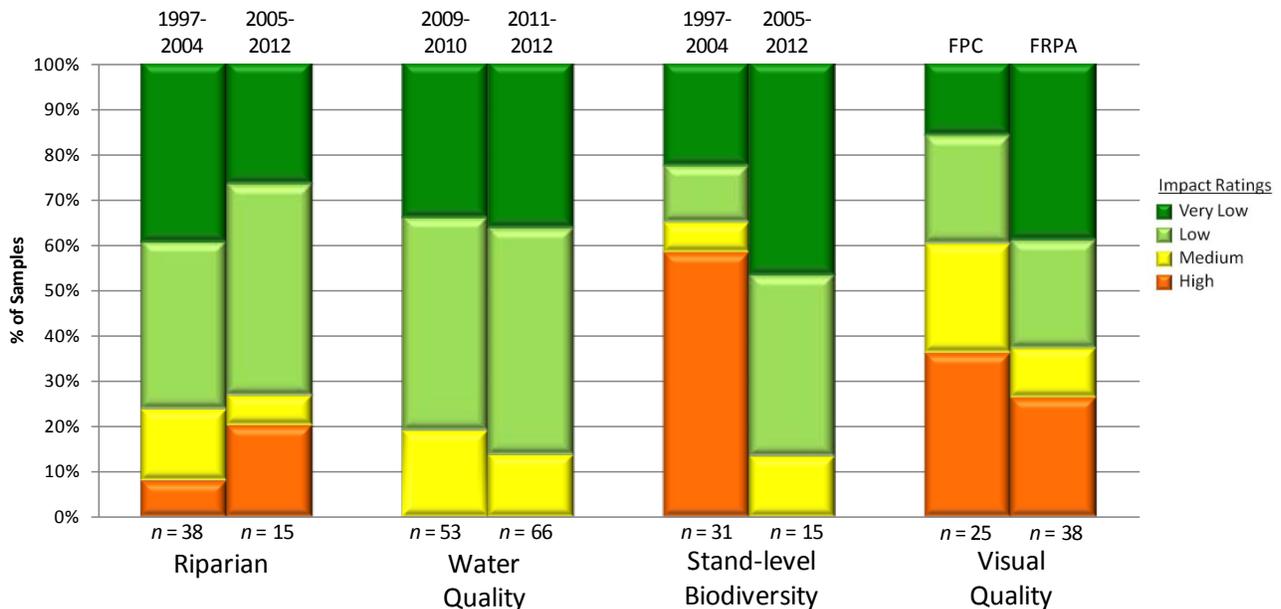
I encourage readers to review the full report and direct any questions or comments to the appropriate district office.

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 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), and visual quality monitoring conducted in the Kalum Timber Supply Area 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: Kalum Timber Supply Area site-level resource development impact ratings by resource value with trend (Riparian, stand-level biodiversity and visual quality 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 Kalum Timber Supply Area. 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.

KALUM TIMBER SUPPLY AREA – ENVIRONMENTAL AND STEWARDSHIP CONTEXT

The Coast Mountains Natural Resource District includes the Kalum, Nass and North Coast TSAs. This report is specific to the area encompassed by the Kalum TSA boundaries (including a portion of the Cascadia and Pacific TSA, and Tree Farm Licences 1 and 41), however to provide a more complete background, context is also given for Nass TSA.

The Kalum TSA and associated TFLs cover approximately 2.3 million hectares. In addition, part of the Nisga'a private land under the Nisga'a Final Agreement is also contained within this TSA. There are also several large protected areas including the Gitnadox River Park, Foch Gilttoyees Park and the Kitlope Heritage Conservancy. This diverse forested environment provides habitat for a wide variety of wildlife species including grizzly bear, black bear, kermode bear, deer, fisher, northern goshawk, moose, marten, raptors and owls. Forestry, public sector, mining and tourism are the major employment sectors, with construction and fishing and trapping also contributing to the local economy. Seven First Nations have asserted territories in the core area of the Kalum TSA: Gitga'at, Gitksan, Haisla, Kitselas, Kitsumkalum, Lax Kw'alaams and Metlakatla. Of these, Haisla, Kitselas, and Kitsumkalum have communities within, or very close to, the core area of the Kalum TSA. Under the Nisga'a Final Agreement, the Nisga'a have rights to the Nass Wildlife Area, which includes part of the core area of the Kalum TSA. None of the Nisga'a communities lie within the core area of the Kalum TSA.

Each TSA has unique characteristics and operational challenges. Terrain and timber profile are the two most predominant limiting factors to resource development in all the TSAs. The Kalum TSA has both interior and coastal offshore areas, but is centered around Terrace. It also has the most economic activity of the three. Historically this TSA supported two lumber mills and two pulp mills. Mill closures in the late 90s and 2000s resulted in a downturn in timber harvesting. In the years following, harvesting for export markets began to increase. Of note, none of the three TSAs have harvested their allowable annual cut (AAC) in more than a decade.

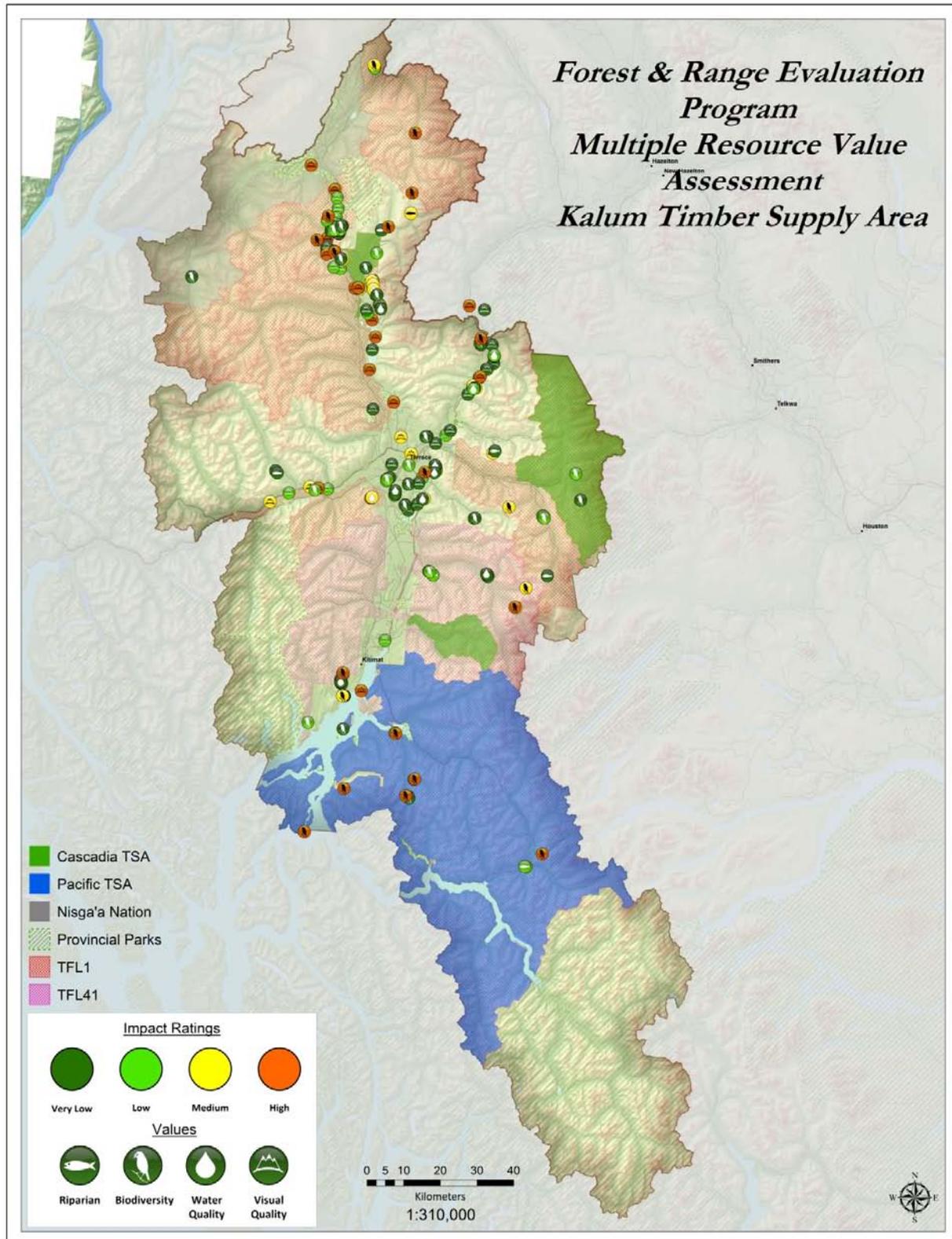
There have historically been low levels of top quality wood export. Recently, export logging, including domestic sawlogs, for sale to the Chinese market. This activity dramatically changed the nature of forest development in the district. Market logging has resulted in fewer and poorer quality roads to minimize cost. It has also targeted leave patches and smaller cutblocks that could be accessed easily along highways and mainline roads.

The Nass TSA experienced similar effects resulting from the downturn in the forest industry which are amplified due to poorer timber profiles and distance from processing facilities. Due to the proximity to Stewart, export logging in the Nass TSA also occurred but at a smaller scale than that of the Kalum due to the high pulp content in most stands. Timber profiles in the Nass and Kalum TSAs are characterized by overmature Hemlock stands with high percentages of pulp grade wood. The Kalum TSA has higher site indices and more Cedar and Amabilis Fir than the Nass TSA. Growing conditions are better in the Kalum as well where 50 year old second growth Fir stands are now being harvested.

The majority of timber harvest in the TSAs is focused on targeting economically viable stands. The result is a focus on generally smaller stands containing higher value timber or stands with minimal development cost (focus is often on harvesting leave patches with road access). Due to export harvesting practices, high levels of waste are common due to sawlogs being targeted and a poor market for pulp. In-block roads have also been observed to be progressively poorer. This reduced road quality has been driven by the need to reduce cost and keep valuations positive through the use of corduroy and stump wood in road structures, less road maintenance and an increased use of temporary roads.

The Kalum TSA has an abundance of Cultural Heritage features which often results in increased development costs due to the need to complete archaeological assessments (this year one CHR sample has ~400 CMTs). In addition, difficult terrain requires significant investments in road engineering and construction which can often be at risk due to landslides and mass wasting. High fisheries values are found across the region and salmon and fish bearing streams are predominant throughout the TSAs. This requires fisheries assessments and careful road construction and maintenance practices. Offshore areas of the Kalum TSA utilize drop zones, log dumps or barge ramps to manage log handling into an often sensitive marine environment. Scenic areas and Visual Quality Objectives have been established in the district since 1997. The viewsapes in the Kalum TSA are highly sensitive to forest harvesting and often require assessments and visual design. Risk of windthrow is significant in all three TSAs. In Oct 2010, the Kalum TSA experienced catastrophic wind damage to many stands resulting from 150+ km/hr winds. Partial cutting and variable retention harvesting systems are especially vulnerable to these high winds. Windthrow assessments are often required, particularly in visually sensitive areas or those approaching VQO percent alteration thresholds.

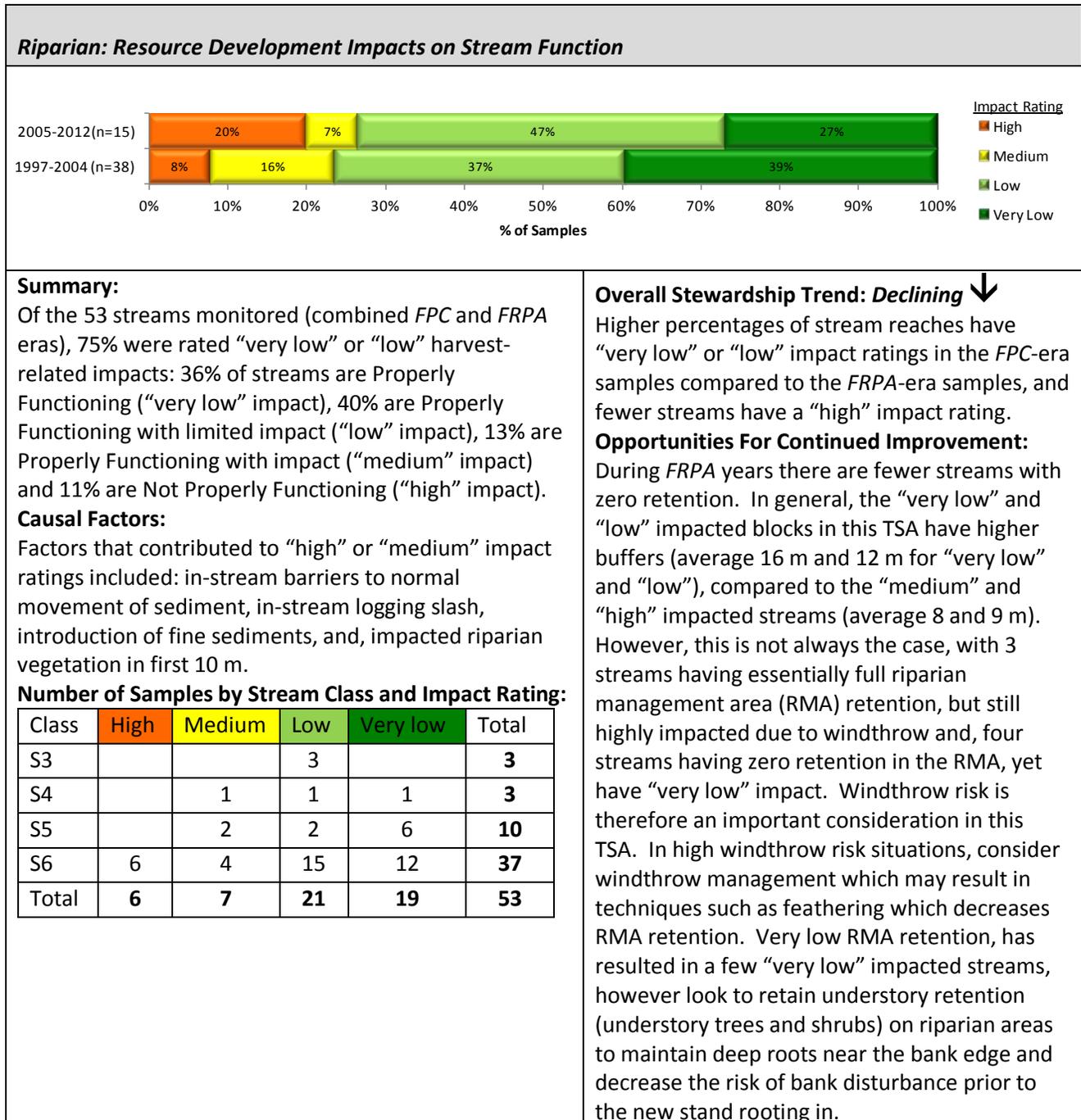
Figure 2: Kalum Timber Supply Area, showing FREP sample locations and results (see <http://www.for.gov.bc.ca/hfp/frep/publications/mrva.htm> for a high-resolution version of this map).



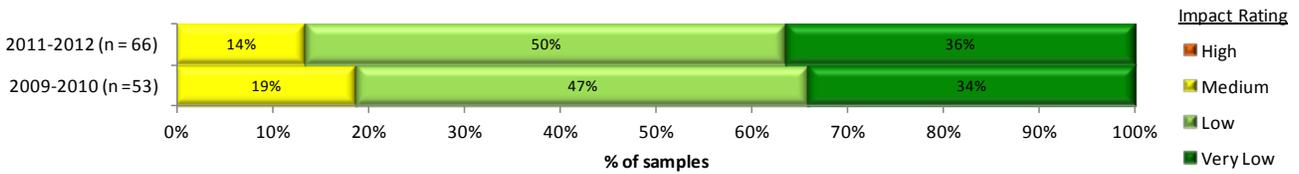
KEY RESULTS BY RESOURCE VALUE AND OPPORTUNITIES FOR CONTINUED IMPROVEMENT

Table 1 shows the resource values assessed for the Kalum Timber Supply Area, 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 Kalum Timber Supply Area.



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



Summary:

Of the 119 road segments assessed from 2009 to 2012, 84% were rated as “very low” or “low” road-related impact.

Site assessments show the range for potential sediment generation as 35% “very low” (“very low” impact), 49% “low” (“low” impact), 16% “moderate” (“medium” impact), 0% “high” and “very high” (“high” impact).

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.

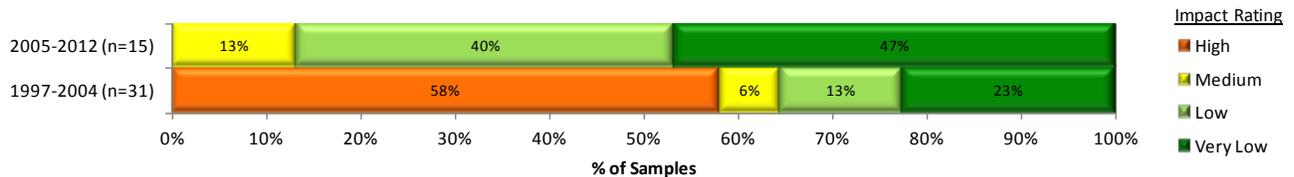
Overall Stewardship Trend: *neutral*

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

Opportunities For Improvement:

The most frequent suggested maintenance issues are to armour, seed and protect bare soil, and, use cross ditches and kickouts.

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



Summary:

Of 46 cutblocks (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, 30% sites are rated as “very low” impact on biodiversity, 22% as “low,” 9% as “medium,” and 39% as “high.”

Causal Factors:

58% of all blocks had more than 3.5% treed retention. However, considering only the *FRPA*-era blocks, that number increased to 94%. Retention increased from an average 10.8% in the *FPC*-era to 13.9% in the *FRPA*-era. Large snag retention in both eras has been similar or slightly higher compared to expected baseline densities. Large tree density (≥ 70 cm dbh) is low. The number of tree species retained has improved in *FRPA*-era to be similar to expected. Large patches (> 2 ha) are more prevalent in the *FRPA*-era. Coarse woody debris quality in terms of big pieces (> 20 cm and > 10 m) has increased.

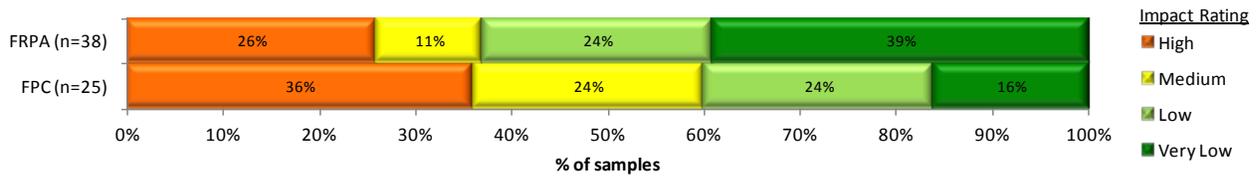
Overall Stewardship Trend: *Increasing* ↑

A large component of this increasing trend is due to an increase in the number of blocks with 3.5% or more retention from the *FPC*-era to the *FRPA*-era.

Opportunities For Continued Improvement:

Continue trend to leaving treed retention on every cutblock, having more large patches, tree species diversity similar to pre-harvest conditions and densities of large snags similar to preharvest. Continue the good quality coarse woody debris (i.e., big pieces ≥ 20 cm and ≥ 10 m). Increase retention quality by retaining large trees in densities similar to pre-harvest conditions. Leave the full range of tree species available.

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



Summary:

Of the 63 landforms assessed (25 FPC cutblocks and 38 FRPA cutblocks), 54% were rated with “very low” or “low” harvest-related impacts on achieving the Visual Quality Objectives.

VQOs were “well met” (“very low” impact) on 30% of landforms, “met” (“low” impact) on 24%, “borderline” (“medium” impact) on 16%, “not met” on 8%, and “clearly not met” (“high” impact) on 22%.

Causal Factors:

5% of the openings contained visually effective levels of tree retention (> 22% by volume or stem count) and 35% 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	3	4	6	13	24
PR	14	4	7	5	30
R	2	2	2	1	7
Total	19	10	15	19	63

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

Overall Stewardship Trend: Increasing ↑

There are higher percentages of “very low” and “low” impacted landforms in the FRPA-era compared to the FPC-era, as well as fewer “high” impacted landforms.

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.

Cultural Heritage: Resource Development Impacts on Cultural Heritage Resources

There are currently only six Cultural Heritage samples in the Kalum TSA. Analysis will be completed in subsequent years when more samples are available.

Soils: Resource Development Impacts on Soil Productivity and Hydrologic Function

There are currently only four Soils samples in the Kalum TSA. Analysis will be completed in subsequent years when more samples are available. The soils value has not been evaluated for several years in the Kalum TSA for various reasons. The protocol has been under review and development indefinitely and soils has not been a mandatory value for districts to sample.

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 Skeena 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)							
	Skeena Region Comparison							Skeena Region ^a
	Kalum TSA	Lakes TSA	Morice TSA	Kispiox TSA	Nass TSA	Bulkley TSA	North Coast TSA	
Riparian – all data	75% (53)	64% (36)	74% (42)	85% (27)	ID (9)	90% (31)	76% (45)	77% (243)
FRPA-era data	73% (15)	68% (19)	83% (18)	ID (9)		93% (14)	76% (21)	80% (100)
FPC-era data	81% (36)	59% (17)	67% (24)	83% (18)		88% (17)	75% (24)	75% (141)
Water quality – all data	84% ^b (119)	52% (83)	46% (92)	93% (58)	ID (15)	100% (53)	ID (45)	73% (465)
2010–2012 samples	83% (103)	ID (35)	ID (46)	ID (32)		100% (46)		79% (291)
2008–2009 samples	ID (16)	48% (48)	43% (46)	ID (26)		ID (7)		63% (174)
Stand-level biodiversity –all data	52% (46)	28% (46)	38% (29)	76% (37)	36% (11)	33% (48)	74% (43)	48% (260)
FRPA-era data	87% (15)	17% (23)	50% (14)	83% (18)		30% (30)	95% (20)	55% (121)
FPC-era data	35% (31)	26% (23)	27% (15)	68% (19)		39% (18)	57% (23)	42% (139)
Visual Quality								
FRPA	63% (38)	ID (11)	ID (7)	ID (3)	ID (3)	ID (8)	ID (5)	71% (75)
FPC	40% (25)	ID (11)	ID (7)	ID (1)	ID (0)	ID (0)	ID (9)	55% (53)

^a Includes the Nadina, Kalum, North Coast and Skeena-Stikine Natural Resource Districts.

^b Note that a different split of data was used in table 1 for Kalum to allow for two years of data in each date range (there was no 2008 water quality data). For comparisons between districts however, a consistent date range must be used.

DISTRICT MANAGER COMMENTARY¹

As highlighted in this report, the Kalum report covers the management units of the former Kalum Forest District, including the Kalum TSA, TFLs 1 and 41, as well as other smaller tenure areas.

Trends and Concerns

Of the four values with adequate data to perform analysis (Stand-level Biodiversity, Riparian, Water Quality and Visual Quality), all except Riparian have a trend of increasing “very low” and “low” ratings from FPC to FRPA-era. These improving trends are encouraging. I hope all licensees will carefully consider the “opportunities for improvement” in table 1, to work towards continual improvement for all values.

Riparian

The decreasing trend in Riparian stewardship as seen by the “high” and “medium” impact ratings, continuing to form a significant part of sample populations for Riparian (27%), can be primarily attributed to stream bank disturbance from streamside windthrow of riparian reserves, logging debris deposited into the streambeds and introduction of fine sediments. These factors must be carefully considered by licensees and practices modified accordingly. As per the recommendations in table 1, as a minimum, I encourage the retention of all understory trees and shrubs on all riparian areas to maintain deep roots near the bank edge and decrease the risk of bank disturbance.

Stand-level Biodiversity

This value had the most improved outcomes with “very low” and “low” impact ratings increasing by 45%. In addition to continuing the good coarse woody debris practices (i.e., retaining large pieces of coarse woody debris), licensees should increase retention quality by retaining large trees in densities similar to pre-harvest conditions. Leave the full range of tree species available.

Water Quality

While Water Quality outcomes continue to improve, the “very low” and “low” impact (low potential sediment generation) improved by 5%. There is an opportunity to further reduce impacts associated with resource roads by improving road maintenance, in particular improvements are to armour, seed and protect bare soil, and, use cross ditches and kick outs. I strongly encourage licensees to follow these improvement opportunities.

Visual Quality

A 23% increase of blocks with “very low” and “low” stewardship impact rating was observed.

Summary

Overall, while a 23% increase of blocks with “very low” and “low” stewardship impact rating was observed for Visual Quality; for Water Quality, the “very low” and “low” impact (low potential sediment generation) improved by 5%. However, “high” and “medium” impact ratings continue to form a significant part of sample populations for Riparian (2%), Stand-level Biodiversity (27%) and Visual Quality (37%) values. District FREP effectiveness evaluations should continue to monitor these values to ensure licensees are aware of the need to improve performance. I will also be looking to future FSP results and strategies where needed to see how these results are incorporated.

Areas of Focus

The Kalum TSA boundary, the area of this report, overlaps the core traditional territory of nine First Nations and is rich in Cultural Heritage Resources (CHR). All forest licensees operating in the district must account for CHR in their forest stewardship plans and operational plans by following the FRPA objective for cultural heritage resource values, carrying out Archaeological Impact Assessments and obtaining site alteration permits when impacting features protected by the Heritage Conservation Act. FREP effectiveness evaluations

¹ Commentary supplied by Barry Dobbin, District Manager Coast Mountains Natural Resource District

for CHR began in 2012 and should continue in subsequent years to monitor this important value. It is hoped that refocusing the district's FREP program to CHR will result in better protection measures utilized by licensees and enhance relationships with local First Nations by making this value a priority.

Future Opportunities

I see the continued necessity of monitoring stream health through the Water Quality and Riparian protocols. In addition, though fish passage assessments are not currently a FREP protocol, I encourage my staff to pay attention to these outcomes and promote the monitoring with licensees. Although the results of Water Quality have improved and "very low" and "low" impact ratings are currently at 86%, it is recommended that staff continue to monitor this value as well due to the importance of the fisheries values in the district. The protection of streams from sediment delivery from roads is critical in fish bearing watersheds (particularly salmon streams) and water quality will be a key value to monitor non-forestry activities where road construction and maintenance is occurring.

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 Kalum Timber Supply Area 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 Kalum Timber Supply Area.

Resource Value	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + low resource development impact rating (sample size in brackets)				
	Kalum TSA	Forests, Lands and Natural Resource Operations Areas			Province
		North	South	Coast	
Riparian – all data	75% (53)	71% (654)	69% (678)	58% (451)	67% (1783)
FRPA-era data	73% (15)	71% (257)	68% (277)	62% (198)	67% (732)
FPC-era data	81% (36)	71% (394)	70% (401)	55% (253)	67% (1048)
Water quality – all data	84% ^a (119)	66% (992)	70% (1515)	76% (1526)	71% (4033)
2010–2012 samples	83% (103)	67% (505)	70% (823)	79% (1021)	73% (2349)
2008–2009 samples	ID (16)	64% (487)	70% (692)	70% (505)	68% (1684)
Stand-level biodiversity all data	52% (46)	42% (655)	54% (780)	77% (455)	56% (1890)
FRPA-era data	87% (15)	49% (270)	61% (347)	84% (201)	63% (818)
FPC-era data	35% (31)	38% (385)	49% (433)	72% (254)	50% (1072)
Visual Quality					
FRPA	63% (38)	73% (122)	54% (136)	78% (153)	69% (411)
FPC	40% (25)	56% (96)	65% (85)	62% (68)	61% (249)

^a Note that a different split of data was used in table 1 for Kalum to allow for two years of data in each date range (there was no 2008 water quality data). For comparisons between districts however, a consistent date range must be used.