STUART NECHAKO FREP RESULTS

View from Murray Ridge

View from Sinkut Mtn

2021

Multiple Resource Value Assessment

Summary of FREP monitoring results for the Forest & Range Practices Act era (2005 to present).

Stuart Nechako FREP Results

MULTIPLE RESOURCE VALUE ASSESSMENT

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MULTIPLE RESOUCE VALUE ASSESSMENTS – IN BRIEF

Multiple resource value assessments (MRVA) show the results of stand and landscape-level monitoring carried out under the Forest and Range Evaluation Program (FREP). This report summarizes results in the Stuart Nechako Natural Resource District for riparian, water quality (sediment), visual quality, cultural heritage resource (CHR) monitoring, and range assessments. Stand level biodiversity results are discussed with recommendations. A new rating procedure is being developed for assessments moving forward. Included is an outline of key strengths and weaknesses. MRVA reports help provide expectations for sustainable resource management of public resources and identify opportunities for continued improvement.

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 conditions. 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 results 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 improvements 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. The sites sampled are based on a random list generated annually from a list of cutblocks harvested within the last two years. Some targeted sampling is allowed for cultural heritage resource monitoring due to a lack of samples for this value and where First Nations bring forward any blocks which should be considered for assessment. Targeted sampling is also being considered for visual quality monitoring to focus assessments on high use areas. For all other values, targeted sampling is used for special projects to identify any special areas of concern that may need more information for reporting out.

Although this report focusses 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"

As part of the results-based FRPA framework, the provincial government committed to conducting effectiveness evaluations and publicly reporting the monitoring results. The results are being used to determine if FRPA objectives are being met, and if practices and legislation are meeting government's broader intent for sustainable use of resources. Government is delivering its effectiveness evaluation commitment through the Forest and Range Evaluation Program; for details, see https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program. 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 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 Stuart Nechako Natural Resource District. MRVA reports clarify resource stewardship expectations and promote the open/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 a natural resource district scale, such as natural resource managers and professionals, government decision makers, and Indigenous Peoples. 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 Timber Supply Area (TSA)-level resource stewardship with staff, licensed stakeholders, tenure holders and Indigenous Peoples
- 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 Indigenous Peoples, 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: https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/integrated-resource-monitoring/forest-range-evaluation-program/frep-reports-extension-notes. 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 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 during the FRPA era through comparisons of cutblocks harvested before 2013, (since our first MRVA report was published), with those harvested in 2013 and after. FREP's site assessment monitoring results for each resource value are categorized by impact rating (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 detailed description of the MRVA methodology and terms used in this report, please go to: (https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/frep/frep-docs/frep_technical_note_06.pdf?fileName=frep_technical_note_06.pdf). Appendix 1 contains a brief description of the criteria used to determine impact ratings.

STUART NECHAKO NATURAL RESOURCE DISTRICT – ENVIRONMENTAL AND STEWARDSHIP CONTEXT

This report covers the Stuart Nechako Natural Resource District. The total area within the District is 4.57 million hectares which represents about 57 percent of the Prince George TSA. https://www2.gov.bc.ca/gov/content/industry/forestry/managing-our-forest-resources/timber-supply-review-and-allowable-annual-cut/allowable-annual-cut-timber-supply-areas/prince-george-tsa. This area has a diversity of landscapes from gently rolling hills mostly in the south to the extremely mountainous and largely roadless landscapes in the north. The biogeoclimatic zone is Engelmann Spruce-Subalpine-fir in the north and scattered in other areas, with mostly Sub-Boreal Spruce in the south.

The Stuart Nechako District supports a variety of wildlife, including moose, mule deer, woodland caribou, mountain goats, wolves, grizzly and black bears, and mountain lions. Smaller animals of interest include pine marten, fisher, beaver and lynx. It is renowned for being a bird migration corridor used by many duck species, Canadian geese, snow geese, trumpeter swans, and raptors. Parks and protected areas in this region include Beaumont Provincial Park, Entiako Provincial Park, Finger-Tatuk Provincial Park, Francois Lake Provincial Park, Mount Blanchet Provincial Park, Mount Pope Provincial Park, Mudzenchoot Provincial Park, Nation Lakes Provincial Park, Nechako Canyon Protected Area, Omineca Provincial Park, Paarens Beach Provincial Park, Rubyrock Lake Provincial Park, Sowchea Bay Provincial Park, Stuart Lake Marine Provincial Park, Stuart Lake Provincial Park, Stuart River Provincial Park, Sustut Provincial Park, Sutherland River Provincial Park and Protected area, Takla Lake Ecological Reserve, Takla Lake Marine Provincial Park, and Trembleur Lake Provincial Park.

Twenty five First Nations have asserted territories within the district boundaries, these include: Binche Whut'en, Burns Lake Band (Ts'il Kaz Koh First Nation), Cheslatta Carrier Nation, Gitxsan Hereditary Chiefs First Nation, Halfway River First Nation, Lake Babine Nation, Lheidli T'enneh, Lhoosk'uz Dene Nation, Lhtako Dene (Red Bluff) First Nation, McLeod Lake Indian Band, Nadleh Whut'en Band, Nak'azdli Whut'en, Nazko First Nation, Nee-Tahi-Buhn Indian Band, Saik'uz First Nation, Skin Tyee Nation, Stellat'en First Nation, Tahltan Central Government, Takla Nation, Tl'azt'en Nation, Tsay Keh Dene Nation, Tsilhqot'in National Government, Ulkatcho First Nation, West Moberly First Nations, and Yekooche First Nation.

The Stuart Nechako District includes four main towns: Fort St James, Vanderhoof, Fraser Lake and Fort Fraser; serving a total population of around 12,000. The primary employers are associated with the forestry sector, while mining and agriculture also contribute to the area's economy. The agricultural industry is primarily located within the Nechako Valley but there are range activities spread throughout the district.

STUART NECHAKO NATURAL RESOURCE DISTRICT FREP SAMPLE LOCATIONS AND RESULTS MAPPED

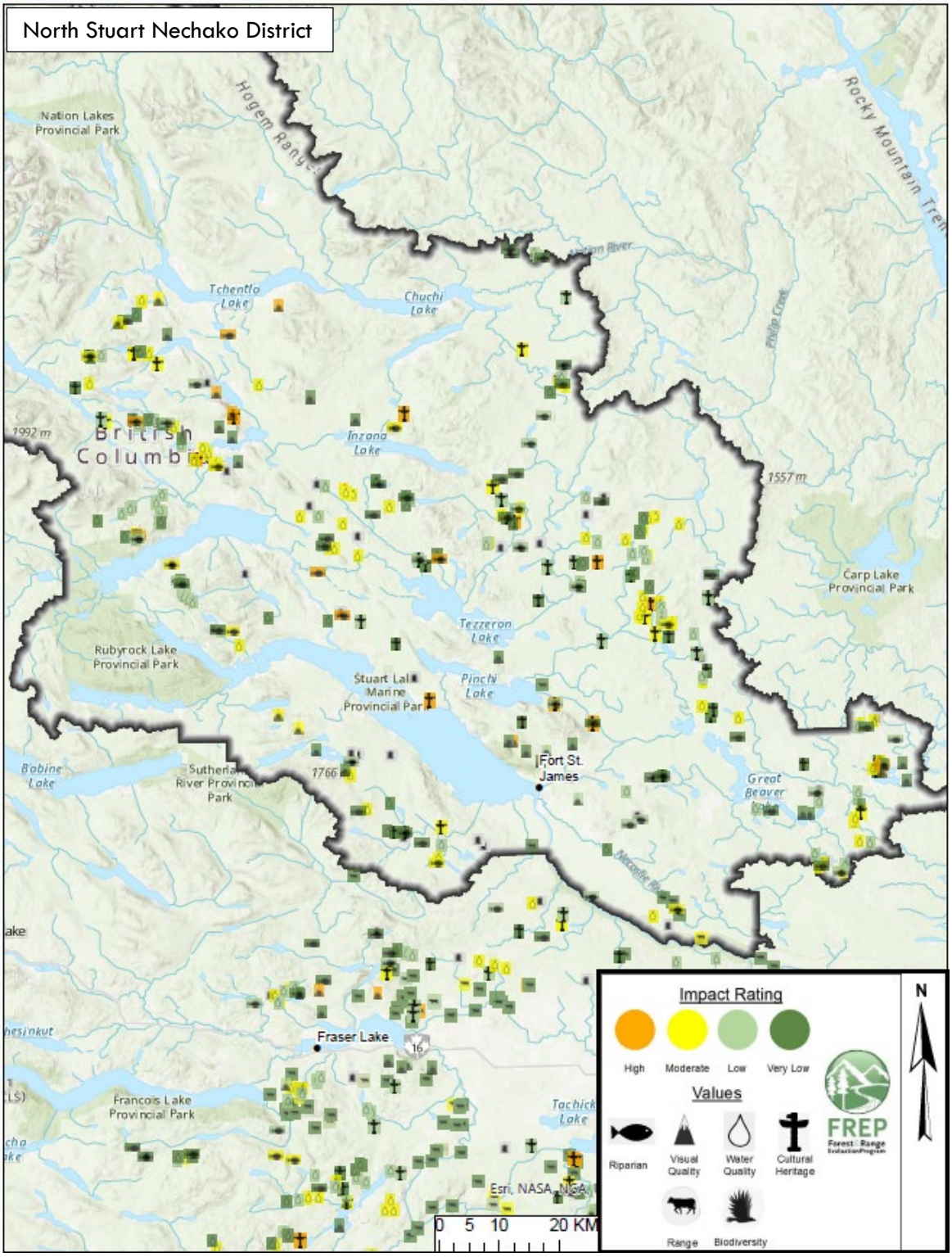

Figure 1: North Stuart Nechako Natural Resource District

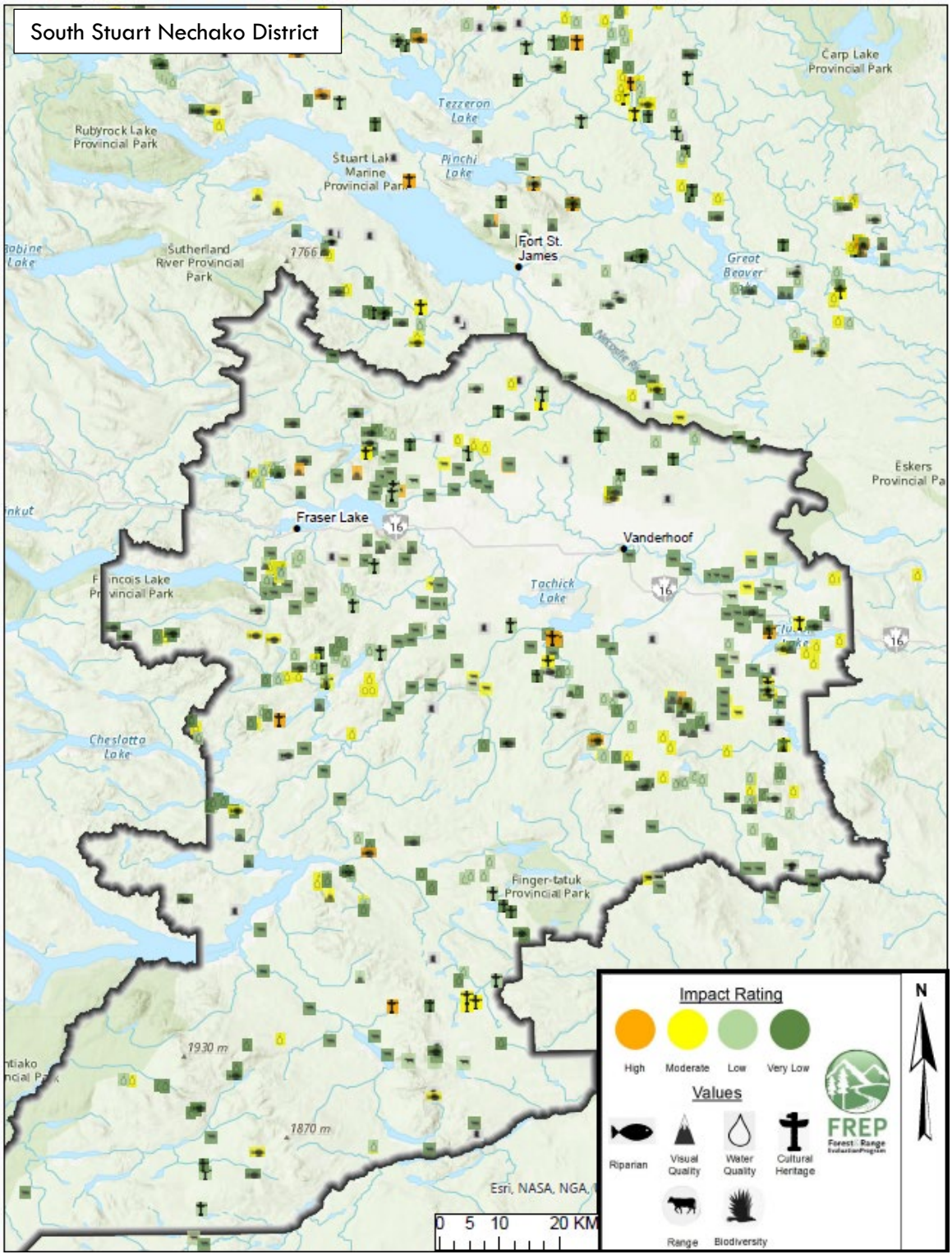

Figure 2: South Stuart Nechako Natural Resource District

RESOURCE DEVELOPMENT IMPACTS ON RIPARIAN AREAS (STREAM & WETLAND FUNCTION)

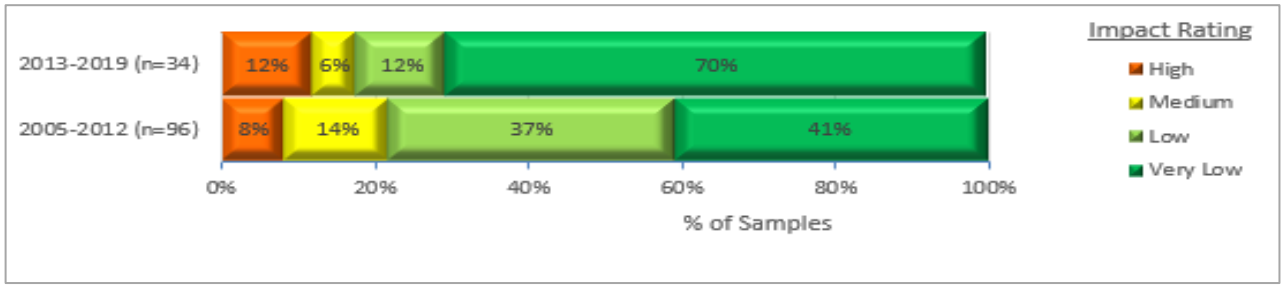

Figure 3: Impact Results on Riparian Areas

Table 1: Number of Samples (2013-2019) by Stream Class and Impact

Class	High	Medium	Low	Very low	Total
S2		1	1		**2**
S3				12	**12**
S4	2	1	1	6	**10**
S6				1	**1**
W1	1			2	**3**
W3	1		2	2	**5**
W5				1	**1**
Total	**4**	**2**	**4**	**24**	**34**

Figure 4: Properly Functioning Stream

Summary

During the 2013 to 2019 harvest period, 34 riparian areas were monitored with 83% rated as "very low" or "low" harvest-related impacts: 70% of streams are properly functioning ("very low" impact), 12% are functioning but at risk ("low" impact). The 6% moderate impact rating is associated with riparian areas that are functioning but at high risk, and the 12% high impact rating are associated with riparian areas that are not properly functioning.

There has been a significant improvement in the higher percentage of riparian areas that have resulted in a "very low" impact rating in the 2013+ period compared to the 2005-2012 period. Improvements in the most recent period include large woody debris kept intact, minimizing stream blockages, ensuring a healthy moss substrate, minimizing the introduction of fine sediments, and improving shade along stream banks.

Causal Factors

The general causal factors impacting these riparian areas were associated with the following: 49% logging; 18% roads; 15% natural events; 13% animal disturbance; and 5% upstream factors. The specific impaired indicators that contributed to "high" or "medium" impact ratings included: channel bed disturbance; windthrow; bare erodible ground in the riparian area; and, the introduction of disturbance increasing plants, noxious weeds, and/or invasive plant species.

Opportunities for Continued Improvement

Some key opportunities for improvement are associated with management of windthrow and the introduction of fine sediments. In one of the high impacted blocks, spruce trees retained along an S4 stream resulted in windthrow, damaging the stream bed causing increased levels of sedimentation (see Figure 5). Windthrow management needs to be incorporated in these areas by feathering the edges and/or topping some of the retained trees. Another issue found was road surface erosion causing sediment transfer to streams. Silt traps, improved road surfacing, and/or grass seeding could have helped mitigate this impact.

Figure 5: Windthrow on an S4 Stream

There was an occurrence where logs were left in the stream crossing caused problems with natural drainage and sedimentation. Improvements could be made to deactivate these crossings after planting activities have been completed.

One should have a quick review of a recent study in: *The Influence of Riparian Forest Age and Complexity in the Recovery of Post-Harvest "At-Risk" Streams and Riparian Areas*[1]. This report demonstrates that at risk streams can recover if retained vegetation surrounding streams is older and more complex, in comparison to younger second growth stands.

In 2018, a new wetland protocol was implemented that focused on small wetlands to identify any impacts of adjacent roads or cutblock developments. Wetlands can be easily influenced by inflow- or outflow-changes resulting from inadequate drainage infrastructure and/or disturbance to soils and vegetation linked to the wetland. The main causes of wetland inflow and outflow changes is the existence of a road nearby and the installation of elevated culverts; something to be mindful of when roadbuilding around or through wetlands. The logging-related causal factors impacting soils and vegetation influencing wetlands were windthrow and low retention which resulted in a not properly functioning outcome.

Figure 6: Wetland Training Session

[1] Nordin, L. and L. Malkinson 2021. B.C. Ministry of Forests, Lands, Natural Resources Operations and Rural Development. The influence of riparian forest age and complexity in the recovery of post-harvest "at-risk" streams and riparian areas. FREP Report #43. frep-report43_final.pdf (gov.bc.ca)

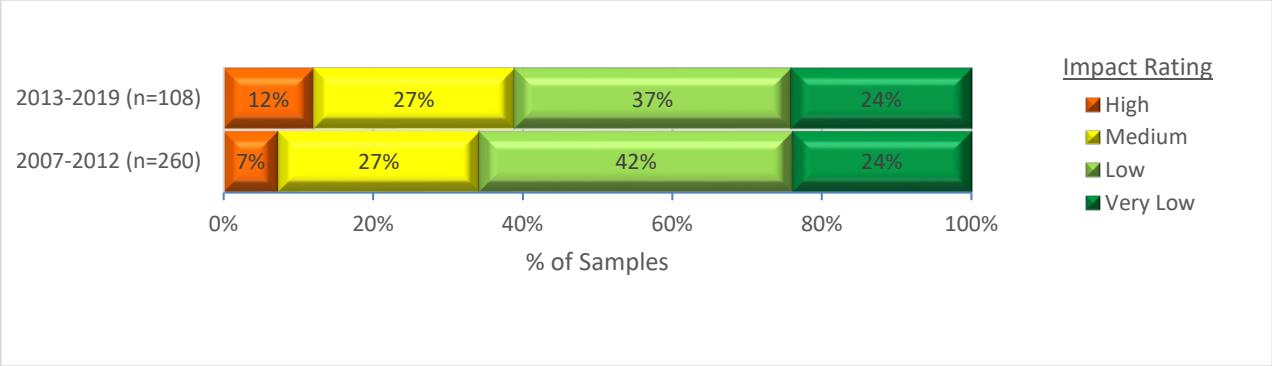

Figure 7: Impact Results on Water Quality

Summary

Water quality results are based on 2007 to 2019 survey years, capturing the impact of road traffic and maintenance.

Of the 108 road segments assessed since the last MRVA report (2013+), 61% have a very low or low road-related impact (see Figure 7).

Figure 8: Well Managed Deactivated Stream Crossing

Causal Factors

One of the main causal factors causing high impacts is associated with long road ditches where an abundance of water is accumulated in the ditch bringing ditch and road surface sediment directly into streams.

Opportunities for Improvement

The most frequent suggested improvements are to spread out logging debris, avoid deeply dug ditches, plan for sufficient number of culverts, avoid stream crossing, install strategically placed cross ditches, and remove grader berms.

Figure 9: Stream Crossing with High Sediment Loads

To mitigate the impact of long ditches, install kick-outs to disperse the flow of water and/or install more culverts to divert this ditch line flow away from the stream to allow sediments to disperse into the forest floor. Also, grass seeding the ditches and road cut and fills will also help minimize sediment accumulations (see Figure 8 vs Figure 9)). Just a reminder to use a grass seed mix approved by an FLNRORD biologist or range agrologist to prevent noxious weed establishment.

RESOUCE DEVELOPMENT IMPACTS ON ACHIEVEMENT OF VISUAL QUALITY OBJECTIVES

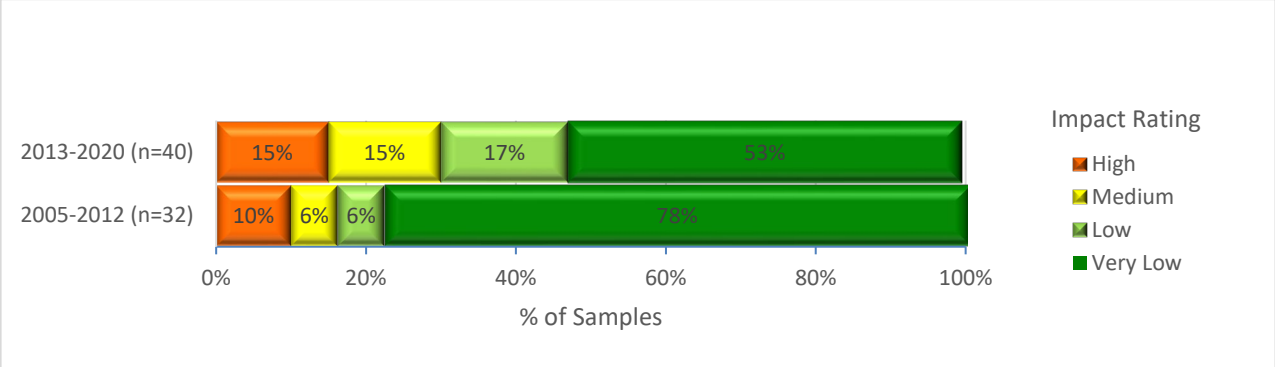

Figure 10: Impact Results on Visual Quality

Summary

Of the 40 landforms assessed in the 2013 to present period, 70% were rated with "very low" or "low" harvest-related impacts on achieving the Visual Quality Objectives (see Figure 10). This means that VQOs were "well met" ("very low" impact) on 53% of landforms and "met" ("low" impact) on 17% of the landforms. There were 15% borderline assessments ("medium" impact) in the same period, with 15% of the landforms being "clearly not met" for VQO ("high" impact). See Table 2 for the actual number of samples by VQO and impact rating for the 2013+ period.

Figure 11: Carrying out Visual Quality Effectiveness Evaluation

The *low* and *very low* impact ratings decreased from 84% to 70% between the two FRPA reporting periods, indicating a negative trend in meeting VQOs. This trend has resulted from an increase in borderline assessments ('medium' impact) between periods, growing from 6% to 15%. The number of assessments that did not meet VQOs ('high' impact) increased from 10% to 15%. As the area of first pass harvesting increases, more harvesting is occurring in these visually-sensitive areas resulting in not meeting VQOs. More care must be taken when harvesting in visually sensitive areas to prevent non-compliance with VQOs.

Causal Factors

The blocks generally have good design with irregular boundaries with some form of tree retention. Despite these efforts, one must also consider all potential viewpoints, especially the most direct viewpoint which generally results in the greatest impact to the landform (see sample in Figure 12).

Table 2: Number of Samples by VQO and Impact Rating (2013+)

VQO[1]	High	Medium	Low	Very Low	Total
M	3	4	5	14	26
PR	2	2	2	6	12
R	1			1	2
Total	**6**	**6**	**7**	**21**	**40**

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

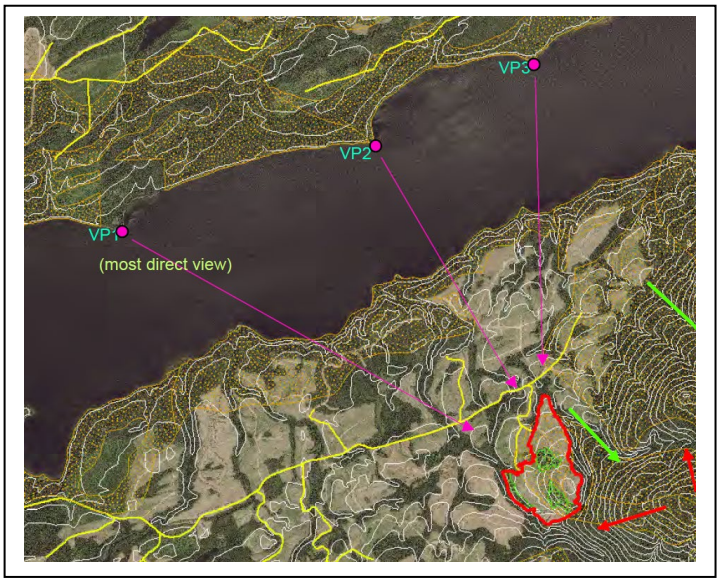

Figure 12: Overview map of viewpoints

Opportunities for Improvement:

Continue to use existing visual design techniques to create more natural-looking openings to better achieve VQOs. Use a variety of differing tree retention strategies which may include scattered/individual retention, small tree patch retention, large tree patch retention, reduced opening size, and/or partial retention to reduce/minimize the visual impact. Also remember to consider all potential public viewpoints when conducting visual impact assessments, especially those viewpoints which provide the most direct view of the cutblock.

RESOURCE DEVELOPMENT IMPACTS ON CULTURAL HERITAGE RESOURCES

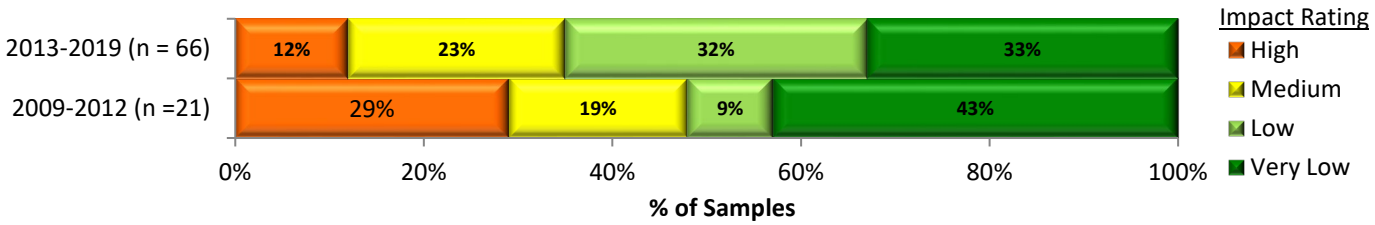

Figure 13: Impact Results on Cultural Heritage

Data Source: Cultural heritage resource assessment data was collected by ministry field staff, often with the assistance of local First Nations and license holder's staff. Sampling sites can have a minimum of 50% randomly selected sites and up to 50% targeted sites (First Nations and/or licensee requests) based on recently harvested cut-blocks with known cultural heritage resource values. There were 14/87 blocks (16%) targeted for sampling. Data presented were collected from 2009 through 2019 from cut blocks harvested from 2006 to 2017.

Summary

The number of samples to date is 87, and the District will continue to sample annually to be able to analyze the data by Licensee or by First Nations territory. Of the 87 cut-blocks assessed, 36% were rated as "very

low" impact to cultural heritage features. The CHR features were composed of post-1846 culturally modified trees (CMTs), archaeological sites (<1846 CMT's, lithics, cultural depressions, burial site), cultural trails, and traditional use sites.

There is a definite trend of improvement in the management of CHR over time with a significant reduction of the High-Risk sites (from 29% down to 12%) between the 2009 - 2012 and the 2013 - 2019 sampling periods.

Causal Factors

At the CHR individual feature level, out of a total of 287 features across the 87 blocks sampled, 62% were intact, while 38% had some level of damage. These CMT features were mostly affected by harvesting (40%) and/or wind-throw (35%), but damage was also attributed to road building where operational constraints prevented an alternate route. Of the 82 features identified with damage, 31 had irreversible damage to their features, making these features unsuitable for continued use. Forty eight percent (48%) of the sampled blocks had no First Nations management recommendation.

Opportunities for Improvement:

Figure 14: CHR Cache Pit

Opportunities for improvement include buffering, flagging, and windthrow management. Greater consideration should be made to manage for windthrow from dead beetle-attacked trees. Wider buffers or tree feathering should be established to protect CHRs from the direct impacts of high winds. Alternatively, design the boundary so that trees can be stubbed to minimize windthrow. With cultural trails, retain smaller trees, stub larger trees and CMTs within the 5m machine free zones for protection and better identification of the trail for operators, designate skid trail crossings, fall and skid away from the trail, and avoid site prep and planting of trails. Flag out special management zones along the area of potential (AOP) boundary. Layout roads to avoid CHR features and consider harvesting during winter to further reduce impact around these areas. When carrying out archeological impact assessments (AIAs), the best practice is to shovel test to determine whether features exist or not, instead of establishing an area of potential or high potential zone with no further research.

There are opportunities for improvement associated with communication from the planning to the operational practices. This includes ensuring that the pre-harvest assessment of CHRs and their recommendations for management are addressed at the harvest stage. Also communicating with planting contractors to ensure that these CHR areas, such as cultural trails, aren't planted.

The strategies and/or practices that were particularly effective in managing for CHR values included stubbing CMT's, leaving CMT's and trails well outside the harvest area with windfirm trees, establishing machine free zones around CMT's or CHR sites, stubbing trees around the boundary of the CHR sites for easy identification and to minimize windthrow, good protection of Cheslatta trail as per district policy, flagging boundary of high potential zones for ease of identification for logging contractors.

The FREP Cultural Heritage value assesses the management practices of the individual cultural heritage features on a given block, as well as an overall block rating of Very Poorly, Poorly, Moderately, Well, or

Very Well assigned during the field evaluation. To standardize the reporting for all of the FREP Values in one report the MRVA rating is a conversion of the FREP rating of both the features and the overall block rating into an impact rating of Very Low, Low, Medium, or High impact. See Appendix 1 for more information.

RESOURCE DEVELOPMENT IMPACTS ON STAND LEVEL BIODIVERSITY

Summary

The effects of forest harvesting on stand-level biodiversity can be evaluated through various factors including: patch/retention size, density of retention in the harvest area, windthrow management, retention of large trees (30cm diameter at breast height (DBH) or greater), and quality of coarse woody.

Table 3 summarizes the results of the sample data, comparing the two FRPA periods. Also, our district Stuart Nechako (DSN) results are compared with the Omineca Region and BC Interior results. In Table 3, key focus areas are highlighted in yellow summarizing the average block sizes, average patch retention and equivalent retention area associated with dispersed trees left within the harvest areas, average number of large trees retained, average large pieces of CWD retained in the NAR compared with what was found in the wildlife tree patch(es). There are other results which one may find interesting to note.

Table 3: SLBD Retention Results with Comparison of Other Averages

Location	Stuart Nechako District		Omineca Region		BC Interior	
Reporting Periods	2013+	2005-2012	2013+	2005-2012	2013+	2005-2012
Sample size (n)	27	63	73	151	375	732
Avg Gross Blk Area (ha)	**93.0**	**88.5**	**74.7**	**64.9**	**46.1**	**55.7**
Avg Total Patch Area (ha)	25.4	12.2	14.2	8.3	7.3	8.3
Avg % Patch Retention	**27%**	**14%**	**19%**	**13%**	**16%**	**15%**
Avg Dispersed Retention (ha)	0.8	1.6	1.1	2.0	1.0	1.6
Avg % Patch & Dispersed Retention	**28%**	**16%**	**20%**	**16%**	**18%**	**18%**
Avg % trees windthrown	**6.7**	**9.9**	**11.2**	**10.9**	**8.4**	**8.0**
Avg DBH of Trees in Retention (cm)	**22.6**	**23.8**	**22.8**	**24.0**	**24.2**	**24.8**
Avg SPH Trees >=30cm DBH	**102**	**119**	**111**	**123**	**134**	**140**
Avg CWD Log Length in NAR (m)	**2.9**	2.2	**2.5**	2.6	**2.4**	2.5
Avg CWD Diameter in NAR (cm)	**12.7**	13.3	**13.8**	13.6	**14.2**	14.1
Avg CWD Pieces/ha >=10m long, >=20cm diam in NAR	**48**	49	**57**	62	**44**	44
Avg CWD Pieces/ha >=10m long, >=20cm diam in WTP	51	52	64	56	51	53
Percent difference of CWD large pieces NAR vs WTP	**-6%**	-4%	**-12%**	10%	**-15%**	-18%
Median CWD Pieces/ha >=10m long, >=20cm diam NAR	**41.6**	31.5	**46.0**	42.6	**32.0**	29.1
Median CWD Pieces/ha >=10m long, >=20cm diam WTP	43.7	34.3	42.2	37.0	39.7	37.3
Median 20% Increase Target of CWD Large Pieces/ha		**34.9**		**35.9**		**38.9**
Avg CWD Volume in NAR (m^3/ha)	**98**	105	**128**	115	**127**	119
Avg CWD Volume of logs >=20cm in NAR (m^3/ha)	35	41	55	50	58	68

In the most recent 2013+ reporting period, the average size of the blocks sampled has grown from 88.5ha to 93 ha, with the proportion of average patch retention and dispersed retention almost doubling in percent size. The retention increase between the two periods for our district is a significant improvement to

biodiversity at the stand level. There have also been improvements by reducing windthrow from 9.9% to 6.7% and retaining longer CWD with average length increasing from 2.2m to 2.9m.

Figure 15: CWD Transect

Our district has done well to retain higher quality CWD through the retention of larger piece sizes (>=10m and >=20cm diam), in comparison to the Omineca Region and the BC Interior, when comparing to that which has been found in the retention areas. In the most recent reporting period (2013+), the difference between the average number of large CWD found in the NAR compared to that measured in the WTP is significantly less in our district at -6% compared to -12% and -15% for the Omineca region and provincial interior averages respectively. Ideally, the CWD in the NAR should reflect that found in the WTP. An alternative analysis is through the median value with a target of a 20% increase from the previous period based on the difference between that which is found in the WTP versus that which is left in the NAR. As a result, we can see that the 20% target for DSN in the 2005-2012 period is 34.9 large pieces/ha, and it is great to see that DSN exceeded this target with 41.6 large pieces/ha in the current 2013+ period. Table 3 also shows the targets for the Omineca Region and the BC interior for comparison. One thing to consider is that this doesn't take into consideration for the increasing CWD found in mountain pine beetle damaged stands.

Updated stand-level retention rating systems are being incorporated into current assessments, which compare block results to various averages based on biogeoclimatic subzone. Improved idividual block rating systems will be reported out in future FREP district reports/results.

Causal Factors

The DSN sample blocks are significantly larger compared to the Omineca Region, and the BC Interior averages. This is consistent with most of the district being in the natural disturbance type 3 (NDT3) with frequent stand-initiating events, characterized by frequent wildfires that can cover tens of thousands of hectares. Mountain pine beetle salvage harvesting was designed with larger opening sizes. Thus, the resulting average patch size is significantly larger than the Omineca Region and BC Interior average patch sizes as expected in NDT3.

The average stems per hectare of large tree retention decreased within all reporting areas (DSN, Omineca, BC Interior) between the two reporting periods. The greatest difference was observed in at our district level with a change of 17 SPH avg for trees >=30cm DBH.

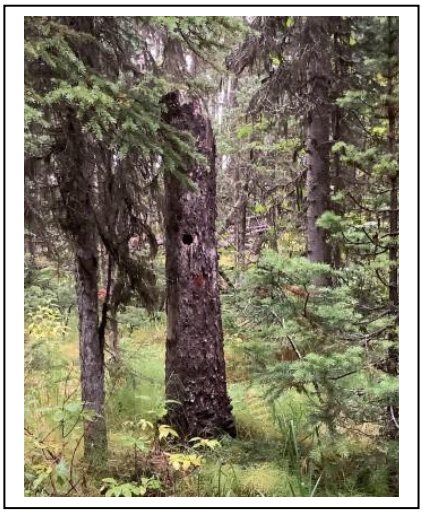

Figure 16: Cavity Nesting in Large Dead Tree

In a quick analysis of the three sampled blocks in 2020, the two key causal factors that prevented the block from achieving a properly functioning condition were: 1) retention of trees greater than 30cm DBH in retention areas compared to the average pre-harvest stand condition; and 2) retention of CWD greater than 20cm diameter and 10m length in the net area to reforest (NAR).

Figure 17: Raptor Nesting

Opportunities for Improvement

Opportunities for improvement relate to the retention of larger trees (>30cm DBH) and larger CWD (>20cm diameter & >10m long). Data averages from pre harvest blocks indicate that there were more larger trees as compared to that which is being left in wildlife tree patches. The retention areas should reflect the timber types of the harvested areas. In many cases these retention areas should be composed of larger trees which are mostly found in riparian areas reflective of good wildlife habitat areas, which contribute to the high biodiversity value for the site. It is acknowledged that average piece size may be declining, but retention of these large trees is still something that must be managed for to maintain or improve biodiversity.

RESOURCE DEVELOPMENT IMPACTS ON RANGELAND HEALTH

Background

The main sampling criteria for conducting range health assessments is that the land is under a Crown Grazing Agreement. District range agrologists carry out the majority of range health assessments as part of their compliance monitoring of a range use plan. Agreement areas to be sampled include those up for renewal, those previously identified (formally or informally) as being at risk, and where a major change has been implemented or is proposed (e.g. period of rest from grazing, construction of range developments). Because livestock grazing is rarely in discrete blocks, but rather spread out in time and space across the landscape, randomly assigning sampling plots across a district's range tenures would not effectively capture grazing influence. Therefore, each tenure area identified for sampling is stratified by intensity of use into primary, secondary, and tertiary range. When viewing range health assessment data, it is important to keep in mind the focus of the range health monitoring is on primary use areas. The sampling methods on primary use areas consider 10 to 16 main indicators of range health, depending on whether it is a wetland, upland, or riparian site.

Data Source

FLNRORD Range program staff monitor rangeland health using the Rangeland Health Field Guide [2]. Monitoring is conducted on Range Act agreements to assess the health of uplands, wetlands, and streams where there is primary use for forage for livestock grazing.

The data used for the Stuart Nechako assessment was collected between 2011 and 2020. Monitoring focused on areas of primary use and not randomly selected because livestock use is not evenly spaced across the landscape. There is a much higher rate of monitoring conducted in areas of more frequent livestock use, ensuring impacts are identified and remedied more often. There were 189 assessments, with 100 upland, 41 stream and 48 wetland forms completed. See results of these assessments in Figure 18.

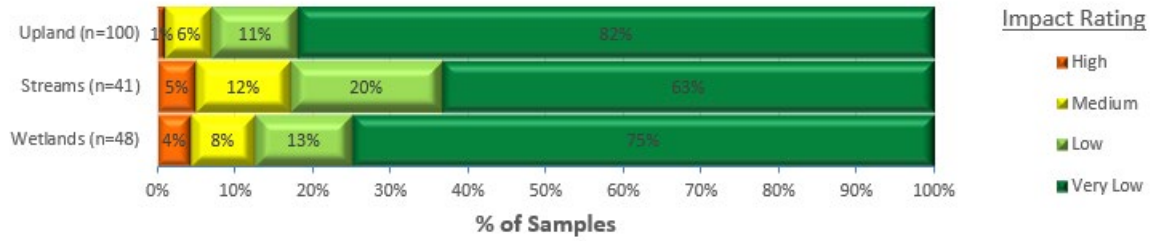

Figure 18: Impact Results on Rangeland Health

Causal Factors

Logging, silviculture practices, roads, culverts, ditches, ingrowth/encroachment, recreation activities, and grazing management practices are some of the leading causes of non-functioning or at-risk ecosystems on Crown Range. Often the consequence of short-sighted land management practices is a cumulative effect where subsequent practices put ecosystems further at risk. For example, timber harvesting activities and practices create transitional grazing areas for livestock but also encourage livestock access and use of riparian ecosystems. The presence of water and forage make riparian areas prone to overgrazing and soil compaction, thus altering their productivity and ability to safely store and release water.

Opportunities for Improvement

Maintaining natural range barriers, building range developments, and implementing practices which minimize livestock movement and use in sensitive areas will help protect and promote healthy ecosystems. Meaningful referral processes and communication between forestry licensees and range agreement holders can help mitigate future issues. Managing for cumulative effects and protecting sensitive riparian areas while maintaining healthy uplands is important in maintaining healthy ecosystems.

[2] Fraser, D.A. 2009. Rangeland Health Field Guide. B.C. Min. For. Range, Range Br., Kamloops, B.C. www.for.gov.bc.ca/hfd/pubs/Docs/Mr/Mr117.htm

DISTRICT RESULTS COMPARED TO REGIONAL AND BC INTERIOR AVERAGES

Table 4 displays the overall ratings for the Stuart Nechako Natural Resource District as compared to the Omineca Regional average and the BC Interior average.

This Table provides ratings of stewardship effectiveness at varying scales. Effectiveness is determined by the percentage of samples with a combined "very low" and "low" resource development impact rating.

Table 4: Stuart Nechako District FREP Monitoring Results Compared to the Omineca Region and BC Interior Results

	Effectiveness of Practices in Achieving Resource Stewardship Objectives: % Very low + low resource development impact ratings (sample size in brackets)		
Resource Value	Stuart Nechako District	Omineca Region	BC Interior
Riparian all data *2013+* FRPA-pre2012	**83%** (34) 79% (96)	**85%** (103) 73% (176)	**79%** (431) 71% (684)
Water quality all data *2013+* FRPA-pre2012	**61%** (108) 66% (260)	**65%** (359) 56% (440)	**64%** (1901) 68% (2168)
Visual Quality all data *2013+* FRPA-pre2012	**70%** (40) 84% (32)	**69%** (110) 83% (40)	**73%** (443) 62% (220)
Cultural Heritage Resources *2013+* FRPA-pre2012	**65%** (66) 52% (21)	**55%** (58) 2011-2015[3] 66% (29) 2000-2010	n/a
Rangeland Health *2011+*	93% Upland 73% Streams 88% Wetlands	n/a	**Provincial Avg** (2020-2014) 64% Upland 71% Streams 71% Wetlands

[3] CHR results taken from FREP Report #42, Assistant Deputy Minister Resource Stewardship Report: Regional Results of the Forest and Range Evaluation Program, April 2019.

DISTRICT MANAGER COMMENTARY

It is important that we carry out the FREP monitoring to determine how well we are achieving the objectives of the various FRPA values. We will continue to improve First Nations and licensee staff participation in FREP monitoring and training (as in Figure 19) to help improve forest planning to operational practices. Forest practices are achieving basic legislative requirements but as we continue to strive to manage the forests to the best of our ability, opportunities for improvements are discussed. As a result, we are relying on forest professionals to ensure that these recommendations are implemented in future practices. Where future findings identify any concerns in any particular value or specific area, then targeted sampling may be utilized to focus on and address any potential issues.

Figure 19: Riparian Training

One of the recent impacts to the landscape has been associated with the wildfires that occurred in 2017, 2018, and 2021. As a result, almost 50 of our random samples have been associated with a burned area resulting in

these blocks being dropped since monitoring is assessing the impacts of harvesting, not wildfires. As a result, this has created challenges in finding cultural heritage resource blocks to sample resulting in some targeted sites to achieve our sampling goals, which are incorporated into the overall results.

Riparian Management

The riparian management practices within Stuart Nechako have significantly improved in the two FRPA era periods analyzed with the very low rating increasing from 41% to 71%, which are streams being found in properly functioning condition. A large part of this is a result of good retention practices along these riparian areas. It is good that there is an increase in 10m retention areas along these smaller streams as they maintain stream side vegetation, provide shade, reduce stream temperature, provide CWD recruitment, eliminate/reduce bare/erodible ground, and soil disturbance. As we strive for perfection in riparian management, we find that logging is the major cause of streams being in the high to medium impact rating. More specifically, windthrow management could be improved with edge treatments, topping, selective harvesting of high windthrow trees, and/or leaving a wider retention area to help minimize the potential of root wads damaging the stream bank/bed. Another opportunity for improvement is around the practice of managing stream crossings to prevent sediments from reaching the stream. After harvesting, ensure the crossing is properly deactivated and surrounding area is grass seeded to prevent further introduction of sediments.

Water Quality (Stream Crossing) Management

Water quality management at stream crossings has not significantly changed in Stuart Nechako, so there is an opportunity for improvement in this area. Here our district average is slightly below the average in comparison to the Omineca Region and the BC Interior for the 2013+ period. The results show that improvements can be made by decreasing the length of ditches by increasing the number of kickouts and/or culverts to disperse the flow of water onto the forest floor to minimize road sediments reaching the streams. As always, continue to apply seed mix on newly exposed cut and fill banks and road deactivations to further minimize sedimentation.

Visual Quality Management

Successful VQO management in Stuart Nechako has declined in recent years, with the number of landforms/blocks ranked as very low to low impact rating has decreased from 84% to 70%. This is mostly a result of a 9% increase in borderline VQO achievements, and a 5% increase in not meeting VQOs. As more harvesting occurs in these sensitive areas, there is greater risk of these landforms failing VQO without proper planning. Awareness of VQO management appears to be appropriate with the completion of visual impact assessments. However, viewpoint selection might be impacting the effectiveness of management. The most direct significant public viewpoint must be considered when designing cutblock boundaries and retention areas to ensure the VQO is achieved.

Cultural Heritage Resource Management

Management of cultural heritage resources has improved between the two reporting periods, as has Indigenous participation in completing FREP CHR assessments in DSN. These positive trends are consistent with the Provincial priority of Reconciliation, and I look forward to further improvements.

In identifying blocks for CHR sampling, it is recognized that licensees are conducting archaeological impact assessments above and beyond the high areas in the Vanderhoof archaeological overview assessment (AOA)

model. The Fort St James AOA model resulted in a high success rate in identifying cultural heritage features indicating that this model isn't over-estimating that area.

In recent sampling, identified high potential zones (HPZ) has become an area of concern. It has been found that when an HPZ has been identified and reserved out from harvesting, it is usually logged right to this boundary resulting in windthrow within the HPZ area causing disturbance. Also there has been instances where the HPZ zone has been further disturbed with newly planted seedlings. As a result, the following practices are recommended:

- Clarify the intent of an HPZ in the site plan.
- Freshen the HPZ boundary with a ribbon appropriate for the intended management (harvest boundary, machine free, or special management).
- Stub trees along the harvest edge of that zone.
- Keep site prep machinery, planted trees, or other site disturbance out of these zones.
- Leave more of a buffer to the HPZ boundary to ensure windthrow is minimized within this area.
- Carry out the extra AIA field work to identify the specific cultural heritage resource feature(s) in the HFP zone requiring protection.

Stand Level Biodiversity Management

Although this section has not been ranked like the other sections, the general state of biodiversity management in DSN can be identified by comparisons with the regional and BC interior averages as well as any trending observed from the two period. As a result, I am pleased to see the increasingly larger retention areas associated with our district's larger size cutblocks. For the most recent reporting period (2013+), it is good to see that the difference in large CWD found in the NAR versus the WTP is less for our district compared to the Omineca and the BC Interior averages. It is also good to see that the median large CWD has increased between the two periods. Do keep up the good efforts to continue to maintain large CWD (longer than 10m length and greater than 20cm diameter) within the harvest areas to support biodiversity.

Further emphasis on retention of large trees greater than 30cm diameter will improve Stand Level Biodiversity. This district's average for retention of larger trees is below both the Omineca region and the BC interior averages. The trending for all areas shows that the retention of these large trees is on the decline. It is understood that the average piece size may be less available, but block harvest data indicates that there are larger trees in the harvest area compared to the retention areas. As a result, it is reminded that retention areas should reflect the timber type that is being harvested to ensure large trees are retained. It is good to see retention areas are established surrounding streams, wetlands, and other high value biodiversity/wildlife areas. Just remember to exclude marginal non-productive and immature stands from retention areas.

Rangeland Health

Rangeland health monitoring has determined that the cumulative effects of timber harvesting activities creates transitional grazing areas but also exposes riparian areas to overgrazing and soil compaction. As a result, communication between forest licensees and range agreement holders is essential for coordinating the protection of sensitive areas to promote healthy ecosystems, by using natural range barriers, building range developments, and using other practices to minimize livestock movement and use in these areas.

In comparing Stuart Nechako's district results with the provincial average results for the last six years, it is good to see that rangeland health in our district is found to be above average, especially for upland and wetland areas. Keep up the good work, maintaining ecosystem health on our rangelands.

FREP Dashboard

A new development that has occurred since this report was first initiated is the production of a FREP Dashboard. It is a great product to view updated results of FREP monitoring for riparian, visual quality, and water quality for Stuart Nechako District. Please take a moment to check it out and provide us with any comments on this regarding its ease of interpretation and understanding. Future reports may include direct links to these results as we become more familiar with the usability and benefits of this data output. See this link to the FREP Dashboard: FREP Dashboard (arcgis.com) Please feel free to give us your feedback on this for future use of this reporting tool. Thanks.

Opportunity for Feedback

The production of this report has been a result of input and review from various district and branch staff. As we continue to strive for improvements in communication, we appreciate any feedback that anyone may have. As a result, please take a moment to provide us with any comments you may have on this report using the following web link or QR Code to an online survey form.

https://forms.office.com/r/X7hcFPD6nd

Thank you for your interest in the Stuart Nechako district FREP results.

APPENDIX 1. SUMMARY DESCRIPTION OF RESOURCE DEVELOPMENT IMPACT RATING CRITERIA

Table 5 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 Multiple Resource Value Assessment Resource Stewardship Methodology, 2012 (insert link to methodology paper when available). The ratings of "very low," "low," "medium," and "high" are "technical ratings" based on best available science.

Table 5: 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	Moderate	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 "no" answers = *'properly functioning condition'*	3–4 "no" answers = *'functioning condition but at risk'*	5–6 "no" answers ='*functioning condition but at high risk'*	>6 "no" answers ='*not properly functioning condition'*
Water Quality	Are forest practices effective in protecting water quality?	Fine sediment potential	Amount of fine sediment resulting from expected surface erosion or past mass wasting	<0.1 m^3	<1 m^3	1–5 m^3	>5 m^3
Visual Quality	Are forest practices achieving established visual quality objectives in scenic areas?	Visibleness of alteration, use of visual landscape design elements, percent of landform altered, visual impact of roads, percent of block with visible tree retention	Basic visual quality class (VQC) is determined using the ocular assessment method. Adjusted VQC is derived using the percent alteration assessment method, which includes adjustment factors. The two measures are combined to determine a final rating.	Well Met Both methods indicate VQO achieved and percent alteration is low or mid-range	Met Both methods indicate VQO achieved, but percent alteration for one or both is close to alteration limit	Borderline Only one method indicates VQO achieved	Not Met Both methods indicate VQO not achieved
Cultural Heritage Resources	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	Block rated well/very well & no features rated poor/very poor	Block rated well/very well & ≥1 feature rated poor/very poor ***OR*** Block rated moderate & no features rated poor/very poor	Block rated moderate & ≥1 feature rated poor/very poor	Block rated poor/very poor