FREP

CHIEF FORESTER'S REPORT

February 2011

FOREST AND RANGE EVALUATION PROGRAM

Chief Forester's 2010 Annual Report on the Forest and Range Evaluation Program

February 2011

Stan of Okanagan Shuswap District evaluating a stream at Bear Ck. East of Lumby.
Photo credit: Pat Hughes

FREP Forest & Range Evaluation Program

PREMIER'S AWARD
PROMOTING INNOVATION AND EXCELLENCE

BRITISH COLUMBIA
The Best Place on Earth

Sustainability of Forest and Range Resources Through Science and Stewardship

MINISTRY OF FORESTS, MINES AND LANDS
FOREST AND RANGE EVALUATION PROGRAM

Chief Forester's 2010 Annual Report on the Forest and Range Evaluation Program

February 2011

This Chief Forester's Report summarizes recent FREP findings and highlights recommendations and opportunities for continued enhancement of forest and range practices as seen from the lens of the Chief Forester in my responsibility of overseeing the stewardship of British Columbia's 55 million hectares of forest and range resources.

Jim Snetsinger, RPF
Chief Forester

FREP Forest&Range EvaluationProgram

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INTRODUCTION

This second annual Forest and Range Evaluation Program (FREP) Chief Forester's Report summarizes the program's findings to date along with some related perspectives and recommendations for the consideration of resource managers. With natural resource management professionals as its key audience, the intent is to encourage dialogue among resource professionals, support continuous improvement of management practices, and ensure the resource management community gains maximum value from FREP.

The *Forest and Range Practices Act* (*FRPA*) and regulations provide for a results-based, forest and range management framework in British Columbia. Under this framework, the government, through FREP, evaluates and monitors the effectiveness of forest and range practices in achieving management objectives, including sustainable resource management. The government also evaluates compliance with the law through compliance and enforcement activities.

A partnership between the Ministry of Forests, Mines and Lands, the Ministry of Natural Resource Operations, and the Ministry of Environment, FREP meets the commitment of government to:

1. Assess the effectiveness of forest and range legislation in achieving stewardship objectives;
2. Determine whether forest and range practices are achieving government's objectives, with a focus on ecological function and social values (e.g., visual quality and cultural heritage);
3. Identify forest and range resource value status and trends; and
4. Identify opportunities for continued improvement of British Columbia's forest and range practices, policies, and legislation.

The Forest and Range Evaluation Program is foundational to the success of the *FRPA* results-based model and the associated principle of professional reliance.[1]

To help ensure enhanced knowledge, informed decision making, and sustainable practices, FREP conducts ongoing monitoring of forest and range practices and any associated impacts on the 11 *FRPA* resource values, and communicates these monitoring results to resource management professionals. A key goal of FREP is to provide current, high-quality information that supports the continuous improvement of policy and management practices which balance social, environmental, and economic values in the interest of British Columbians.

Specific "evaluation questions" have been developed for each of the 11 *FRPA* resource values (see: http://www.for.gov.bc.ca/hfp/frep/about/questions.htm). These questions frame the context for FREP monitoring indicators and procedures. This monitoring has identified practices for eight resource values (see Table 1 and Figure 1) that have proven effective in sustainably managing forest and range resource values as well as opportunities and recommendations for continued improvement. FREP monitoring results have been used to inform policy development (e.g., Chief Forester's guidance on coarse woody debris), timber supply reviews (e.g., Prince George and Quesnel Timber supply Areas), and on-the-ground practices.

Atluck Lake
Photo credit Paul Barolet

The FREP Mission: To be a world leader in resource stewardship monitoring and effectiveness evaluations, communicating science-based information to enhance the knowledge of resource professionals and inform balanced decision making and continuous improvement of British Columbia's forest and range practices, policies, and legislation.

1 The term *professional reliance* is used to describe the specialized knowledge that professionals bring to their practice. This includes the understanding that professionals, on a regular and consistent basis, maintain a currency of knowledge, have a method of acquiring the current science and then incorporate this knowledge into their practice. Under professional reliance, government and industry rely on the judgement of resource professionals who, in turn, are held accountable for their actions by the Association of BC Forest Professionals (Mike Larock, ABCFP, pers. comm.).

Table 1 lists the eight resource values currently monitored under FREP and describes the status of resource value monitoring. Figure 1 illustrates the spatial distribution of FREP resource monitoring completed to date.

Table 1. ***Forest and Range Practices Act resource values currently monitored and reported under FREP***

FRPA resource value and team lead(s)	Number of samples (as of end of 2009 field season)	Resource value monitoring status
Fish/Riparian Peter Tschaplinski Peter.Tschaplinski@gov.bc.ca	1668 stream reaches	Operational monitoring across the province Results published on the FREP website Data available
Water Quality Dave Maloney Dave.Maloney@gov.bc.ca	1717 stream crossings (sediment) 466 range	
Stand-level Biodiversity Nancy Densmore Nancy.Densmore@gov.bc.ca	1642 cutblocks	
Visual Quality Jacques Marc Jacques.Marc@gov.bc.ca	324 landforms	
Cultural Heritage Peter Bradford Bradford.Peter@gov.bc.ca	54 cutblocks 164 cultural features	Completion of pilots in 2010 Results published on the FREP website Ready for operational implementation in 2011
Timber Frank Barber Frank.Barber@gov.bc.ca	266 post-free-growing cutblocks	
Forage (range) Doug Fraser Doug.Fraser@gov.bc.ca Francis Njenga Francis.Njenga@gov.bc.ca	439 upland areas 117 wetlands 56 streams	Ready for operational monitoring across the province
Soils Stephane Dubé Stephane.Dube@gov.bc.ca Shannon Berch Shannon.Berch@gov.bc.ca	150 cutblocks	

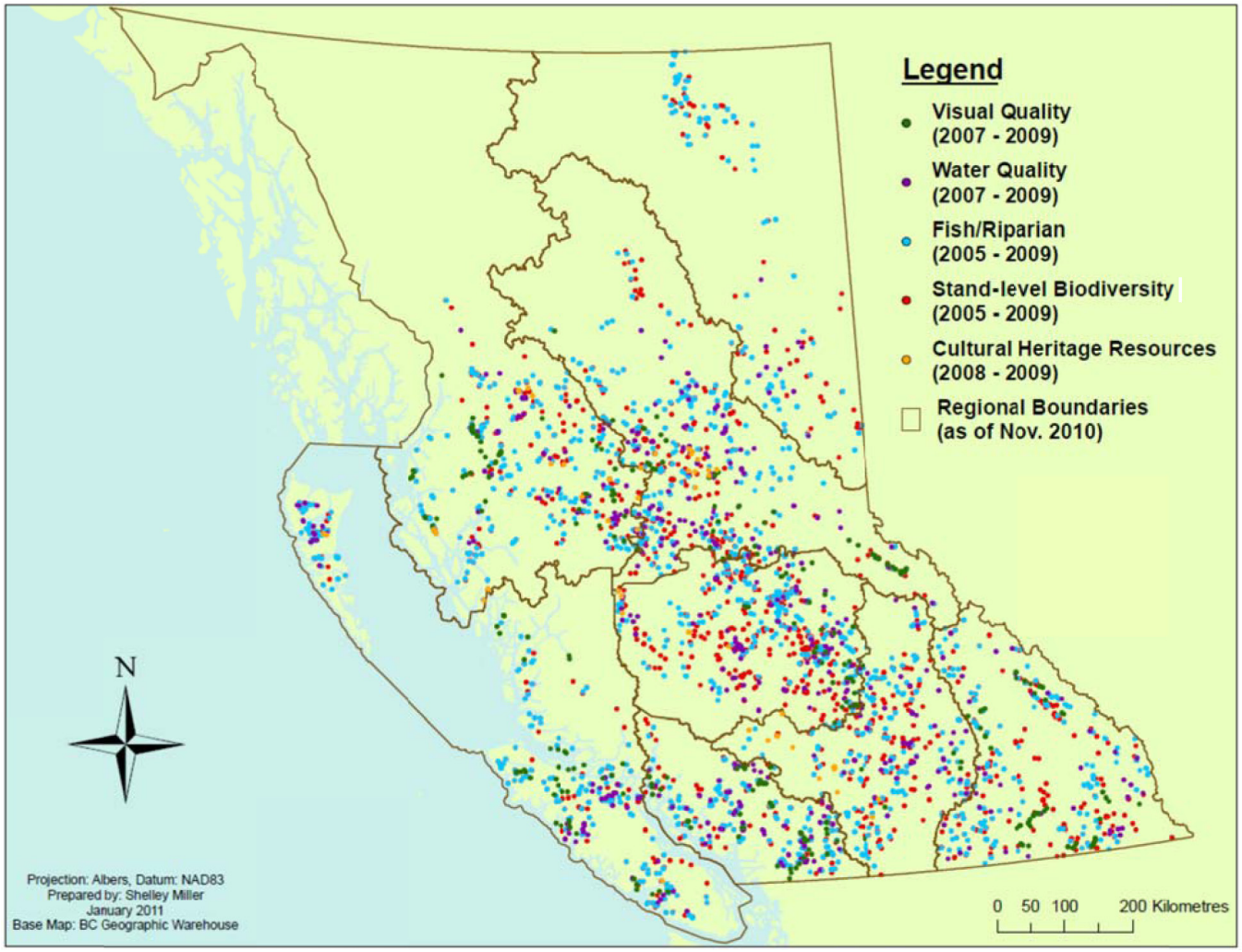

Figure 1. ***Sample site locations for FREP Resource Stewardship Monitoring of the visual quality, water quality, cultural heritage resources, fish/riparian, and stand-level biodiversity resource values.***

BIODIVERSITY (STAND-LEVEL)

The FREP evaluation question for the biodiversity resource value is: *Is stand-level retention providing the range of habitat with the structural attributes understood as necessary for maintaining the species dependent on wildlife trees and coarse woody debris*?

Key Stand-level Biodiversity Findings

The amount and quality of both tree and coarse woody debris (CWD) retention on harvested cutblocks varies greatly throughout British Columbia. Table 2 provides a summary of results from three predominant biogeoclimatic ecosystem classification (BEC) subzones in the province.

Table 2. ***Summary of stand-level biodiversity retention in the predominant BEC subzones***

BEC subzone	Average total retention (%)	Cutblocks with retention (%)	FREP tree indicator[a] average as % of average baseline value[b]				
			Large snags	Large diameter trees	No. tree species	CWD m^3/ha	CWD big pieces per hectare
Boreal White and Black Spruce moist warm (BWBSmw)	10	87	78	134	79	91	24
Interior Douglas-fir dry cool (IDFdk)	27	93	67	70	110	79	26
Coastal Western Hemlock very wet maritime (CWHvm)	21	92	85	57	79	108	40

a Definitions: large snags are dead trees ≥ 30 cm dbh and ≥ 10 m tall; large diameter trees are live or dead trees ≥ 70 cm dbh in the CWHvm, ≥ 50 cm dbh in the BWBSmw, and ≥ 40 cm dbh in the IDFdk; big pieces of CWD are ≥ 20 cm diameter and ≥ 10 m long.

b Baseline for the tree indicators comes from timber cruise data from the same subzone. Baseline for the CWD harvest area comes from CWD data collected within wildlife tree retention patches.

- A large range in average wildlife tree retention is evident in the three predominant subzones, from 10% in the BWBSmw (northeast of the province), to 27% in the IDFdk (dry central interior), and 21% in the CWHvm (coastal, mainly Vancouver Island)
- Looking at the quality of the trees retained, the BWBSmw has large-diameter trees in densities similar to that found before harvest; these are valuable as current and future wildlife trees.
- The full spectrum of tree species diversity is being maintained in the IDFdk.
- The coastal CWHvm shows higher relative densities of big CWD pieces (length and diameter), which can provide valuable long-term denning and feeding habitat opportunities.

Recommendations

The following activities would improve overall outcomes for the Biodiversity (stand-level) resource value.

- In the CWHvm subzone, maintaining higher densities of large-diameter trees, representative of pre-harvest conditions, would improve critical habitat for species that depend on wildlife trees.
- In the IDFdk and BWBSmw subzones, maintaining higher densities of big CWD pieces would be valuable for factors such as wildlife habitat, soil structure, and hydrologic stability.
- Improving densities of big CWD is applicable to most subzones to bring the density of these ecologically valuable pieces closer to that found on the ground in unharvested areas.
- Maintaining retention areas with densities of large dead trees (snags), large live trees, and the full diversity of tree species representative of pre-harvest stand conditions will serve to ensure that the complete range of natural variation of such important mature forest characteristics continues to support habitat and biodiversity needs.
- Maintaining areas of both dispersed retention and patch retention with a variety of patch locations internal to, and on the edge of, harvest boundaries will allow for dispersal of species, better connectivity of mature patches for wildlife movement, and recruitment of future CWD throughout the cutblocks. External retention patches, which are not directly connected to an individual cutblock, do not provide any of these stand-level biodiversity benefits to the cutblock and are best avoided.

CULTURAL HERITAGE RESOURCES

The FREP evaluation question for the cultural heritage resources value is: *Are cultural heritage resources being protected and conserved for First Nations cultural and traditional activities as a result of forest practices*?

Key Cultural Heritage Resources Findings

- The most common cultural heritage resource (CHR) management strategies identified were feature or site avoidance and stumping of some or all culturally modified trees above the cultural markings or scars.
- Approximately 50% of CHR assessments showed no evidence of damage to individual sites or features; 21% of sites evaluated in 2009 showed avoidable damage attributed to harvesting activities, with an additional 8% of sites with damage from activities such as road building or post-harvest influences such as pile burning.
- Of all sites evaluated in 2009, 12% had permanent damage and (or) were rendered unsuitable for continued use.

Recommendations

The following activities would improve overall outcomes for the Cultural Heritage resource value.

- Successful CHR outcomes are often associated with careful pre-harvest planning and communication, such as:
  - Understanding local First Nations perspectives and expectations through direct contact and information sharing with local First Nations (direct contact is often the only way to obtain detailed cultural and historic information).
  - Knowing and understanding readily available CHR information, recommendations, and (or) requirements in Preliminary Field Reconnaissance reports, Archaeological Impact Assessments, Site Plans, and Forest Stewardship Plans.
  - Locating, assessing, and determining the significance of individual and (or) multiple features on a site-specific basis before harvest.
- In harvest design: Avoiding CHR features by excluding them from the harvest areas and (or) providing higher levels of post-harvest retention (buffers) to protect features.
- During harvesting and road building: Falling and yarding away from cultural features, keeping accumulations of slash and (or) burn piles away from features and using machine-free zones or buffers to help ensure long-term feature integrity.
- Post harvest: Ensuring adequate communication with people conducting silvicultural post-harvest activities, such as pile burning (avoid burning near features), site preparation (avoid features and damage to tree roots buffering features), and planting (not planting on features such as trails), so that cultural resource features protected during harvest will remain protected.

FISH/RIPARIAN

The FREP evaluation question for the fish/riparian resource value is: *Are riparian forestry and range practices effective in maintaining the structural integrity and functions of stream ecosystems and other aquatic resource features over both short and long terms?*

Key Fish/Riparian Findings

- From 2005–2008, 1441 stream reaches were assessed for a number of stream indicators (measures) including sedimentation, tree retention, and stream bank disturbance.
- Results of FREP riparian monitoring correspond closely with findings reported in 1998 by the B.C. Forest Practices Board (see Table 3). FREP results also support the Board's conclusion that riparian management resulting from implementation of the Forest Practices Code (Code) represented a great improvement over pre-code conditions because of "a marked reduction in the level of logging-related alterations to streams."

Landscape: Anahim Lake Morning
Photo credit: Dan Hicks

Table 3. ***Percentage of pre-Forest Practices Code, early Code era (Forest Practices Board 1996 assessment), and FREP assessed streams (2005–2008) in not properly functioning (NPF) condition***

Riparian class	Pre-Forest Practices Code *(Percentage of streams equivalent to FREP NPF streams)*	Forest Practices Board Assessment *(assessed 1996, publ. 1998) (Percentage of streams equivalent to FREP NPF streams)*	FREP Assessment (2005–2008) (Percentage of NPF streams)
S1	5	0	0
S2	20	0.6	1.2
S3	41	4.4	5.3
S4	60	9.4	10.8
S5	45	3.3	5.4
S6	76	20.2	19.0

- Provincially, 87% of all stream reaches were in one of the three categories of properly functioning condition[2]. For stream reaches classified as fish-bearing, 93% were assessed as properly functioning.
- 1074 streams were sampled in the Northern Interior and Southern Interior forest regions; 89% of these streams were in properly functioning condition; 11% of Interior streams were not properly functioning.
- On the Coast, 81% of streams were in properly functioning condition; 19% of coastal streams were not properly functioning.
- Primary forestry-related influences on functional condition, in descending order of frequency, are: (1) generation and transport of road-related fine sediments, (2) low levels of tree retention in riparian management areas, (3) windthrow, (4) falling and yarding trees across streams, and (5) machine disturbance in riparian management areas during harvest.
- Fine sediments generated by forestry-related activities affected 38% of sample streams across all stream classes, regardless of retention levels or buffer widths along streams.
- The functional condition of stream reaches across all stream classes with buffers wider than 10 m was not significantly different from streams with buffers 10 m wide.
- Livestock trampling in riparian areas was a top-ranked impact factor in the Southern Interior Forest Region, affecting 24% of all sites with recorded impacts. These effects were generally higher for larger streams and their fish-bearing tributaries (riparian class S4). The frequent location of these streams on gentler slopes, valley bottoms, or at lower elevations within watersheds may have made them more accessible to livestock.

Recommendations

The following activities would improve overall outcomes for the Fish/Riparian resource value on riparian class S4, S5, and S6 streams.

- Retaining full, wind-firm retention within the first 10 m of all S4 streams, and all perennial S5 and S6 streams that deliver water, nutrients (e.g., nitrogen, phosphorus, and carbon including fine organic particles), and invertebrates downstream to fish-bearing areas and (or) drinking water sources throughout the year.
- Retaining full, wind-firm retention within the first 10 m of all S5 and S6 streams that transport coarse sediments and large woody debris downstream to fish-bearing areas and (or) drinking water sources.
- Retaining, at minimum, all non-merchantable trees, understorey, and smaller vegetation, and as many wind-firm trees as possible within the first 10 m of all

2 Stream condition is based on answering 15 questions related to stream and riparian health in consideration of current conditions and the range of variability naturally found in streams. If there are six or fewer problem indicators, a stream is designated in one of three classes of "properly functioning condition." If there are more than six problem indicators, the stream is designated as "not properly functioning." For more details on the designation of stream condition and related implications, please see FREP Extension Note No. 17, *State of Stream Channels, Fish Habitats, and Adjacent Riparian Areas: Resource Stewardship Monitoring to Evaluate the Effectiveness of Riparian Management, 2005–2008* (http://www.for.gov.bc.ca/ftp/hfp/external/!publish/FREP/extension/FREP%20Extension%20Note17.pdf).

other S5 and S6 streams (intermittent and ephemeral streams with low coarse sediment and debris transport capability) directly connected to fish-bearing areas and (or) drinking water sources.

- Retaining at minimum, all non-merchantable trees, understorey, and smaller vegetation within 10 m of all other S5 and S6 stream channels (intermittent and ephemeral S5 and S6 streams with low coarse sediment and debris transport capability not directly connected to fish-bearing areas and [or] drinking water sources).
- Balancing overall stream retention levels by considering that non-fish-bearing streams, with low debris transport potential and which dry up in summer or are ephemeral, rarely require treed reserves for in-stream structure and function.
- Following established best management practices concerning fine sediment delivery to channels from roads and stream crossings. These two documents provide excellent sources of information:
  - Forest Road Engineering Guidebook (http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/Road/FRE.pdf)
  - Erosion and Sediment Control Practices for Forest Roads and Stream Crossings (FERIC, http://www.feric.ca/en/?OBJECTID=D1719534-C09F-3A58-EAFC64F9625A170F)

FORAGE

The FREP evaluation questions for the forage (range) resource value are: *What impact are range practices having on the desired plant succession? and What impact are range practices having on the water cycle/hydrologic function?*

Key Forage Findings

- Of the 439 upland areas sampled for forage condition, 56% were assessed as properly functioning to slightly at risk, 11% were moderately at risk, and 33% were highly at risk to non-functional.
- Approximately one-third of range upland areas show the combined effects of decades of livestock use, decreasing forage supply because of forest in-growth (due primarily to exclusion of low-intensity ground fires), and (or) heavy wildlife use.
- Wetlands are showing the effects of low snowpacks and low water levels; low water levels in wetlands create new access for livestock and increase the susceptibility to trampling damage.
- Of the 117 wetlands sampled, 68% were properly functioning to slightly at risk, 5% were moderately at risk, and 27% were highly at risk to non-functioning.
- Of the 56 streams sampled, 63% were properly functioning to slightly at risk, 25% were moderately at risk, and 12% were highly at risk to non-functional.

Recommendations

The following activities would improve overall outcomes for the Forage (Range) resource value.

- Following well-established best management practices, such as:
  - Building planned rest into the annual grazing plan for bunchgrass range. Typical rest-rotation grazing systems rest one-quarter of their pastures from livestock use each year.
  - Adjusting grazing use levels and stocking rates according to seral stage and rangeland health. Ideally, early-seral range should be used lightly (17–25% of annual forage production), whereas healthy mid- and late-seral range is best used moderately (30–40% of annual production).
  - Allowing dormant season (winter grazing) on low-elevation bunchgrass range is beneficial to grass plants and biological soil crusts.
- Preserving natural range barriers (vegetation and downed woody debris) to help limit livestock access to streams, wetlands, and lakes. Removal of natural range barriers during timber harvesting and road building can create new livestock access to streams, wetlands, and lakes and result in trampling damage.
- Co-ordinating timber harvesting, road building, and range use to insure that natural range barriers in riparian areas remain effective.

SOILS

The FREP evaluation question for the soils resource value is: *Are forest practices successful in preventing levels of site disturbance that are detrimental to soil productivity and hydrologic function?*

Monitoring for the soils resource value at the cutblock level has been under way for several years and derived in part by digital imagery review complemented with ground survey observations. Soils indicators reflect the status of a specific aspect of the soil value. Indicators include: (1) lost productivity due to access construction,

(2) areas affected by landslide, erosion, and natural drainage diversion, (3) soil disturbance, (4) green tree retention, and (5) dead wood. Analysis of 150 post-harvest areas is near completion, using recent improvements to the soils monitoring procedures. Publication of soils monitoring results is planned for the fall of 2011.

Key Soils Findings

- Results show loss of soil productivity due to access structure averages 3.3% of gross cutblock area; the allowable loss is 7%. These results indicate a shift from landing-based operations to roadside work areas.
- Most cutblocks were below the soil disturbance limits of 5% for sensitive soils and 10% on other soils.
- Soil disturbance levels created during roadside processing of timber and piling debris were often concentrated and exceed the allowable loss of 25% of roadside processing areas.
- In salvage-logged beetle areas, changes in soil hydrologic functions were evidenced by exposed seepage areas and areas of standing water (ponding).

Recommendations

The following activities would improve overall outcomes for the Soils resource value.

- Increasing awareness and action when operating conditions change; for example, machinery-caused compaction can increase significantly when soils are too wet.
- Avoiding thick layers of slash, as these affect site quality and tree growth; instead, use techniques such as lop and scatter and slash pile chipping.
- Following established best management practices concerning soil compaction and conservation. These two sources provide excellent information:
  - Preventing Soil Compaction and Rutting in the Boreal Forest of Western Canada: A Practical Guide to Operating Timber-harvesting Equipment (http://www.feric.ca/en/index.cfm?objectid=DDF72A13-E081-222F-A4DA52C482E31BA9)
  - Best Management Practices for Soil Conservation in Mountain Pine Beetle Salvage Operation (http://www.for.gov.bc.ca/hfd/pubs/Docs/En/En91.pdf).

Additional recommendations will be developed following the completion of the soil data analysis.

TIMBER

The FREP evaluation question for the timber resource value is: *What is the forest health and productivity (merchantable timber volume, value, and availability) in 15–40-year-old second-growth stands*?

Key Timber Findings

- Monitoring the timber value to date has primarily consisted of assessing 15–40-year-old, post-free-growing stands to determine their condition and whether they are developing as predicted.
- Of the 266 stands examined across five timber supply areas, the majority have undergone a loss of free-growing density in the decade or so since declaration. Changes in total stand density varied by biogeoclimatic ecosystem classification zone across the province with stands in the Coastal Western Hemlock and Sub-Boreal Spruce zone increasing due to high levels of natural ingress. Stands in the Interior Cedar–Hemlock, Interior Douglas-fir, Montane Spruce, and Engelmann Spruce–Subalpine Fir zones experienced a net decrease in total density due to mortality, usually a result of pests or vegetative competition.
- Four of five timber supply areas examined experienced a change in leading inventory species in about 20% of stands with the exception of the lodgepole pine-dominated Lakes Timber Supply Area, where the leading species did not change. Changes in leading species were the result of ingress of natural regeneration and specific forest health issues that decreased preferred species stocking.
- The most common forest health agents found were: hard pine rusts, deformities and abiotic damage, vegetation competition, mammal damage, and root disease. Most of these cause tree mortality or reduce tree value and vigour by causing permanent deformity.

Recommendations

The following activities would improve overall outcomes for the Timber (second-growth stand management) resource value.

- Planting species mixes at densities that account for local forest health and abiotic conditions, and their anticipated long-term impacts, and not only to fulfill short-term legal reforestation requirements. For some ecological units, site-specific tree species selection, species mixes, and densities including existing stocking standards may need to be improved to better reflect current and evolving stand conditions.

- Conducting forest management activities that mitigate future stand density losses such as:
  - Proactive inoculum reduction (e.g., stumping) before planting to help control root diseases.
  - Appropriate timing of brushing treatments to control vegetation competition.
- Updating inventory labels to reflect changes to second-growth stands as these stands develop (e.g., tree species shifts and stand density changes) will provide a more current inventory and help refine yield estimates for timber supply forecasts.

VISUAL QUALITY

The FREP evaluation questions for the visual quality resource value are: *How well are we managing and conserving views in designated scenic areas?* and *Are established Visual Quality Objectives being achieved*?

Key Visual Quality Findings

- Under the Forest Practices Code, Visual Quality Objectives (VQOs) were achieved on 143 of the 234 (61%) landscapes sampled across the province between 2007 and 2008.
- VQOs on highly sensitive "Retention" landscapes were achieved 33% of the time, whereas VQOs on less sensitive "Modification" landscapes were achieved 76% of the time.
- Visual design concepts (cutblock shaping) were clearly evident in 40% of the 234 landscapes sampled.
- Visually effective levels of tree retention (i.e., > 24% by volume or stem count) were present in 22% of openings sampled; 48% of openings sampled contained 15% or less tree retention.

Recommendations

The following activities would improve overall outcomes for the Visual Quality resource value.

- Retaining higher levels of designed in-block tree retention or volume creates more natural-appearing landscapes and helps meet VQOs (e.g., visual perception studies show a minimum level of 24% by volume or stem count is required).
- Designing dispersed retention harvesting can facilitate greater overall short-term volume removal from a given landform, for a given VQO, when compared to clearcutting.
- Implementing existing visual design concepts and principles (i.e., cutblock shaping) will ensure harvested areas better blend with the natural landscape.
- Encouraging visual design training for natural resource professionals practicing in this field would help ensure higher levels of VQO achievement (e.g., > 61% achievement). These two sources provide excellent information on visual design:
  - Interactive web-based Visual Landscape Design training package (http://www.for.gov.bc.ca/hfp/training/00018/)
  - Visual Landscape Design Training Manual (http://www.for.gov.bc.ca/HFD/pubs/docs/mr/rec023.htm)

WATER QUALITY

The FREP evaluation question for the water quality resource value is: Are forest practices effective in protecting water quality?

Key Water Quality Findings

- Of the 2183 sample sites evaluated during the 2008 and 2009 field seasons:
  - Approximately 70% of the sites were rated "Very Low" or "Low" for potential sediment generation, indicating water quality is being preserved.
  - 25% of sites were rated as "Moderate" for potential sediment generation, where water quality may be negatively impacted in sensitive watersheds.
  - 5% rated as "High" and "Very High" for potential sediment generation, indicating water quality is negatively impacted on these sites.
  - Long ditch lines, disturbed natural drainage patterns, exposed erodible soils, and road maintenance shortcomings were the main causes of elevated sediment generation.

Recommendations

The following activities would improve overall outcomes for the Water Quality resource value.

- Constructing short ditch lines to reduce water build-up and erosive potential.
- Building roads with natural dips, swales, and grades to shunt water off the road into the understorey to filter any suspended sediment.
- Avoiding ditch lines that end at creeks.

- Armouring disturbed ground immediately after construction (or deactivation) using techniques such as re-seeding and strategic placement of woody debris.
- Using risk ranking to prioritize effective and timely road construction and management procedures in balance with stream class/uses. On balance, roads adjacent to fish-bearing and drinking water streams, lakes, and wetlands should receive highest priority.
- Co-ordinating timber harvesting, road building, and range use to help ensure natural range barriers in riparian areas remain effective.
- Following established best management practices concerning fine sediment delivery to channels from roads and stream crossings. These two documents provide excellent sources of information:
  - Forest Road Engineering Guidebook (http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/Road/FRE.pdf)
  - Erosion and Sediment Control Practices for Forest Roads and Stream Crossings (FERIC, http://www.feric.ca/en/?OBJECTID=D1719534-C09F-3A58-EAFC64F9625A170F)

CONCLUSION

As a summary of FREP monitoring results to date, this second annual Chief Forester's report provides an opportunity to communicate continuous improvement perspectives and recommendations to natural resource professionals. Along with other available documents, such as FREP reports, extension notes, and monitoring protocols, it is hoped the information presented here will support and promote the dialogue among resource professionals necessary to achieve sustainable resource management in British Columbia.

To ensure the resource management community gains the maximum value from FREP, natural resource professionals are encouraged to:

1. Carefully review the Key Findings and Recommendations contained in this report in the context of individual roles and responsibilities.
2. Contact district FREP representatives to discuss local results and (or) see how data is collected in the field.
3. Visit the FREP website (http://www.for.gov.bc.ca/hfp/frep/index.htm) and (or) contact any of the FREP Resource Value Team Leads (see Table 1) for detailed information on monitoring protocols, indicators, and results.
4. Review the FREP monitoring protocols as these documents identify best available information on key attributes and indicators of forest and range resource health and sustainability.
5. Send any feedback or questions relating to this report, or FREP in general, to Peter.Bradford@gov.bc.ca or by telephone at (250) 356-2134.

THANK YOU

Thank you to the Resource Value Team Leads for their work in developing the FREP monitoring indicators and protocols and for the analysis of data on which this report is based. Thank you to the field staff who collect resource stewardship monitoring data and help champion ongoing continuous improvement of FREP, and final thanks to Shelley Miller for her help on this report.

Norma of Prince George District in the creek
Photo credit: Heather MacLennan