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Free Growing Ocular Assessments
An FMLT Guidance Document for North Island – Central Coast Resource District

Acknowledgements

This document has been prepared and endorsed by members of the North Island – Central Coast Forest Management Leadership Team (FMLT). Contributions to this guidance paper have been made by Forest Analysis and Inventory Branch (FAIB), silviculture specialists, survey specialists and a number of qualified forest professionals (QFP) in British Columbia.

Purpose

The document is intended to provide local level guidance for professionals to consider as they operate within a framework of professional accountability and a culture of professional reliance. Increasing personnel safety, opportunities for operational productivity, economic benefit and reporting accuracy are considered in this document. Questions related to this document may be directed to North Vancouver Island FMLT members.

Introduction

Forest professionals responsible for determining the Free Growing status of harvested areas are required to collect accurate information to carry out legal reporting requirements on the status of these young forests. For a variety of reasons, a QFP may choose to forgo formal surveying techniques because conditions are such that an ocular assessment would provide reasonably accurate reporting information and would realize cost savings, increased productivity and potentially reduce safety hazards. The use of ocular assessments in forestry field work in BC and across Canada is one of the purest forms of professional reliance and is actually very common, but standards and proceedures are rarely documented. As a result, very little information or guidance is available to QFPs to aid them in deciding on the appropriateness of an ocular assessment and what to consider regarding the collection and interpretation of information. Ocular assessments are generally acceptable where statistical accuracy is redundant or when stocking conditions are very obvious. Additionally, specific site conditions may result in safety issues that might be encountered that would expose field personnel to significant and unnecessary risk of injury or death. Under these conditions, an ocular Free Growing assessment may be appropriate method of collecting stand information for reporting purposes.

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This guidance paper will provide forest professionals with some decision making tools that would help determine the appropriateness of ocular surveys used to establish the Free Growing status of harvested areas.

The scope of this guidance paper does not deviate from the existing best practices as described in the *Silviculture Surveys Procedures Manual*, the *Establishment to Free Growing Guidebook* and is consistent with legal reporting requirements, but provides more specific conditions and examples of situations where ocular assessments would be appropriate and acceptable to determine the Free Growing status of openings.

Free Growing Objectives

The first thing a QRP must consider before commencing any type of assessment is its purpose. The objectives of a Free Growing stand must be clear (operable forest or other objectives, conifer, hardwood or mixed forest, etc.) and established in the Site Plan and higher-level plans. Information must be collected and reviewed so the effectiveness of the silviculture treatments can be assessed in light of the objectives. This is the primary duty of the QRP to the profession and to the science of forestry.

Field Safety

The coast of British Columbia has some of the most rugged and isolated forests in the world. Combined with the increased use of helicopter logging and the resulting access problems, survey personnel occasionally encounter field conditions that have an elevated risk of personal injury or death. Under no circumstances is statistical accuracy worth the risk of injury or death. It is expected that, under normal conditions, field personnel should assess field sites for safety concerns and if conditions are such that personal safety will be compromised during survey work, this work should be delayed until such a time that conditions change or improve so that the safety concern is removed. It may be that the safety issue is permanent, in which case- an ocular estimate of the stand conditions may be appropriate.

Examples:

Dangerous Wildlife – grizzly bear habitat such as floodplains, etc (formal survey in winter)

Extreme Topography – Areas with unavoidable, dangerous terrain (unstable areas, cliffs, etc.)

Access – Where access to an area becomes a significant safety concern (difficult shoreline or unsafe helipads, etc.) an ocular assessment may be the best option.

Other hazards – Areas with numerous snags (created by wildfire, insect/disease infestations, flooding or die back) may pose an elevated risk to field personnel. If an assessment of the level of risk is high due to these overhead hazards, field personnel may find it appropriate to carry out ocular assessments..

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Qualifications

Professionals performing assessments must always consider their scope of practice and whether they have the experience and knowledge to perform an assessment that meets the precision requirements required to maintain an optimally accurate forest inventory. A qualified registered professional would typically have competencies gained through:

- Many years of silviculture experience and/or forest inventory work
- A good understanding of survey techniques and statistical analysis
- Considerable regional/ecological knowledge
- Familiarity with the specific harvest areas (e.g. involved in the planning, planting and/or previous surveys)
- Knowledge and understanding of crop reliability and the potential for insect and disease and other biotic and abiotic impacts on young stands.
- Knowledge of tree species adaptability to climate change

Stratification

The stratification of ecological Standard Units and Strata begins during pre-harvest planning and continues to be fine-tuned during post-harvest silviculture treatments such as planting, brushing, walkthroughs and during formal survey work at the regeneration milestone. Accurate stratification is a basic requirement for a successful monitoring program and is paramount to forest inventory accuracy. Accurately stratified areas are more appropriate and much easier to assess ocularly for Free Growing status.

Precision

Information gathered in silviculture assessments is used for legal reporting submissions to government. The Electronic Submission Famework Overview Guide and the Reporting Silviculture Updates and Land status Tracking System (RESULTS) include the levels of precision required in these submissions.

Standards of precision are required for accurate forest modeling which is used in Timber Supply Reviews (TSRs) and ultimately in Annual Allowable Cut (AAC) determinations. Therefore the precision of information provided in RESULTS has a direct impact of forest resource sustainability.

Accuracy becomes extremely important when reporting Site Index where the reporting accuracy must be within +/- 3 of the actual Site Index. The SIBEC method of estimating Site Index has proven to meet the relative accuracy required for reporting and resource modeling and would be appropriate for use with ocular assessments. However, the use of the SIBEC method is only accurate if proper stratification and accurate ecological classification has occurred.

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The Forest Cover Definition (Inventory Layer) is also very important for modeling future stands and the estimated Inventory Layer must be within 20% of actual. Monocultures and near monocultures are normally very easy to label. However, forest cover in multi-species stands becomes more and more difficult to estimate as the number of species increases.

Generally, all information collected and required for reporting in RESULTS must be within 20% of actual and within a reasonable variation from what other QRPs would establish.

Parent Data

In a multi-block setting such as a series of small helicopter logged blocks where the ecology and Site Index are the same or very similar, information from a formal survey may be extrapolated across other similar blocks. These "child" blocks would still require an ocular assessment to confirm site conditions and forest cover.

Brush Sites and Disturbed Sites

BEC site series 05, 06, 07, 08, 09 and 10 deserve special attention and a QFP should carefully consider the ingress and effect of brush on the developing stand in these ecosystems. Similarly, sites that contain significant soil disturbance due to harvesting techniques or mass wasting should be of significant concern to the QFP as the ingress of non-crop hardwoods could have a significant impact on the future stand even after Free Growing obligations have been met. The assessment of these types of sites should be delayed until the forest cover is fully expressed. Similarly, delayed assessments would be necessary for sites that have required brushing treatments to establish efficacy of the treatment. Some ground truthing may be required.

The Use of Remote Sensing/Google Earth

Remote sensing technology has become more useful and more available in recent years and can facilitate an ocular assessment. However, QRPs should be cautioned to use this technology only as a supplementary tool as accuracy is often not realized when using this technology. For instance, using aerial photography to determine species composition may result in inaccuracy greater than 30% (Magnussen, 1997). Similarly, the use of multi-sensor and multi-spectral imaging has not increased the accuracy to an acceptable level either (Wolter, 2009),(Wolter, 2010),(Plourde, 2007). The Canadian Forest Service was able to achieve a precision of less than 20% using semi-automated individual crown analysis (Lecke et al, 2002). However, this technique is likely too onerous for operational purposes. LiDAR is showing significant promise as a tool to help collect forest stand information, but high-precision imagery is often cost-prohibitive at this time.

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Until this technology becomes more accurate and cost effective QRPs should consider these systems as tools, but should not rely on them exclusively.

Testing the Assessment

The qualified registered professional must be confident their assessment is within the accuracy parameters outlined in the reporting requirements. Unbiased peer reviews by other QRPs are required to confirm the accuracy of the assessment.

Ocular assessments often lack statistical support and in reality, each qualified registered professional generally has their own techniques used for assessments which may change depending on specific site conditions. Because of this, ocular assessments on Crown land carry a higher risk to government and are likely to be more scrutinized or monitored by government then conventionally surveyed areas would be. For this reason, qualified registered professionals must ensure they record and maintain all materials relevant to the assessment and be confident in their ability to establish due diligence and defend their assessment.

Ultimately, if the qualified registered professional providing the ocular assessment and forest inventory information feels that they could successfully defend their position in an audit, administrative hearing or court of law, then they have carried out their work to the standards acceptable to the profession.

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Appendix A –
Bibliography and Additional Resources

References:

Leckie, Donald, et al. 2002. Stand Delineation and Composition estimation using semi-automated individual tree crown analysis. Canadian Forest Service. Remote Sensing of Environment 85. Pages 355-369

(Precision of normally less than 20% achieved in stands age-class 10-20 yrs. In Port Alberni)

Wolter, P.T. Estimating Forest Species Composition Using a Multi-Sensor Approach. American Geophysical Union, Fall Meeting 2009. Univ. of Wisc. Biblio code:2009AGUFM.B31A0312W (Lecture)

(Forest species composition estimation in Minnesota and Ontario had an overall accuracy of 78% using regression to intergrate satellite data from several sources (Landsat, Radarsat-1, PALSAR and SPOT-5)

Wolter, P.T. and Philip A. Townsend. 2010. Multi-sensor data fusion for estimating forest species composition and abundance in Northern Minnesota. Univ. of Wisc. Remote Sensing of Environment 115. Pages 671-691 (Journal Submission)

(Same as above)

Magnussen, Steen. 1997. Calibrating photo-interpreted forest cover types and relative species compositions to their ground expectations. Canadian Journal of Forest Research. 27:4) 491-500

(Data from New Bruinswick - Interpretation of cover types and relative species composition (by volume) to expected ground values was weak to poor and these calibrations resulted in significant shifts in cover types and species composition and enlarged the associated standard errors by 10-30%)

Plourde, Lucie C. et al. 2007. Estimating Species Abundance in a Northern Temperate Forest Using Spectral Mixture Analysis. Photogrammetric Engineering and Remote Sensing. Vol 73, No. 7, July 2007, pp. 829-840

(Multi-sensor spectral instruments were used to create hyper-spectral imaging unmixing to measure and estimate the species composition of two forest species (maple/beech). Precision accuracy ranged from 72% for Beech and 59% for Maple. Overall accuracy = 70%)

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Additional Resources

- Silviculture Surveys Procedures Manual – April 2012 (http://www.for.gov.bc.ca/hfp/silviculture/Surveys/SilvicultureSurveyProceduresManual-2012.pdf)
- Silviculture Surveys Forest Practices Branch (http://www.for.gov.bc.ca/hfp/silviculture/Silviculture_Surveys.html)
- Electronic Submissions Framework (http://www.for.gov.bc.ca/his/efm/)
- Establishment to Free Growing guidebooks (http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/Guidetoc.htm)
- BC Ministry of Forests *Silviculture Manual* (http://www.for.gov.bc.ca/hfp/publications/00099/)
- Site Index Estimates by Site Series (SIBEC) (http://www.for.gov.bc.ca/hre/sibec/)
- Reporting Silviculture Updates and Land status Tracking System (RESULTS) http://www.for.gov.bc.ca/his/efm/

FRPA Bulletins

- Use of the term “practicable”

  http://www.for.gov.bc.ca/ftp/hth/external/!publish/Web/frpa-admin/frpa-implementation/bulletins/frpa-general-no-3-defining-practicable-under-frpa-jun-9-2005.pdf

- Declarations regarding free growing obligations met to the extent practicable

  http://www.for.gov.bc.ca/ftp/hth/external/!publish/Web/frpa-admin/frpa-implementation/bulletins/frpa-general-no-20-declaration-re-free-growing-obligations-nov-19-2009.pdf

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