

Vegetation Resources Inventory Photo Interpretation Project Implementation Plan

Pacific Timber Supply Area (TSA 44) Blocks 18 and 19

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BCTS
BC Timber Sales
Strait of Georgia

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1.0 Introduction

1.1 Background Information

In the province of British Columbia, the Vegetation Resources Inventory (VRI) is a strategic level inventory designed to support, among other things, the Timber Supply Review (TSR) process, and is the current Provincial standard for forest inventory in B.C. The primary objective of this project is to create a reliable Phase I inventory meeting provincial VRI standards for the BCTS Chart Area in Blocks 18 and 19 of the Pacific Timber Supply Area. This area is administered by the Strait of Georgia BCTS unit based in Campbell River.

The current data for this area, acquired by the province through the Bill 28 TFL Take Back process, covers areas previously within TFLs 25 and 39. The existing forest cover data for each area, provided to BCTS by Western Forest Products (WFP), are inconsistent in format and content. After review and assessment, both data sets were deemed to be inadequate for BCTS's planning and timber supply analysis purposes. Even though both TFL areas were recently under licence to WFP, the two datasets are from different eras and carry different attributes and fields due to TFL 39 originally being a Cascadia (previously Weyerhaeuser and MacMillan Bloedel) TFL and TFL 25 a long-time WFP licence. Neither inventory meets current MFR VRI Standards.

1.2 Project Land Base

Pacific TSA – Blocks 18 & 19 cover slightly more than 60,000 hectares and are located north of Sayward on the east coast of Vancouver Island within the Tsitika River, Eve River and Naka Creek drainages (see Figure 1).

Approximately 77.3% of this area is productive forest and 6,486 hectares are excluded from the Timber Harvesting Land Base (THLB) due to Wildlife Habitat, Old Growth Management and other constraints. The unreliable quality of the data that was received from the previous licensee means that it is not presently possible to accurately determine the true THLB. The species and age class distribution of the forest based on existing inventory data is presented in Table 1 for the TFL 39 portion and in Table 2 for the TFL 25 portion. The original TFL boundaries are shown in Figure 2 and these boundaries segment the entire land base into the two areas represented in Table 1 and 2 statistics below.

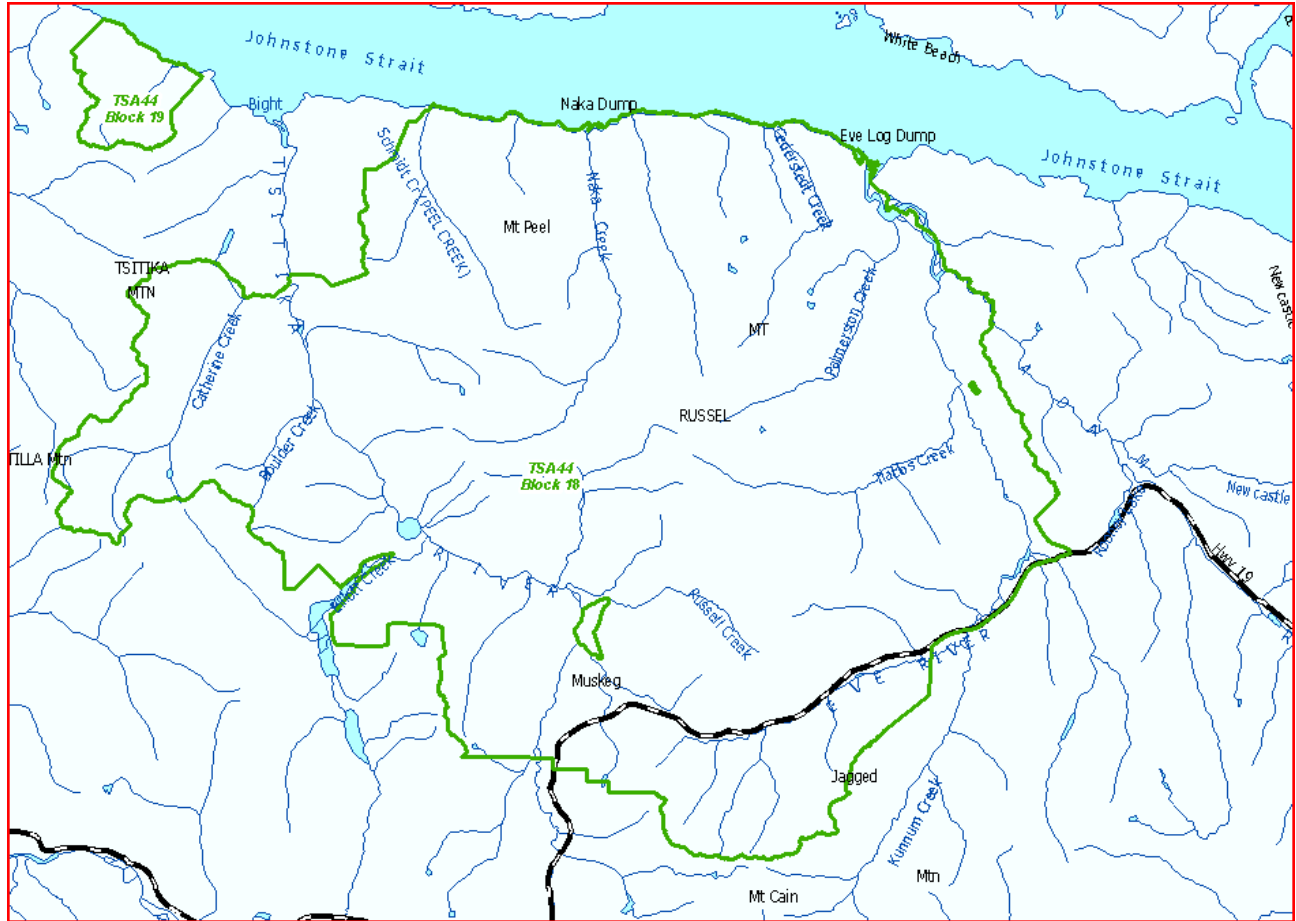


Figure 1: Overview map of Pacific TSA - Blocks 18 and 19

- Project area outlined in green

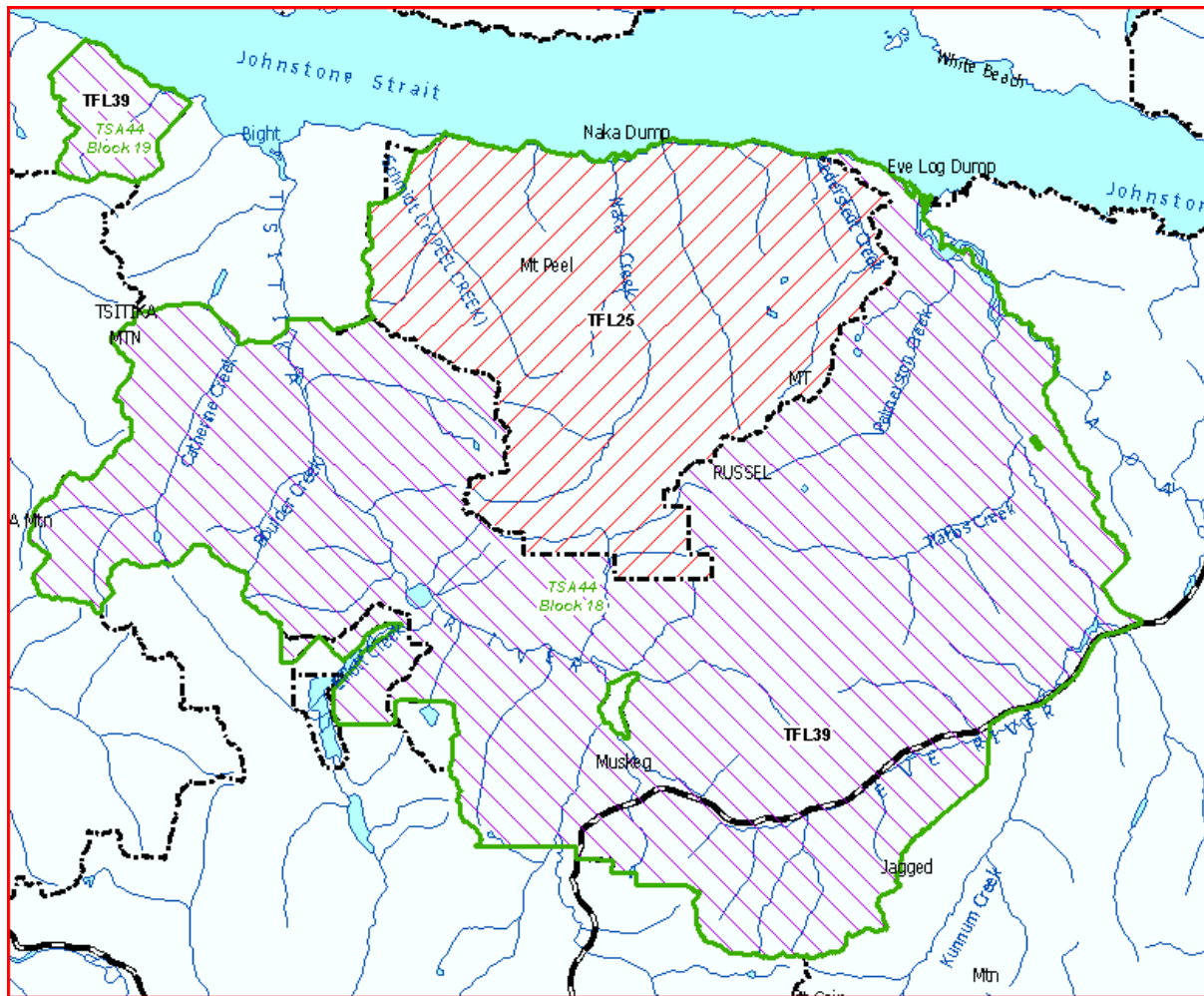


Figure 2: Map of Pacific TSA - Blocks 18 and 19 showing original TFL boundaries

- TFL 25 Take back area cross-hatched in red: TFL 39 area in purple

**Table 1: Species and Age Class Distribution by Percent for TFL 39 Portion
(Total area = 43766 ha.)**

Species	Age Class										Total
	1	2	3	4	5	6	7	8	9		
Non Productive	19.9	0	0	0	0	0	0	0	0	0	19.9
B	0	0	0	0	0	0	0.2	0.1	1.4	8	9.7
Ba	0	0.5	0	0	0	0	0.1	0	0	0	0.6
Bg	0	0	0	0	0	0	0	0	0	0	0
C	0	0.2	0	0	0	0	0	0	0.2	2.3	2.7
Cx	0	0	0	0	0	0	0	0	0	0	0
Cy	0	0.3	0	0	0	0	0	0	0.1	5	5.4
D	0	0	0	0	0	0.1	0	0	0	0	0.1
Fd	0	0.5	0.7	0	0	0.1	0	0.1	0.1	0.3	1.9
H	0	0	1.2	0	0.1	0.2	0.3	0.1	5.2	34.1	41.2
Hm	0	0.1	0	0	0	0	0	0	0	0	0.1
Hw	0	7.1	9	0	0.6	0.1	0.1	0	0	0	16.9
S	0	0.1	0	0	0	0	0	0	0	0.2	0.3
Se	0	0	0	0	0	0	0	0	0	0	0
Ss	0	0.1	0.1	0	0	0	0	0	0	0	0.2
No Species Info	0	1.1	0	0	0	0	0	0	0	0	1.1
Total	19.9	10	11.1	0	0.7	0.5	0.7	0.3	7.0	49.8	100.0

**Table 2: Species and Age Class Distribution by Percent for TFL 25 Portion
(Total area = 16174 ha.)**

Species	Age Class										Total
	1	2	3	4	5	6	7	8	9		
Non Productive	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8
Ba	0.0	0.6	0.0	0.2	0.0	0.1	0.1	0.1	0.3	2.7	4.1
Cw	0.0	1.3	0.6	0.0	0.1	0.0	0.0	0.0	1.4	8.5	12.0
Cy	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	6.8	6.7	14.7
Dr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Fd	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5
Hm	0.0	0.0	0.0	0.3	0.0	0.1	1.8	0.0	12.2	7.9	22.2
Hw	0.0	7.8	6.5	0.6	0.2	0.6	1.0	0.3	5.5	16.3	38.9
Pw	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Ss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Species Info	0.0	4.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.7
Total	2.8	15.8	7.5	1.1	0.3	0.8	3.1	0.4	26.1	42.1	100.0

Most of Blocks 18 and 19 of the Pacific TSA is located in the Coastal Western Hemlock Biogeoclimatic zone. The remainder of the area, at elevations generally above 900 metres, is within the Mountain Hemlock and the Coastal Mountain-Heather Alpine zones.

These broad biogeoclimatic zones are further subdivided into subzones and variants that reflect local climatic conditions. The variants are distinguished by the different climax in plant communities found on similar soil and moisture conditions. The representation of these biogeoclimatic subzones and variants by area across Blocks 18 and 19 of the Pacific TSA are shown in Table 3.

Table 3: Pacific TSA - Blocks 18 and 19 Biogeoclimatic Units

Biogeoclimatic Variants		Area (ha)
Coastal Mountain-Heather Alpine Undifferentiated Parkland	CMA unp	3251
Coastal Western Hemlock Submontane Very Wet Maritime Variant	CWHvm1	23497
Coastal Western Hemlock Montane Very Wet Maritime Variant	CWHvm2	17781
Mountain Hemlock Windward Moist Maritime Variant	MHmm1	15962
Total Area		60491

1.3 State of the Current Inventory

Currently existing inventory data for Blocks 18 and 19 is comprised of two separate TFL data sets originating from different eras and to differing standards. Neither inventory is considered useable or acceptable for BCTS' purposes due to its age and/or not meeting current MFR Standards. Summarized below is what is known about these inventories:

TFL 39 Block 2 (Eve River and Tsitika River)

This area covers 43,766 hectares out of the total of 59,940 hectares of Blocks 18 and 19. A photo interpreted "average volume line" inventory was produced by the original licensee, MacMillan Bloedel (MB), in 1964/65 covering what was then considered commercially accessible/operable forest. The photo interpretation was supported by extensive volume sampling and inventory cruise plots. Later, in 1982, a photo interpreted inventory without sampling was done for those areas previously categorized as "inaccessible/inoperable". Data from an Operational Cruise (OPC) program initiated in 1979 was cut in to the inventory and this data updated the original attributes and volumes for some mature stands. About 25% of remaining (unlogged) mature stands in TFL 39 Block 2 have had their volumes updated with OPC data.

A program of sampling immature (logged) stands provided estimates of species, basal area, age and height once these stands reached an age of 31 years. The immature stands not sampled were re-mapped and re-labelled from orthophotos using sample data as a reference. Changes in volume and attributes of the immature component have not been projected over time to account for growth.

Some key attributes carried by MFR forest inventories on the TSAs (both VRI and the earlier FIP standard) were not captured from photo interpretation in the MB inventory standard although some were subsequently derived mathematically. Attributes in question include stand height, species percent and crown closure.

Information available indicates that TFL 39 Block 2 was last updated for growth and depletion in 1995.

TFL 25 Block 3 (Naka Creek)

This area covers 16,174 hectares and includes the entire area previously comprising Block 3 of WFP's TFL 25. In 2001, a Phase I VRI project was initiated by the licensee using hard copy photos, but only areas of second growth/immature forest were re-inventoried using 1994 photography. Mature/old growth areas were not reinventoried and still carry the delineation and possibly also attribution from an older 1971 inventory.

A significant amount of calibration work was collected during this project, including both air and ground calls. The numbers of each calibration type is not known.

This partial VRI reinventory was produced in WFP's own format using FRBC funding and was not subject to external QA. Neither the final Phase I digital product nor field calibration data were ever delivered to MFR at the conclusion of the project. The whereabouts of the document photos is unknown. Subsequently, in 2002-2003, Phase II and NVAF sampling was completed by WFP across TFL 25 Blocks 2 and 3. Acceptance by MFR of some of the final products from this work is still pending.

2.0 Photo Interpretation Plan

2.1 Project Objectives

The objective of this project is to improve the quality and reliability of forest cover information for Blocks 18 & 19 of TSA 44 using photo interpretation of recent photogrammetric technology. A well designed field calibration program will provide data to support reliable attribute estimates to compare against those managed stand attributes used in timber supply analysis.

The following current VRI Standards will be followed and can be downloaded from the following MFR-FAIB web site:

<http://www.for.gov.bc.ca/hts/vri/standards/index.html#photo>

- *VRI Photo Interpretation Procedures, Version 2.6, March 2010*
- *VRI Photo Interpretation Quality Assurance Procedures and Standards, Version 3.3, March 2010*
- *VRI Field Calibration Procedures for Photo Interpretation, Version 1.0, March 2010*
- *Digital Data Standards for VRI Map File Production, Version 1.0, December 2008*
- *VRIMS Personal Geodatabase Structure and Use, Version 1.2, April 2009*
- *VRIMS Vegetation Cover Polygon Validation Rules, Version 1.5.4, April 2009*
- *VRI Contract Source Data, February 2010*

2.2 Target Area

The target area for this Phase I VRI is the entire area (approx. 60,000 ha.) of Blocks 18 and 19 of the Pacific TSA (TSA 44) land base and will include the Tsitika River Ecological Reserve (110 ha.) located in the SE corner of map sheet 92L038. No other protected areas or private lands lie within the project boundaries. An increased intensity of ground/air calibration will be targeted in areas that lack existing valid data sources, are areas of uncertainty, and areas where enhanced information is required.

2.3 Aerial Photographs and Base Mapping

2.3.1 Existing Photography

In anticipation of a future VRI project for the Pacific TSA, 1:15,000 scale colour photography was flown for all of Block 18 in the summer of 2006. The small area of Block 19, separated by the Lower Tsitika protected area, was not flown (*see key map in RFP*). The photos were scanned at a resolution of 12 microns, aerial triangulation (AT) completed, and Digital Image Analytical Photogrammetry (DiAP) models produced. The photos are available in softcopy format as well as in hard copy as a reference source.

In the absence of new photos, the most recent photos available for the Block 19 area will be used. As all of Block 19 is either mature or old-growth forest with no recent disturbances, the use of the most recent older photo coverage will be necessary.

2.3.2 Base Mapping

Base mapping is available for all project map sheets from GeoBC in TRIM NAD83 format.

2.4 Existing Calibration Data Sources

As many as 80 three point ground calls and ground observations with measurements were established in the 2001-2002 Phase I project. This data has not been made available by WFP to BCTS but, if obtainable, could significantly reduce the effort and costs associated with new calibration work.

Other available data sources include:

1) RESULTS data for young stands, partially cut stands, and recently disturbed areas. This is a low priority for ground calibration as we have reliable survey information available for these stands;

2) Limited historical silviculture records held by BCTS will be provided in paper and or digital format. Any stands deemed Free Growing will be re-delineated and attributed by the contractor;

3) Suitable cruise data (non-logged stands only). There is reliable cruise information for BCTS Timber Sale blocks that have been established since the Take Back.

4) Research and Growth & Yield (G&Y) plots. A number of G&Y plots exist in this area, notably those installed by WFP in Naka Creek. MFR has copies of this data and will provide it to the contractor.

2.5 Integrating RESULTS Information

Special consideration will be given to the integration of silvicultural opening data that exists in RESULTS into the photo interpreted inventory. BCTS will provide a copy of the RESULTS Shape files at the start of the contract. The integration process will follow the requirements outlined in the current VRI Standards.

2.6 New Field Calibration

A data source review and analysis will need to be completed to determine the type, number and locations for new calibration data.

All field calibration (Air Calls and Ground Calls) data collection will be completed to the most current 2010 Standards.

The guideline set out for new calibration in the Standards is for the establishment of 10 ground calls and 20 air calls per full map sheet equivalent. For this project (4 full maps) that will entail 40 ground calls and 80 air calls. BCTS wish to see particular emphasis placed on managed stands in the development of the calibration plan.

The exact number and distribution of calls will be finalized once existing data sources have been accessed and evaluated as part of preparing the field calibration plan. Funding availability will also influence the final number of calls which will be established.

Prior to the initiation of the field calibration program, a Field Calibration Plan (FCP) will be prepared in accordance with MFR guidelines and submitted by the contractor to the Project Manager for approval. This plan should include a map of the unit documenting the general location and distribution of the calibration points.

3.0 Project Implementation

3.1 Pre-work meeting

A Pre-work meeting is required as part of this project. The Pre-work meeting will involve the VRI Project Manager, BCTS representatives and the Phase I contractor. The contractor hired to provide third party QA will also attend the Pre-work meeting. A Project Pre-work Checklist is attached in Appendix 3 and will be reviewed at the Pre-work Meeting.

3.2 Scheduling and Costs

Phase 1 work for Blocks 18 & 19 will proceed according to the following proposed schedule:

Work Component	Deadline	Comments
Polygon delineation	October 8, 2010	Softcopy environment
Supplementary sample plan design	October 15, 2010	To confirm sufficient calibration calls. Includes analysis of existing data sources (gap analysis).
Field data collection	October 29, 2010	Review after phase completion to ensure no further fieldwork required
Polygon attributing	January 15, 2011	Concurrent with final digital mapping
Final digital mapping	January 15, 2011	
Final deliverables	February 15, 2011	
Quality assurance	Continuous	QA will be done concurrently through all phases

At currently seen prices for VRI Phase I contracts of \$0.70 to \$1.00 per hectare, the estimated all-found cost for completing this Phase I project is \$50,000. About 10% of the total budget will be required for the QA component.

3.3 Quality Assurance

It will be the responsibility of the Project Coordinator to ensure that all VRI Phase I Standards and Procedures are followed. To this end, a qualified independent (of the primary Contractor) company or individual from the FAIB-approved QA Contractors list will conduct all required Quality Assurance. The QA contractor will be in place before the project starts and will attend the Pre-work meeting.

The QA contractor will conduct the QA for the field data collection, polygon delineation and attribute estimation. Efforts must be made to sample a portion of the work done by each crew or photo interpreter. In addition to providing a QA role, the intent is that he will also provide project technical support and mentoring and monitor the work to ensure that the procedures and standards for VRI work are being followed as detailed in the contract.

The QA contractor will develop a schedule for the work that is designed to 'shadow' the photo interpretation contractor's delivery. Timely follow up by the QA contractor and good communication with all project team members will be a condition of this contract.

The QA contractor will be responsible for providing complete records of QA activities to the Project Coordinator.

3.4 Deliverables

The following is a list of products that will be delivered to MFR. At each stage, project coordination, photo interpretation and quality control work, and all project deliverables will be signed off by a Registered Professional Forester. Two (2) copies of each deliverable are required:

- Complete VRI data files in the format specified in "VRI Phase 1 Digital Data Deliverables Format" Standards;
- VegCap validation reports;
- MFR validation reports for each map sheet in a format provided by the MFR.
- Hardcopy tally sheets or digital equivalent for each ground and air calibration point;
- Digital field summary for all calibration points per MFR VRI requirements. (This is for the VRI "Calibration Tile");
- Photo Interpretation Contractor Project Completion Report. Detailed requirements will be verified at the Pre-Work meeting for this project. It should be noted that the Project Completion Report is the responsibility of the proponent, but may be written by the Contract Administrator or VRI Contractor, with input from the MFR VRI Staff and QA Contractor;
- QA Contractor documentation for each phase of the VRI project

3.5 Reference Materials

The most current version of all VRI Standards and Procedures for Photo Interpretation must be followed when completing this project. They can be found at the MFR VRI website:

<http://www.for.gov.bc.ca/hts/vri/standards/index.html#photo>

4.0 Project Sign-Off Sheet

Pacific TSA (TSA 44)–Blocks 18 and 19 Vegetation Resources Inventory Photo Interpretation Project Implementation Plan


It is the intention of the proponent to implement the Pacific TSA (TSA 44), Blocks 18 and 19 Vegetation Resources Inventory Photo Interpretation Project Implementation Plan (VIP) as described. As a key stakeholder and custodian of the inventory, the Ministry of Forests and Range (MFR) VRI group has been consulted throughout the development of this plan.

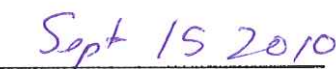

Rob Martin, RPF


Date

Planning Officer,
BCTS - Strait of Georgia

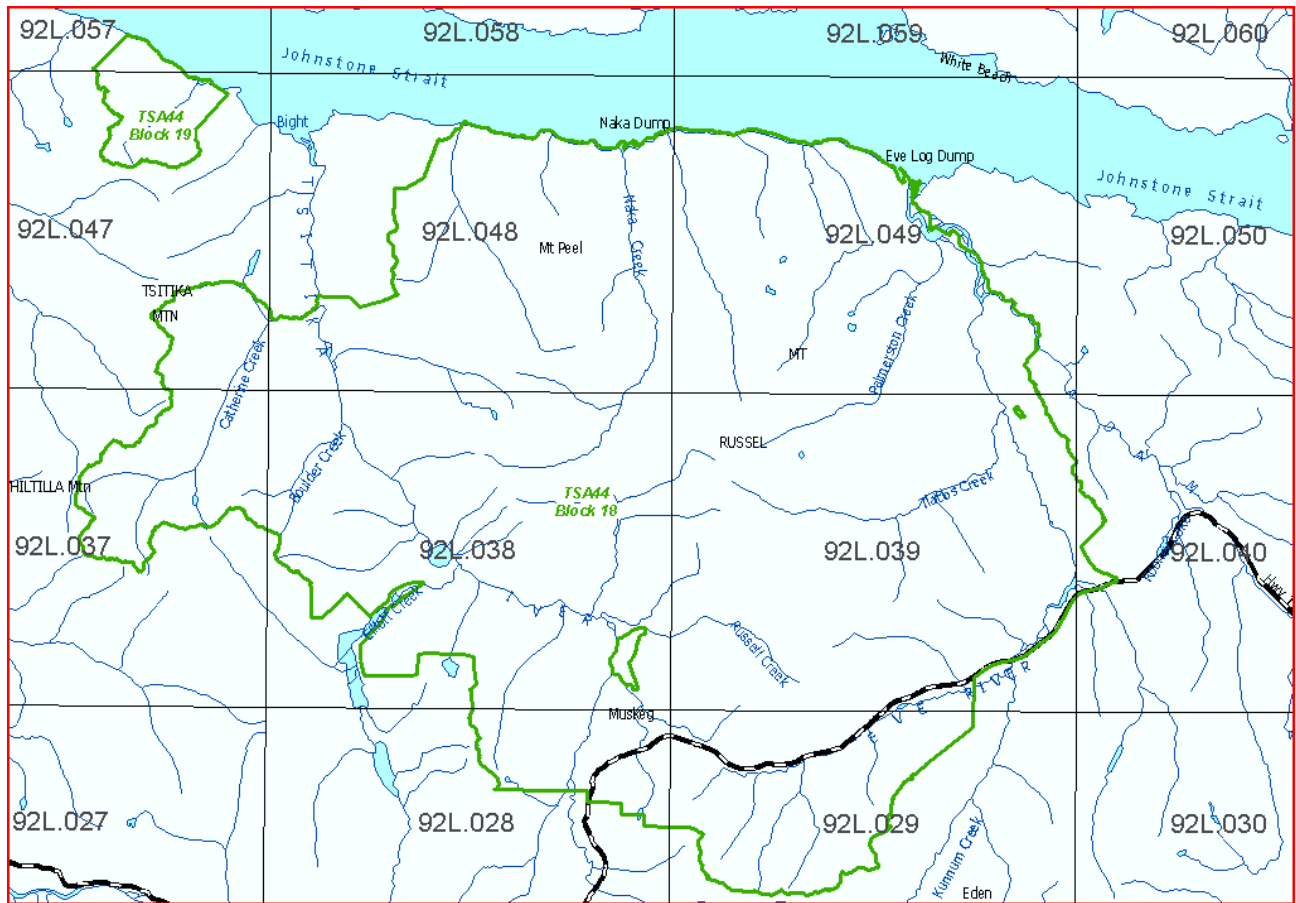
I have reviewed the Pacific TSA (TSA 44), Blocks 18 & 19 Vegetation Resources Inventory Photo Interpretation Project Implementation Plan. I will be advising the appropriate contacts that the work proposed in this plan meets Vegetation Resources Inventory Standards and MFR business needs.


Albert Nussbaum, RPF


Date

A/Director,
Forest Analysis and Inventory Branch,
Ministry of Forests and Range

Appendix 1: Map Sheet Index Map



BCGS Map Tile List
92L.029
92L.040
92L.028
92L.039
92L.038
92L.049
92L.037
92L.048
92L.047
92L.057

Appendix 2: 2006 Aerial Photography Coverage Key Map

- Flight lines and photo centres depicted in red.

