

Vegetation Resources Inventory Photo Interpretation Project Implementation Plan

Pacific Timber Supply Area (TSA 44) Block 27 – Sproat Lake

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BCTS
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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 objective of this project is to deliver a reliable Phase I inventory meeting provincial VRI standards for the entire area of Block 27 of the Pacific Timber Supply Area and adjacent two blocks of the Alberni Valley Community Forest (AVCF) located in the Sproat Lake area of the South Island Forest District. The Block 27 area is administered by BCTS Strait of Georgia - Port Alberni Field Team. The AVCF tenure is held by the City of Port Alberni.

Existing data for both Block 27 and the Community Forest, acquired by the Province through the Bill 28 TFL Take Back process, covers an area previously within TFL 44 Block 3. The existing forest cover data from 1977, provided to BCTS by Western Forest Products (WFP), has been reviewed and found to be unacceptable for BCTS's planning and timber supply analysis purposes. As was the case with other ex-MacMillan Bloedel (MB) TFL inventories, this inventory does not meet current MFR VRI Standards and cannot be retrofitted or upgraded to an acceptable condition.

1.2 Project Land Base

Pacific TSA Block 27 covers 65,249 hectares and is located in the south central part of Vancouver Island, west of Port Alberni. The south east boundary of the unit is formed by the Alberni Inlet and the E & N Lands. The southern and western boundaries of the unit border the Arrowsmith TSA, TFL 44 Block 4 and TFL 57. The northern boundary is mostly formed by the remaining area of TFL 44 Block 3. Included in the project area are small blocks of Maa-Nulth Treaty Lands, one parcel of private land and Woodlot W1476 operated by the Hupacasht First Nation. The AVCF covers 6,391 hectares and a small portion (40 ha.) of Woodlot W1479 managed by Island Roots Forestry Services is located within its boundaries (see Figure 1). The total project area of 71,640 hectares occupies portions of thirteen BCGS 1:20,000 scale map sheets (see Appendix 1).

Approximately 80% of the project area is productive forest and, presently, 7,041 hectares are excluded from the Timber Harvesting Land Base (THLB) due to Wildlife Habitat, Old Growth Management and other constraints. Shortcomings in 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 area, based on analysis of the existing inventory data, is presented in Table 1. This data set will be provided to the Phase I VRI contractor for reference purposes only.

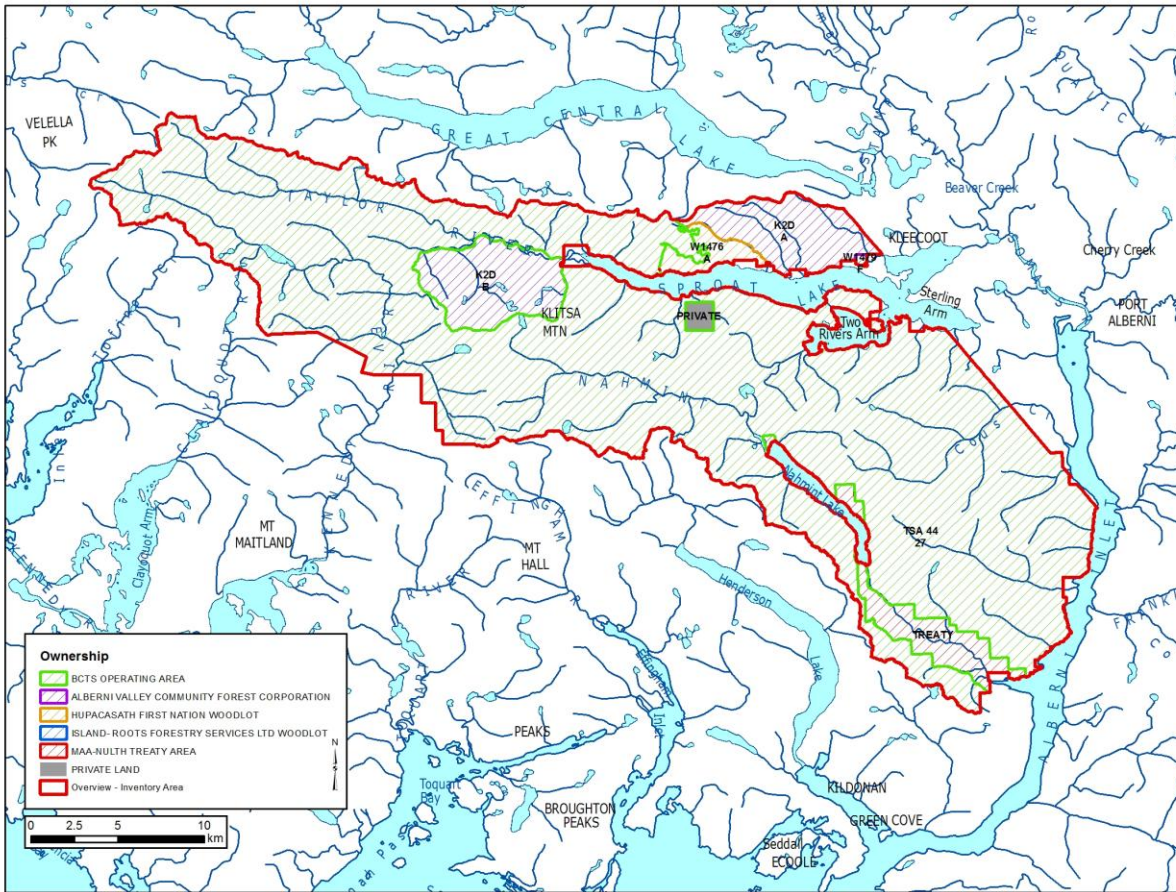


Figure 1: Overview map of Pacific TSA – Block 27 (Sproat Lake) and Alberni Valley Community Forest

**Table 1: Leading Species and Age Class Distribution by Percent for Project Area
(Total area reported = 69690.4 hectares*)**

Species	Age Class (Percentage)									Total	
	1	2	3	4	5	6	7	8	9		
Non Productive	7.8										7.8
Non Forest	11.1										11.1
Ba	0.7	1.3	0.0	0.1	0.1	0.0	0.0	2.8	6.2		11.2
Cw	0.6	0.2	0.1	0.1	0.0	0.1		0.4	2.3		3.8
Dr	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Fd	2.8	10.4	7.2	1.6	0.0	0.1	0.1	1.2	5.6		29.0
Hw	6.1	4.4	1.1	0.4	0.1	0.1	0.1	5.6	16.1		34.0
Yc	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.0		2.3
No Species Info	0.6										0.6
Total	19.5	10.3	16.3	8.5	2.3	0.2	0.3	0.2	10.2	32.2	100.0
* Based on 69690.4 hectares (Nahmint and Sproat Lake Areas Previously Excluded from FC Dataset - Not Included in Summary)											
(Portion of Maa-Nulth Treaty Areas - No Inventory Information Currently Available - Not Included in Summary)											

Most of Pacific TSA Block 27 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 (MH) and the Coastal Mountain-Heather Alpine (CMA) zones.

Most of the AVCF is located in the CWH zone, with small inclusions of CMA and MH.

These broad Biogeoclimatic Zones are further subdivided into subzones and variants that reflect local climatic conditions. The subzones and variants are distinguished by the climax plant communities found on similar soil and moisture conditions. The representation of these Biogeoclimatic subzones and variants across the project area is shown in Table 2.

Table 2: Pacific TSA and AVCF Biogeoclimatic Units

Biogeoclimatic Variants	Area (ha)
Coastal Mountain-Heather Alpine Undifferentiated Parkland	CMAunp 500.8
Mountain Hemlock Windward Moist Maritime Variant	MHmm1 8085.0
Coastal Western Hemlock Very Wet Maritime Montane	CWHvm2 19031.3
Coastal Western Hemlock Very Wet Maritime Submontane	CWHvm1 15928.8
Coastal Western Hemlock Moist Maritime Montane Variant	CWHmm2 4374.4
Coastal Western Hemlock Moist Maritime Submontane Variant	CWHmm1 13776.8
Coastal Western Hemlock Very Dry Maritime Western Variant	CWHxm2 8833.2
Coastal Western Hemlock Very Dry Maritime Eastern Variant	CWHxm1 1109.7
Total Area	71639.9

1.3 Assessment of the Existing Inventory

Existing inventory information for Block 27 is comprised of a TFL data set produced 36 years ago by MB as a part of the TFL 44 inventory. This data is not considered useable or acceptable by BCTS or AVCF due to its age and also being deficient in meeting current Ministry Standards.

Summarized below is what is known about this inventory:

- A photo interpreted “average volume line” (AVL) inventory was produced by the original licensee (MB) in 1977 covering what was then considered commercially accessible/operable forest. Photo interpretation was supported by extensive volume sampling and inventory cruise plots. Data from an Operational Cruise (OPC) program, initiated in 1979 and continuing for about a decade, was incorporated into the inventory and this data updated the original attributes and volumes for some mature stands. About 25% of remaining (unlogged) mature stands in TFL 44 Block 3 have had volumes updated with OPC data prior to the removal of the Sproat block from the TFL.
- During previous decades, an MB 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 and mortality.
- Some key attributes carried by TSA forest inventories (both VRI and the earlier FIP standard) were not captured in the MB inventory standard of the day, although some may have been mathematically derived.
- In 1996-97, the original licensee (MB) conducted a test of inventory volumes on a subset of what was then considered the Mature Operable area of TFL 44 Block 3 (Sproat). Of the total Mature Operable area at that time of 47,729 hectares, only 35,791 were the subject of this audit-like test. Areas of the unit that had been Operationally Cruised (OPC) were excluded from this exercise. Single point samples were established in 92 typed polygons and stand volume compared to inventory volume was measured and reported. The results showed that on average the “audit” volume for the unit was 612 m³/ha compared to 663 m³/ha in the inventory giving a volume ratio of 0.92 or an 8% overestimate. The “audit” volume coefficient of variation was 78% and the correlation coefficient of ground versus inventory volume was 0.185. While average audit volumes showed a bias of 8%, other statistics indicated that there is almost *no correlation between the inventory and ground volumes for individual polygons*. The accuracy of leading species, species composition, stand height and age, or site index is unknown as they were not measured or reported.

Available information indicates that TFL 44 Block 3 was last updated for growth and depletion in 1999.

2.0 Photo Interpretation Plan

2.1 Project Objectives

The plan objective is to improve the quality and reliability of forest cover information for Block 27 of Pacific TSA and the Alberni Valley Community Forest (AVCF) by photo interpretation using digital photogrammetric technology. A well designed field calibration program will provide data to support reliable attribute estimates to compare against those managed and unmanaged stand attributes used in timber supply analysis.

The following current VRI Standards will be followed and are available at the following MFLNRO FAIB web site:

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

- *VRI Photo Interpretation Procedures, Version 2.8, June 2012*
- *VRI Photo Interpretation Quality Assurance Procedures and Standards, Version 3.5, June 2012*
- *VRI Field Calibration Procedures for Photo Interpretation, Version 1.2, June 2012*
- *Digital Data Standards for VRI Map File Production, Version 1.0, December 2008*
- *VRIMS Personal Geodatabase Structure and Use, Version 1.1, April 2009*
- *VRIMS Vegetation Cover Polygon Validation Rules, Version 1.5.4, April 2009*

2.2 Project Area

The total area for this Phase I VRI project is 71,640 hectares comprising the entire extents Block 27 of the Pacific TSA (65,249 ha.) and the two blocks of the AVCF (6,391 ha.). Two woodlots and small areas of Maa-Nulth Treaty Lands and minor Parks within the project boundaries will be included. An increased intensity of ground/air calibration will be directed to areas that either lack existing valid data sources, are areas of uncertainty, or where enhanced information is required.

2.3 Aerial Photography and Base Mapping

2.3.1 Existing Photography

BCTS has acquired digital soft copy photography flown by a consultant over this area of Vancouver Island in the summer of 2012. The digital photography has a pixel size of 30 metre Ground Sample Distance (GSD) which is closely equivalent to 1:18,000 scale in hard copy (roll film) photography and therefore a suitable photo scale for VRI purposes. The orientation of the flight lines is north-west/south-east rather than the east-west direction usually flown for inventory purposes, however, this different orientation of photos does not present a problem when using modern soft copy viewing systems. The photos have been converted into digital soft copy models and orthophotography. The latter are a useful resource for project planning and field calibration work and will also be provided to the contractor.

2.3.2 Base Mapping

TRIM base mapping is available from GeoBC for all project map sheets in 1: 20,000 scale NAD83 format.

2.4 Existing Calibration Data Sources

Very little historic calibration data is currently available for the project area. WFP will be approached for any old air and ground call data or operational cruise plots with accurate coordinates in the project area. Referencing existing data sources could reduce the cost and effort required for the Phase I field work component.

Other available data sources include:

- 1) RESULTS data for young stands, partially cut stands, and recently disturbed areas;
- 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). Any reliable cruise information for BCTS Timber Sale blocks that have been established since the Take Back will be reviewed for usability and provided to the contractor;
- 4) Research and Growth & Yield (G&Y) plots. The Ministry is in possession of the data for 56 ex-TFL 44 G&Y Permanent Sample Plots (PSPs) and of these 27 are located in the project area. Some of this data will be usable dependent upon when the last remeasurement of plots has occurred. All of this useable G&Y data will be provided to the contractor by FAIB.

2.5 Integrating RESULTS Information

Special consideration will be given to the integration of silviculture opening data that exists in RESULTS into the photo interpreted inventory. FAIB 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 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 June 2012 VRI Standards.

The guideline set out for new calibration in the VRI Standards is for the establishment of 10 ground calls and 20 air calls per full map sheet equivalent. For this particular project, covering just over 4.5 full map sheet equivalents, a minimum of 45 ground calls and 90 air calls will be required. BCTS wish to see particular emphasis placed on managed (second growth) 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 Coordinator 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 will be scheduled to occur at the initiation of this project. The Pre-work meeting will involve the Project Co-ordinator, BCTS and AVCF representatives, the Phase I contractor and the contractor retained to provide third party QA. A Project Pre-Work Checklist will be provided by FAIB to be reviewed and completed at this meeting.

3.2 Scheduling and Costs

Phase I work for this project will proceed according to the following proposed schedule:

Work Component	Target completion date	Comments
Polygon delineation	May 31, 2013	Digital Softcopy environment
Field Calibration Plan design	June 30, 2013	To ensure sufficient calibration calls. Includes analysis of existing data sources (gap analysis).
Field data collection	July 31, 2013	Review after phase completion to ensure no further fieldwork required
Polygon attributing	September 15, 2013	Concurrent with final digital mapping
Final digital mapping	September 30, 2013	
Final deliverables	September 30, 2013	
Quality Assurance	Continuous	QA will be done concurrently through all phases

Based on an initial cost estimate provided to the Ministry, the all-found cost for completion of a Phase I VRI for the entire Plan area is \$65,000, comprised of \$59,000 for the area of Block 27 and \$6,000 for the AVCF. In addition, third party Quality Assurance is expected to cost approximately 10% of the total primary contract value and so is estimated at \$6,500.

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 retained before the project starts and will attend the Pre-work meeting.

The contractor will conduct the QA for the field data collection, polygon delineation and attribute estimation phases of the project. Efforts will be made to sample a portion of the work done by each crew or photo interpreter. In addition to providing a QA function, the intent is that technical support and mentoring will also be provided by this contractor to the project through monitoring of the work to ensure that the appropriate procedures and standards are being followed.

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 requirement of this contract.

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

3.4 Deliverables

The following is a list of products that will be delivered to the Ministry. At each stage, 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;
- Ministry validation reports for each map sheet in a format provided by FAIB.
- Hardcopy tally sheets or digital equivalent for each ground and air calibration point;
- Digital field summary for all calibration points per FAIB 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 FAIB 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 FAIB VRI website:

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

4.0 Project Sign-Off Sheet

Pacific TSA (TSA 44)–Block 27 Vegetation Resources Inventory Photo Interpretation Project Implementation Plan

It is the intention of the proponent to implement the Pacific TSA (TSA 44), Blocks 27 Vegetation Resources Inventory Photo Interpretation Project Implementation Plan (VPIP) as described. As a key stakeholder and custodian of the inventory, the Ministry of Forests, Lands and Natural Resource Operations (MFLNRO) FAIB VRI group has been consulted throughout the development of this plan.




Rob Martin, RPF



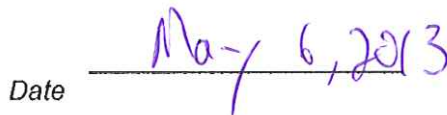
Date

Planning Officer
BCTS - Strait of Georgia

I have reviewed the Pacific TSA (TSA 44) Block 27 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 MFLNRO business needs.



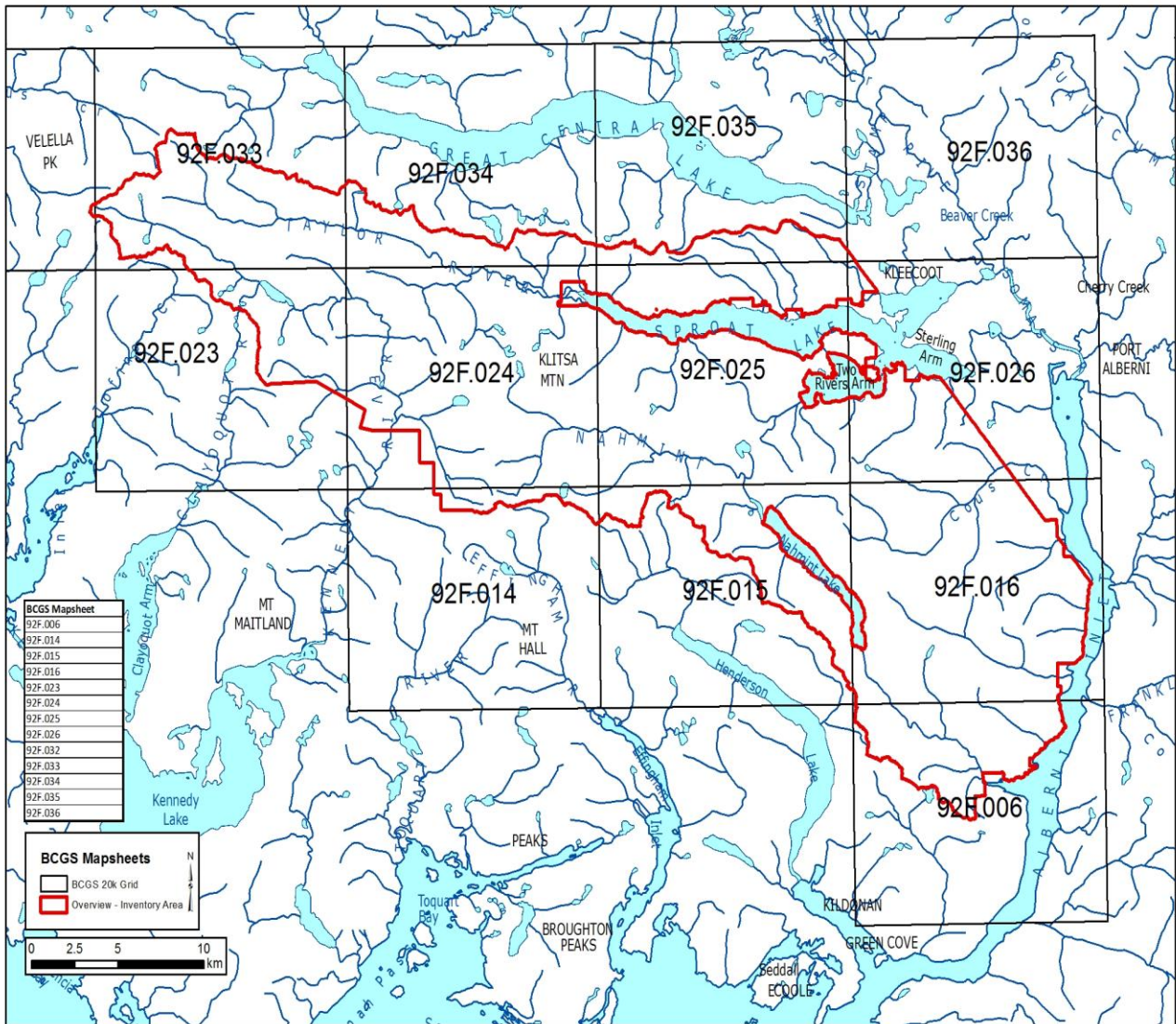
Pat Martin, RPF



Date

Manager, Forest Inventory
Forest Analysis and Inventory Branch
FLNRO

Appendix 1: Project Map Sheet Index and Areas



Map Sheet	Hectares
092F006	2723.3
092F014	862.2
092F015	5141.7
092F016	13282.1
092F023	3503.6
092F024	11100.9
092F025	11845.1
092F026	4020.8
092F032	13.4
092F033	6650.1
092F034	2962.0
092F035	437.1
Total area (excluding waterbodies)	62542.3

Appendix 2: 2012 Digital Aerial Photography Key Map

