

Dawson Creek Timber Supply Area

Vegetation Resources Inventory

Project Implementation Plan Phase I Photo Interpretation

Prepared for:

**Ministry of Forests and Range
Louisiana Pacific Canada Ltd.**

Prepared by:

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Timberline Forest Inventory Consultants Ltd.
Victoria, B.C.**

March, 2006

EXECUTIVE SUMMARY

This Vegetation Resources Inventory (VRI) Project Implementation Plan (VPIP) was prepared for the Ministry of Forests and Range (MoFR) and Louisiana Pacific Canada Ltd and covers all Phase I VRI activities that will be conducted in the Dawson Creek Timber Supply Area (TSA).

The planned Phase I VRI activities cover approximately 1,500,000 hectares and include:

- Polygon Delineation
- Polygon Attribute Estimation
- Digital Mapping
- Third-party Quality Assurance

The objective of the planned Phase I VRI activities is to complete the Vegetation Resource Inventory of the remaining mapsheets in the Dawson TSA to the same standards and specifications as the mapsheets completed in the period 2003-2005. The Chief Forester will use this new inventory information in future Dawson Creek AAC determinations.

This document was prepared and submitted in accordance with current MoFR standards and guidelines. It has been reviewed and approved by MoFR and licensee representatives to ensure that all appropriate standards are being followed and to ensure that all of the planned activities will meet MoFR and licensee business needs.

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1.0 INTRODUCTION

This Vegetation Resources Inventory (VRI) Project Implementation Plan (VPIP) was prepared for the Ministry of Forests and Range (MoFR) and Louisiana Pacific Canada Ltd and covers all Phase I VRI activities that will be conducted in the Dawson Creek Timber Supply Area (TSA). This document was prepared and submitted in accordance with current MoFR VPIP standards and guidelines.

1.1 Background Information

1.1.1 Overview of the VRI Process

The British Columbia VRI system has been approved by the Resource Information Standards Committee (RISC) to assess the quantity and quality of BC's timber and vegetation resources. The system uses both photo interpretation and detailed ground sampling to arrive at an accurate assessment of timber volume and other vegetation resources within a predefined unit.

The VRI is carried out in two phases. Phase I Photo Interpretation involves estimating vegetation polygon characteristics from existing information, aerial photography, or other sources. No sampling is done in Phase I.

Phase II Ground Sampling phase provides the information necessary to determine how much of a given characteristic is within the inventory area. Ground samples alone cannot be collected in sufficient numbers to provide the specific locations of the land cover characteristics being inventoried. Net Volume Adjustment Factor (NVAF) sampling collects data on a number of selected trees to account for errors in the estimates of net tree volume. The NVAF is calculated from the ratio of actual to estimates of sample tree volumes and is applied as a correction to VRI ground sample volumes. This data, used in conjunction with the original ground sampling data, provides an unbiased estimate of the net volume in the project area.

The ground measurements are used to estimate the proper total for the population. The relationship between the polygon estimates and ground samples is used to adjust the photo-interpreted polygon estimate. The total for the population is then distributed into the adjusted description for each polygon.

More detailed information, including VRI standards and procedures, is available at <http://www.for.gov.bc.ca/hts/vri/index.html>.

1.1.2 State of the Current Inventory

Forest cover inventories covering the Dawson Creek TSA (excluding Tree Farm Licence 48) were conducted between 1970 and 1991.

In September 2002, Louisiana Pacific Canada Ltd. issued a Request for Proposals for a Phase I Vegetation Resources Inventory for portions of the Dawson Creek TSA. The contract to conduct this work was awarded to ARC Alpine Resource Consultants Ltd. of Victoria, BC. The work began in the winter of 2003 and was completed in October 2005. As a result, portions of 62 British Columbia Geographic System (BCGS) mapsheets within the Dawson Creek TSA have been inventoried to current VRI standards and specifications. (Please see Section 2.4 Inventory Status and Appendix 1 for detailed information).

1.1.3 Information Needs

In the Ministry of Forests' 1996 *Dawson Creek TSA Rationale for Annual Allowable Cut (AAC) Determination* document, the Chief Forester acknowledged the deficiencies in the existing forest cover inventories and recommended that a re-inventory of the TSA be conducted as soon as possible.

Completion of the Phase I Vegetation Resources Inventory of the remaining areas in the Dawson Creek TSA will allow the Chief Forester to use current inventory information in the future Dawson Creek AAC determinations.

1.2 Document Objectives

The objective of this document is to outline and describe the Phase I VRI activities that will be completed within the Dawson Creek TSA. The document provides basic land base information and background information from previous *Rationale for Annual Allowable Cut (AAC) Determination* documents. It also summarizes the planned VRI project's methodology, standards, objectives and scheduling.

This document has been reviewed and approved by MoFR and licensee representatives to ensure that all appropriate standards are being followed and to ensure that the planned activities will meet MoFR and licensee business needs.

1.3 Land base

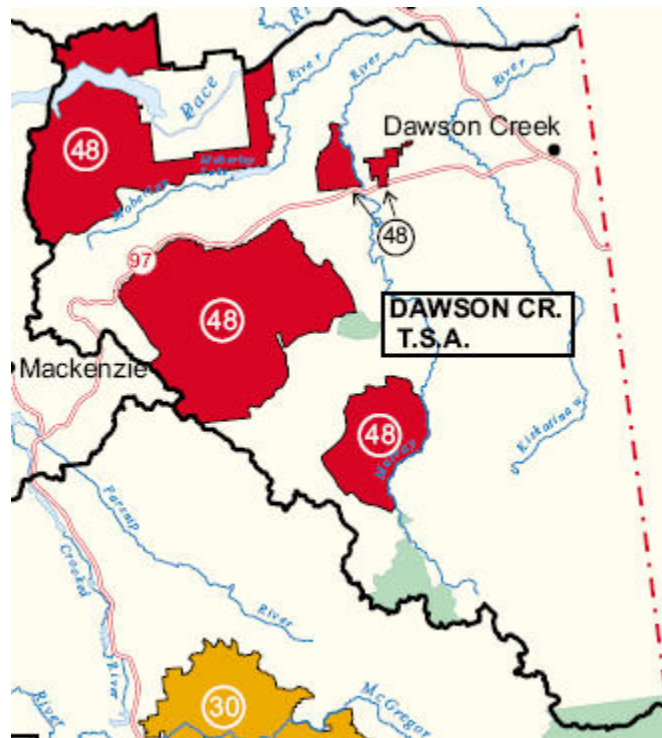


Figure 1.1 Overview Map of the Dawson Creek TSA

“The Dawson Creek TSA covers about 2.3 million hectares in northeastern British Columbia and is one of thirteen TSAs within the new Northern Interior Forest Region. The TSA is bounded by

the Peace River to the north and the Alberta border to the east. To the west are the Hart Ranges and to the far south lie the Front Ranges, both of which are characterized by the mountainous terrain and steep valleys of the Rocky Mountains.

In 2001, the population of the Dawson Creek TSA was estimated at 26 500 people. The city of Dawson Creek is the largest community in the TSA, where about 40 percent of the population of the TSA lives. Other communities include Tumbler Ridge, Chetwynd, Hudson's Hope and Pouce Coupe. Two First Nations communities in the TSA are the West Moberly and Saulteau. In addition, there is a Métis community at Kelly Lake.

About 60 percent of the Dawson Creek TSA (about 1.4 million hectares) is considered productive forest land managed by the Crown. Currently about 52 percent of this area is considered available for timber harvesting under current forest management practices. The current timber harvesting land base is estimated at 730 220 hectares, of which 429 440 hectares (59 percent) are stands of predominately coniferous species and 260 342 hectares (41 percent) are stands of predominately deciduous species.

The TSA lies primarily within two ecoregions: the Boreal Plains in the east, and the Central Canadian Rocky Mountains in the west. Climate is characterized by cold prolonged winters and warm short summers. Of the 14 biogeoclimatic zones in the province, four are represented in the TSA: Boreal White and Black Spruce (BWBS); Engelmann Spruce-Subalpine Fir (ESSF); Sub-Boreal Spruce (SBS); and, Alpine Tundra (AT). White spruce, lodgepole pine, trembling aspen, balsam poplar, black spruce and sub-alpine fir are the main tree species occurring in the TSA and frequently grow together as mixed-wood stands.”¹

¹**B.C. Ministry of Forests.** 2003. *Dawson Creek TSA Rationale for Annual Allowable Cut (AAC) Determination.*

Table 1.1 Dawson Creek TSA Area Summary²

Classification	Area (ha)	Percentage of TSA Area	Percentage of Productive Forest Area
Total area on file	2,989,835		
Area within TFL 48	644,724		
Total TSA area	2,345,111	100.0	
Non-forest land	664,153	28.3	
Woodlots	14,695	0.6	
Not managed by the BCFS	157,121	6.7	
Parks and eco-reserves	110,387	4.7	
Total area of Crown forest	1,398,755	59.6	100.0
Reductions to Crown forest			
Non-commercial brush	61,937	2.6	4.4
Riparian areas	65,318	2.8	4.6
Utility corridors	7,518	0.3	0.5
Transportation features	3,742	0.2	0.3
Physically inaccessible areas	34	0.0	0.0
Problem forest types	166,735	7.1	11.9
Economically inoperable	26,279	1.1	1.9
High value recreation	21,905	0.9	1.6
Non-merchantable stands	163,607	7.0	11.7
Low productivity — immature stands	89,789	3.8	6.4
Sensitive wildlife habitat	24,750	1.1	1.8
Wildlife tree patches	22,288	1.0	1.6
Non-commercial deciduous	14,633	0.6	1.0
Total current reductions	668,535	28.5	47.8
Current timber harvesting land base (including NSR)	730,220	31.1	52.2
Coniferous stands (including small pine)	469,878		
Deciduous stands	260,342		
Future reductions — roads	34,005	1.5	2.4
Future timber harvesting land base	696,215	29.7	49.8

² B.C. Ministry of Forests. 2002. Dawson Creek TSA Analysis Report.

2.0 PHASE I VRI PHOTO INTERPRETATION PLAN

2.1 Project Objectives

The objective of the planned Phase I VRI photo interpretation project is to complete the Vegetation Resource Inventory of the remaining mapsheets in the Dawson TSA to the same standards and specifications as the mapsheets completed in the period 2003-2005. The Chief Forester will use this updated inventory information in future Dawson Creek AAC determinations.

2.2 Target Area

Approximately 1,500,000 hectares of land in the Dawson Creek TSA remain to be inventoried to VRI standards.

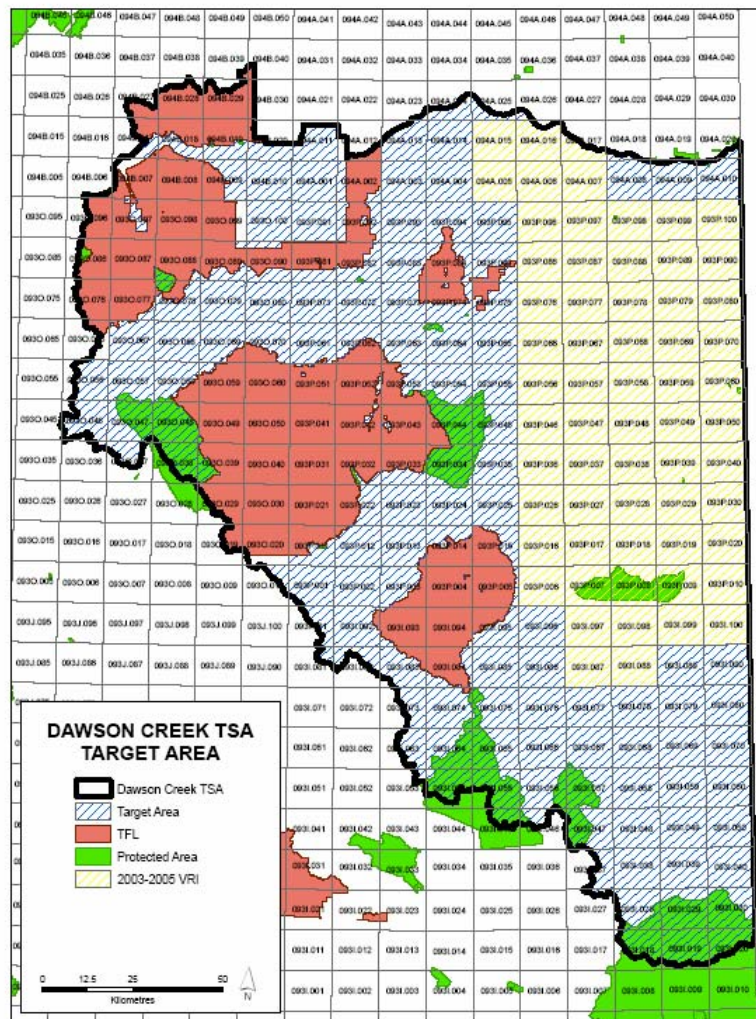


Figure 2.1 Target area

The completion of photo interpretation in the Dawson Creek TSA will be done in a coordinated manner. Unique, geographically specific projects will be selected and completed in their entirety before moving on to the next project area. The remaining portion of the TSA that has not been completed to VRI standards will be divided into three project areas (south, central and north) to facilitate easier contract administration.

2.3 Integrated Inventories

Individual licensees may undertake integrated inventories to address other information requirements (e.g. terrain or ecology information) in addition to the minimum requirements set forth in the VRI standards.

However, such additional work is optional for each licensee and will not be considered an obligation for the TSA Phase 1 VRI program.

2.4 Calibration Data Sources

The number, type and distribution of Calibration Data Sources will conform to the same standards used for the Phase I VRI of the 62 mapsheets completed from 2003 to 2005.

“Field calibration (air calls and ground calls) data collection is to be completed as per the Vegetation Resources Inventory Air Calibration (Air Call) Data Collection Procedures and the Vegetation Resources Inventory Ground Calibration (Ground Call) Data Collection Procedures. Field calibration data collection is to be documented and recorded in a format acceptable to the Ministry.

Data collection should occur in polygons that do not otherwise have any source information or in polygons where the source information is questionable. Field calibration locations should be selected so that a variety of cover types are visited including non-vegetated and non-treed polygons, except for silviculture openings. Field calibration points should be distributed over the entire project area.

The ground calls are to be three point ground calls with 1 full measure and 2 count plots. There are to be 20 air calls per mapsheet, 4 (four) - 3 point ground calls per mapsheet, and 6 ground observations with measurements per map sheet.”³

2.5 Inventory Documentation and Archive

2.5.1 Inventory Status

The Dawson Creek TSA contains four Public Sustained Yield Units (PSYU’s). The most recent forest cover inventories of the Dawson Creek SSA were conducted in 1969, 1971 and 1988. The most recent forest cover inventories of the Moberly PSYU were conducted in 1970 and 1983 (using 1970 photography). The most recent forest cover inventories of the Wapiti PSYU were conducted in 1969 and 1991 and the most recent forest cover inventories of the Peace River PSYU were conducted in 1972 and 1981. All four PSYU’s had Environmentally Sensitive Area surveys conducted in 1978.

As noted earlier, 62 BCGS mapsheets (located primarily in the Dawson Creek SSA) were inventoried to Phase I VRI specifications in 2003 to 2005.

³ **Louisiana Pacific Canada Ltd.** 2002. *Request for Proposal for VRI Photo Interpretation and Field Plan Formulation.*

Table 2.1 Dawson Creek TSA – Current Inventory Status

Type of inventory	Number of BCGS maps	Area (ha)
VRI (2003 to date)	62	863,172
Forest Inventory (1981-1991)	160	1,490,780
Total TSA	222	2,353,953

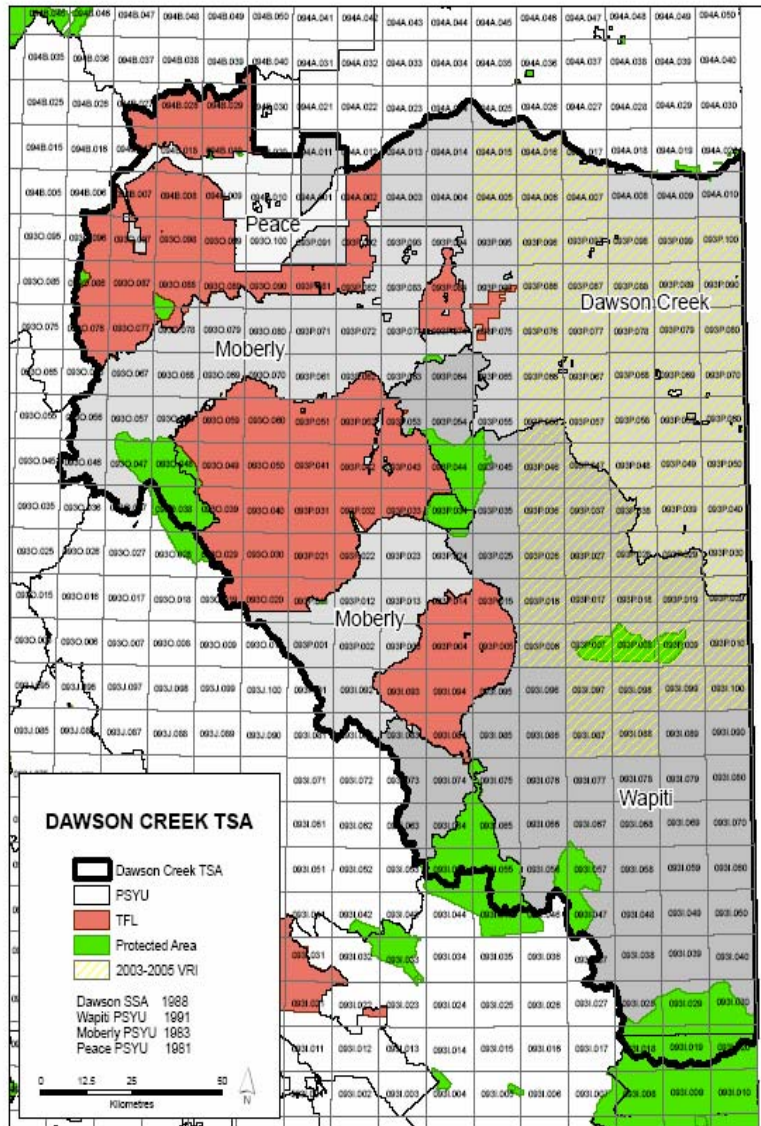


Figure 2.2 Current inventory status

2.5.2 Digitizing History

The years of digitizing of the most recent forest cover inventory information was 1998/89 for the Dawson Creek SSA, 1991/92 for the Wapiti PSYU, 1983/84 for the Moberly and 1981/82 for the Peace River PSYU. The “FS810” method was used for entering forest cover details for the four PSYU’s.⁴

The 62 BCGS mapsheets inventoried from 2003 to 2005 used the “VegCap” method for entering and validating vegetation cover details and the DiAP softcopy photogrammetry system for delineating and digitizing VRI polygons.

2.5.3 Aerial Photographs

The photography used to conduct the most recent forest cover inventories of the four PSYU’s were flown from 1980 to 1990 and ranged in scales from 1:15,000 to 1:20,000. The original inventory copies of these document photographs are currently stored in the offices of MoFR in Prince George⁵.

The photography used in the 2003 to 2005 Phase I VRI project was 1:40,000 scale panchromatic photos flown in 2001 in a north-south direction. The photographs were scanned at a 0.56 meter resolution (14 micron scan) and converted to SIS format digital files for use with the DiAP softcopy photogrammetric system.

The coverage of suitable aerial photographs for the remaining portion of the TSA is incomplete. Acquisition of future photographs will be prioritized such that the central portion of the TSA is completed first followed by the northern portion and finally the south. The priorities may need to be revised dependent upon available funding and the availability of suitable flying weather. Acquisition of aerial photographs will be completed at a scale suitable for VRI photo interpretation as indicated by the Ministry of Forests and Range, Forest Analysis and Inventory Branch.

All aerial photographs and digital stereo models used for the VRI photo interpretation program will be approved for all relevant details by the Base Mapping and Geomatics Services (BMGS) section of the Integrated Land Management Bureau of the Ministry of Agriculture and Lands.

⁴ Nakatsu, Dick. 2005. Ministry of Forests and Range. Forester. Personal Communication.

⁵ Nakatsu, Dick. 2005. Ministry of Forests and Range. Forester. Personal Communication.

3.0 PROJECT IMPLEMENTATION

3.1 Scheduling

The Phase I VRI project will be completed over a period of several years (pending the availability of recent photography and funding). In general, each individual project will cover a period of 18 months starting in October of each year (once the results of the aerial photography program are known). Each year's project will follow the schedule outlined below.

3.1.1 Preparation

- Select administrative/ management unit (October);
- Conduct preliminary review (October);
- Define project area (October).

3.1.2 Work Plan

- Identify activities needed to meet project objectives (October);
- Acquire funding (October).

3.1.3 Viewing

- Identify contract evaluation team (November);
- Develop viewing materials (November):
 - o Maps (TRIM and traditional forest cover);
 - o Photos (new and source);
 - o Global Positioning Satellite (GPS) traverse of roads and Silviculture Opening boundaries;
 - o Silviculture information;
 - o Identify eligible contractors;
 - o Prepare RFP packages for contractors.

3.1.4 Contract

- Develop and submit bid proposal for Phase I VRI project (November);
- Develop and submit bid proposal for third-party Quality Assurance (November);
- Compile and evaluate proposals (November);
- Award the contracts (December);
- Contract Implementation (January - March):
 - o Polygon delineation (January - March);
 - o Quality Control of polygon delineation (January - March);
 - o Quality Assurance of polygon delineation (March).
- Contract Implementation (April - March):
 - o Field data collection preparation (April);
 - o Pre-work meeting and site familiarization (May);

- o Data Collection -establish air and ground calibration points (May - August);
- o Summarize and record field data (August – September).
- o Quality Control and Quality Assurance of field data collection (May – August);
- o Polygon attribute estimation (September – January);
- o Quality Control of polygon attribute estimation (September – January);
- o Quality Assurance of polygon attribute estimation (January);
- o Digital mapping (September – February);
- o Quality Control of digital mapping (September – February);
- o Preparation of final project deliverables (February);
- o MoFR review and acceptance of final project deliverables (March).

3.2 Aerial Photography

This project will utilize the DiAP digital softcopy photogrammetric system and the most recent available medium-scale aerial photography that meets current MoFR and Base Mapping and Geomatic Services standards and specifications.

The 2005 Phase I VRI project will use 1:30,000 scale colour photos flown as part of the Provincial Forest Health program in 2005 where available. The acquisition of additional aerial photographs outside of that program may be required to complete the required coverage for the TSA.

All photographs will be scanned at a 10 to 15 micron resolution and then converted to SIS format digital files for use with the DiAP system. All scanning, aerial triangulation and control transfer will be conducted to current Base Mapping and Geomatic Services standards.

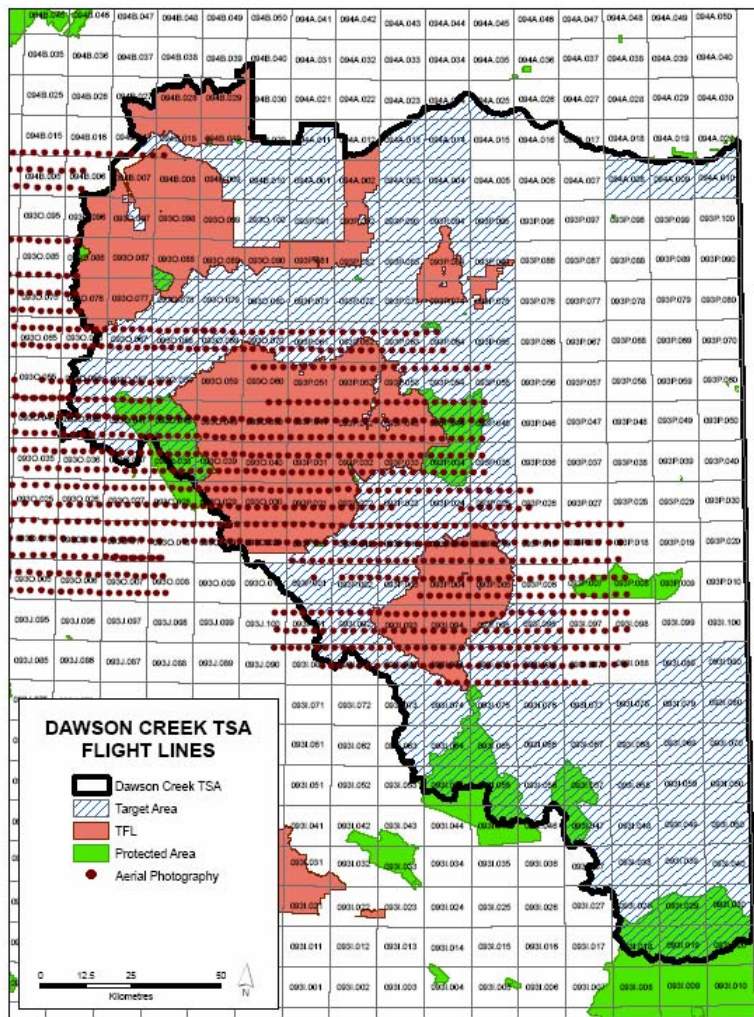


Figure 3.1 2005 Aerial Photography

3.3 Project Coordinator

The project coordinator will be Carole Dascher RPF of Highwood Forest Management, Parson, BC. Her responsibilities will include coordinating the project; monitoring and communicating project progress; ensuring all contractors are qualified and certified; overseeing photo-interpretation activities; ensuring quality assurance is complete and assisting in coordinating technical expertise where required.

3.4 Quality Assurance

An independent third-party auditor will provide Quality Assurance services for polygon delineation, polygon attribute estimation and field data collection. The auditor will be a Registered Professional Forester specializing in forest inventory with a minimum of five years experience supervising, managing or auditing Phase I VRI projects. The auditor will be on the

BC Government Certified Photo Interpreters listing and will be employed by a company that is on the BC Government Qualified VRI Photo Interpretation Company listing. The Quality Assurance services will be provided as per the schedule contained in section 3.14 of this document.

The contractor will make available to the Ministry all documentation pertaining to the quality control or quality assurance completed as part of the photo interpretation project.

The minimum standards for this project are contained in the following BC Resource Information Standards Committee documents:

- VRI BC Land Cover Classification Scheme Version 1.3;
- VRI Photo Interpretation Procedures Version 2.4;
- VRI Quality Assurance Procedures for Photo Interpretation Version 2.0;
- VRI Photo Interpretation Standards March 1998;
- VRI Air Call (Air Calibration) Data Collection Procedures and Standards Version 2.0;
- VRI Ground Call (Ground Calibration) Data Collection Procedures and Standards Version 3.0.

3.5 Certified Photo Interpreters

All work will be completed by or supervised by a VRI Certified Photo Interpreter. For all VRI projects, at least 50% of the interpreters working on the project must be certified photo interpreters. Certified interpreters are directly responsible for the work completed by uncertified interpreters working under their supervision. The licensee reserves the right to utilize only VRI Certified Photo Interpreters for all portions of the Phase 1 project, thereby precluding any non-Certified Photo Interpreter staff from working on the project to ensure quality deliverables are received.

3.6 Estimated Costs

Table 3.1 Total Phase I and II VRI Project Costs- 2006-2016⁶

Phase	Activity	Cost per hectare	Total Cost
I	Photo Products and Softcopy Costs	\$ 0.20	\$ 298,156.00
I	Polygon Delineation and Descriptions	\$ 1.00	\$ 1,490,780.00
I	Field Data Collection	\$ 0.20	\$ 298,156.00
I	Helicopter	\$ 0.15	\$ 223,617.00
I	Third-party Professional Quality Assurance	\$ 0.05	\$ 74,539.00
I	Phase I Total	\$ 1.60	\$ 2,385,248.00
II	Analysis and Attribute Adjustment	\$ 0.02	\$ 29,815.60
II	Phase II Total	\$ 0.02	\$ 29,815.60
I and II	Grand Total	\$ 1.62	\$ 2,415,063.60

Table 3.2 Annual Phase I VRI Project Costs - 2006-2016⁷

Phase	Activity	Cost per hectare	Total Cost
I	Photo Products and Softcopy Costs	\$ 0.20	\$ 29,815.60
I	Polygon Delineation and Descriptions	\$ 1.00	\$ 149,078.00
I	Field Data Collection	\$ 0.20	\$ 29,815.60
I	Helicopter	\$ 0.15	\$ 22,361.70
I	Third-party Professional Quality Assurance	\$ 0.05	\$ 7,453.90
I	Phase I Total	\$ 1.60	\$ 238,524.80

⁶ Based on historic Dawson Creek TSA Phase 1 VRI costs and on estimates contained in the most recent approved Prince George TSA and Vanderhoof TSA Vegetation Resources Inventory Strategic Inventory Plans.

⁷ Based on historic Dawson Creek TSA Phase 1 VRI costs and on estimates contained in the most recent approved Prince George TSA and Vanderhoof TSA Vegetation Resources Inventory Strategic Inventory Plans.

4.0 APPROVAL/SIGN-OFF OF VPIP

It is understood that this is an agreement in principle and does not commit the signatories to completing the inventory activities outlined within this plan.

All signatories acknowledge that the licensee reserves the right to obtain newer aerial photography/imagery and technology for any inventory work undertaken and that this photography/imagery and technology and actual works undertaken will be to current MoFR approved standards and procedures in place at the time of project commencement. The signatories also acknowledge that any new VRI standards or processes that may evolve as a result of the Mountain Pine Beetle Inventory Strategy (or other VRI standard changes) will be incorporated into this project.

Implementation schedules and priorities (and resulting deliverables) identified in this plan are subject to acquisition of suitable aerial photography. Should significant changes to the existing implementation schedule be required, an addendum to this plan, agreeable to all stakeholders, will be required.

I have read and agree that the activities and procedures outlined in this proposal meet current MoFR minimum standards and will meet MoFR and Dawson Creek TSA Licensee's business needs.

original signed

Jon Vivian, R.P.F.

date

Manager, Vegetation Resources Inventory Section

Forest Analysis and Inventory Branch

Ministry of Forest and Range

original signed

Doug Russell

date

Louisiana Pacific Canada Ltd.

Dawson Creek, BC

APPENDICES

Appendix I

REQUEST FOR PROPOSAL FOR VEGETATION RESOURCES INVENTORY PHOTO INTERPRETATION AND FIELD PLAN FORMULATION

ISSUED BY:
Louisiana Pacific Canada Ltd.
116 – 116th Avenue
Dawson Creek, B.C.
V1G 3C8

SUMMARY OF KEY INFORMATION

1. Viewing Session: Not Applicable
2. Closing Date for Response: October 28, 2002, 1PM Pacific Standard Time.

Send one hard copy and one digital copy of the proposal by the Closing Date to the following address:

Carole Dascher, RPF
FIA Coordinator for Louisiana Pacific Canada Ltd.
C/O LP Engineered Wood Products Ltd.
P.O. Box 170
1221 10th Avenue North
Golden, B.C.
V0A 1L0

Phone: (250) 348-2212
Fax: (250) 348-2442
Email: pioneer@rockies.net

Hard copies can be faxed to (250) 348-2442 with the digital copy emailed to pioneer@rockies.net.

4. Proposal Scope: This RFP refers to the services required to complete all components of Phase I Vegetation Resource Inventory (Photo Interpretation & Digital Mapping) for Louisiana Pacific Canada Ltd.

Company Contact:

Carole Dascher, RPF
FIA Coordinator for Louisiana Pacific Canada Ltd.
Phone: (250) 348-2212
Fax: (250) 348-2442
Email: pioneer@rockies.net

5. Information offered from sources other than the above Company Contact is not official and may be inaccurate.