

---

# Vegetation Resources Inventory

## Guidelines for Preparing a Project Implementation Plan for Photo Interpretation

Prepared by  
Ministry of Forests and Range  
Forest Analysis and Inventory Branch

May 2008

Version 2.2

© The Province of British Columbia  
Published by the  
Resources Information Standards Committee

## **Library and Archives Canada Cataloguing in Publication Data**

Main entry under title:

Vegetation resources inventory. Guidelines for preparing a project implementation plan for photo interpretation [electronic resource]. -- Version 2.2

Available on the Internet.

Issued also in printed format on demand.

ISBN 978-0-7726-6002-2

1. Aerial photography in botany - British Columbia - Handbooks, manuals, etc. 2. Aerial photography in forestry - British Columbia - Handbooks, manuals, etc. 3. Photographic interpretation - Handbooks, manuals, etc. I. British Columbia. Forest Analysis and Inventory Branch. II. British Columbia. Resources Information Standards Committee. III. Title: Preparing a VRI project implementation plan for photo interpretation.

QK203.B7V43 2008 333.95'30723 C2008-960107-6

Additional Copies of this publication can be purchased from:

### **Government Publication Services**

Phone: (250) 387-6409 or

Toll free: 1-800-663-6105

Fax: (250) 387-1120

[www.publications.gov.bc.ca](http://www.publications.gov.bc.ca)

**Digital Copies are available on the Internet at:**

<http://ilmbwww.gov.bc.ca/risc/pubs/teveg/index.htm>

# Table of Contents

Introduction .....	1
VRI Planning.....	3
Project Implementation Plan Guidelines .....	5
Executive Summary .....	5
Section 1 - Introduction .....	5
Background Information .....	5
VRI Planning Process.....	5
State of the Current Inventory .....	5
Document Objectives .....	5
Landbase.....	5
Section 2 - Photo Interpretation Plan.....	6
Project Objectives.....	6
Target Area.....	6
Inventory Documentation and Archive .....	6
Calibration Data Sources.....	6
Polygon Delineation.....	7
Integrating RESULTS Information .....	7
New Field Calibration .....	9
Attribute Estimation .....	10
Mapping .....	10
Section 3 - Project Implementation .....	10
Scheduling.....	10
Photo Scale .....	10
Project Coordinator .....	11

## Preparing a VRI Project Implementation Plan for Photo Interpretation

Personnel.....	11
Quality Assurance.....	11
Deliverables .....	11
Reference Materials .....	11
Costs.....	12
Approval/Sign-off of VPIP .....	12
Appendix A: Glossary of Terms .....	13
Appendix B: Needs Analysis .....	14
Appendix C: Calibration Data Sources.....	17
Appendix D: Documentation and Archive.....	19
Appendix E: Project Schedule Guidelines .....	21
Appendix F: Project Completion Report .....	23

## List of Figures

Figure 1 - Suggested Vegetation Resources Inventory Planning Process .....	4
Figure 2 – Integration of RESULTS Openings in VRI Projects .....	8



## Introduction

The Ministry of Forests and Range (MFR) has developed a business planning process to ensure the successful implementation of the Vegetation Resources Inventory (VRI) ground sampling and photo interpretation projects. This process includes development of VRI Strategic Inventory Plans (VSIPs) and Project Implementation Plans (VPIPs). This document provides guidelines that can be used to prepare a VPIP for photo interpretation projects. Guidelines for the preparation of VPIPs for ground sampling are available in a separate report.

The photo interpretation VPIP is a working document that details the specific operational activities associated with the implementation and documentation of the inventory project. It identifies the target areas for new photo interpretation, data sources, availability of existing aerial photographs or acquisition plan for new aerial photographs, format of base files, project scheduling, costs, deliverables, etc. The intent is that these guidelines will expedite the MFR VPIP standards and business review process while also generating documentation that will provide photo interpretation consultants with a basis to develop competitive contract submissions.

Included in this document is a description of the VRI business planning process and an outline of the VPIP document preparation guidelines. Appendices in the back of the document provide supplementary information and guidance in the development of the photo interpretation VPIP.

Development of a VPIP document is a fundable activity under the current Forest Investment Account (FIA) investment guidelines and is a component of the MFR VRI inventory standard.



## VRI Planning

The VRI planning process involves developing VSIPs and VPIPs that identify resource-specific management issues, desired inventory products and activities, and priorities (see Figure 1). A VSIP broadly outlines the VRI activities and products needed to address the identified forest management issues.

The photo interpretation VPIP is a working document that details the specific operational activities associated with the implementation and documentation of the inventory project. It identifies the target areas for new photo interpretation, data sources, availability of existing aerial photographs or acquisition plan for new aerial photographs, format of base files, project scheduling, costs, deliverables, etc.

The development of VSIPs and VPIPs are lead by industrial stakeholders. These planning exercises are a minimum, fundable standard required under Forest Investment Account (FIA) funding rules. Both VRI ground sample and photo interpretation inventories must be approved by the MFR to ensure that projects are completed to current standards, and to ensure the project meets the business needs of all identified stakeholders.

MFR VRI inventory staff are available to assist in the development of these plans. To facilitate an efficient and expedited approval of any of the VRI planning documents, it is highly recommended that the proponent or project administrator contact the MFR Forest Analysis and Inventory Branch and Regional VRI Staff to involve them as early in the process as possible. Coordination between the proponent / project administrator and the Ministry will help to guide the determination of priorities and help to ensure that the business needs and considerations of as many stakeholders as possible are achieved.

Preparing a VRI Project Implementation Plan for Photo Interpretation

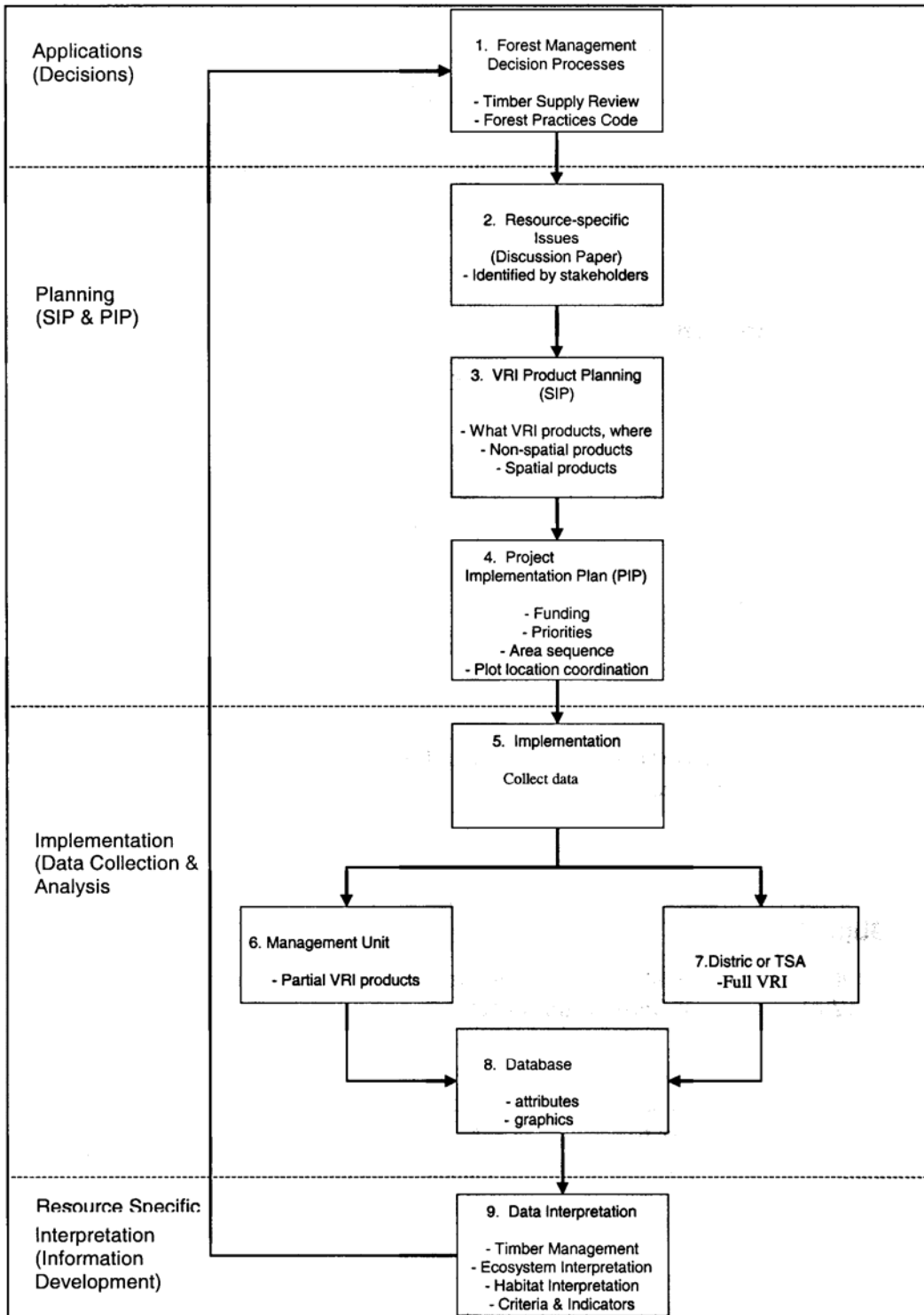


Figure 1 - Suggested Vegetation Resources Inventory Planning Process

# Project Implementation Plan Guidelines

The following sections provide an outline and guidelines for preparing a photo interpretation Project Implementation Plan (VPIP) for management unit inventories.

## Executive Summary

### Section 1 - Introduction

#### Background Information

Briefly describe:

- The support of the stakeholders in the unit.
- The information needs (Timber Supply Review, habitat mapping, etc.)
- How the photo interpretation fulfills the information requirements.

#### VRI Planning Process

Describe how this document relates to the overall planning process and provide an overview of the VRI planning process.

#### State of the Current Inventory

Describe the quality of the inventory, age of the inventory, existing data deficiencies if any, results of the inventory audit if available, special surveys and results, etc.

#### Document Objectives

Describe the objectives of the VPIP document. What work is to be performed and why.

#### Landbase

Describe the land base in terms of geographic area, forest types, and administrative zones (such as the presence of Tree Farm Licenses, parks, woodlots or private land), population centres if any in the unit, biogeoclimatic zones present. Include a map and summary area statistics. Note that all portions of project maps within a Timber Supply Area (TSA) or other management unit must be completed to VRI standards. This can be accomplished through a variety of means, developed in consultation with VRI Staff. No holes, gaps or blank spaces shall exist in the data for the contiguous portion of the TSA or management unit on any map sheet completed as part of a VRI photo interpretation project.

## **Section 2 - Photo Interpretation Plan**

### **Project Objectives**

Define the objectives of the photo interpretation project. VRI planning documents (*VSIPs*) or other relevant reports (*MFR AAC Rationales, LRMPs, Inventory Audits*) will provide guidance on the objectives of new photo interpretation. These documents outline forest management issues and inventory product needs identified by stakeholders in the management unit. If these planning documents are not available, a needs analysis must be undertaken. A needs analysis may also be necessary to confirm or refine the objectives in a VSIP. Guidelines for conducting a needs analysis are given in Appendix B. Project objectives must be clearly identified within the VPIP

### **Target Area**

Define the target area for the proposed photo interpretation in terms of map sheets (placed in an appendix), stand types, or geographic locations, including a map of the target area. All portions of project maps within a Timber Supply Area (TSA) or other management unit must be completed to VRI standards. No holes, gaps or blank spaces shall exist in the data for the contiguous portion of the TSA or management unit on any map sheet completed as part of a VRI photo interpretation project. Include an indication of excluded areas if any, such as TFLs, large parks, tracts of private land, etc.

### **Inventory Documentation and Archive**

Document the history of the existing inventory, digitizing history, quality, and availability of aerial photographs (document photos and new photos), format of base maps (TRIM), and data sources. This information is useful to potential contractors who will bid on the project. Guidelines for this documentation are outlined in Appendix D.

### **Calibration Data Sources**

Data sources are used as calibration points for improving the quality of photo interpretation. An analysis should be undertaken that summarizes the status of the existing data sources, including all types of ground measurements and air observations. The analysis should be focused on the kind, frequency, distribution, age, completeness, and condition of the available data. Guidelines for this analysis are given in Appendix C. The analysis should also recommend the number and distribution of additional (new) air calls, ground calls and observations that are needed in the project area. As a general guideline, proponents should consider establishing at least 10 ground calls, 10 air calls and 10 observations per full map sheet.

All existing data sources must be retained on, or transferred to the new graphics file except when a justifiable case can be made to remove them. Situations that would justify removal of existing data sources include a major disturbance (such as a large fire, harvesting or insect / disease damage), large stand structure changes, or as defined in the contract document.

## Polygon Delineation

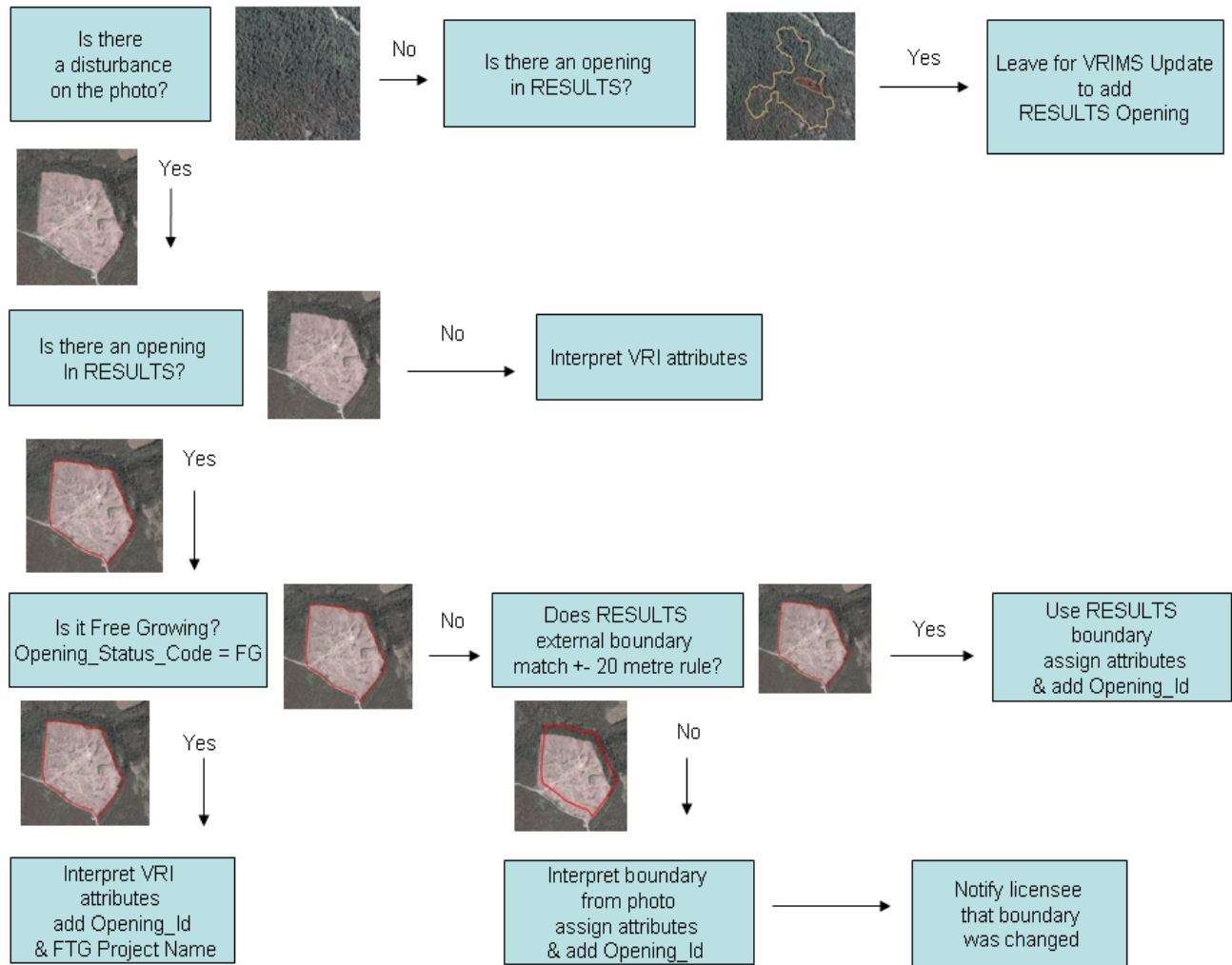
Indicate whether the polygon delineation is to be completed to VRI standards and procedures or if a VRI project combined with Terrestrial Ecosystem Mapping (TEM) or terrain mapping is planned for the project area. There should also be a description of the intended or desired quality control of the polygon delineation to be undertaken by the successful photo interpretation contractor.

## Integrating RESULTS Information

Special consideration must be given to the process of integrating RESULTS (silviculture) openings into the photo interpreted inventory (see Figure 2.) The MFR will provide a copy of the RESULTS shapes at the start of the photo interpretation contract.

- The VRI is a photo-based inventory therefore any external polygon (opening) boundaries that exist on the current imagery will be maintained.
  - Forest licensees must clearly identify any variation from this standard in the Photo Interpretation VPIP and contract documentation.
  - The most recent version of the RESULTS external boundary will be used to assess the accuracy and acceptability of the RESULTS external boundary against the imagery (photo interpreted) external boundary. RESULTS external boundaries that are within the  $\pm 20$  metre rule may be used or replaced at the discretion of the photo interpreter. RESULTS external boundary lines that exceed the  $\pm 20$  metre rule must be replaced.
  - If the RESULTS boundary is used, the adjacent VRI polygon type lines must be “snapped” to the RESULTS boundary.
  - Where an opening shape does not exist in the RESULTS file, the external boundary from the imagery will be used.
  - Licensees will be notified when their RESULTS external boundary was not used and will be provided with a spatial file of the external boundary used in the VRI.
- RESULTS opening information that is newer than the current imagery will not be included in the VRI photo interpretation.
  - VRI photo interpretation contractors will not be required to incorporate RESULTS information that occurs after the date of photography unless otherwise instructed by the licensee. The MFR will integrate all RESULTS information that occurred after the date of photography after the photo interpretation project has been delivered to the MFR.

## Preparing a VRI Project Implementation Plan for Photo Interpretation



**Figure 2 – Integration of RESULTS Openings in VRI Projects**

- RESULTS openings not declared Free Growing (FG) will have minimum attributes assigned. A process is being developed to extract attribute data from RESULTS. Until that has been finalized, the following rules will apply:
  - Attributes will be taken from RESULTS where possible and will include:
    - Estimated site index;
    - Estimated site index species;
    - Estimated site index source;
    - BC Land Cover Classification code (assigned by the interpreter);
    - Opening ID number (contact the licensee if there is no opening ID in RESULTS);
    - Disturbance type, disturbance start and end years;
    - Inventory Standard will be “I” for these records.
  - Wildlife Tree Patches (WTP) or reserves larger than 1 ha will be delineated and assigned the full suite of VRI attributes.

## Preparing a VRI Project Implementation Plan for Photo Interpretation

- New openings that are partially disturbed (such as those with selective logging or having numerous seismic lines) will require the full suite of VRI attributes estimated by the photo interpreter as RESULTS may be inconsistent in providing sufficient data for these areas.
- RESULTS openings that have been declared Free Growing will have the polygon delineation and attribute estimation completed to VRI standards.
  - RESULTS free growing attributes should be used as a reference for the VRI photo interpretation.
  - Each free growing polygon must have the code “FTG” entered in the Project Name field.
  - External boundaries may be modified unless they are shared with a non-free growing opening.
- Openings may be split by map sheet boundaries as per previous standards.
- Opening ID numbers must be provided for each silviculture opening polygon including WTP.
- For areas identified as large openings (such as historic fires) with a number of diverse vegetation types, the full suite of VRI attributes is to be provided.
- For VRI / terrain projects, divide the opening by terrain lines. Internal polygon delineation of the opening is governed by the RESULTS guidelines therefore the terrain lines will disappear after the integration of the next RESULTS submission.
- Note that there is an anomaly in the BC Land Cover Classification Scheme where polygons that have a tree crown closure between 5 and 9% with no other vegetation identified do not fit into the Scheme. For these situations, a minimum crown closure of 10% is to be assigned to these polygons.

### **New Field Calibration**

Document the types of stands to be visited (specific species, old growth, second growth) or the targeted stand conditions that need to be reviewed. The preference is to have the same individuals completing the field data collection as are performing the attribute estimation – document whether or not this is to occur. As part of the deliverables, the MFR requires a complete set of any new data sources be provided in a suitable digital format, including the geographical locations (UTM coordinates) of these data sources as well as the complete set of field attribute data collected.

Prior to the initiation of a field calibration program, a Field Calibration Sampling Plan is to be submitted to the MFR. Documentation within this sampling plan should include a map of the unit indicating the general location and distribution of the calibration points.

Local knowledge can be very useful in structuring a field calibration program. Proponents may want to consider discussing with licensees and MFR concerns such as drainage-specific knowledge of age ranges related to historic disturbance events, old growth patches, species distribution and history of events.

## **Attribute Estimation**

Document the general process and format to be undertaken in the attribute estimation such as whether the project will be in softcopy or hardcopy format. If a softcopy project is to be undertaken, an indication of the absolute number or percentage of heights that will be digitally measured per map sheet should be indicated. If additional requirements are in place for the project such as the simultaneous capture of TEM or terrain information, documentation should be provided as to the sequencing of the VRI and the other data collection.

## **Mapping**

The MFR has developed a format and database standards for the submission and storage of spatial and attribute data for VRI Photo interpretation. All new projects must be completed to this standard.

## **Section 3 - Project Implementation**

### **Scheduling**

Outline in detail the activities and roles and responsibilities needed to implement the project. Suggested guidelines are available in Appendix E. Pre-work meetings are suggested in advance of the polygon delineation phase as well as in advance of the field calibration phase. Suggested invitees include the project coordinators, the photo interpreters responsible for completing the work, the third-party quality assurance contractor, and MFR VRI Staff.

### **Photo Scale**

For traditional photo interpretation using hard copy photographs, the minimum acceptable photo scale is 1:15,000 colour or black and white.

For projects utilizing digital softcopy photogrammetric technology, the minimum acceptable scale of the imagery shall be 1:20,000 for coastal areas; 1:20,000 for southern interior and central interior areas; and 1:40,000 for portions of the far northern interior.

The year(s) of photograph acquisition for the project area must be included and approved as part of the Plan. As a guideline, the maximum age of the photographs is five years from the date of the start of attribute estimation. Acceptance of older photographs to fill in small information gaps must be reviewed in consultation with the MFR.

The acquisition of aerial photographs that are intended to be used in the VRI program must meet the specifications of and be approved by the Base Mapping and Geomatics Services section of the Ministry of Agriculture and Lands. Aerial photographs flown outside of the BC government flying program must be approved before work may commence on the photo interpretation component. Consideration must be given to the time required to obtain this approval when developing the schedule for the completion of the photo interpretation project.

## **Project Coordinator**

The project coordinator and their responsibilities should be identified in the plan. Responsibilities usually involve: 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.

## **Personnel**

All VRI photo interpretation work conducted in British Columbia must be completed by or directly supervised by a VRI Certified Photo Interpreter. At least 50% of the photo interpreters working on a VRI project must be certified for VRI photo interpretation. All uncertified photo interpreters are to be directly supervised by a Certified Photo Interpreter working on that project. An indication of the desired qualifications and / or level of experience of the photo interpreters should be indicated in the VPIP.

For projects where TEM or terrain will be completed at the same time as the VRI program, an indication of the qualifications of the individuals completing the other project requirements must be identified.

## **Quality Assurance**

Indicate who will conduct quality assurance (polygon delineation and estimation, fieldwork, and digitized attribute and graphic data), when, and by what minimum standard. This standard must meet or exceed MFR quality assurance standards for VRI photo interpretation. Indicate the process for selecting the third-party quality assurance person.

## **Deliverables**

Indicate the format that meets the MFR standards and the recipient(s) of the deliverables when they are complete.

A Project Completion Report is required at the end of each VRI photo interpretation project. This report is to include, but is not limited to: a listing of the photo interpreters (both certified and uncertified) involved in the polygon delineation and attribute estimation; a listing of the map sheets completed (indicate whether full or partial map sheets were completed); the certified interpreter responsible for internal quality control; a copy of the internal quality control reports; the third-party quality control photo interpreter; a copy of the quality control reports; and the total cost to complete the project. A template for this report is outlined in Appendix F.

## **Reference Materials**

Indicate the reference materials that could be used by the photo interpreters in the completion of the project. Rather than referencing specific version numbers of documents, it may be best to reference documents as the “Current Version” of the name of the document without the version number.

## Preparing a VRI Project Implementation Plan for Photo Interpretation

### **Costs**

Indicate the anticipated or estimated costs for completing the project including photo acquisition, quality assurance, data capture and field costs based on the level of field calibration to be completed.

### **Approval/Sign-off of VPIP**

The VPIP must be reviewed by the MFR to ensure all appropriate standards are being followed and to ensure the scope of the project will meet their business needs. The sign-off contact for the MFR and suggested wording for the sign off is:

I have read and agree that the procedures and process outlined in this plan meet current Ministry of Forests and Range standards and business needs and considerations.

---

Manager, Vegetation Resources Inventory  
Forest Analysis and Inventory Branch  
Ministry of Forests and Range

---

Licensee Representative

## Appendix A: Glossary of Terms

<b>Ground Sampling</b>	Ground sampling is the field measurement of timber, ecology, range and/or coarse woody debris values at one or more locations within each sample polygon. The sample polygons are selected proportional to their area from a sorted list. To accommodate the wide variety of resources, various types and sizes of sampling units (e.g., fixed and variable plots, transects) are used to make the measurements.
<b>Inventory Unit</b>	An inventory unit is the target population from which the samples are chosen. For management inventories, the inventory unit is usually a TSA or TFL.
<b>Land Cover Classification</b>	The BC Land Cover Classification Scheme (BCLCCS) was designed specifically to meet the requirements of the VRI, in addition to providing general information useful for “global vegetation accounting” and “integrated resource management.” The BCLCCS is hierarchical and reflects the current state of the land cover (such as the presence or absence of vegetation, type and density of vegetation) and such fixed characteristics as landscape position (wetland, upland, alpine.)
<b>Photo Interpretation</b>	Photo interpretation involves the subjective delineation of polygons and the photo estimation of attributes for all polygons in an inventory unit. For hardcopy projects, medium scale aerial photographs (1:20,000) are most often used in the photo interpretation process. The scale of aerial photographs for softcopy projects can vary depending on the geographic location in the province.
<b>Vegetation Resources Inventory (VRI)</b>	<p>The VRI is the MoFR standard for assessing the quantity and quality of BC’s vegetation resources. The VRI process is designed to include a flexible set of sampling procedures for collecting vegetation resource information. The VRI is essentially a toolbox of procedures, which include:</p> <p><i>Photo Interpretation:</i> the delineation of polygons from aerial photography and the estimation of resource attributes.</p> <p><i>Ground Sampling:</i> the establishment of plot clusters in selected polygons to measure timber, ecological, and/or range attributes.</p> <p><i>NVAF Sampling:</i> stem analysis sampling of individual trees for net volume adjustment.</p> <p><i>Statistical Adjustment:</i> the adjustment of the photo interpreted estimates for all polygons in an inventory unit or management unit using the values measured during ground sampling.</p> <p>The VRI can be deployed over a management unit measuring selected resources in specific portions of the land base. The VRI sampling process produces spatial and non-spatial databases that can be used in multiple resource management applications, including timber, ecosystem and wildlife habitat management.</p>

## Appendix B: Needs Analysis

A needs analysis is not needed if a VSIP has already concluded that new photo interpretation is required. However, a needs analysis may be necessary, in some cases, to confirm or refine the photo interpretation objectives identified in a VSIP. Identifying what needs to be improved (attributes or delineation), where, and how, involves the following three steps:

- **Identify the needs.** Identify and consult stakeholders to define forest management issues and inventory product needs. The stakeholders may include local planning groups and the users of the inventory. Review recent Timber Supply Review reports and other related documentation.
- **Identify priority areas within the target area.** Develop and apply criteria for ranking areas based on the management needs.
- **Review the existing inventory.** This involves quantitative evaluation of the attributes and the delineation, an assessment of calibration data sources, and a review of existing photos, maps, and technology.

### Quantitative Evaluation

Evaluate the existing photo estimates and delineation. This assessment involves consideration of many factors, including:

- Number and age of unit surveys on which the current inventory is based (classification standards can vary significantly between surveys).
- Quality of the document photos used for photo interpretation.
- Stand complexity, in terms of stand structure and the average number of species per type (how difficult is the photo interpretation?)
- Frequency and distribution of data sources.
- Ratio of immature to mature stands.
- Frequency of stands with a high probability for structural or successional change between inventories.
- Current and future data needs for forest management – will the descriptive data now in the database meet management needs?
- Priority strata, attributes, and geographic areas identified for special attention by resource users.
- Kind and frequency of disturbances since the last re-inventory.
- Quality of the classification of non-forest attributes.

The assessment should be extensive and comprehensive enough to determine:

- Whether the current classification standards for stratification and type descriptions are being met for each unit survey, forest cover stratum, and descriptive attribute.
- The short and long-term requirements for improving the inventory.

### **Assessment of Stand Attributes**

Assess the accuracy of stand attributes using the inventory audit data or similar study information. If an inventory audit has been completed for the project area, briefly summarize and discuss the results of the audit.

The conclusions of the assessment should state:

- What improvements are necessary.
- What and how much work is needed to make those improvements.
- Where to distribute the work.

Also, check the consistency of the old estimates, to identify the potential statistical benefits of completing new photo estimates. (New estimates may not be any better than the old estimates for the purpose of statistical adjustment.) To check the consistency of the old estimates, new estimates should be derived for the sample polygons in which the sample clusters fall. Regression relationships between the old and new estimates and the ground measurements would then be compared. This process should be done using one photo interpreter to provide consistency among estimates. Existing polygon boundaries would be maintained.

### **Stand Delineation**

Assess if current stand delineation meets the new criteria and standards. This assessment could result in the recommendation of (with reasons) one or more of the following options for a given area: no action, an update for disturbance, or new delineation.



## Appendix C: Calibration Data Sources

### Existing (Historical) Data Sources

Conduct a quantitative assessment and summarize all existing data sources for the project area by type of data source (air calls, ground call, permanent samples, temporary samples, etc.), frequency, year of establishment, completeness, and condition. Check the data sources and provide an indication of their overall quality if possible. Regional inventory staff may need to be contacted to provide guidance and support in this process.

### Cruise Plot Data Sources

Cruise plot data from unlogged timber sales can be used as calibration points. Determine the number of unlogged cutblocks and the potential number of current and valid cruise plots available to be summarized and transferred to the new photos. Check the availability, suitability, condition, and compatibility of cruise plot data for use in calibration. Also, note how accurately the cruise plots are mapped because this will influence how well they can be transferred to the new photos.

### Other Resource Data Sources

There are several types of non-timber surveys that can be used for improving forest classification or other resource overlays. These surveys are not to be confused with the resource overlay information identified in the section on digitizing history. Surveys that may be available can be identified during the client interviews.

Review the availability and suitability of non-timber surveys that could be incorporated into an inventory update or reinventory. This resource information may include wildlife habitat, recreation, watersheds, fisheries, soil sensitivity, and harvesting operability classification. A summary of other resource surveys should include:

- Kind, scope, and number of surveys available.
- Data reliability and compatibility.
- How the data can be incorporated.



## Appendix D: Documentation and Archive

### Inventory Status

This section describes the history and other relevant details of the current inventory. Summarize the surveys on which the current inventory is based. Information on each unit survey conducted should include the year and the kind of survey (e.g., reinventory, update, ESA, EPA).

A reference map may be prepared to show:

- Boundaries of previous inventories on which the current inventory is based (include project names and corresponding reference year).
- Boundaries of ESA/EPA surveys and reference year(s).

Summarize the potential classification inconsistencies originating from the previous inventories.

### Digitizing History

For each unit survey, list the year of digitizing and the method used for entering forest cover details [detailed forest cover attribute lists (FS 810) or generalized direct label entry].

### Aerial Photographs

Summarize the photo specifications and characteristics that could affect the quality of photo interpretation for the document photos by unit survey, and for new photography, if it is available.

### Photo Coverage

A complete list of document photos and new photography should be provided. A photo key map highlighting the photos available will also be useful.

### Photo Specifications and Quality

Vital information on document and new aerial photographs includes year of photography, scale, photo colour, direction flown, quality of photos, and identification of missing photos. This information should be presented for both the document and new photos.

### Base Maps

Review and summarize the status of the base maps and plotting needs. The overriding fact regarding base maps is whether the maps are available in TRIM (NAD 83) format. Other important considerations for each base map are discussed below:

- Show the latest year the base maps were updated for ownership and cadastre, planimetry, and forest cover.

## Preparing a VRI Project Implementation Plan for Photo Interpretation

- Identify any maps in the project area that are being modified or updated on another contract, including mapsheets which are adjacent to the project area and mapsheets that border other Forest Regions or Districts. List the maps and highlight them on a map index key map.
- Identify TRIM maps available for an inventory update or reinventory

Information and data that may contribute to the inventory will come from a wide variety of sources and may have been prepared over a long period of time. Special consideration may need to be given to the following aspects of source preparation, digitizing, and plotting:

- Are there planimetric changes, i.e., rivers, roads, or glaciers to plot?
- Considering the age of new classification photography, the rate of disturbance and year of update for planimetry, is a satellite update required?

### **Special Studies or Surveys**

The client interviews may reveal information about special studies such as old history records, fish and wildlife studies, soil sensitivity studies, and terrain mapping projects, which may be useful if they are available.

## Appendix E: Project Schedule Guidelines

*The following information is presented as a general guideline and can be modified based on the specific requirements of individual projects.*

### Preparation

1. Select administrative or management unit (September/October):
  - Timber Supply Area (TSA), Forest District, Tree Farm License (TFL), Park
2. Conduct preliminary review (October to January):
  - Evaluate inventory, audits, strategic planning issues, management/government action issues
  - Arrange for Terrain Resource Information Management (TRIM) bases
  - Ensure that photos are available
  - Obtain updated overlays
3. Define project area (January):
  - Determine objectives
  - Determine limits of project area
  - Finalize project priorities
  - Conduct stakeholder review

### Work Plan

1. Identify activities needed to meet project objectives (January/February)
2. Acquire funding

### Viewing

1. Identify contract evaluation team (January/February)
2. Develop viewing materials (January/February):
  - Source material:
    - i. Maps (TRIM and traditional forest cover)
    - ii. Photos (new and source)
    - iii. Global Positioning Satellite (GPS) traverse of roads and silviculture opening boundaries
    - iv. Silviculture information

## Preparing a VRI Project Implementation Plan for Photo Interpretation

- Request for Proposals (RFPs):
  - i. Identify eligible contractors
  - ii. Prepare RFP packages for contractors
- 3. Prepare for viewing (February)
- 4. Conduct the viewing for photo interpretation contract (end of February)

### The Contract

1. Develop and submit bid proposal (February/March)
2. Award the contract (March):
  - Contract evaluation team compiles and evaluates proposals
  - Award the contract for photo interpretation
3. Post contract award and contract implementation:
  - Fulfill WorkSafeBC / safety requirements
  - Data transfer, polygon delineation and quality control (March to May)\*
4. Conduct field work (May to August)\*:
  - Prepare for field work (May)
  - Pre-work meeting and site familiarization
  - Conduct field work: air calls and ground calls (June to August)
  - Internal quality control
  - Quality control field work
5. Photo interpretation (September to January)\*:
  - Polygon attribute estimation and data entry
  - Quality control photos
6. Quality assurance (September to April)\*:
  - Polygon transfer
  - Quality assurance of data and graphics, and acceptance (February to April)

\* **Note:** These time frames are totally dependent on the contract area, the number of photos to be used for the contract area, and field accessibility. Flexibility is required in planning when these activities, and consequently the project, are to be completed.

# Appendix F: Project Completion Report

*The following information is presented as a general guideline and can be modified based on the specific requirements of individual projects.*

## Project Completion Report

### Phase 1 - Vegetation Resources Inventory (VRI)

### Photo Interpretation and Digital Map Production

of

**XXXX** TSA / TFL

**Prepared By**

**Signoff**

**Date**

## **Purpose**

The purpose of this report is to document and provide a historical reference of the area of interest, personnel and activities associated with the completion of a VRI Photo Interpretation project.

### **1. Introduction**

Provide a brief description that includes:

- Reference to the approved VSIP / VPIP.
- Start up date and timeframe required to complete the project.
- Lead Licensee, groups or other name, who initiated the project.
- Logic for doing a VRI Phase 1 (brief).
- Contractor company(s) awarded the contract.
- Funding through FIA or other source.

In the event that more than one VRI contractor is awarded a portion of a TSA/District/TFL, then each will complete this report for their appropriate area.

### **2. Project Area Description**

Provide a general description of where the area of interest is located within the province.

- Document should contain a project area map.
- Should reference a listing of BCGS maps or portions of maps or an appendix containing a list of all maps or portions thereof, included within the project.

### **3. Personnel:**

List all personnel utilized by the company involved (with qualifications) and their roles in this VRI including third-party quality assurance.

### **4. Air Photo Coverage / Format**

Identify photo coverage used and formats including but not limited to:

- Year and scale of photography.
- Colour or black and white imagery.
- Preset model format (sjs or other) if softcopy was used.
- Any gaps in photo coverage in the area and what was done with holes in coverage?
- If different scales, GSD's (ground sampling distances - digital camera) are involved, and which maps are effected by each scale.
- Scanning rates.

5. **VRI Assessment:**

Logic on the need for this VRI project which could include: recommendations from the Chief Forester, licensee or other authority; forest management issues identified in the VSIP or other planning documents; age of previous inventory; defined need for a new inventory or other assessments.

6. **VRI Phase 1 Photo Interpretation Process**

This section will describe the range of aspects related to the capture of the new photo interpreted inventory.

**6.1 General Comments**

Provide a standard statement that all procedures (unless explicitly stated otherwise) conformed to Provincial VRI Standards. If not, describe variances to the standards or any changes that were incorporated including but not limited to whether the entire area was completed or only portions, and identify what portions were included or excluded. This section should also indicate whether softcopy of hardcopy prints were used.

**6.2 Inventory Base Maps**

Identify whether the TRIM base was used or not, and any processes used to prepare the base for VRI in a softcopy environment.

**6.3 Data Source Analysis**

Identify what was done to recover or assess historic data sources (air calls, ground calls, PSP, TSP) and what success was achieved. This would include a statement or table on the amount of historic data sources transferred or why some were not transferred (such as the original data source information could not be found, the age of the information, etc.)

**6.4 Polygon Delineation**

This section is to include but is not limited to whether:

- Private lands, woodlots or other features were excluded from delineation.
- Other inventory processes such as bioterrain, TEM, etc. were used as a base for or supplementation to the VRI delineation. If so, what criteria were used to insert the VRI over this base.
- A desired or predefined polygon size or number of polygons per map was targeted strived and the logic for this decision.
- The project was completed to TSA / TFL boundaries not necessarily to the map sheet boundary.
- Any maps or portions were not delineated because of incomplete or missing imagery.

**6.5 Field Calibration Data Collection**

**6.5.1 Sample Plan**

Indicate whether a field calibration sampling plan was completed; who completed it; who reviewed it and who signed it off.

### **6.5.2 Candidate Stand Criteria**

Indicate the priority candidate types that were targeted for field calibration based on the information in the planning documents, contract documents, etc.

### **6.5.3 Data Collection**

This section should provide an indication of how the data was collected. Information should indicate whether GPS data was collected for all field locations and how this was collected. This section should also document whether the location of the field calibration points were marked on hardcopy photos, the orthophoto or a copy of the forest cover map and how this information was transferred to the digital data base. It should also be indicated whether the data was collected on traditional hardcopy forms or through digital means.

#### **6.5.3.1 Air Calibration and Ground Calibration**

Indicate the number of air calls completed and general types of data collected at each of these points. Also indicate the number of one point and three point ground calls completed and the general rationale behind why a one point call was completed instead of a three point call or vice versa. Indicate whether the field work sample plan was followed and provide reasoning behind any changes that happened to the plan.

#### **6.5.3.2 Air Observations and Ground Observations**

Indicate the number of data points recorded and provide a general indication of the types of data collected at the air observations and the ground observations.

#### **6.5.3.3 Data Description Format**

- Were all data points transferred to the digital data base?
- What was the disposition of the data? Specifically, where is any hardcopy photo, orthophotos, maps, forms, etc. containing this data being stored?
- Was a digital field data list with UTM or latitude / longitude coordinates (excel or other format) completed to MFR requirements and delivered to the MFR?

## **6.6 Attribute Estimation and Cover Descriptions**

### **6.6.1 Final Attribution**

This section should indicate the process used to assign attributes to the vegetation cover polygons. Items to consider include a description of how the polygon numbering was completed; whether all of the polygons were attributed with full VRI descriptions and if not, what was the rationale behind this decision and who approved it; were all lands included in the attribution (such as private lands, woodlots, etc.) Any other discrepancies or variances to the standard must also be included.

As well, it should be indicated how the attribute information was entered into a digital medium (MFR software or custom application) and the process used to

validate the data. If the data was entered using something other than the MFR software, indicate the process used to convert that information to the VRI database format.

It must also be indicated whether polygon line work (delineation) and attributes were edge tied to adjacent map sheets including VRI line work and attributes in adjacent projects (such as previously completed TSAs.)

#### **6.6.2 Silviculture Information**

How was the information from silviculture openings incorporated into the VRI? This is to include but is not limited to:

- External opening boundaries derived from new photography.
- Internal opening polygon boundaries derived and maintained from an existing inventory update.
- Internal opening polygon descriptions maintained from an existing inventory.
- Stands identified as free growing where a complete VRI description is required.

#### **6.7 Digital Map Production**

Information included in this section will document the completion of the digital mapping for the project. The version of digital mapping standards used must be indicated as well as the digital mapping process, including but not limited to:

- Confirmation that all polygons were noded after line transfer.
- Confirmation that the planimetry and cadastre were updated and annotated with appropriate toponyms and description.
- Confirmation that the new files were vector and polygon cleaned and then compared to the associated VRI attribute files to ensure a one-to-one polygon correspondence.
- Confirmation that all maps are in single neat line format.
- Any other aspects of the digital map production process.

### **7. Quality Assurance**

A detailed description of the quality assurance process used must be provided including a summary of results achieved by phase (polygon delineation, field work, attribute estimation.) This section must also indicate who was responsible for completion of the quality assurance. Documentation of any internal quality control completed by the photo interpretation contractor should also be included.

For any work that did not achieve the standards it must be indicated what was done to remedy the situation, whether it was corrected, and any remedial measures to ensure that similar errors did not occur again in the project.

## Preparing a VRI Project Implementation Plan for Photo Interpretation

### 8. **Costs**

Project costs should be broken out by phase (as much as possible) such as polygon delineation and data source transfer; field work; final attribution; and digital mapping. Where possible, separate costs for the quality assurance component should be indicated, otherwise this can be included in the cost for each appropriate phase.

### 9. **Conclusion and Recommendations**

This section allows for the indication of any problems that were encountered in the project and any recommendations to be considered in future projects. These could be associated with the project start-up and availability of data to start the project; issues regarding photo quality, scale, different scales and incomplete photo coverage.

Other items to consider include changes in staffing midway through the project; insufficient field work to assist in the attribute estimation or areas where more work might be required to generate a more valuable product. It also may be appropriate at this point to document any issues with the polygon delineation or attribute estimation in problem areas such as dry belt fir stands, low productivity coastal polygons, spruce-balsam types, etc.

### 10. **Potential Attachments**

Attachments provide valuable insight into the completion of the project and can quickly summarize the project status, problems encountered, work completed, etc. The types of attachments include but are not limited to:

- A list of the map sheets included in the project or alternatively a map indicating those areas included in the project.
- The existing data source analysis if completed.
- A copy of the field calibration sampling plan.
- Any other documents or attachments that could add value to future users of the data.