Standards for Predictive Ecosystem Mapping (PEM) - Digital Data Capture

Predictive Ecosystem Technical Standards and Database Manual

Prepared by

PEM Data Committee
for the
TEM Alternatives Task Force
Resources Inventory Committee

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PREFACE

The Resources Inventory Committee members are resource specialists from a number of professional disciplines and represent Provincial, Federal, First Nation and private sector agencies and other resource interests. RIC's objectives are to develop a common set of standards and procedures for provincial resource inventories, as recommended by the Forest Resources Commission in its report 'The Future of our Forests".

Funding of the Resource Inventory Committee work, including the preparation of this document, is provided by the Corporate Resource Inventory Initiative (CRII) and by Forest Renewal BC (FRBC). Preliminary work of the Resources Inventory Committee was funded by the Canada-British Columbia Partnership Agreement of Forest Resource Development FRDA II.

For further information about the Resources Inventory Committee and its various Task Forces, please visit the RIC website at http://www.for.gov.bc.ca/ric

ABSTRACT

The *Standards for Predictive Ecosystem Mapping (PEM) - Digital Data Capture* (RIC, 2000) works in conjunction with the Resources Inventory Committee's (RIC) *Standards for Predictive Ecosystem Mapping – Inventory standard,* (RIC, 1999), *Standard for Terrestrial Ecosystem Mapping (TEM) in British Columbia* (RIC, 1998), along with the *Terrain Classification Manual,, Version 2.0,* (Howes and Kenk, 1997).

This document sets out procedures and rules for capturing, storing and delivering ecological data and associated metadata for the ministry's GIS (Geographic Information Systems) and other database systems. Its goal is to help the province capture and administer this data in an organized fashion throughout the province commensurate with the objectives of RIC. This will facilitate information sharing between practitioners, inform those who use PEM outputs as the basis for interpretations and decisions, and expand our collective knowledge of ecosystems and their functions.

The PEM Data Committee under the auspices of the TEM Alternatives Task Force (RIC) compiled this manual. The TEM Alternatives Task Force consists of biologists, ecologists, foresters and database and computer-mapping experts from the private industry and government agencies.

For more information contact Enquiry BC:

- Victoria - (250) 387-6121
- Vancouver - (604) 660-2421
- Elsewhere in BC - 1-800-663-7867

and ask for the Habitat Data Manager at:

Wildlife Inventory Section, Resources Inventory Branch,
Ministry of Environment, Lands and Parks,
2nd Floor, 2975 Jutland Road
Victoria, BC

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Tim Brierley
GIS Systems Analyst
Resources Inventory Branch
Ministry of Environment, Lands and Parks

Carmen Cadrin
Vegetation Ecologist
Resources Inventory Branch
Ministry of Environment, Lands and Parks

Terry Conville
Atticus Resource Consulting
Coquitlam, BC

Dave Clark
Vegetation Ecologist
Resources Inventory Branch
Ministry of Environment, Lands and Parks

Terry Gunning
Habitat and Spatial Data Analyst
Resources Inventory Branch
Ministry of Environment Lands and Parks

E.C. (Ted) Lea
Provincial Ecology Correlator
Resources Inventory Branch
Ministry of Environment, Lands and Parks

Darren McKellar
Habitat Data Manager
Resources Inventory Branch
Ministry of Environment Lands and Parks

R. Keith Jones
R. Keith Jones & Associates
Independent Consultant
Victoria, BC

John Johnson
Manager, Ecology
Timberline Forest Resource Consultants
Prince George, BC

Maureen Ketcheson
JMJ Holdings Inc.
Independent Consultant
Nelson, BC

Brian Low
Geospatial/Landscape Scientist
Canadian Forest Service
Natural Resources Canada

Del Meidinger
Research Ecologist
Research Branch
Ministry of Forests

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1 Introduction

1.1 Purpose

The *Standards for PEM Digital Data Capture* draws heavily upon the *Standards for Predictive Ecosystem Mapping - Inventory Standards* (RIC, 1999) and its supporting documents; *Protocol for quality assurance and accuracy assessment of ecosystem maps*, (Meidinger, 1999), *A method for large-scale biogeoclimatic mapping in British Columbia*, (Min. of Forests, 1999) the *Standard for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998), the *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia* (RIC, 2000), the *Terrain Classification Manual, Version 2.0*. (Howes and Kenk , 1997) and the *Standard for Digital Terrain Mapping Data Capture in British Columbia* (RIC, 1998) and the *Field Manual for Describing Terrestrial Ecosystems* (Min. of For., 1998) and existing standards described at the TEM Alternatives Task Force http://www.for.gov.bc.ca/research/TEMalt/

Currently, users must cross-reference these standards; there is little duplicated information. The authors are considering the impacts of creating a single, stand-alone document, or a web-based HTML group of documents that will facilitate cross-referencing. Users must note that the standards listed above, and all other referenced material throughout this document must be included in the PEM process.

The *Standards for PEM Digital Data Capture* describe how to capture, store, document and deliver digital data for PEM in British Columbia. These data, including spatial data, polygon data, metadata, reports, models and legends, are suitable for digital data exchange among business, government, the research community, and the general public. This document also aims at providing mappers, contractors, government custodians, and users with consistent criteria for predictive ecosystem data management.

In developing these standards, the authors have sought to strike a balance between two objectives

- facilitating consistent ecosystem mapping of known reliability, quickly and at low cost, and
- capturing and disseminating project metadata and the “knowledge base” i.e., the model used to predict the ecosystems.

The first objective addresses the immediate needs of the proponent. The second objective informs 'decision makers' and other users of PEM products, and serves to advance our knowledge of the characterization and the function of ecosystems.

PEM can currently be generated from a variety of different processes. (For more details on these approaches follow the “links” at:

http://www.for.gov.bc.ca/research/TEMalt/links.htm

The standards specify interchangeable data formats to facilitate data management. As PEM matures we hope to reduce the use of unstructured Rich Text Format “RTF” formatted files in favour of structured Comma Separated Value "CSV" or possibly Data Base Format “DBF” formatted files.

It is anticipated that all publicly funded mapping projects in BC will comply with the recommendations of the Resources Inventory Committee (RIC). This document will provide consistent terms of reference for mappers, correlators and data managers, whether they work in

the private sector, districts, regions or provincial custodian offices. The PEM Data Committee, under the auspices of the TEM Alternatives Task Force (RIC), plans annual reviews of this manual to improve functionality and to ensure conformity between standards. A web-based change management procedure will manage feedback and revisions to this Standard. See the Change Management web site at http://www.for.gov.bc.ca/research/TEMalt/

Provincial ecology and terrain correlators will be available to PEM project leaders, consultants, and other users of this manual for consistent help and direction with PEM mapping projects. As well, GIS, data managers and quality assurance specialists will provide guidance on the use of all ecosystem-related documents. All comments should be forwarded to:

Habitat Data Manager
Wildlife Inventory Section, Resources Inventory Branch,
Ministry of Environment, Lands and Parks,
2nd Floor, 2975 Jutland Road
Victoria, BC

NOTE: MANY OF THE REQUIREMENTS FOR PEM MAPPING AND DELIVERABLES ARE DRAWN DIRECTLY FROM THE *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia* (RIC 2000).

1.2 Scope and Status

This manual includes the following sections:

- *Ecosystem Inventory Database Standards*, which include information on the input attributes used in the knowledge base and on the output attributes to generate a PEM map, as well as conventions used to code those attributes, See Section 2.
- *Data Capture (DC) Standards*, which include instructions on how to capture the ecosystem information in a structured manner and outlines differences between mandatory and optional attributes, See Section 2
- *Check and Presentation Plots*, which provides guidelines and references for submitting this information, See Section 3.
- *Metadata Standards*, which is information about information (e.g., data quality, spatial referencing, lineage) and includes information on the two types of metadata required, See Section 4.
- *Delivery Standards*, which provide detailed instructions about the location and formats users are to use to deliver data and hard copy information, See Section 5.
- *References*, which provide references to those documents specifically mentioned in this document. Additional references may be found in the *Standards for Predictive Ecosystem Mapping - Inventory Standard*, (RIC, 1999) and the *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia*, (RIC, 2000), See Section 6.

- *Appendix,* which outlines the project sign off and task completion schedule, See Appendix A.

The *Spatial standards for PEM* are based on the requirements provided in the *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia,* RIC, 2000. The digital TEM standards manual details the specifications for digital storage of terrestrial and predictive ecosystem data in ARC/INFO format and an attribute database. It is intended to simplify the capture, processing, distribution, and use of digital predictive ecosystem data by explicitly specifying the exact format and content of the data in digital form. Spatial outputs for PEM include the predicted ecosystem coverage and associated polygon attribute data base, the structural stage coverage and associated polygon attribute data base and the optional ground sample location coverage and associated point attribute data base.

The following provides an overview of the predictive ecosystem mapping process adapted from the document *Towards the Establishment of a Predictive Ecosystem Mapping Standard: A White Paper*, (Jones et. al, 1999) This material is based on experience in using two of the more developed systems. Figure 1-1 illustrates aspects of the process. Individual methods will vary in their specific approaches and protocols.

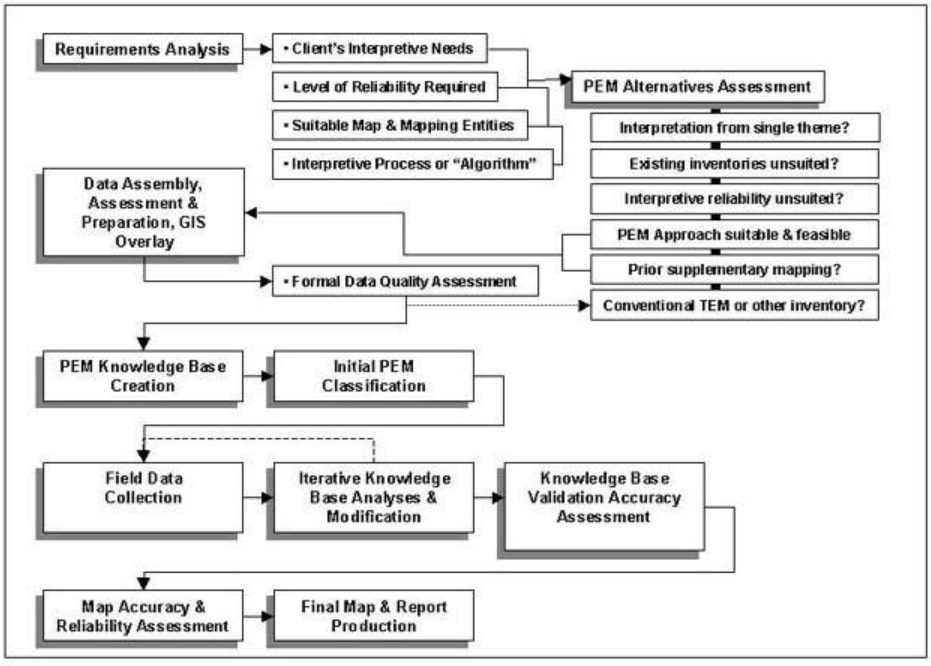

Figure 1-1 - Generic PEM Process: general steps from requirements analysis to map and report productions

1.3 Using this Document

- Review Table 2-3, 2-5 and 2-7 which provide the form name, description, field length, format and CSV (comma separated value) field name for each attribute. Strict adherence to the codes is necessary.
- Coding instructions, specifications and mandatory attributes for predictive ecosystem mapping are described for ecosystem and terrain attributes in the manuals listed below. The standards provided must be strictly adhered to, where applicable, to facilitate Quality Assurance. Users must refer to:
    - *Standards for Predictive Ecosystem Mapping - Inventory Standard,* (RIC, 1999);
    - *Standard for Terrestrial Ecosystem Mapping in British Columbia,* (RIC, 1998);
    - *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia,* (RIC, 2000);
    - *Field Manual for Describing Terrestrial Ecosystems*, (Min. of For., 1998);
    - *Terrain Classification Manual, Version 2.0,* (Howes and Kenk, 1997); and
    - *Standard for Digital Terrain Mapping Data Capture in British Columbia.* (RIC, 1996).

If unfamiliar with PEM, refer to the manuals listed in the 'References Section', and for general guidance, refer to the web site, http://www.for.gov.bc.ca/research/TEMalt/ for Predictive ecosystem mapping procedures.

2 Database Standards and Data Capture

2.1 Background and Scope

This section includes information on the input attributes used in the knowledge base and on the output attributes, as well as conventions used to code those attributes. The mandatory attributes are listed, followed by tables of all input and output attributes.

Depending on client needs, the user may choose to capture only the mandatory attributes in the database for their project. Additional attributes including those that are detailed in the *Standard for Terrestrial Ecosystem Mapping in British Columbia,* (RIC, 1998) may also be captured and submitted. The coding in the database must adhere to all standards provided in the database procedures to ensure consistency of data.

2.2 Recording input, project and polygon metadata

Table 2-1 lists all attributes that must submitted with each PEM project. Users may submit additional attributes, however only those listed in 2-1 are required.

Table 2-1 - Mandatory input, project and polygon metadata required for predictive ecosystem mapping

Thematic Input Data Source – recorded for each thematic input data source: based on attributes from Table 2-2
Citation
Publication scale
Projection
Mapping entities
Map entities
Edge matching
Edge matching error minimum
Edge matching error average
Edge matching error maximum
Attribute / Label matching
Raster size
Adjusted control feature shift
Project (or mapsheet) Specific Attributes – recorded once per project: based on attributes from Table 2-5
Project name
Geographic Location
Consultant/Department
TRIM Version
Ecosystem Survey Intensity Level
Date Recorded
Recorder Name
Package Version
PEM Supervisor
GIS Supervisor

Table 2-1 continued on next page

Table 2-1 continued

Knowledge base Supervisor
Structural Stage Knowledge Base File Name
Structural Stage Non-spatial File Name (see note below)
Structural Stage Spatial File Name(see note below)
Polygon Specific Attributes - recorded for each polygon: rules based on attributes from Table 2-2 in the TEM TSD)
Recorded once per polygon:
Ecosystem Polygon Tag
Mapsheet number
Polygon number
Ecosection unit
Biogeoclimatic unit (Zone, subzone, variant, and phase)
Recorded up to three times per polygon: (first component mandatory, 2nd and 3rd optional)
Ecosystem
Decile (first component)
Site Series (or other approved mapping unit) Map Code (first component)
Site Modifiers (those that relate to slope and aspect) (first component)
Polygon Specific Attributes for **Structural Stage layer (when submitted)** - recorded for each polygon: rules based on attributes from Table 2-2 in TEM TSD)
Ecosystem Polygon Tag
Mapsheet number
Polygon number
Decile (first component)
Structural stage (first component)
Polygon Specific Attributes for **Localized Biogeoclimatic layer (when submitted)** - recorded for each polygon: rules based on attributes from Table 2-2 in TEM TSD)
Ecosystem Polygon Tag
Mapsheet number
Polygon number
Ecosection unit
Biogeoclimatic unit (Zone, subzone, variant, and phase)

NOTE: If the structural stage is assigned directly to each ecosystem component within each polygon, the spatial and non-spatial files are not required.

2.3 Database Field Definitions For Predictive Ecosystem Data Capture

Database field definitions and procedures for entering predictive ecosystem mapping attributes must follow the standards provided in Section 2.3 of the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000).

2.4 PEM Data Attributes

All PEM output polygon attributes must be entered in accordance to Section 2.4 and Table 2-2 of the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British*

Columbia, (RIC, 2000). Not all TEM attributes are required for a PEM, however the attributes entered must adhere to the standards set out in TEM.

A number of attribute fields require the mapper to choose from a specific set of values. The *description* column in Tables 2-3, 2-5 and 2-7 indicates the valid code or where to find the table of allowable values that is to be used.

The *CSV field name* columns in Tables 2-3, 2-5 and 2-7 give the corresponding attribute name for the comma-separated values (CSV) file. For several of the attributes to be entered in a PEM data set it is not possible to record the information with a code or in a comment of reasonable length. As well, several attributes are more easily recorded in a table format or matrix. For this reason, associated documents for several of the attributes used to describe the thematic input data source, knowledge base, structural stage knowledge base, localized biogeoclimatic knowledge base and the non-standard new inventories in support of a PEM project must be submitted with all other deliverable data. The format for additional tables is provided at the end of Section 2 and examples of how to fill each table in are given in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999). *The files containing this information must be submitted in a Rich Text Format (RTF).* The file name must be 8.3 compliant, with a maximum of 8 characters in the name and it must have a 3-character extension. See Section 5 Delivery for further explanation.

2.4.1 Thematic input data source

The attributes in Table 2-2 are those which are described in the associated *input* RTF file. For further information of how to describe these following attributes see Section 4.7 - Documentation - Meta-data Standards in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).

Users are also required to submit an interim *input data quality assessment,* subject to approval of the PEM custodian. This document is to be included in the *input* RTF final deliverable.

Table 2-2 - Attributes of the associated thematic input data source RTF

Citation	Written description within associated input RTF
Mapping entities	Contained within a table in associated input RTF - See Table 4 in *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Map entities	Contained within a table in associated input RTF - See Table 5 in *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Entity relationships	Written description within associated input RTF
Edge matching	Written description or set up into a table

Table 2-2 continued on next page

Table 2-2 continued

Edge matching error minimum	Written description or set up into a table
Edge matching error average	Written description or set up into a table
Edge matching error maximum	Written description or set up into a table
Digital Elevation Model Derivation	Written description within associated input RTF
Mapping entity cross product correlation	Written description within associated input RTF
Sliver adjustment	Written description within associated input RTF
Attribute extraction	Written description within associated input RTF
Landform feature extraction or derivation	Written description within associated input RTF
Spatial attributes	Written description within associated input RTF

The attributes in Table 2-3 are those which are described in the associated *input* CSV file. For further information of how to describe these following attributes see Section 4.7 - Documentation - Meta-data Standards in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard*, (RIC, 1999).

Table 2-3 - Description of attribute fields for each thematic input data source

Field #	Form Name	Description	Length	Type	Case	CSV field name
NOTE: Items 1 through 11 in Table 2-3 are repeated for each thematic input data source for PEM						
1	Project Name	The common name of the project – usually a well-known local place or feature. This is a primary field to link all project related files, users must enter exactly the same project name in each table.	100	C	M	Proj_Name
2	Input Inventory Name	Enter the Input Inventory Name. E.g. Bedrock Geology or Forest Cover, etc.	100	C	M	Inv_Name
3	Publication scale	Specify the original publication scale of input inventory. E.g. 20000 not 1:20000	7	C		Pub_scale

Field #	Form Name	Description	Length	Type	Case	CSV field name
4	Period of compilation	Where possible, specify the date range during which the data were compiled. A format of YYYY-MM-DD should be used. E.g. 1997-03-03-1999-05-10	21	C		Period_com
5	Projection	Specify the original projection used, before conversion to BC Albers. E.g. Universal Transverse Mercator.	35	C	U	Projection
6	Attribute / Label matching	Specify the percentage of polygon labels or attributes that differ on either side of the neat line for the project area. Do not enter in percentage sign. E.g. 70%, enter 70.	3	N		Att_Label
7	Raster size X	For raster process, specify raster size used on x-axis. For example, 20m enter 20, 50m enter 50. Enter "0" for not applicable	3	C		Raster_X
8	Raster size Y	For raster process, specify raster size used on Y axis For example, 20m enter 20, 50m enter 50. Enter "0" for not applicable	3	C		Raster_Y
9	Initial or adjusted control feature shift	The standard requires determination and reporting of the control feature shift for each input inventory. See Table 3 in *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard*, (RIC, 1999) and copy table into associated .RTF document. Enter name of input RTF file. User must also note in title of table, for each input inventory, if the information in Table 3 represents the initial or adjusted feature shift.	12	C	M	Feat_shft
NOTE: Item 10 can be used for any additional comments pertaining to this thematic input data.						
10	Project Specific Comments	This field may be used to record any pertinent information regarding the input project attributes. At all times attempt to use referenced classifications which are well defined and understood in the science, or provide thorough definitions for the user.	1000	C	M	Proj_Com

NOTE: Items in Table 2-2 and 2-3 are repeated for each attribute used in the thematic input data source.

NOTE: Table 2-2 and 2-3 together provide information explaining the full suite of *input* attributes required for PEM.

2.4.2 Knowledge base

The attributes in Table 2-4 are those which are described in the associated *knowledge base* RTF file. The actual knowledge base, (belief values or likelihood of occurrence) which is the relationship between the input attributes and the output mapping entities must be reported in a CSV file if possible, otherwise in a RTF format. In addition, the inferencing element (knowledge engine or PEM software) that applies the knowledge base to the assembled input inventories must be referenced.

The *knowledge base* RTF is a "data dictionary" that defines the input data file. For further information of how to describe these following attributes see Section 4.7 - Documentation - Meta-data Standards in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).

Users are also required to submit a proposed list of map entities, subject to approval of the Regional Ecologist or PEM custodian. This approved list of map entities is included in the *knowledge base* RTF final deliverable. See Table 2-6.

Table 2-4 - Attributes of the associated knowledge base RTF

Definition and description	Written description of attributes listed below.
Attribute code	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Method	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Unit of measure	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Entity / Relationship described	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Precision	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Statistic	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Statistic Number	See Table 6 in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Valid values	Written description within associated input RTF
Rank and limits	Written description within associated input RTF

NOTE: Items in Table 2-4 are repeated for each attribute used in the knowledge base.

2.4.3 Project output data

A project RTF file may be required for project information that cannot be submitted in a CSV format, such as Table 2-9 - example reporting accuracy assessment for PEM.

The attributes in Table 2-5 are those which are described in the associated *project* CSV file. For further information of how to describe these following attributes see Section 4.7 - Documentation - Meta-data Standards in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).

Table 2-5 - Descriptions of attribute fields for predictive ecosystem project output data

Field #	Field Name	Description	Length	Type	Case	CSV field name
NOTE: Items 1 through 35 of Table 2-5 refer to the *Project Output Metadata* for Predictive Ecosystem Mapping						
1	Project Name	The common name of the project – usually a well-known local place or feature. This is a primary field to link all project related files, users must enter exactly the same project name in each table.	100	C	M	Proj_Name
2	Input File	Provide the name of the file *submitted* that contains the non-spatial written information for each thematic input data source. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	INP_RTF
3	Non-standard Inventory File	Provide the name of the file, *if submitted* that contains the non-spatial written information for the new inventories in support of a PEM project. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	NON_RTF
4	Localized Biogeoclima-tic File	Provide the name of the file, *submitted* that contains the non-spatial written information for the localized Biogeoclimatic layer. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	BGC_RTF
5	Project File	Provide the name of the file, *submitted* that contains non-spatial written information for project information. See Section 5.2.1 for structure and naming convention for delivered RTF files. Currently Table 2-9 is submitted in the project file.	12	C	M	PRO_RTF
6	Knowledge Base File	Provide the name of the file *submitted* that contains the non-spatial written information for the knowledge base. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	KNB_RTF

Field #	Field Name	Description	Length	Type	Case	CSV field name
7	Structural Stage File	Provide the name of the file, *submitted* that contains the non-spatial written information for the structural stage layer. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	STS_RTF
8	User Defined File	Provide the name of the file, *if submitted* that contains the non-spatial written information for the user defined data. See Section 5.2.1 for structure and naming convention for delivered RTF files.	12	C	M	USR_RTF
9	Input Database	Provide the name of the file *submitted* that contains non-spatial table information for each thematic input data source. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	INP_CSV
10	Non-standard Inventory Database	Provide the name of the file, *if submitted* that contains the non-spatial table information for the new inventories in support of a PEM project. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	NON_CSV
11	Localized Biogeoclima-tic Database	Provide the name of the file, *submitted that* contains the non-spatial table information for the localized Biogeoclimatic information. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	BGC_CSV
12	Project Database	Provide the name of the file, *submitted* that contains non-spatial table information for project information. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	PRO_CSV
13	Ecosystem Polygon Database	Provide the name of the file, *submitted* that contains non-spatial table information for the polygon (ECP) information. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	ECP_CSV
14	Structural Stage Database	Provide the name of the file, *if submitted* that contains non-spatial table information for the structural stage information. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	STS_CSV

Field #	Field Name	Description	Length	Type	Case	CSV field name
15	Sample Points Database	Provide the name of the Venus.mdb, *if submitted.* This file contains the field data from both full plots and Ground Inspection Forms (GIFs). As well, visual checks may be submitted through the Gravitti form included in VENUS. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	ECI_MDB
16	Sample Points Database (Excel)	Visual checks may be submitted through an excel spreadsheet if the Gravitti form in VENUS is not used. Provide the name of xls, *if submitted.* See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	ECI_XLS
17	User Defined Database	Provide the name of the file, *if submitted* that contains the non-spatial table information for the new inventories in support of a PEM project. See Section 5.2.2 for structure and naming convention for delivered CSV files.	12	C	M	USR_CSV
18	Localized Biogeoclima-tic Spatial Coverage	Provide the name of the file, *submitted* that contains the spatial information for the localized Biogeoclimatic layer. See Section 5.2.3 for structure and naming convention for delivered e00 files.	12	C	M	BGC_e00
19	Polygon Spatial Coverage	Provide the name of the file *submitted* that contains the spatial information for the polygon (ECP) layer. See Section 5.2.3 for structure and naming convention for delivered e00 files.	12	C	M	ECP_e00
20	Structural Stage Spatial Coverage	Provide the name of the file, *if submitted* that contains the spatial information for the structural stage layer. See Section 5.2.3 for structure and naming convention for delivered e00 files.	12	C	M	STS_e00
21	Sample Point Spatial Coverage	Provide the name of the file, *if submitted* for the spatial information for the sample points (plot locations) layer. See Section 5.2.3 for structure and naming convention for delivered e00 files.	12	C	M	ECI_e00

Field #	Field Name	Description	Length	Type	Case	CSV field name
22	Geographic Location	The geographic area of the mapping project. The general location in/near which the project takes place. This field must be a gazetted name taken from published map; it may be a town, lake, watershed, etc.	500	C	M	Geog_Loc
23	Consultant/ Department	The public or private-sector organization name responsible for the mapping project.	80	C	M	Org_Name
24	TRIM Version	The version of TRIM mapsheets used for Ecosystem mapping. Enter: 1 for TRIM version 1; 2 for TRIM version 2; 3 for a composite of TRIM version 1 and 2.	1	C		Trim_Nbr
25	Ecosystem Survey Intensity Level	The sampling intensity characterized according to percentage of polygons that have been field inspected or density of inspections by area. See Table 6.3, *Standard for Terrestrial Ecosystem Mapping in British Columbia*, (RIC, 1998) Record "P" for PEM, to indicate non-compliance with TEM Standards.	1	C	U	ESIL
26	Date Recorded	The date (yyyy-mm-dd) project and polygon data is generated or entered into a database.	10	D		Date_Rec
27	Recorder Name	The person who generated or entered the project and polygon data into a database.	80	C	M	Recor_Name

Field #	Field Name	Description	Length	Type	Case	CSV field name
28	Version of Package Used	Version of manuals used for ecosystem mapping. As codes have changed the version of manuals used must be indicated to identify appropriate validation routines. Package 1 - *Standard for Terrestrial Ecosystem Mapping in British Columbia (1995);* and *Addenda to Terrestrial Ecosystems Mapping Standards, (1996);* or Package 2 - *Standard for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998)*;* and *the Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia* (RIC, 1998); or Package 3 - *Standard for Terrestrial Ecosystem Mapping in British Columbia* (RIC, 1998)*;* and the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia Version 3* (RIC, 2000); *Or* Package 4 - *Standard for Predictive Ecosystem Mapping - Inventory Standard* (RIC, 1999). (no digital standards) Package 5 - *Standard for Predictive Ecosystem Mapping - Inventory Standard* (RIC, 1999); and the *Standards for Predictive Ecosystem Mapping (PEM) Data Capture in British Columbia* (RIC, 2000); Enter 1 for package 1, 2 for package 2 or 3 for package 3, etc.	1	C		Pack_Nbr
29	PEM Supervisor	The accountable registered professional who supervised the PEM project.	80	C	M	PEM_Sup
30	GIS Supervisor	The public or private-sector individual or organization responsible for digital data.	80	C	M	GIS_Sup
31	Knowledge Base Supervisor	The ecologist who structured the knowledge base for the project area. If other ecologists structured the knowledge base for different strata (BGC subzone/variant) then provide name of digital (RTF) file where this information is given.	80	C	M	KNB_Sup
32	Accuracy Assessment	Enter in number from 1-6 based level of accuracy assessment used. See *Protocol for quality assurance and accuracy assessment of ecosystem maps.* Draft. on (Meidinger, 1999).	1	C		Accuracy

Field #	Field Name	Description	Length	Type	Case	CSV field name
33	Image Year	Year of air photo (YYYY) for localized BCG, or for new, non-RIC PEM input data, (see appendix 1 of *Standard for Terrestrial Ecosystem Mapping in British Columbia*, RIC, 1998), as required.	4	C		Pho_Yr
34	Image Scale	Scale of air photo for localized BCG, or for new, non-RIC PEM input data, (see appendix 1 of *Standard for Terrestrial Ecosystem Mapping in British Columbia*, RIC, 1998), as required.	8	C		Pho_Sc
35	Image Type	Indicate specific details about the image type. Enter: 1 - colour airphoto 2 - black and white airphoto 3 - digital colour airphoto 4 - digital black and white airphoto 5 - orthophoto 6 - landsat	1	C		Pho_Type

2.4.4 Structural stage layer

Users must submit information about the knowledge base used to model structural stage in an associated RTF file, including:

- A list of the inventories used;
- The attributes used from the listed inventories; and
- The relationships of those attributes to the *structural stage* classes.

Unless the structural stage attributes are assigned directly to each ecosystem component, the user must also submit an ecosystem polygon CSV and e00 file containing the non-spatial and spatial information for the following attributes:

- Ecosystem Polygon Tag ID
- Mapsheet Number
- Polygon Number
- Decile (minimum of component 1)
- Structural Stage (minimum of component 1)

NOTE: See Section 5 - Delivery, for file name structure

2.4.5 Localized biogeoclimatic layer

Users must submit a *localized Biogeoclimatic* layer, and include information about the knowledge base in an associated RTF file, including all rule sets used in compiling the layer. This information is to be submitted prior to the final deliverables for Quality Assurance. See Appendix A for the Task Completion Schedule.

The user must also submit an ecosystem polygon CSV and e00 file containing the spatial and non-spatial information for the attributed listed directly below. All spatial and non-spatial data submitted must adhere to the standards provided in the *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia,* (RIC, 2000). The e00 file containing the spatial information should include intermediate coverage (input line work) and output line work.

- Ecosystem Polygon Tag ID
- Mapsheet Number
- Polygon Number
- Ecosection
- Biogeoclimatic Unit (zone, subzone, variant, phase)

NOTE: See Section 5 – Delivery, for file name structure

2.4.6 Metadata for new inventories in support of a PEM project

The intent of the meta data presented below is to document new, "non-RIC" PEM input data, collected for a PEM project, in sufficient detail for other qualified PEM practitioners to evaluate the quality of the data and products. The information required must be collected either in a CSV table structure or an associated RTF file. See *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999)*, Appendix 1* for further explanation.

Table 2-6 - Attributes of the associated RTF for new 'non-RIC' inventories in support of a PEM project

Citation	Written description within associated input RTF
Mapping entities	Contained within a table in associated input RTF.
Map entities	Contained within a table in associated input RTF
Entity relationships	Written description within associated input RTF
Delineation method and criteria	Written description within associated input RTF
Sampling design	Written description within associated input RTF
Sampling methods	Written description within associated input RTF
Sampling frequency	Contained within a table in associated input RTF - See Table A-1 *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard,* (RIC, 1999).
Attribution	Written description within associated input RTF
Validation method	Written description within associated input RTF
Validation criteria	Written description within associated input RTF
Validation design	Written description within associated input RTF
Validation results	Written description within associated input RTF
Correlation Procedures	The following two items are required for Correlation Procedures
Taxonomy	The entities that were correlated. e.g. slope position; 6 classes as defined in DEIF. Written description within associated input RTF
Attributes	What attributes were actually checked in the Quality Assurance. Written description within associated input RTF
Map Production	The following five items are required for Map Production
Edge matching	Written description or set up into a table
Line edit	Written description within associated input RTF
Symbol edit	Written description within associated input RTF
Attribute edit	Written description within associated input RTF
Legend edit	Written description within associated input RTF

The attributes in Table 2-7 are those which are described in the associated CSV file. For further information of how to describe these following attributes see Section 4.7 - Documentation - Meta-data Standards in the *Standards for Predictive Ecosystem Mapping in British Columbia, Inventory Standard, (*RIC, 1999).

Table 2-7 - Description of Attribute Fields for Ecosystem Meta Data for new 'non-RIC' inventories in support of a PEM project

Field #	Field Name	Description	Length	Type	Case	CSV field name
NOTE: Items 1 through 11 of Table 2-7 refer to the Meta Data for a new inventory in support of a PEM project.						
NOTE: Items 1 through 5 of Table 2-7 refer to the *Project* Meta Data for a new inventory in support of a PEM project						
1	Project Name	The common name of the project – usually a well-known local place or feature. This is a primary field to link all project related files, users must enter exactly the same project name in each table.	100	C	M	Proj_Name
2	Consultant/ Department	The public or private sector organization(s) responsible for collecting, compiling, and maintaining the data and an appropriate contact within the organization(s)	80	C	M	Org_Name
3	Compilation Scale	The scale at which the data were compiled. E.g. 20000 not 1:20000	7	C		Comp_scale
4	Period of Content	The date of data collection.	10	D		Period_con
5	Period of compilation	Where possible, specify the date range during which the data were compiled. A format of YYYY-MM-DD must be used. E.g. 1997-03-03-1999-05-10	21	C		Period_com
NOTE: Items 6 through 11 of Table 2-7 refer to the *Base Map* Meta Data for a new inventory in support of a PEM project						
6	Compiling agency	The agency or organization responsible for the compilation	80	C	M	Comp_agen
7	Year of compilation	The year in which compilation was completed. A format of YYYY-MM-DD must be used.	10	C		Compl_yr
8	Projection	Specify the original projection used, before conversion to BC Albers. E.g. Universal Transverse Mercator.	35	C	U	Projection
9	Ellipsoid	The ellipsoid used. E.g. GRS 1980.	40	C	M	Ellipsoid

Field #	Field Name	Description	Length	Type	Case	CSV field name
10	Compilation method	The compilation method, E.g. ortho-photo.	40	C	M	Comp_meth
11	Datum	Specify the Datum. E.g. Nad 83.	10	C	M	Datum

NOTE: Items in Table 2-6 and 2-7 are repeated for each attribute used in a new inventory in support of a PEM project.

NOTE: Table 2-6 and 2-7 together provide information explaining the full suite of a new inventory in support of a PEM project.

2.4.7 User defined data

For some PEM outputs there may be a true deciled complex of ecosystems (based on deciled input data). These outputs are captured in the PEM polygon attribute database. However, most PEM outputs will be ranked site series. The PEM software may report belief values or likelihood of occurrence (probabilities) for several site series in a specific polygon, these are *not* complexes. The first-ranked of these predictions is captured in the same manner as for TEM. The PEM practitioner may optionally choose to report the other ranked predictions and their belief values or likelihood of occurrence in user-defined fields in the polygon attribute database. See Table 2-8 for an example of PEM user defined data.

Table 2-8 - Example of PEM user defined data

First Ranked Prediction			Second Ranked Prediction		
Site Series	Site Series Modifier	First ranked belief value	Site Series	Site Series Modifier	Second ranked belief value

To submit user defined data, users must follow Table 2-4 in the *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia*, (RIC, 2000). as well as include the following 3 attributes:

- Ecosystem Polygon Tag ID
- Mapsheet Number
- Polygon Number

User would also have to submit an associated RTF file that gives a clear description of each output attribute submitted.

NOTE: See Section 5 - Delivery, for file name structure

The information presented in Table 2-9 is an example of reporting assessment statistics for each assessment, whether a Quality Assurance check or accuracy assessment (Meidinger, 1999). Once table is complete it must be submitted as part of the project.RTF files.

NOTE: See Section 5 - Delivery, for file name structure

Table 2-9 - Example reporting accuracy assessment of PEM

	Chi-squared test of Proportions	Degrees of Freedom	Percent Dominant Correct	Percent Overlap	Percent Acceptable Overlap
Biogeoclimatic Unit	47.06	10	56	49	45
Site series (or other approved mapping unit)	23.12	5	47	42	39
Site modifier (optional)	110.43	20	65	60	46
Structural stage	65	12	58	47	43
User Defined Interpretive Classes (optional)	15.34	4	34	29	24

2.5 Data Capture Overview

Any data form, GIS or database program may be used for data capture, data entry, or short-term storage, but the data must follow the defined standards and must be submitted in the formats described in Delivery, Section 5. The Ministry will provide a database application used for recording predictive ecosystem mapping attributes called the “PEM Data Capture” (DC) application. (In Progress)

3 Check and Presentation Plots

To produce check plots that demonstrate spatial accuracy of input data sets relative to TRIM, users must follow the guidelines provided in Section 4.7.2.3.1 Procedure for evaluating consistency with a TRIM base map in the *Standards for Predictive Ecosystem Mapping - Inventory Standard*, (RIC, 1999).

To facilitate Quality Assurance, check plot files of the PEM graphic files, including the structural stage layer and optional ground sample locations layer must be submitted in the format specified in *Standard for Digital Terrestrial Ecosystem Mapping Data Capture in British Columbia*, 2000, except that "PEM" will be substituted for "TEM" and "Predictive Ecosystem Mapping" will be substituted for "Terrestrial Ecosystem Mapping" wherever encountered on the map surround, title or legend.

4 Metadata

Metadata is information about information (e.g., data quality, spatial referencing, lineage). Two types of Project Metadata will be created. The first set of metadata consists of a record of mapping information, See Section 2.

The second set of metadata should be a META INFO table associated to each coverage. The META INFO table should follow standards at the Ministry of Environment, Lands and Parks web site at http://www.elp.gov.bc.ca/gis/arcmetadata.html. The Ministry provides a Macro (AML) and instructions on how to capture the META info table data.

All metadata must be included with all data sets when submitted to any government repository at the end of a project or contract.

5 Deliverables

5.1 Location

PEM digital data is to be delivered to the Ministry of Environment, Lands and Parks ftp site at **ftp.env.gov.bc.ca** in the ***/Branches_Regions/ribftp/pub/incoming/pem/<project_name>*** sub-directory**.** Anonymous login will be used by the contractor to access the ftp site. PEM deliverables will be put under a project code directory created by the contractor. The digital data may also be submitted via CD-ROM. All CD's should be clearly marked with a Project Name, Contractor Name and Contact Information.

Hard copy manuscripts, plots, and data capture methodologies are to be mailed to the Habitat Data Manager at:

Ministry of Environment Lands and Parks,
Resources Inventory Branch, Wildlife Inventory Section,
P.O. Box 9344,
Station Provincial Government,
Victoria, BC
V8W 9M1

5.2 Structure and naming convention for delivered files

To ensure all deliverables listed below are submitted correctly, users must also adhere to the deliverables required in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000). The TEM technical standard manual provides standards for the spatial and non-spatial attributes in the project, polygon, structural stage, localized BGC and sampling points CSV's as well as the polygon, structural stage, localized BGC and sampling point e00 files.

Users should always refer to the project contract, referenced materials and all other necessary documentation.

The completed project spatial data file must include the entire project boundary, all features along with the required spatial attributes identified in Section 3 of the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000).

Predictive Ecosystem mapping is divided into five possible layers: the naming convention for these five layers must be followed. *Place the appropriate character (q, l, t, x, v) to represent scale at the start of the file name.*

The following scale designators must be used to indicate mapping scale:

Table 5-1 - Scale designators used in PEM naming conventions

Character	Mnemonic	Scale	Nominal accuracy
q	Quarter Million	1:250,000	250 metres
l	Roman Numeral fifty	1:50,000	50 metres
t	TRIM	1:20,000	20 metres
x	Roman Numeral ten	1:10,000	10 metres
v	Roman Numeral five	1:5,000	5 metres

5.2.1 Non-spatial RTF files

When submitted, the following associated RTF files should follow the naming convention below:

1. PEM Input RTF file (mandatory) - A non-spatial RTF file of thematic input data containing the information outlined in Table 2-2 of this document. This file also includes the input data quality assessment.

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tINP_lig.RTF

2. PEM Non-Standard Inventory RTF (optional) - A non-spatial CSV file containing input for new inventories in support of a PEM project outlined in Table 2-6 of this document.

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tNON_lig.RTF

3. Localized Biogeoclimatic RTF file (mandatory) - A non-spatial RTF file containing all rule sets used in compiling the layer for the attributes outlined in Section 2.4.4 of this document along with the rules in Table 2-3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000). This information is to be submitted prior to the final deliverables for Quality Assurance. See Appendix A for the Task Completion Schedule.

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tBGC_lig.RTF

4. PEM Project File (mandatory) - A non-spatial RTF file of PEM project data. Currently Table 2-9 is reported within this file.

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tPRO_lig.RTF

5. PEM Knowledge base RTF file - (mandatory) - A non-spatial RTF file of the PEM knowledge base containing the relationship between the input attributes and the output mapping entities outlined in Table 2-4 of this document. The inferencing element that applies the knowledge base to the assembled input inventories must also be referenced within this document.

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tKNB_lig.RTF

6. PEM Structural Stage RTF file (mandatory) - A non-spatial RTF file containing the PEM structural stage knowledge base information outlined in Section 2.4.3 of this document along with the rules in Table 2-3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000).

Example for Lignum non-spatial RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tSS_lig.RTF

7. PEM User Defined RTF (optional): Often other attributes or codes are approved for certain projects in certain areas, however they are not yet provincially approved. In these circumstances, it is necessary for the contractor to submit all approved project specific attributes or codes.

Example for Lignum user defined RTF file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<project name>.RTF - tUSR_lig.RTF

NOTE: The structural stage data base is *not required* if the structural stage is assigned directly to each ecosystem component in the polygon data base.

NOTE: The localized BGC database is an interim product and is not required as final deliverable.

5.2.2 Non-spatial databases

When submitted, the following associated CSV files should follow the structure below:

1. PEM Input Polygon Database (mandatory) - A non-spatial CSV file of thematic input data containing the information outlined in Table 2-3 of this document.

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tINP_lig.CSV

2. PEM Non-Standard Inventory Database (optional) - A non-spatial CSV file containing input for new inventories in support of a PEM project outlined in Table 2-7 of this document.

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tNON_lig.CSV

3. Localized Biogeoclimatic Database (mandatory) - A non-spatial CSV file containing the localized biogeoclimatic polygon information outlined in Section 2.4.4 of this document and Table 2-3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000). This information is to be submitted prior to the final deliverables for Quality Assurance. See Appendix A for the Task Completion Schedule.

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tBGC_lig.CSV

4. PEM Project Database (mandatory) - A non-spatial CSV file of PEM project data containing the information outlined in Table 2-5 of this document.

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tPRO_lig.CSV

5. PEM Polygon Database (mandatory) - A non-spatial CSV file of PEM polygon data containing the information outlined Table 2-3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000).

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tECP_lig.CSV

6. PEM Structural Stage Database (See note below) - A non-spatial CSV file containing the PEM structural stage polygon information outlined in Section 2.4.3 of this document and Section 3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000).

Example for Lignum non-spatial CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tSS_lig.CSV

7. PEM Sample Points Database (optional) - A non-spatial CSV file containing the sample points (plot locations) information outlined in Section 3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia, (*RIC, 2000). This data is submitted from the VENUS system, which includes field data from both Full plots and GIFs. As well, visual checks may be submitted through the Gravitti form included in VENUS or an Excel spreadsheet.

Example for Lignum non-spatial mdb or xls file at 1:20,000 the file name should be:

- <scale designator><venus>_<project name> – tECI_lig.mdb
- <scale designator<>venus>_<project name> – tECI_lig.xls

8. PEM User Defined database (optional): Often other attributes or codes are approved for certain project in certain areas, however they are not yet provincially approved. In these circumstances, it is necessary for the contractor to submit all approved project specific attributes or codes.

Example for Lignum user defined CSV file at 1:20,000 the file name should be:

- <scale designator><thematic content>_<project name>.CSV - tUSR_lig.CSV

NOTE: The structural stage data base is *not required* if the structural stage is assigned directly to each ecosystem component in the polygon data base.

NOTE: The localized BGC database is an interim product and is not required as final deliverable.

5.2.3 Spatial databases

ARC/INFO single digit precision export files:

1. Localized Biogeoclimatic Coverage (mandatory) - A spatial coverage containing the localized biogeoclimatic polygon information outlined in Section 2.4.4 of this document and Table 2-3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000). This information is to be submitted prior to the final deliverables for Quality Assurance. See Appendix A for the Task Completion Schedule.

Example for Lignum spatial biogeoclomatic coverage at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tBGC_lig.e00

2. PEM Polygon Coverage (ECP) (Mandatory) - A spatial coverage containing the PEM polygon information, outlined in Table 2-3 and Section 3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia*, (RIC, 2000).

Example for Lignum spatial polygon coverage at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tECP_lig.e00

3. PEM Structural Stage Coverage (See note below) - A spatial coverage containing the PEM structural stage polygon information outlined in Section 2.43 of this document and Section 3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia*, (RIC, 2000).

Example for Lignum spatial polygon coverage at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tSTS_lig.e00

4. PEM Sample Points Coverage (ECI) (Optional) - A spatial coverage containing the sample points (plot locations) information outlined in Section 3 in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia*, (RIC, 2000).

Example for Lignum spatial point coverage at 1:20,000 the file name should be:

- <scale designator><thematic content>_<map extent> - tECI_lig.e00

NOTE: The structural stage data base is *not required* if the structural stage is assigned directly to each ecosystem component in the polygon data base.

NOTE: The localized BGC database is an interim product and is not required as final deliverable.

5.3 Quality Assurance

The PEM digital data must conform to all standards discussed in this document and relevant sections of *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia*, (RIC, 2000) and must pass all validation rules.

If the PEM coverages do not meet all requirements, an error report will be generated by the Ministry of Environment, Lands and Parks and returned to the contractor. The contractor must rectify any identified problems and resubmit the coverage to the Ministry. Projects will not be accepted until the ministry has received all reports and approved all Quality Assurance measures.

If the ecosystem digital map is stored in a format other than ARC/INFO, it is the responsibility of the contractor to convert the data into the accepted format.

6 References

User should note that any references that have been documented in the *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia,* (RIC, 2000), are not duplicated in the list below unless specifically referred to.

BC Ministry of Forests. 1999. *A Method for Large-scale Biogeoclimatic Mapping in British Columbia.* Version 1. Eng, M. Research Branch, Victoria, BC.

BC Ministry of Forests and BC Ministry of Environment. 1998. *Field manual for describing terrestrial ecosystems*. BC Min. For. and BC Min. Environ., Lands and Parks, Victoria, BC.

Meidinger, D. 1999. *Protocol for quality assurance and accuracy assessment of ecosystem maps.* Draft. Research Branch, B.C. Ministry of Forests, Victoria, BC.

Howes, D.E., and E. Kenk. 1997. *Terrain classification system for British Columbia, Version 2.* MOE Manual 10. B.C. Min. Environment, Lands and Parks and Ministry of Crown Lands, Victoria, B.C.

Jones, R.K., D.V. Meidinger, D. Clark, F. Schultz, D.E. Moon, and R.A. Sims. 1999. *Towards the establishment of a predictive ecosystem mapping standard*: A White Paper. BC Min. Environ., Lands and Parks, Resources Inventory Committee, TEM Alternatives Task Force, Victoria, BC.

Resources Inventory Committee. 2000. *Standard for Digital Terrestrial Ecosystem Mapping (TEM) Data Capture in British Columbia.* Version 3. Terrestrial Ecosystems Task Force, Ecosystems Working Group. Victoria, BC.

Resources Inventory Committee. 1999. *Standards for Predictive Ecosystem Mapping – Inventory Standard.* Terrestrial Ecosystems Task Force. Victoria, BC.

Resources Inventory Committee. 1998. *Standard for terrestrial ecosystem mapping in British Columbia*. Terrestrial Ecosystems Task Force, Ecosystems Working Group. Victoria, BC.

7 Appendix

Appendix A - Project Sign Off - Task Completion Schedule

For more information about the requirements and deliverable of PEM, see the PEM Schedule A at http://www.for.gov.bc.ca/research/TEMalt/

Project Sign Off - Task Completion Schedule for _____ PEM Project

	Project Steps	Deliverables and undertakings to be supplied by proponent / contractor	Contractor Sign-off & date	Agency (ministry rep) Sign-off & date	Notes (file names listed here are generalized. See section 5.2 for project specific naming conventions)
Project Planning	**Client Requirements Assessment**	Determine client's interpretive needs, required Reliability (risk), available resources, timelines. Undertake a rough assessment of input data quality.		MELP WHIS MELP RIB (Agency signoff not required)	Consider provincial, Regional priorities. Resource management plans Decision matrix
	Project initiation meeting	Info gathering, confirm all existing knowledge available to contractor, area familiarization, review of contract expectations / steps, mapping methods, Schedules, roles and responsibilities, partnership agreement for QC/QA...etc.		MELP WHIS MELP RIB (Agency signoff not required)	Date and Place Invite participation of FS Ecologist
Input Data Preparation And evaluation	**Localized BGC**	Typed photos (if applicable), rule sets, graphic file and associated polygon data base, graphics files of intermediate coverages		FS Ecologist or MELP RIB	BGC.RTF BGC.CSV BGC.e00
	Input data quality assessment report	Contractor must report Input data Quality issues and modifications to methods and schedules		MELP WHIS	Include plots of Positional accuracy IND.RTF
Knowledge Base Development	**Mapping Entities**	Submit new proposed mapping entities for approval		FS Ecologist or MELP RIB	KBD.RTF
	Knowledge Base First iteration	Run "blank" data set through Knowledge Base Or submit test results as meta data		FS Ecologist or MELP RIB	

Project Completion	**Project Meta Data**	Submit meta data		MELP RIB	INP.RTF INP.CSV PRO.RTF PRO.CSV USR.CSV (optional) USR.RTF (optional)
	Additional meta data New inventories and Derived coverages/attributes	Report meta data for Non-RIC standard inputs generated specifically for this PEM (as required)			NON.CSV NON.RTF See appendix #1 in PEM Inventory Standards
	Predicted Ecosystem Knowledge base	Report final mapping entities, entity-attribute relationships, and assumptions, knowledge base reliability and reference the inferencing element		MELP RIB	KNB.RTF
	Predictive Ecosystem Map, Structural stage layer	Submit final graphic files, associated polygon data bases		MELP RIB	ECP.e00 ECP.CSV STS.e00 STS.CSV ECI.XLS (optional) ECI.MDB (optional) ECI.e00 (optional)
	Structural Stage Knowledge base	Report structural stage entity-attribute relationships and meta data		MELP RIB	STS.RTF