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1. Introduction

1.1 Purpose of This Document

This document is Volume 4 of a series of five documents supporting the VDYP system.

- **Volume 1 – VDYP Overview** provides general information about VDYP7 application, and describes how to use this documentation set.
- **Volume 2 – WinVDYP7 User Guide** describes how to use WinVDYP7, an easy to use interactive interface, designed to predict yields one stand at a time.
- **Volume 3 – VDYP7Console Interface Guide** describes in detail how to use VDYP7Console, an interface to generate yield tables from text files in CSV format.
- **Volume 4 – VDYP7Attribute Adjustment Guide** is this guide. It describes in detail how to undertake VDYP7Attribute Adjustment using a series of interfaces that generate yields for adjustment, import adjustment factors and project the adjusted inventory.
- **Volume 5 – Computerized Adjustment Process Audit System Guide (SAS/VDYP7)** describes the process of using the SAS-based Adjustment system to calculate the adjustment ratios, interface with VRISTART, and some of the interactions with the VDYP 7 modules.

The purpose of Volume 4 is to provide sufficient instruction to enable users to process forest inventory polygons using VDYP7Attribute Adjustment.

1.2 How to Use This Document

The information in this guide is organized as follows:

Section 1 – Introduction provides an overview of the VDYP7Attribute Adjustment process within the context of the other VDYP7 user guides.

Section 2 – Getting Started references appropriate sections in the VDYP7 Overview guide for installing the VDYP7Attribute Adjustment interfaces onto your computer.

Section 3 – Structure and Function describes the structure and function of the various VDYP7Attribute Adjustment command lines.

Section 4 – Metadata describes the metadata about VDYP7 processing that is returned by VDYP7Attribute Adjustment at various processing steps.

Section 5 – Processing Unadjusted Inventories describes how to project inventories without performing an adjustment using VDYP7Attribute Adjustment.

2. Getting Started

2.1 Installing the VDYP7Attribute Adjustment Programs

For system requirements, downloading and installation instructions, a description of the configuration and other support files, see Volume 1 – VDYP7Overview (section 4).

2.2 Processing Messages Overview

Processing messages will be written to the log file supplied on your command line. See Appendix G for some common messages generated by VDYP7Attribute Adjustment, along with interpretation as to cause. Appendix A of the Volume 2 – WinVDYP7 User Guide provides a list of processing messages that may be generated by all the interfaces.

2.3 Running the VDYP7 Attribute Adjustment Interfaces

VDYP7Attribute Adjustment has been designed to facilitate the statistical adjustment of photo-based forest inventories. This application runs in a sequence of Steps described here that have been prepared in conjunction with an adjustment procedure written in SAS (described in Volume 5 – Computerized Adjustment Process Audit System Guide).

Functionally, VDYP7Attribute Adjustment starts by creating a file structure, or ‘Template File’ containing the forest inventory information required by subsequent processing. Yield predictions are then made for adjustment by calling the following five VDYP7 core programs:

- FIPSTART – creates the stand description for each needed to project a FIP polygon.
- VRISTART – creates the stand description needed for project a VRI polygon.
- VRIADJST – applies the adjusted attributes to the stand description and harmonizes other stand description attributes accordingly.
- VDYP7 – projects the stand description forward in time using GY models.
- VDYPBack – moves the stand description backward using interpolation procedures.

Further details regarding these five core programs can be found in Volume 1 (section 5) of this document set. The calculation of adjustment coefficients is described in Volume 5 of this document set.

The provision exists within VDYP7Attribute Adjustment to project the adjusted inventory to a user-defined final year (FinalYr), or to generate yield tables. Another core program, SINDEXT, supported by the Research Branch of the MoF, is called by VDYP7Attribute Adjustment to obtain various site-related information.

These applications are employed in the following multi-step adjustment sequence. First, the photo inventory is projected to the year of ground sampling (GSYr). Resultant yields at GSYr are then adjusted using ground sample information. These adjusted inputs are then used to predict an additional seven attributes that serve as inputs to VRIADJUST. These additional attributes are next adjusted.

Each of the VDYP7Attribute Adjustment steps is launched via the use of a command line. These can be invoked a number of ways.

1. Save your command line to a file with a .cmd or .bat extension (e.g. LaunchStep01.cmd) and then click on the file name from within Windows Explorer.
2. Open a DOS box, type the file name and then press the Enter key. When using the Windows Explorer option, the addition of a line at the end of the file containing the command line with the text string of 'pause' will cause the DOS box to stay open after processing is complete. The DOS box messaging may help to diagnosis any problems that are encountered.
3. Use the demonstration procedures provided with the installation (see Appendix H).

This document presents the appropriate command line syntax (the structure) along with some processing details (the function) needed to successfully run these Steps. Results of running these steps for one polygon are provided in Appendices A, B and C.

It is essential that file and path names in your command line are correct. In particular the text string for each step that references the .cmd file name must match that given in this Guide exactly.

Once you have read through this Guide and have a good appreciation of each step, you can try running each of the steps, using the demonstration materials supplied with the install program. Procedures to do this are described in Appendix H.

2.4 Step Summary

The following sequence of steps assumes the inventory is to be adjusted and projected. A shorter sequence is used if the inventory will not be adjusted (section 5).

The processing generally occurs on a template database.

Step01 – This step initializes the template database to be processed by importing the inventory file. Two versions of Step01 exist; only one should be used for a particular inventory. For INCOSADA VIF files, Stpe01 – CombineMaps.cmd should be used. For PGDB files, Step01 – PGDB2Template.cmd should be used.

Step02 – This step copies photo attributes into a number of tables for further processing by FIPSTART or VRISTART, depending on the inventory type

Step03a or 03b – This step completes the polygon information using either FIPSTART or VRISTART and projects it forward. There are two versions of Step03. If the inventory is to be adjusted, the inventory is projected to the ground-sampling year (Step03a – ProjectToGroundSamplingYear.cmd). If the inventory will not be adjusted, the inventory is projected to the reference year (Step03b – ProjectToReferenceYear.cmd).

Step04 – There is no Step04.

Step05 – This step imports the adjustment coefficients relevant to VRISTART and FIPSTART for application to the inventory. The adjustment coefficients are determined separately using a series of SAS programs (see Volume 5). This step has 3 subcomponents that must be run in sequence.

1. The adjustment coefficients are set to null (Step05a - ResetVRISTARTStrata.cmd).
2. The adjustment coefficients are loaded into the database (Step05b - LoadVRISTARTStrata.cmd).
3. The adjustment coefficients are applied to each polygon within the database (Step05c - ExpandVRISTARTStrata.cmd).

Step06 – This step adds seven attributes required by the VRIADJST program. Step06 – GenerateVRIADJSTSeeds.cmd.

Step07 - This step applies the adjustment coefficients for the seven attributes generated in Step06 to each polygon in the inventory. This step is very similar to Step5. They differ in the attributes that are adjusted. Step05 adjusts core attributes such as age, height, basal area and trees/ha. Step07 adjusts derived attributes such as the close utilization volumes. This step has 3 subcomponents that must be run in sequence.

1. The adjustment coefficients are set to null (Step07a - ResetVRIADJSTStrata.cmd).
2. The adjustment coefficients are loaded into the database (Step07b - LoadVRIADJSTStrata.cmd).
3. The adjustment coefficients are added to each polygon (Step07c - ExpandVRIADJSTStrataIntoPIT.cmd).

Step08 – This step projects the polygons to the final projection year. There are three subcomponents of this step, the second of which is optional.

1. Step08a – FinalProjection.cmd projects the yields to the requested final year.
2. Step08b – ProduceYieldTables.cmd produces yield tables for each polygon the user specified age range and increment. (Optional)
3. Step08c – Template2PGDB.cmd makes a copy of the original database and updates it using the projections from Step08a. .

CompressMDBFile – CompressMDBFile.cmd compresses the template database. This can optionally be invoked after each step.

3. Structure and Function

This section assumes inventory adjustment is to be undertaken. It is possible to project unadjusted inventories to some final year as outlined in section 5.

3.1 Notes and Recommendations

3.1.1 Reviewing Processing Messages

It is important to always review the processing messages generated by each Step. This will help ensure that any problems are addressed at the first point they occur. Two options exist: view the file specified on the command line or view the messages returned to the Template file itself (tblPROJECTION_MESSAGE).

3.1.2 The Template File

The inventory information is read into the template file and most additional processing occurs to this file. The running of Steps 01, 03, 06, 08a/b may require several hours to process TSA/TFL-sized files. It is therefore a good idea to archive the template file generated after running each of these Steps. This will prevent having to start all over again if a problem is encountered in one of the later processing Steps.

Experience shows that the Template file size can quickly become very large (e.g. > 1 gb) when processing TSA/TFL-sized datasets. It is therefore strongly recommended that the file compression utility be run after each step (see section 3.17). File size reductions in the order of 4-5 times can be expected. Experience shows that significant improvements in processing speed can also be expected when compressed files are employed.

3.1.3 Automatic Launch of Command Lines

The option exists to establish an integrated adjustment/projection processing environment, whereby the command lines described in this guide are launched automatically as each step is completed. This will ensure that processing continues without delay. Such provisions are employed within the adjustment procedures that have now been programmed in SAS (as described in Volume 5 of this document set). If you wish however, the command lines can each be launched manually to enable an inspection of the processing the results of each step prior to moving on. **This needs more explanation – I don't think there are any examples in the VDYP7 distribution.**

3.1.4 Re-running a Step

VDYP7Attribute Adjustment allows for re-running a Step if required. In this case any results from later Step processing will be nullified. For example, if Step 03 was re-run after running Steps01-08a then the VRIADST inputs would be deleted and the final projected values set to null.

3.1.5 Streamlining Processing Times

An IGNORE_POLYGON field exists in the tblPOLYGON table of the Template file and, if checked, a polygon will not be processed. So if polygons exist in the Template file that are not of interest, you can flag them to be ignored. The key advantage to this is that the processes will run faster when fewer polygons are involved. Also, the number of messages generated at each step will be reduced. Use of this feature provides an excellent evaluation opportunity, prior to running an all-polygon process. Note that running the 'SelectPolygonsWithSpecies' query will exclude all polygons, after Step02, that have no chance of processing by VDYP7 because a species must exist. Its use is recommended.

3.1.6 Projection Phases

There are three distinct projection phases.

Phase 1 – The projection phase 1 data are the raw, unprojected, unadjusted inventory records.

Phase 2 – The projection layer 2 data are the data projected to the ground sampling year, i.e., the output of Step 03.

Phase 3 – The projection layer 3 data are the polygon records completed by VRIPSTART OR FIPSTART, i.e., the output of Step 06.

3.2 Common Parameters

Several parameters are commonly (but not always) found within the command lines using to launch the VDYP7Attribute Adjustment application. Parameters are case sensitive.

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Turns on Test Mode which 'echos' the internal command line arguments. All command line arguments will default to a value that may or may not be applicable to the processing environment. Use this parameter to test the default arguments against what is expected.
-params	Points to the file that contains any number of command lines. Each line holds a single command line parameter. This is an alternate way to specify parameter arguments. See examples in Appendix A
-binary	Points to the location and executable to be used (i.e. VDYP7Batch.exe or DTSTRun.exe)
-load	Points to the load file to be used by DTSTRun.exe

Parameter	Description
-srcdb	Points to the source file(s) for used for processing (i.e. the INCOSADA mdbs or the adjustment factor file)
-destdb	Points to the file that will be generated by running the step. If not supplied, defaults to the value: .\Combined.mdb
-rpt	Points to the file that will contain any processing information.
-err	Points to the file that will contain processing notes, warnings, errors generated by the command line process.
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
singlestep	Each individual step is processed then confirmation is required from the user.
-debugfile	Points to the debug file where diagnostic and other information is dumped. If not supplied, defaults to no debug file being generated.

To ensure that you are employing the appropriate file, you need to always supply the full path with the file name.

The next sections more fully describe the structure and function of each Step.

3.3 Step01 – CombineMaps.cmd (for INCOSADA VIF FILES)

Depending on the format of the data files, one of two version of Step01 is used. For INCOSAS VIF files, 'Step01 – CombineMaps.cmd' is used. For personal geodatabases (PGDBs), 'Step01 – PGDB2Template.cmd' is used.

3.3.1 Command Line Function

Step 1 combines any number of source inventory files (in INCOSADA VIF file format) into a single template file that has the required the format needed to run all the subsequent Steps. In keeping with current inventory standards and VDYP7 core program requirements, some legacy INCOSADA attributes are dropped in the template file (e.g. all adjusted attributes in the photo inventory tables, stocking class), other attributes are added (e.g. VDYP7 version and processing date), and values for some attributes that were completed by VDYP6, are set to null (e.g. projected age and height, all volumes). Note that SQL views of the original INCOSADA tables exist within the template file created by running Step 01.

One functionally significant aspect of the template file created at this Step is the initialization of three Projection Input Tables (PIT tables). These tables contain placeholders for the inventory attributes that will be generated as the subsequent projection and adjustment steps proceed. Also, these tables will contain the adjusted yields that will be used as the starting points for the final inventory projection and/or yield table generation.

A single reference year per polygon must also be derived for adjustment and projection purposes. This attribute is placed in the tblPOLYGON table. The following logic is currently employed:

- -use the reference year of the rank=1 layer, if not null;
- -else use the reference year of the layer 1, if not null;
- -else use the reference year of layer 2, if not null;
- -else set to null.

One new attribute, POLYGON_RCRD_ID, is used as the key to join many of the tables at a polygon level in the template file created by running Step 01. This attribute's relationship with map_ID and polygon_ID can be determined by examining the tblVERSION and tblPOLYGON tables. The INCOSADA table views will present records by the more familiar map_id + polygon identifiers.

Another related attribute, 'Maintainer' is also created which requires some explanation. Values in this field are parsed from the district identifier within the INCOSADA file name. For example, the maintainer value is 'DCB' for the file: 082G007_VEG_DCB.mdb. This convention is required to ensure that a unique polygon key can be constructed (using Maintainer + Map_ID + Polygon_ID). Map_ID + Polygon_Id alone are insufficient because multiple districts may independently update the same map, and potentially, assign duplicate polygon numbers.

The BGC_ZONE in the RESULTANT table of INCOSADA mdb's is always set to null. This means the Template file created at Step01 will be deficient of an attribute that is a required to run all VDYP7 core programs. To accommodate for this deficiency you can create special files containing appropriate BEC zones for the polygons of interest and import this file into the Template file after

Step01. These BEC assignments are then merged into the tbIRESLTANT table, via SQL update query, prior to initializing the PIT tables at Step02. **I don't think this last paragraph is correct.**

3.3.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path\Step01-CombineMaps.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running.
-params	Param file name.
-template	Created in Step1 and contains the forest inventory information required by subsequent processing
-binary	DTSTRun executable.
-load	DTSTRun LOAD specification file. Defaults to .\MDBConvert.load
-srcdb	Source MDB File(s) to be loaded. Defaults to .\OriginalData\66Maps*.MDB
-destdb	Destination of the template file. Defaults to .\Template\Template.MDB
-rpt	Report file containing the results of combining. Defaults to .\MDBConvert.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation).
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed upon confirmation from the user.

3.3.3 Command Line Example

```
c:\VDYP7\SampleData\Step01-CombineMaps.cmd
-binary c:\VDYP7\DTSTRun.exe
-template c:\VDYP7\SampleData\template\template.mdb
-load c:\VDYP7\SampleData\MDBConvert.load
-srcdb W:\VR\Inv\DMHProjected2002\*DMH.mdb
-destdb D:\100MILE\TemplateFormat.mdb
-rpt E:\100MILE\STEP01.log
```

3.4 Step01-PGDB2Template.cmd (for PGDB files)

3.4.1 Command Line Function

With the implementation of the Vegetation Resources Inventory Database (VRID) and the generation of personal geodatabases (PGDBs), this Step will replace Step01-CombineMaps.cmd. In this case, PGDBs must be translated into the same template format referenced above, as required for VDYP7Attribute Adjustment processing.

Map_ID and Polygon_ID are now determined from Polygon_Number. Maintainer is set initially to '001', and then incremented accordingly if duplicate Polygon_Number values are encountered within the PGDB. Forest_Cover_Object_ID is placed in Feature_ID of the tblFEATURE_LINK table of the template format. No attempt is translate every attribute on the PGDB to the template format; all attributes required as input to VDYP7 are however included.

3.4.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path\Step01-PGDB2Template.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	DTSRun executable
- template	Created in Step1 and contains the forest inventory information required by subsequent processing. Defaults to .\Template\Template.MDB
-load	DTSRun LOAD specification file. Defaults to .\PGDB2Template.load
-srcdb	Source PGDB File to be loaded Defaults to .\OriginalData\PGDB\PGDBSample.mdb
-destdb	Destination of the template file. Defaults to .\Combined.MDB
-rpt	Report file containing the results of combining. Defaults to .\PGDB2Template.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)

Parameter	Description
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed upon confirmation from the user.

3.4.3 Command Line Example

```
c:\VDYP7\SampleData\Step01-PGDB2Template.cmd
-binary c:\VDYP7\DTSRun.exe
-template c:\VDYP7\SampleData\template\template.mdb
-load c:\VDYP7\SampleData\PGDB2Template.load
-srcdb F:\PGDBfromVIVIDNov012005\Adjustment_1000069.mdb
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\PGDB2Template.log
```

3.5 Step02 – InitializePIT.cmd

3.5.1 Command Line Function

This Step copies the majority of photo attributes required as inputs to FIPSTART and VRISTART to one of the following three PIT tables:

- -tbIPROJECTION_INPUT_ADJUSTMENT
- -tbIPROJECTION_INPUT_STRING
- -tbIPROJECTION_INPUT_VALUE

As the table names imply, attributes that are normally to be adjusted (e.g. age, height) are placed in the first table; other text string attributes (e.g. species codes, BEC zone) in the next table; and additional numeric attributes (e.g. species percents, reference year) in the last table. Some additional attributes required as inputs to these above two programs (e.g. crown closure, non_productive_descriptor), are not copied to the PIT tables and are accessed from the photo inventory tables in the template file.

Attributes from all photo inventory layers are copied to the PIT tables during this Step. No attribute fill-in or ‘completion’ by VDYP7 occurs during this Step; only values that exist on the photo inventory will appear in these PIT tables. If multiple BEC zones are encountered for a polygon, a single BEC must be determined – the one with the largest resultant area. At this Step the Projection Phase is also set to ‘1’ in each PIT table.

3.5.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

path\Step02-InitializePIT.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	DTSRun executable
-load	DTSRun LOAD specification file. Defaults to .\InitializePIT.load
-destdb	Template file to be initialized. Defaults to .\Combined.MDB
-rpt	Report file containing the results of initialization. Defaults to ./InitializePIT.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.

3.5.3 Command Line Example

```
C:\VDYP7\SampleData\Step02-InitializePIT.cmd
-binary c:\VDYP7\DTSRun.exe
-load c:\VDYP7\SampleData \InitializePit.load
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP02.log
-run
```

3.6 Step03a – ProjectToGroundSamplingYear.cmd

3.6.1 Command Line Function

In this Step the photo inventory (at reference year PhotoYr) attributes are projected to the year of ground sampling (GSYr) for the following four ‘adjustable’ input attributes for VRISTART:

HEIGHT	Dominant Height
AGE	Total Age
BA075	Basal Area 7.5cm+
STEMS075	VRI Live Stems per Ha 7.5cm+

These projected attributes are added to the tblPROJECTION_INPUT_ADJUSTMENT table and the projection phase is set to ‘2’.

More specifically, projected AGE and HEIGHT are added, via calls to SINDEXT, whenever a FIPSTART/VRISTART input file can be created from the PIT attributes at projection phase 1, with no further requirement that a stand description be possible at GSYr.

On the other hand, BA075 and STEMS075 will only appear with values at this projection phase *if* a stand description can be generated at GSYr for the primary layer (as defined below). This occurs when a substantial portion of basal area is judged to exist above the 7.5cm+ dbh limit. The non-forest descriptor must also be null. Otherwise, if no stand description is possible at GSYr, then the BA075 and STEMS075 values at projection phase 2 in the PIT adjustment table will be set to null.

If a stand description can *also* be generated at the earlier reference year of the photo inventory (PhotoYr), the projected BA075 and STEMS075 values that appear in the PIT adjustment table at GSYr will be grown using the photo estimates as the starting point for the projection. In this case a link is established between the starting values, if they exist, and the projected values. Otherwise, if a stand description is only possible *after* the PhotoYr (but before GSYr), then yield equations will be used to predict the starting BA075 and STEMS075 at the first possible year. No ‘growth relationship’ will exist between the photo estimates of BA075 and STEMS075 and the projected values predicted at GSYr. A poor relationship may in fact be evident; particularly when the photo estimates are not consistent (from a VDYP7 perspective) with attributes (e.g. height) that the core programs use to predict these values.

Likewise for projected height, if the photo age is greater or equal to 30 years, then site index (SI) will be derived from calls to SINDEXT, using these photo age and height as inputs. Projected height at GSYr is then derived accordingly, using the projected age and SI as inputs to SINDEXT. In this case, the photo and projected height should always be ‘harmonized’, since they will be in accordance with the same derived site index. When the photo age is less than 30 years, the supplied SI (as found on the tblSPECIES table) will be employed to determine the projected height at GSYr. In this case, the projected height may not correspond well with to the photo height; particularly when the age/ht/supplied SI triplet at the PhotoYr is not consistent with relationships found within the SINDEXT.

Generally, in the other PIT string and values tables, attributes that appear at projection phase 1 are simply copied to a projection phase 2. Reference year is an exception; it is set to the GSYr. Species percents will also change for inventory standard 'F' polygons because the determination from the VDYP7 output files is based on basal area, not volume as supplied on the photo inventory. In the future, once the species dynamics capability of VDYP7 growth models is implemented, these percents may further change.

Furthermore, during this step, several additional attributes required as inputs to FIPSTART and VRISTART must be filled-in or 'completed' from other attributes that do exist on the photo inventory. These include:

- Percent Stockable: this is an estimate of percent of a polygon's total area will eventually become stocked.
- Yield Factor: this factor impacts the predicted BA075 within the stand description. It is normally set to 1.0; except for cases where inventory standard is 'F' and NonProductiveDescriptor is not null (e.g. 'AF' for alpine forest).
- Projection layer: see the paragraph below.
- Additional site information, if not supplied on the photo inventory; but required by VDYP7 to project the inventory.

Derivation of the Projection Layer requires additional description. Currently, projection layers are assigned from the rank = '1' photo layer and possibly a remaining top layer, if it is judged to have veteran characteristics. These layers are assigned a V7_LAYER code of 'P' or 'V' respectively, and will appear in the PIT string table. The VDYP7 core programs handle each layer separately and yields are returned to the PIT adjustment table accordingly. Additional photo layers that do not qualify as projection layers do not currently appear in the PIT tables from this Step onwards. Furthermore, the occurrence of a stand description from FIPSTART/VRISTART processing is dependant on characteristics of the P layer *only*; thus the appearance of BA075 and STEMS075 in the PIT adjustment table is fully dependant on P layer attribute values.

Note if no Rank='1' layer exists, then the default rank=1 assignment will be determined using INCOSADA logic and this layer will be used as the primary layer (a warning will be generated). If multiple Rank='1' layers exist for a polygon the uppermost layer encountered will be processed as the primary layer (a warning will be generated).

This projection layer derivation is termed 'layering-lite'. In the future the option will exist to consider summarizing *all* photo layers as projection layers (except 'S'). This future option will be more difficult. Attributes on the photo layers will need to be summarized prior to the projection and projected yields then de-aggregated back to the original photo layers.

3.6.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step03a-ProjectToGroundSamplingYear.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	The executable
-destdb	MDB File to be projected to Year of Ground Sampling. Defaults to .\Combined.mdb
-rpt	Report file showing parameters used. Defaults to .\ProjectToGroundSamplingYear.out
-err	Error file for error and warning messages. Defaults to .\ProjectToGroundSamplingYear.err
-year	The ground sampling year (GSYr). Defaults to 2003
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

3.6.3 Command Line Example

```
c:\VDYP7\SampleData\Step03a-ProjectToGroundSamplingYear.cmd
-binary c:\VDYP7\VDYP7batch.exe
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP03.log
-err D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP03.err
-year 2003
-run
```

3.7 Step05a – ResetVRISTARTStrata.cmd

It is essential that Steps05a, 05b and 05c always be run as a triplet, in the sequence indicated. Do not run Step 05c, for example, without first running Steps 05a then 05b.

3.7.1 Command Line Function

This Step re-sets any previously assigned adjustment factors (at Steps 05c/07c), VRIADJST inputs (at Step 06) and projected values (at Step 08a) to null.

3.7.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step05a-ResetVRISTARTStrata.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-load	LOAD Specification File] Defaults to: .\ResetVRISTARTStrata.load
-destdb	MDB Database File containing the adjustment factors. Defaults to .\Combined.mdb
-rpt	Output Report File. Defaults to .\ResetVRISTARTStrata.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.

3.7.3 Command Line Example

```
c:\VDYP7\SampleData\Step05a-ResetVRISTARTStrata.cmd
-load c:\VDYP7\SampleData\ResetVRISTARTStrata.load
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP05a.log
-run
-binary c:\VDYP7\DTSrun.exe
```

3.8 Step05b – LoadVRISTARTStrata.cmd

It is essential that Steps05a, 05b and 05c always be run as a triplet, in the sequence indicated. Do not run Step 05c, for example, without first running Steps 05a and 05b.

3.8.1 Command Line Function

This Step loads the adjustment information that pertains to the VRISTART/FIPSTART input attributes from the referenced file (in MS Access format). This includes the strata definitions, polygon to strata associations and the adjustment factors. The required format of the tables within the referenced file is illustrated in Appendix D.

The parameters in the StrataVRISTARTAdjustments and VRISTARTParameterOffsets tables (of the MDB strata definitions file identified by the `-srcdb` option) need to correspond to those generated at the previous step and must be named in accordance with what appears in the `tblPROJECTION_INPUT_PARAMETER` table (e.g. HEIGHT). The StrataVRIADJSTAdjustments and VRIADJSTParameterOffsets tables are not required until Step07b.

More specifically, three adjustment factors ('a', 'b', 'k') are loaded to the `tblPROJECTION_STRATA_PARAMETER` table (of the `-destdb` MDB file) that pertain to attribute crossed with strata. A fourth adjustment factor ('c') is loaded to the `tblPROJECTION_PARAMETER_OFFSET` table that pertains to attribute crossed with polygon. The impact of these factors is described at the next Step.

3.8.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step05b-LoadVRISTARTStrata.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-load	LOAD Specification File. Defaults to <code>.\LoadVRISTARTStrata.load</code>
-srcdb	MDB Strata Definitions File Identifies the Database file holding the VRISTART Strata. The organization of the spreadsheet file is fixed. Defaults to: <code>.\Strata.mdb</code>

Parameter	Description
-strata	Table containing Strata Names. Identifies the table within the database containing the stata identifiers Defaults to the table: StrataDefinitions within the MDB file identified by -srcdb
-adjust	Table with Strata Adjustments Identifies the table within the database containing the adjustment coefficients for each strata parameter. Defaults to the table: StrataVRISTARTAdjustments within the MDB file identified by -srcdb
-poly	Table with Polygon/Strata Associations Identifies the table within the database containing the adjustment coefficients for each strata parameter. Defaults to the table: PolygonStrataAssignments within the MDB file identified by -srcdb
-offset	Table with Polygon specific Parameter Offsets Identifies the table within the database containing the polygon specific offsets for each adjustable PIT parameter Defaults to the table: VRISTARTParameterOffsets within the MDB file identified by -srcdb
-destdb	MDB Database File Identifies the MDB Database file to reset the settings and computed values for Defaults to: ..\Combined.mdb
-rpt	Output Report File Lists the results of processing along with any error/warning messages that may have been generated. Defaults to: .\LoadVRISTARTStrata.log
-run or -norun or -singlestep	Identifies the processing mode for the DTSSRun application. Only one of these options should be specified.
-binary	DTSSRun.exe file name Defaults to: ..\ReferenceBinaries\DTSSRun\DTSSRun.exe
-debugfile	Debug File Name The name of the debug file where diagnostic and other information is dumped If not supplied, defaults to no debug file being generated.

3.8.3 Command Line Example

```
c:\VDYP7\SampleData\Step05b-LoadVRISTARTStrata.cmd
-load c:\VDYP7\SampleData \LoadVRISTARTStrata.load
-srcdb f:\AdjustmentFiles\strata_ALLMaps_BA125_OK.mdb
-strata StrataDefinitions
-adjust StrataVRISTARTAdjustments
-poly PolygonStrataAssignments
-offset VRISTARTParameterOffsets
```

```
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP05b.log
-run
-binary c:\VDYP7\DTStrun.exe
```

3.9 Step05c – ExpandVRISTARTStrataIntoPIT.cmd

It is essential that Steps05a, 05b and 05c always be run as a triplet, in the sequence indicated. Do not run Step 05c, for example, without first running Steps 05a and 05b.

3.9.1 Command Line Function

This Step expands the adjustment factors, loaded during Step05b, to the appropriate polygons, layers, species and phase 2 attributes within the PIT adjustment table. The modified flag is also set ‘-1’ (from ‘0’) for each attribute whenever an adjustment factor has been applied. Importantly, if the layer_id or species_id has been set to null in the adjustment factor file that was loaded during the previous Step, then the adjustment factors are applied all layers and species for the polygon respectively.

The adjusted values for subsequent input to the VDYP7 core programs will be derived as follows:

- $\text{AdjustedValue} = [a + b * (\text{InitialValue}) + c] * k$

This derivation is consistent with simple linear and ratio adjustment models. Note that the additional ‘c’ factor offset, is primarily intended to harmonize the VRIADJST inputs, when required, as will be discussed later. The ‘k’ factor is intended primarily to ensure full compatibility between the adjusted polygon values and the unbiased population total.

Although the above formulation is quite simple, it can be made generally compatible with *any* adjustment model; the trick is to use the flexibility provided by the c-factor offset. Specifically, if the adjustment model were not a simple linear or ratio equation, then you could always set the ‘a’ and ‘b’ coefficients to zero and one respectively and derive the c factor as:

- $c = \text{ModelPredictedValue} - \text{InitialValue}$

The AdjustedValue will then always equate to that predicted by any adjustment model, regardless of its complexity. Any additional change to harmonize the VRIADJST inputs would need to also be made. The ‘k’ factor would be determined as usual.

3.9.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step05c-ExpandVRISTARTStrataIntoPIT.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	DTSRun executable
-load	LOAD Specification File Defaults to: .\ExpandVRISTARTStrataIntoPIT.load
-destdb	MDB Database File Defaults to: .\Combined.mdb
-rpt	Output Report File Defaults to: .\ExpandVRISTARTStrataIntoPIT.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.
-binary	DTSRun.exe file name
-debugfile	Debug File Name

3.9.3 Command Line Example

```
C:\VDYP7SampleData\Step05c-ExpandVRISTARTStrataIntoPIT.cmd
-load c:\VDYP7\SampleData \ExpandVRISTARTStrataIntoPIT.load
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP05c.log
-run
-binary c:\VDYP7\DTSrun.exe
```

3.10 Step06 – GenerateVRIADJSTSeeds.cmd

3.10.1 Command Line Function

This Step adds seven attributes, required as inputs by the VRIADJST program, to the tblPROJECTION_INPUT_ADJUSTMENT table. Procedurally, VRISTART or FIPSTART is called using the adjusted PIT values at phase 2 as inputs (or unadjusted if no factors have been applied). If a stand description can be created at reference year now equal to GSYr, then the following seven new attributes are added to the PIT adjustment table, and the projection phase is set to 3.

HL075	Lorey Height 7.5cm+
V_WS075	Whole Stem Volume 7.5cm+
V_WS125	Whole Stem Volume 12.5cm+
V_CU125	Close Utilization Volume 12.5cm+
V_D125	Close Utilization Net Decay Volume 12.5cm+
V_DW125	Close Utilization Net Decay/Waste Volume 12.5cm+
BA125	Basal Area 12.5cm+

If a stand description is possible then all seven attributes will appear with values. A subset of these seven attributes, or any null values, should never appear at this projection phase in the PIT adjustment table. If a stand description cannot be generated by FIPSTART/VRISTART for the primary layer then no records will be generated at this phase. Furthermore, only photo layers that qualify as projection layers at phase 2 in the PIT tables will appear at projection phase 3.

There tblPROJECTION_INPUT_STRING and tblPROJECTION_INPUT_VALUE tables are not modified in any way at this Step because the 'string' or 'values' attributes carried in these tables are not impacted by running this Step. You should never see phase 3 values added to either of these PIT tables.

3.10.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step06-GenerateVRIADJSTSeeds.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name

Parameter	Description
-binary	The executable
-destdb	MDB File to be projected to Year of Ground Sampling Defaults to: .\Combined.mdb
-rpt	Report file showing parameters used Defaults to: .\GenerateVRIADJSTSeeds.out
-err	Error file for error and warning messages Defaults to: .\GenerateVRIADJSTSeeds.err
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

3.10.3 Command Line Example

```
C:\VDYP7\SampleData\Step06-GenerateVRIADJSTSeeds.cmd
-binary c:\VDYP7\VDYP7batch.exe
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP06.log
-run
```

3.11 Step07a – ResetVRIADJSTStrata.cmd

It is essential that Steps 07a, 07b and 07c always be run as a triplet, in the sequence indicated. Do not run Step 07c, for example, without first running Steps 07a and 07b.

3.11.1 Command Line Function

This Step re-sets any previously assigned adjustment factors for the VRIADJST inputs (at Step 07c) and projected values (at Step 08a) to null.

3.11.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step07a-ResetVRIADJSTStrata.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-load	LOAD Specification File Defaults to: .\ResetVRIADJSTStrata.load
-destdb	MDB Database File Defaults to: .\Combined.mdb
-rpt	Output Report File Defaults to: .\ResetVRIADJSTStrata.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.
-binary	DTSRun.exe file name Defaults to: .\ReferenceBinaries\DTSRun\DTSRun.exe
-debugfile	Debug File Name Defaults to no debug file being generated

3.11.3 Command Line Example

```
c:\VDYP7\SampleData\Step07a-Reset\RIADJSTStrata.cmd  
-load c:\VDYP7\SampleData\Reset\RIADJSTStrata.load  
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb  
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP07a.log  
-run  
-binary c:\VDYP7\DTSrun.exe
```

3.12 Step07b – LoadVRIADJSTStrata.cmd

It is essential that Steps 07a, 07b and 07c always be run as a triplet, in the sequence indicated. Do not run Step 07c, for example, without first running Steps 07a and 07b.

3.12.1 Command Line Function

This Step loads the ‘a’, ‘b’, ‘k’, ‘c’ adjustment factors for the seven input attributes required as input to VRIADJST. The same conventions and tables described for Step 05b apply here also. Again, see Appendix D for the required table/variable names within the –srcdb file. The parameters in the StrataVRIADJSTAdjustments and VRIADJSTParameterOffsets tables need to correspond to those generated at the previous step and must be named exactly in accordance with what appears in the tblPROJECTION_INPUT_PARAMETER table (e.g. Whole Stem Volume 7.5cm+). All the other tables supplied during Step 05b need to also be retained intact.

Given the nature of the attributes to which these factors will be applied, checks are required during the adjustment procedure to ensure that the adjusted values are fully harmonized. More specifically, the following inequalities must be satisfied:

$$BA_{7.5} \geq BA_{12.5}$$

$$WSV_{7.5} \geq WSV_{12.5}$$

$$WSV_{12.5} \geq V_CU_{12.5} \geq V_D_{12.5} \geq V_DW_{12.5}$$

Furthermore,

$$\frac{(BA_{7.5+} - BA_{12.5+})}{0.01225} \leq TPH_{7.5+}$$

i.e. the minimum possible number of stems between 7.5cm+ and 12.5+cm dbh must always be less than or equal to the number of stems above 7.5cm+ dbh.

The consequence of not satisfying these inequalities is an error will be issued at Step08a and Step08b and the polygon will not be projected. As a precision standard it has been agreed that the above volume inequalities must remain true at 4 decimals (e.g. $WSV_{7.5} = 123.4567$ and $WSV_{12.5} = 123.4568$ would fail the test).

3.12.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step07b-LoadVRIADJSTStrata.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-load	LOAD Specification File Defaults to: .\LoadVRIADJSTStrata.load
-srcdb	Access MDB File Identifies the Database file holding the VRIADJST Strata. The organization of the spreadsheet file is fixed. Defaults to: .\Strata.mdb
-strata	Table, within the MDB file identified by –srcdb, containing Strata Names Defaults to the table: StrataDefinitions
-adjust	Table, within the MDB file identified by –srcdb, containing Strata Adjustments Defaults to the table: StrataVRIADJSTAdjustments
-poly	Table, within the MDB file identified by –srcdb, containing Polygon/Strata Associations Defaults to the table: PolygonStrataAssignments
-offset	Table, within the MDB file identified by –srcdb, containing Polygon specific Parameter Offsets Defaults to the table: VRIADJSTParameterOffsets
-destdb	MDB Database File Defaults to: ..\Combined.mdb
-rpt	Output Report File Defaults to: .\LoadVRIADJSTStrata.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.
-binary	DTSRun.exe file name
-debugfile	Debug File Name Defaults to no debug file being generated

3.12.3 Command Line Example

```
C:\VDYP7\SampleData\Step07b-LoadVRIADJSTStrata.cmd
-load c:\VDYP7\SampleData \LoadVRIADJSTStrata.load
-srcdb f:\AdjustmentFiles\strata_ALLMaps_BA125_OK.mdb
-strata StratDefinitions
-adjust StrataVRIADJSTAdjustments
-poly PolygonStrataAssignments
-offset VRIADJSTParameterOffsets
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP07b.log
-run
-binary c:\VDYP7\DTsrun.exe
```

3.13 Step07c – ExpandVRIADJSTStrataIntoPIT.cmd

It is essential that Steps 07a, 07b and 07c always be run as a triplet, in the sequence indicated. Do not run Step 07c, for example, without first running Steps 07a and 07b.

3.13.1 Command Line Function

This Step expands the adjustment factors, as loaded by strata in the previous step, to every polygon within the strata. The same conventions described for Step 05c apply here.

3.13.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ Step07c-ExpandVRIADJSTStrataIntoPIT.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	DTSRun executable
-load	LOAD Specification File Defaults to: .\ExpandVRIADJSTStrataIntoPIT.load
-destdb	MDB Database File Defaults to: .\Combined.mdb
-rpt	Output Report File Defaults to: .\ExpandVRIADJSTStrataIntoPIT.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.
-singlestep	Each individual step is processed then confirmation is required from the user.
-binary	DTSRun.exe file name
-debugfile	Debug File Name Defaults to no debug file being generated

3.13.3 Command Line Example

```
c:\VDYP7\SampleData\Step07c-ExpandVRIADJSTStrataIntoPIT.cmd  
-binary c:\VDYP7\DTSrun.exe  
-load c:\VDYP7\SampleData\ExpandVRIADJSTStrataIntoPIT.load  
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb  
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP07c.log  
-run
```

3.14 Step08a – FinalProjection.cmd

3.14.1 Command Line Function

This Step returns projected yields (e.g. projected age/height, basal area, whole stem volume etc.) at the requested final year (FinalYr), commonly the current year, back to the species and layers tables that correspond to the original photo inventory (e.g. tblSPECIES and tblLAYER); so these yields will also appear on the I NCOSADA views that correspond to these tables (e.g. leading_species and layer). Attributes in the three PIT tables, at projection phases 2 and 3, are used as the starting point for this projection.

Procedurally, as with Phase 3 processing, the projected site information will be returned via a separate call to SINDEXT whenever a FIPSTART/VRISTART input record can be created from the projection phase 2 attributes. The return of the other per/ha attributes is dependent on the existence of a stand description. Specifically, the projection phase 2 attributes, adjusted or not, are employed as inputs to FIPSTART/VRISTART to first obtain a stand description at the reference year, if possible. The projection phase 3 attributes are then employed, only if they are adjusted, as inputs to VRIADJST to modify the stand description. If the phase 3 attributes have not been adjusted then the VRIADJST core program will not be called and the stand description generated by VRISTART will be employed directly for the projection, without running VRIADJST.

If a stand description is not possible at this reference year, an attempt is then made by VRISTART to generate one at a subsequent year. If this is possible, and the stand description is generated at/prior the FinalYr, then per/ha values will be returned to the inventory tables. Otherwise, no per/ha values will be returned.

Furthermore, only those polygons/layers projected to ground sampling year (GSYr) will be candidates for processing at this Step and the per/ha attributes will only be returned when a stand description can be generated at the FinalYr and the non forest descriptor is null.

Importantly, the projected yields returned to these tables employ starting values that exist within the three PIT tables that have been projected to GSYr and possibly adjusted, *not to the original starting values on the photo inventory*. Thus the relationship between the photo interpreted and projected values on these photo inventory tables and views may be somewhat misleading. This is an acknowledged compromise, given that we are returning projected values to a legacy VIF table structures that pre-date the development of the projection/adjustment steps described in this guide.

3.14.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ VDYP7Batch.exe

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	VDYPBatch executable
-destdb	MDB File to be projected to Year of Ground Sampling. Defaults to .\Combined.mdb.
-rpt	Report file showing parameters used. Defaults to .\FinalProjection.out
-err	Error file name. Defaults to .\FinalProjection.err
-action	The mode of the current run. Must be set to: ProjectToFinalYr
-year	The Final Year of the projection Defaults to 2020
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

3.14.3 Command Line Example

Check whether `-util` is supported as well as the other parameters

```
C:\VDYP7\VDYP7batch.exe
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP08a.log
-err D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP08a.err
-year 2020
-action ProjectToFinalYr
-util AC=4.0 -util AT=4.0 -util B=7.5 -util C=17.5 -util D=22.5 -util E=22.5
-util F=7.5 -util H=22.5 -util L=17.5 -util MB=22.5 -util PA=7.5 -util PL=22.5
-util PW=4.0 -util PY=22.5 -util S=17.5 -util Y=17.5 -run
```

Util Notes:

1. Yields by a species can also be excluded altogether by using 'excl'. For example:
`-util AC=excl`

2. *These command line based -util arguments are not persistent. They will only be used when running the command line. You can achieve persistent settings as follows:*

-click on VDYP7Batch.exe

-go the to Reporting Options pane

-click on Save Defaults

-click on Exit

These settings will now be employed by default, unless 'over-rides' are supplied (e.g. within the command line).

3.15 Step08b – ProduceYieldTables.cmd

3.15.1 Command Line Function

This Step creates yield tables in accordance with the supplied age range specifications. The identical PIT attributes and processing requirements, as described for the final projection of the inventory, apply to this Step. The one exception is that site information will only be returned when the per/ha yields can also be generated.

The primary species, as judged by the VDYP7 core program at the first year of the projection, is used to establish the projection year-to-age relationship that will hold throughout the entire displayed age range. If two layers are projected, than this year-to-age relationship is determined separately by layer.

Layers judged to have veteran characteristics will only be forward-grown because the VDYP7 core program does not support veteran layer processing. Thus, yields for veteran layers will only appear at the AGE given in the PIT values table, at projection phase 2, and beyond.

3.15.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path/ VDYP7Batch.exe

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	VDYPBatch executable
-srcdb	Source MDB File to be projected into yield tables. Defaults to .\Combined.mdb.
-rpt	Report file containing the yield tables. Defaults to .\ProduceYieldTables.out
-start	Yield table start age.
-end	Yield table end age.
-inc	Yield table age increment .
-err	Error file name. Defaults to .\ProduceYieldTables.err
-action	The mode of the current run. Must be set to: ProduceAdjustedYieldTable

Parameter	Description
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

3.15.3 Command Line Example

```
C:\VDYP7\VDYP7batch.exe
-srcdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\subset\NCOSADA\tables\file_io\tables.dat
-err D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP08b.err
-start 30 -end 300 -inc 10
-action ProduceAdjustedYieldTable
-util AC=4.0 -util AT=4.0 -util B=7.5 -util C=17.5 -util D=22.5 -util E=22.5 -util F=7.5 -util
H=22.5 -util L=17.5 -util MB=22.5 -util PA=7.5 -util PL=22.5 -util PW=4.0
-util PY=22.5 -util S=17.5 -util Y=17.5 -run
```

The same –Util notes given for Step08a also apply to this Step.

3.16 Step08c-Template2PGDB.cmd

3.16.1 Command Line Function

This Step makes an exact copy of the source PGDB as the destination PGDB, then specific parameters are updated on the destination PGDB using values extracted from the three PIT tables in the Template, in accordance with the following logic:

- Values that exist at phase 2 within each of the three PIT tables are *always* used to update the destination PGDB, irregardless of their modification status; and
- Values that exist at phase 3 within the PIT adjustment table are used to update the destination PGDB, but *only* if one or more of these attributes has been modified.

Thus, after running this Step, the destination PGDB will always contain the Phase 2 PIT values for a polygon; and also, if an adjustment has been made, the Phase 3 values.

Some of the key PGDB parameters that are updated using this logic from values in the three PIT include:

Vegetation_Polygon_Adj table:	Stockability
	Yield_Factor
	Reference_year
Tree_Cover_Layer_Adj table:	Basal_Area
	VRI_Live_Stems_Per_Ha
Tree_Species_Adj table:	Age
	Height
	Species_pct
Adjustment_Input_Adjusted table:	Lorey_height
	Whole_stem_volume_7_5CM
	Whole_stem_volume_12_5CM
	Close_util_volume_12_5CM
	Close_util_net_decay_volume
	Close_util_net_waste_volume
	Basal_area_12_5CM

The ADJUSTED_IND parameter in the destination PGDB (Vegetation_Cover_Polygon_Adj table) is set to 'Y' if in any value in any of the three PIT tables has been modified for the Phase 2 or Phase 3 rows; otherwise it is set to 'N'.

All adjustment factors in the Adjusted_Factor_Adjusted table (factor_a, factor_b, factor_c, factor_k) for the polygon are also loaded from the PIT adjustment table, but only if an attribute in this table has been modified at Phase 2 or 3. Additional metadata is mapped from the Template format to the destination PGDB in accordance with Appendix F.

Following the completion of Step08c the destination PBDB can be returned to the MoF. All polygons within this PGDB will be checked in to the Staging Area of the VRID. Only those polygons with an Adjustment_Ind = 'Y' will then be integrated into the Adjusted Business Area of the VRID for subsequent projection by VDYP7 to the current year or for yield table generation using the VDYP7 Console application.

By using the copy then update process described above, record integrity between the source and destination PGDB will always be maintained within the Vegetation_Polygon_Adj, Tree_Cover_Layer_Adj and Tree_Species_Adj tables. Any extra records introduced into PIT tables will not be copied to the destination PGDB. Any deleted records from these tables will have no update impact on the destination PGDB. For example, if a new species was added to the PIT tables during the adjustment process it would not appear in the destination PGDB. As well, if a species was deleted from the PIT tables it would have no impact on the update of the destination PGDB. In either case the resulting species percents on the destination PGDB will most likely be illogical (i.e. not sum to 100%) and subsequent projection by VDYP7 on the VRID would not be possible. It is therefore CRITICAL that records not be added or deleted from the PIT tables during the adjustment process.

3.16.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path\Step08c-Template2PGDB.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	DTSRun executable
-load	DTSRun LOAD specification file. Defaults to .\Template2PGDB.load
-origdb	Source PGDB file as extracted from the VRID. Defaults to .\OriginalData\PGDB\PGDBSample.mdb
-srcdb	Source template file. Defaults to .\Combined.mdb
-destdb	destination PGDB with updated values. Defaults to .\PGDBAdjusted.mdb
-rpt	log file containing the results of processing.

Parameter	Description
	Defaults to .\Template2PGDB.log
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

3.16.3 Command Line Example

```
c:\VDYP7\SampleData\Step08c-Template2PGDB.cmd
-binary c:\VDYP7\DTSrun.exe
-load c:\VDYP7\SampleData\Template2PGDB.load
-origdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\PGDBsupplied.mdb
-srcdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-destdb d:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\PGDBadjusted.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP08c.log
-run
```

3.17 CompressMDBFile.cmd

3.17.1 Command Line Function

This utility is used to compress the template file generated after running each of the above Steps. Importantly, the template file must be closed in order for this command line to work.

3.17.2 Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-srcdb	MDB Database File Identifies the MDB Database file to be compressed. Defaults to: .\Combined.mdb
-destdb	MDB Database File Identifies the destination of the compressed MDB Database file If not supplied, the source database is compressed in place.
-binary	JETCOMP.exe file name The fully qualified path name of the JETCOMP application If not supplied, defaults to the value: ..\ReferenceBinaries\JETCOMP\JETCOMP.exe

3.17.3 Command Line Example

```
@echo on
c:\VDYP7\SampleData\CompressMDB.cmd
-srcdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-binary c:\VDYP7\JETCOMP.exe
```

4. Metadata

Processing information is also returned to several metadata tables within the template file whenever Steps that employ the VDYP7 core programs (Steps 03/06/08a/08b) are run, e.g.

- -tblMETADATA_PROJECTION_RUN: processing time stamp information;
- -tblMETADATA_PROJECTION_VERSION): core program version information;
- -tblPROJECTION_POLYGON: start program used, i.e. FIPSTART or VRISTART processing mode; and
- -tblPROJECTION_LAYERprojection layer designation.

These metadata tables are all initialized when the Template file is created during Step 01.

Additional metadata tables contain placeholders for information about the SAS adjustment process. These include:

- -tblPROJECTION_INPUT_DATASET:adjustment project information; and
- -tblMETADATA_VRI_SAMPLE: VRI ground sample information.

5. Processing Unadjusted Inventories

This guide assumes that an inventory adjustment is to be undertaken. It is possible to project unadjusted inventories to some FinalYr using the command lines described here.

In keeping with the requirements of Step 08a, you must populate the PIT tables at projection phase 2 but, in this case, without projecting the inventory to a GSYr. You can do this by running the additional command line described in Appendix E. This will simply populate the PIT tables with the photo attributes at reference year. Additional attributes are also 'completed' if null on the photo inventory (e.g. basal area). You then proceed directly to Step 08a, without running the Steps that load adjustment factors or create the VRIADJST inputs.

The following sequence of command lines would be employed to project a photo inventory that has not been adjusted:

- Step01-CombineMaps.cmd
- Step02-InitializePIT.cmd
- Step03b-ProjectToReferenceYear.cmd
- Step08a-FinalProjection.cmd

Note that processing at Step03 would be the same, except that the 'projected' values, and the reference year returned to the PIT tables at projection phase 2 correspond to the reference year of the photo inventory, not some GSYr. Step08a and Step08b processing would be exactly the same; but without reference to adjusted VRIADJST inputs, since none would exist.

Appendix A – Example for one Polygon in the PIT Adjustment Table, by Projection Phase

----- PROJECTION PHASE ID=1 -----

LAYER_ID	SPECIES_ID	SPECIES_CD	PROJECTION INPUT		UNADJUSTED_			adjusted_		
			ATTRIBUTE	VALUE	A	B	C	K	value	MODIFIED
2	.		BA075	55.000000	0	1.000000	0	1	55.000000	0
2	.		STEMS075	575.000000	0	1.000000	0	1	575.000000	0
2	1	FDC	AGE	60.000000	0	1.000000	0	1	60.000000	0
2	1	FDC	HEIGHT	26.000000	0	1.000000	0	1	26.000000	0
2	2	DR	AGE	60.000000	0	1.000000	0	1	60.000000	0
2	2	DR	HEIGHT	24.000000	0	1.000000	0	1	24.000000	0

----- PROJECTION PHASE ID=2 -----

LAYER_ID	SPECIES_ID	SPECIES_CD	PROJECTION INPUT		UNADJUSTED_	
			ATTRIBUTE	VALUE	A	B
2	.		BA075	59.255482		
2	.		STEMS075	525.029968		
2	1	FDC	AGE	67.000000		
2	1	FDC	HEIGHT	28.059713		
2	2	DR	AGE	67.000000		
2	2	DR	HEIGHT	24.596462		

A	B	C	K	adjusted_	MODIFIED
				value	
2.2000	1.039218	0	1.03400	65.947839	-1
20.0000	0.906404	0	0.98000	485.971466	-1
1.1000	0.985992	0	1.02000	68.504685	-1
1.0000	0.909596	0	1.03000	27.318686	-1
1.1000	0.985992	0	1.02000	68.504685	-1
1.0000	0.909596	0	1.03000	24.074023	-1

----- PROJECTION PHASE ID=3 -----

LAYER_ID	SPECIES_ID	SPECIES_CD	PROJECTION INPUT		UNADJUSTED_			adjusted_		
			ATTRIBUTE	VALUE	A	B	C	K	value	MODIFIED
2	.		HL075	24.101500	0	1.050000	0	1	25.306573	-1
2	.		V_WS075	524.184753	0	1.050000	0	1	550.393966	-1
2	.		V_WS125	523.857056	0	1.050000	0	1	550.049883	-1
2	.		V_CU125	497.282196	0	1.050000	0	1	522.146282	-1
2	.		V_D125	487.035614	0	1.050000	0	1	511.387371	-1
2	.		V_DW125	483.455780	0	1.050000	0	1	507.628546	-1
2	.		BA125	65.788353	0	1.000000	0	1	65.788353	-1

Appendix B – Example for one Polygon in the PIT Values Table, by Projection Phase

----- PROJECTION PHASE ID=1 -----

LAYER_ID	SPECIES_ID	SPECIES_ CD	PROJECTION INPUT ATTRIBUTE	VALUE	MODIFIED
	.		REFYR	1996	0
1	1	FDC	SP64PCNT	60	0
1	2	HW	SP64PCNT	40	0
2	1	FDC	SP64PCNT	50	0
2	2	DR	SP64PCNT	30	0
2	3	HW	SP64PCNT	20	0

----- PROJECTION PHASE ID=2 -----

LAYER_ID	SPECIES_ID	SPECIES_ CD	PROJECTION INPUT ATTRIBUTE	VALUE	MODIFIED
	.		PCT_STOCK	97.00	0
	.		REFYR	2003.00	0
	.		YLDFACT	1.00	0
2	1	FDC	SP64PCNT	50.00	0
2	2	DR	SP64PCNT	30.00	0
2	3	HW	SP64PCNT	20.00	0

Appendix C – Example for one Polygon in the PIT String Table, by Projection Phase.

----- PROJECTION PHASE ID=1 -----

LAYER_ID	SPECIES_ID	SPECIES_CD	PROJECTION INPUT ATTRIBUTE	STRING	MODIFIED
	.		BEC	CWH	0
1	1	FDC	SP64	FDC	0
1	2	HW	SP64	HW	0
2	.		RANK	1	0
2	1	FDC	SP64	FDC	0
2	2	DR	SP64	DR	0
2	3	HW	SP64	HW	0

----- PROJECTION PHASE ID=2 -----

LAYER_ID	SPECIES_ID	SPECIES_CD	PROJECTION INPUT ATTRIBUTE	STRING	MODIFIED
	.		BEC	CWH	0
2	.		RANK	1	0
2	.		V7_LAYER	P	0
2	1	FDC	SP64	FDC	0
2	2	DR	SP64	DR	0
2	3	HW	SP64	HW	0

Appendix D – Attributes by Table within the Adjustment Factors File

Polygon Strata Assignments		
Name	Type	Size
DISTRICT	Text	255
MAPSHEET	Text	255
POLYGON_ID	Double	8
VRISTART_STRATA_ID	Text	255
VRIADJST_STRATA_ID	Text	255

Strata Definitions		
Name	Type	Size
STRATA_ID	Text	255
STRATA_NAME	Text	255

Strata VRIADJST Adjustments		
Name	Type	Size
STRATA_ID	Text	255
LAYER_ID	Double	8
PARAMETER	Text	255
A	Double	8
B	Double	8
K	Double	8

Strata VRISTAR Adjustments		
Name	Type	Size
STRATA_ID	Text	255
LAYER_ID	Double	8
SPECIES_ID	Double	8
PARAMETER	Text	255
A	Double	8
B	Double	8
K	Double	8

VRIADJST Parameter Offsets		
Name	Type	Size
DISTRICT	Text	255
MAPSHEET	Text	255
POLYGON_ID	Double	8
STRATA_ID	Text	255
PARAMETER	Text	255
LAYER_ID	Text	255
SPECIES_ID	Text	255
C_COEFF	Double	8

VRISTAR Parameter Offsets		
Name	Type	Size
DISTRICT	Text	255
MAPSHEET	Text	255
POLYGON_ID	Double	8
STRATA_ID	Text	255
PARAMETER	Text	255
LAYER_ID	Text	255
SPECIES_ID	Text	255
C_COEFF	Double	8

Appendix E – Step03 – ProjectToReferenceYear

Command Line Function

This command line functions the same as Step03-ProjectToGroundSampleYear.cmd; the one difference being that reference year of is employed, rather the GSYr. Thus a growth projection is not actually undertaken at this step; however attributes are completed in the same manner as for Step03-ProjectGroundSampleYear.cmd.

Command Line Structure

To promote legibility, the command line structure and examples are displayed with each parameter starting on a new line. In application you must place these parameters all on a single line. Parameters are case sensitive.

Path\Step03b-ProjectToReferenceYear.cmd

Parameter	Description
-help	Displays the usage screen describing the parameters.
-test	Show the internal command lines without running
-params	Param file name
-binary	The executable
-destdb	MDB File to be projected to Year of Ground Sampling. Defaults to .\Combined.mdb
-rpt	Report file showing parameters used. Defaults to .\ProjectToReferenceYear.out
-err	Error file for error and warning messages. Defaults to .\ProjectToReferenceYear.err
-run	Batch mode processing with no user interaction. (default and normal mode of operation)
-norun	User must manually start, run and exit the application.

Example

```
c:\VDYP7\SampleData\Step03b-ProjectToReferenceYear.cmd
-binary c:\VDYP7\VDYP7batch.exe
-destdb D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\TemplateFormat.mdb
-rpt D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP03b.log
-err D:\ips\VDYP7batch\mdb_files\combined\ALL_MAPS\STEP03b.err
-run
```

Appendix F – Mapping of Metadata Attributes from the Template to the Destination PGDB

Template Format: table.attribute	PGDB (Adjusted Schema) Format: table.attribute
tblPROJECTION_INPUT_DATASET. Adjustment_Project_Name	ADJUSTED_PROJECT_ADJUSTED. Project_Name
tblPROJECTION_INPUT_DATASET. Adjustment_Agency	ADJUSTED_PROJECT_ADJUSTED. Agency_Code
tblMETADATA_PROJECTION_VERSION. Version_desc Version_number	ADJUSTED_PROJECT_ADJUSTED. VDYP_Version
tblMETADATA_PROJECTION_VERSION. Version_desc Version_number	ADJUSTED_PROJECT_ADJUSTED. Sindex_Version
tblMETADATA_VRI_SAMPLE. VRI_Sample_ID	SAMPLES_USED_ADJUSTED. Name
tblMETADATA_VRI_SAMPLE. VRI_Sample_Weight	SAMPLES_USED_ADJUSTED. Weight
tblMETADATA_VRI_SAMPLE. VRI_Sample_Used	SAMPLES_USED_ADJUSTED. Used_in_Adjustment_Ind
tblPROJECTION_STRATA_NAME. Description	STRATA_ADJUSTED. Name
tblPROJECTION_POLYGON Polygon_Rcrd_ID Projection_Strata_Rcrd_ID (for Projection_Phase_Rcrd_ID = 2)	STRATA_POLYGON_ADJUSTED. Forest_Cover_Object_ID Strata_Adjusted_ID

Appendix G – Some VDYP7Attribute Adjustment Interface Messages

Warnings and Information Notes that Relate to Normal Processing

Some common messages generated by this application, along with interpretation as to cause, include:

Message	Cause
DWL 092O090 2477 1 Estimated SI applied from older species <species code> to younger species <species>.	No estimated site index is available and site index for another species is used.
WL 092O090 2465 1 Height 6.7 at Projection Year <year> is too short to generate yields for species <species code>.	A stand description is not possible at the indicated projection year; no per/ha yields will be returned to the PIT adjustment table.
DWL 092O090 2465 1 Projected data for species <species code> was not generated at stand age <age> (Calendar Year: <year>)	A stand description is not possible at the indicated projection year; no per/ha yields will be returned to the PIT adjustment table.
DWL 092O026 0739 W Primary Layer height was too short to generate a stand description. VDYP7CORE return code: 'Ht L1 too low' (-4).	Inventory Standard 'F' polygons with a non-forest productive code ^= null are routed to FIPSTART always. A stand description cannot be generated and no per/ha yields will be returned to the PIT adjustment table.
DWL 092O026 0522 W Stand description not possible after 80 years of projection. VDYP7CORE return code: 'VRI_YNG +80 yrs nonmerch size' (-14).	A stand description is judged to never be possible, i.e. the core programs projected the stand for 80 years without success. Again, no per/ha attributes will be returned to the PIT adjustment table.
DCB 082G007 0003 1 Basal Area Per Hectare 7.5cm+ Input Parameter is missing.	The supplied basal area in the PIT adjustment table is null. A VRISTART mode that does not require this information will therefore be used.
DCB 082G007 0003 1 Trees Per Hectare 7.5cm+ Input Parameter is missing.	The supplied stems in the PIT adjustment table is null. A VRISTART mode that does not require this information will therefore be used.

Source Data Related Errors

The VDYP7 core programs require, at a minimum, species, site information (age/height/SI) and BEC zone inputs. The following messages related to inadequate input data, can be avoided by filtering polygons without this information from processing (set the ignore polygon flag to 'True'). When insufficient inputs exist the polygon will not be processed and no no projected attributes will therefore be returned any table in the Template file.

Message	Cause
DMK 093N055 0266 E BEC Zone was not supplied.	BEC Zone does not exist for this polygon
DCK 092G020 0453 1 E Unable to locate a Leading Species	Species are missing for this polygon

Input Data Related Errors

Message	Cause
DCK 092H041 0155 1 E Species 'DR' duplicates a species already in layer '1'.	Duplicate species code(s) exist for this polygon.
DQU 093C090 0071 2 E CC was not supplied. No leading species exists to determine a default Crown Closure.	No crown closure exists and leading species also missing.

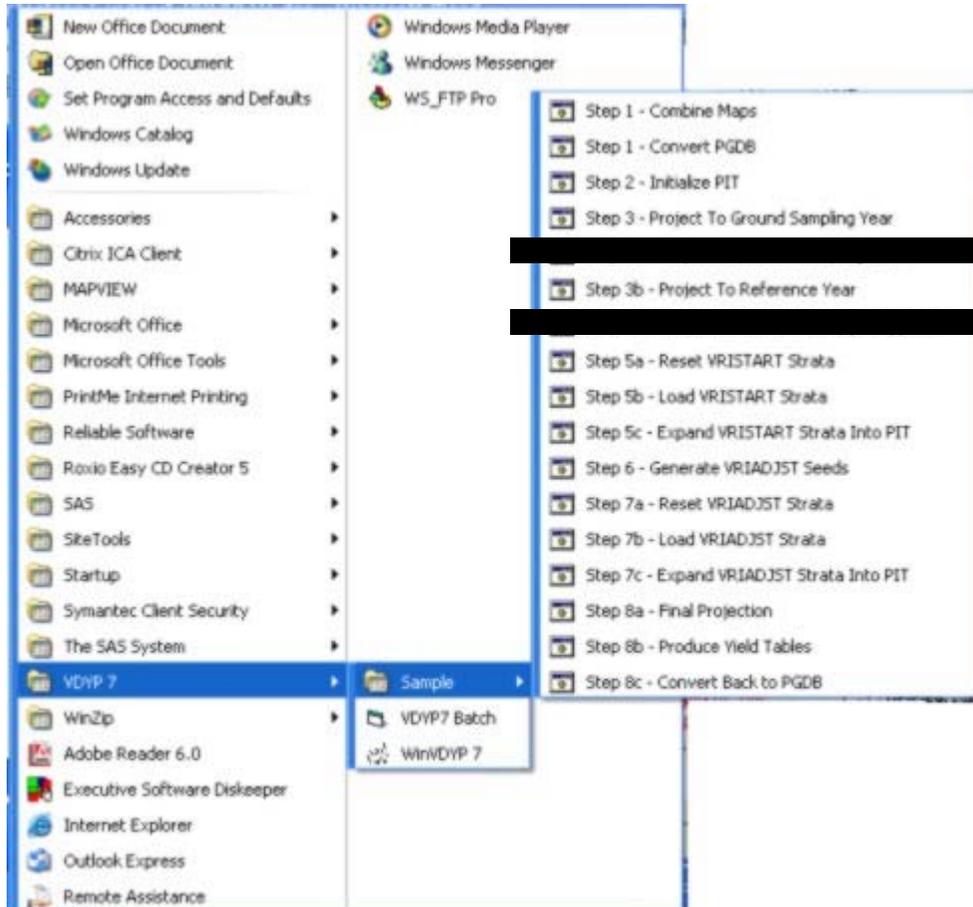
Attribute Validity Related Errors

Other messages relate to the validity of the attributes. For example the inputs to the VRIADJ core program must be harmonized, i.e.

Message	Cause
DCK 092H025 0462 1 W BA 12.5cm+ <value> exceeds BA 7.5cm+ <value>. No adjustments will take place.	The supplied BA 12.5cm+ exceeds the supplied BA 7.5 cm+

Appendix H –VDYP7Attribute Adjustment Demonstration Procedures

To start the demo click on Start, All Programs, VDYP7, Sample and you will see the following display:



Now start by clicking on ‘Step 1-Combine Maps’ or ‘Step 1- Convert PGDB’ and then move progressively through the other steps. **This needs to be updated to delete Step 3 (leaving Step 3a and Step 3b) and delete Step 4.**

These Steps employ the corresponding Parms_*.txt files given in the \SampleData folder of your install directory. You can inspect these files to see which parameter settings are employed (e.g. the source and destination files at Step 1). The results of running each Step can be examined by opening the file created in your \SampleData folder (combined.mdb). Once open, clicking on the Queries option will present a number of views, many of which correspond to tables found within INCOSADA VIF files.

It is recommended that the Parms_*.txt files in the \SampleData folder NOT be used as the starting point for creating your own command lines because the full command line syntax is not included. Instead, a better starting point is the Command line examples, as provided in Section 3.

Appendix I – Parameter File Example

Unlike the command line, the parameter file consists of multiple lines; each holding a single command line parameter as illustrated below.

```
-binary c:\VDYP7\DTSRun.exe  
-template c:\VDYP7\SampleData\template\template.mdb  
-load c:\VDYP7\SampleData\MDBConvert.load  
-srcdb W:\VRI\Veg_Inv\DMHProjected2002\*DMH.mdb  
-destdb D:\100MILE\TemplateFormat.mdb  
-rpt E:\100MILE\STEP01.log
```

If this parameter file is named parm.txt, is saved in the same folder as your command line, and contains all of the parameters of interest the command line for Step 01 would simply become

```
c:\VDYP7\SampleData\Step01-CombineMaps.cmd -params parm.txt
```

Changes are much easier using a parameter file compared to a command line, because each parameter now occupies its own line.

Appendix J – Revision History

Version	Date	Description
1.0	January 21, 2006	Version 1.0 created, reviewed and approved for distribution

Appendix K – References

MoF. (2005). Variable Density Yield Prediction. Volume 1 – VDYP Overview user guide.

MoF (2005). Volume 5 – Computerized Adjustment Process Audit System Guide (SAS/VDYP7).

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