

# The Forest Inventory and Analysis Database:

## Database Description and User Guide for Phase 3 (version 6.0.1)

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# Preface

## Preface Contents:

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## Abstract

This document is based on previous documentation of the nationally standardized Forest Inventory and Analysis database (Hansen et al. 1992, Woudenberg and Farrenkopf 1995, Miles et al. 2001, Woodall et al. 2010). Documentation of the structure of the Forest Inventory and Analysis database (FIADB) for Phase 3 data, as well as codes and definitions, is provided. An example for summarization of vegetation data is also presented. This database provides a consistent framework for storing forest inventory data across all ownerships for the entire United States. These data are available to the public.

### Keywords:

Forest Inventory and Analysis, inventory database, user manual, user guide, monitoring

The use of trade or firm names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

## Background

The Forest Inventory and Analysis (FIA) research program has been in existence since mandated by Congress in 1928. FIA's primary objective is to determine the extent, condition, volume, growth, and use of trees on the Nation's forest land. Before 1999, all inventories were conducted on a periodic basis. The passage of the 1998 Farm Bill requires FIA to collect data annually on plots within each State. This kind of up-to-date information is essential to frame realistic forest policies and programs. USDA Forest Service regional research stations are responsible for conducting these inventories and publishing summary reports for individual States.

In addition to published reports, the Forest Service provides data collected in each inventory to those interested in further analysis. This report describes a standard format in which data can be obtained. This standard format, referred to as the Forest Inventory and Analysis Database (FIADB) structure, was developed to provide users with as much data as possible in a consistent manner among States. A number of inventories conducted prior to the implementation of the annual inventory are available in the FIADB. However, various data attributes may be empty or the items may have been collected or computed differently. Annual inventories use a common plot design and common data collection procedures nationwide, resulting in greater consistency among FIA work units than earlier inventories. Data field definitions note inconsistencies caused by different sampling designs and processing methods.

## Acknowledgments

This document is based on previous documentation of the nationally standardized Forest Inventory and Analysis database (Hansen et al. 1992, Woudenberg and Farrenkopf 1995, Miles et al. 2001, Woodall et al. 2010). The following persons are thanked for their valuable assistance: Michael Amacher (USDA Forest Service, Rocky Mountain Research Station); John Coulston (USDA Forest Service, Southern Research Station); Sarah Jovan (USDA Forest Service, Pacific Northwest Research Station); Charles Perry (USDA Forest Service, Northern Research Station), Christopher Woodall (USDA Forest Service, Northern Research Station), and Beth Schulz (USDA Forest Service, Pacific Northwest Research Station), Barbara L. Conkling (North Carolina State University); Barbara O'Connell (USDA Forest Service, Northern Research Station); Elizabeth LaPoint (USDA Forest Service, Northern Research Station); Jeffery Turner (USDA Forest Service, Southern Research Station); Karen Waddell (USDA Forest Service, Pacific Northwest Research Station); Deborah Boyer (USDA Forest Service, Rocky Mountain Research Station); Glenn Christensen (USDA Forest Service, Pacific Northwest Research Station); Ted Ridley (USDA Forest Service, Southern Research Station); Brian Cordova (University of Nevada-Las Vegas); Lisa Mahal (University of Nevada-Las Vegas).

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# User Guide Updates

## Changes from the Previous Database Version

### Example citation for this electronic publication (ePub):

Forest Inventory and Analysis. 2014. The Forest Inventory and Analysis Database: Database description and user guide version 6.0.1 for Phase 3. U.S. Department of Agriculture, Forest Service. 182 p. [Online]. Available: <http://www.fia.fs.fed.us/library/database-documentation/>.

### Updates

Database users should be aware that changes are made for each version of FIADB. Sometimes the changes are minimal, such as simply rewriting explanatory text for clarification or adding new codes to a particular attribute. Database tables and/or attributes may be added or removed.

This particular document, version 6.0.1, has undergone some major updates and reorganization since the last version. Many of the updates were made to make this document more accessible to all users. Other changes to this document, such as the addition of hypertext links, are reflective of the ePUB environment and will allow users to quickly access particular sections/attributes.

Further updates to this document, such as the reorganization of chapters by topics, will allow users who desire to have a hard-copy version to easily print only the sections that are of interest. For each chapter and appendix, the header information located in the top margin of each page details when the chapter or appendix was last modified. In addition, the page numbering for each chapter and appendix, located in the bottom margin of each page, is independent from other chapters and appendices. Therefore, for future versions, if a particular chapter or appendix has not been modified, it will not need to be printed again.

**Note:** The section/subsection numbering used in this document is specific to this guide; within the FIADB, attributes should be referenced by their actual column name or the column number, which is the last part of the section/subsection number. For example, 2.1.1 indicates chapter 2, section or table 1, and attribute 1.

### Document reorganization and reformatting changes include the following:

- **Document title** - This document is now titled "The Forest Inventory and Analysis Database: Database Description and User Guide for Phase 3 (version 6.0.1)." The term "User Guide" has replaced the term "Users Manual."
- **Chapter and appendix reorganization** - The chapters and appendices in this document have been reorganized. Database table chapters are now arranged by topics. The following lists outline the old and new chapters and appendices:

**Chapters have been rearranged as follows:**

Old Chapter Number and Name	New Chapter Number and Name
Chapter 1 - Introduction	Chapter 1: Overview
-	1.1 Introduction
-	1.2 Database Structure
Chapter 2 - Database Structure	Chapter 2: Ozone Bioindicator
-	Chapter 3: Lichen Indicators
-	Chapter 4: Soil Indicator
-	Chapter 5: Vegetation Structure and Diversity
-	Chapter 6: Reference Tables
Chapter 3 - Views	Chapter 7: Views

**The appendix has been renamed as follows:**

Old Appendix Letter and Name	New Appendix Letter and Name	Old Appendix Letter
Appendix A - Index of Column Names	Now a separate section: Index of Column Names	A

- **Hypertext links** - This document now contains various hypertext links. The main Table of Contents (TOC) contains hypertext links to the chapters and appendix. The "Chapter Contents," located at the beginning of each chapter, contains hypertext links to the primary sections within the chapter. In addition, the database tables (located in chapters 2 to 6) and the "Index of Column Names" now contain hypertext links to the individual column name (attribute) descriptions. With the exception of the main TOC, hypertext links are indicated by blue-color font (black-color font is used for the main TOC).
- **PDF Bookmarks** (located on the left side margin of the PDF) - This PDF feature also contains hypertext links to the primary sections in the document; click on the "+" symbols to expand the list for a particular chapter. **Note:** If needed, click on the bookmarks icon (a folded blue ribbon on the left menu bar of the PDF) to display the bookmark contents. The bookmarks display the primary sections in the PDF document, similar to the table of contents.
- **Page numbering** - The page numbering in this document has been changed to directly apply to an individual chapter. The first digit or letter indicates the chapter and the second digit indicates the individual page number. For example, the page numbering for chapter 2 is 2-1, 2-2, 2-3, etc. Other sections, such as the "Index of Column Names" use text in place of the first digit followed by the particular page number, such as Index-1, Index-2, Index-3, etc. The header information in the top margin of each page will indicate when the chapter or appendix or other section was last revised.
- **Sections and section/subsection numbering** - To aid in organization, this document contains section and subsection numbering. **Note:** The section/subsection

numbering used in this document is specific to this guide; within the FIADB, attributes should be referenced by their actual column name and not by the subsection number used in the guide.

- **Database section table numbering** - Within this guide, database tables are numbered based on the section where they are located within the document. For example, the Ozone Validation Table is located at section 2.3 (the 2.3 section number indicates that the table is located in chapter 2 and it is the third table listed). **Note:** If new tables are added to future versions of the guide, the section numbers for some tables may change.
- **Column name (attribute) subsection numbering** - The descriptions for individual column names (attributes) are organized using subsection numbering. For example, the attribute FIELD\_ID is located at subsection 2.3.7 (the 2.3.7 indicates that the description is located in chapter 2 in the third table under the 7th attribute listed).
- **Other table numbering** - Supplemental tables in this document have been renumbered to directly apply to a particular chapter or appendix. For example, the supplemental table in chapter 1 is numbered table 1-1, (the first digit indicates the chapter number, and the second digit indicates the supplemental table number within the chapter).
- **Figure numbering** - The figures (graphics) in this document have been renumbered to directly apply to a particular chapter or appendix. For example, the figures in chapter 6 are sequentially numbered figure 6-1, figure 6-2 (the first digit indicates the chapter number, and the second digit indicates the figure number within the chapter).
- **User Guide Updates** (Changes from the Previous Database Version) - This section is a separate section.
- **Column of Index Names** - This index is a separate section and contains hypertext links to individual column name (attribute) descriptions. In previous versions, the index was located within appendix A.

**Table A:** In this release (6.0.1), tables A to D summarize major modifications to FIADB 5.1.6. Database table attribute additions in FIADB 6.0.

Name of table affected	Name of column added to table
DWM_COARSE_WOODY_DEBRIS	CONDID
DWM_COARSE_WOODY_DEBRIS	HORIZ_DIST
DWM_COARSE_WOODY_DEBRIS	VOLCF
DWM_COARSE_WOODY_DEBRIS	DRYBIO
DWM_COARSE_WOODY_DEBRIS	CARBON
DWM_COARSE_WOODY_DEBRIS	COVER_PCT
DWM_COARSE_WOODY_DEBRIS	LPA_UNADJ
DWM_COARSE_WOODY_DEBRIS	LPA_PLOT
DWM_COARSE_WOODY_DEBRIS	LPA_COND
DWM_COARSE_WOODY_DEBRIS	LPA_UNADJ_RGN
DWM_COARSE_WOODY_DEBRIS	LPA_PLOT_RGN

Name of table affected	Name of column added to table
DWM_COARSE_WOODY_DEBRIS	LPA_COND_RGN
DWM_COARSE_WOODY_DEBRIS	COVER_PCT_RGN
DWM_COARSE_WOODY_DEBRIS	CHRCO_PNWRS
DWM_COARSE_WOODY_DEBRIS	ORNTCD_PNWRS
DWM_DUFF_LITTER_FUEL	CONDID
DWM_FINE_WOODY_DEBRIS	SMALL_TL_COND
DWM_FINE_WOODY_DEBRIS	SMALL_TL_PLOT
DWM_FINE_WOODY_DEBRIS	SMALL_TL_UNADJ
DWM_FINE_WOODY_DEBRIS	MEDIUM_TL_COND
DWM_FINE_WOODY_DEBRIS	MEDIUM_TL_PLOT
DWM_FINE_WOODY_DEBRIS	MEDIUM_TL_UNADJ
DWM_FINE_WOODY_DEBRIS	LARGE_TL_COND
DWM_FINE_WOODY_DEBRIS	LARGE_TL_PLOT
DWM_FINE_WOODY_DEBRIS	LARGE_TL_UNADJ
DWM_RESIDUAL_PILE	VOLCF
DWM_RESIDUAL_PILE	DRYBIO
DWM_RESIDUAL_PILE	CARBON
DWM_RESIDUAL_PILE	PPA_UNADJ
DWM_RESIDUAL_PILE	PPA_PLOT
DWM_RESIDUAL_PILE	PPA_COND
DWM_TRANSECT_SEGMENT	HORIZ_LENGTH
DWM_TRANSECT_SEGMENT	HORIZ_BEGNDIST
DWM_TRANSECT_SEGMENT	HORIZ_ENDDIST

**Table B:** Database table attribute deletions in FIADB 6.0.

Name of table affected	Name of column deleted from table
DWM_TRANSECT_SEGMENT	HORIZDIST

**Table C:** Database table attributes name changes in FIADB 6.0.

Name of table affected	Old attribute	New attribute
DWM_TRANSECT_SEGMENT	BEGNDIST	SLOPE_BEGNDIST
DWM_TRANSECT_SEGMENT	ENDDIST	SLOPE_ENDDIST



**Table D:** Database table attributes with updates to the attribute description text in FIADB 6.0.

Name of table affected	Name of column with updated text
DWM_VISIT	PLOT
DWM_VISIT	CREATED_BY
DWM_VISIT	CREATED_DATE
DWM_VISIT	CREATED_IN_INSTANCE
DWM_VISIT	MODIFIED_BY
DWM_VISIT	MODIFIED_DATE
DWM_VISIT	MODIFIED_IN_INSTANCE
DWM_COARSE_WOODY_DEBRIS	PLOT
DWM_COARSE_WOODY_DEBRIS	SUBP
DWM_COARSE_WOODY_DEBRIS	TRANSECT
DWM_COARSE_WOODY_DEBRIS	CWDID
DWM_COARSE_WOODY_DEBRIS	SLOPDIST
DWM_COARSE_WOODY_DEBRIS	SPCD
DWM_COARSE_WOODY_DEBRIS	DECAYCD
DWM_COARSE_WOODY_DEBRIS	TRANSDIA
DWM_COARSE_WOODY_DEBRIS	SMALLDIA
DWM_COARSE_WOODY_DEBRIS	LARGEDIA
DWM_COARSE_WOODY_DEBRIS	LENGTH
DWM_COARSE_WOODY_DEBRIS	HOLLOWCD
DWM_DUFF_LITTER_FUEL	STATECD
DWM_DUFF_LITTER_FUEL	COUNTYCD
DWM_DUFF_LITTER_FUEL	PLOT
DWM_DUFF_LITTER_FUEL	SUBP
DWM_DUFF_LITTER_FUEL	SMPLOCCD
DWM_DUFF_LITTER_FUEL	SMPLDCD
DWM_DUFF_LITTER_FUEL	DUFFDEP
DWM_DUFF_LITTER_FUEL	LITTDEP
DWM_DUFF_LITTER_FUEL	FUELDEP
DWM_FINE_WOODY_DEBRIS	PLOT
DWM_FINE_WOODY_DEBRIS	SUBP
DWM_FINE_WOODY_DEBRIS	CONDID
DWM_FINE_WOODY_DEBRIS	SMALLCT
DWM_FINE_WOODY_DEBRIS	MEDIUMCT
DWM_FINE_WOODY_DEBRIS	LARGECT
DWM_FINE_WOODY_DEBRIS	RSNCTCD

Name of table affected	Name of column with updated text
DWM_FINE_WOODY_DEBRIS	PILESCD
DWM_MICROPLOT_FUEL	SUBP
DWM_MICROPLOT_FUEL	LVSHRBCD
DWM_MICROPLOT_FUEL	DSHRBCD
DWM_MICROPLOT_FUEL	LVHRBCD
DWM_MICROPLOT_FUEL	DHRBCD
DWM_MICROPLOT_FUEL	LITTERCD
DWM_RESIDUAL_PILE	PLOT
DWM_RESIDUAL_PILE	SUBP
DWM_RESIDUAL_PILE	PILE
DWM_RESIDUAL_PILE	SHAPECD
DWM_RESIDUAL_PILE	HEIGHT1
DWM_RESIDUAL_PILE	WIDTH1
DWM_RESIDUAL_PILE	LENGTH1
DWM_RESIDUAL_PILE	HEIGHT2
DWM_RESIDUAL_PILE	WIDTH2
DWM_RESIDUAL_PILE	LENGTH2
DWM_TRANSECT_SEGMENT	PLOT
DWM_TRANSECT_SEGMENT	SUBP
DWM_TRANSECT_SEGMENT	TRANSECT
DWM_TRANSECT_SEGMENT	SEGMNT
DWM_TRANSECT_SEGMENT	CONDID
DWM_TRANSECT_SEGMENT	SLOPE

Other changes in the user guide text are:

- The title of this document was changed to be consistent with the Phase 2 document.
- All STATECD, COUNTYCD, and UNITCD descriptions were updated due to changes in the Phase 2 documentation.
- In the SOILS\_LAB table, the Oracle data type for column 29 EXCHNG\_NA was changed from NUMBER(7,3) to NUMBER (8,3)
- In the SOILS\_LAB table, the Oracle data type for column 31 EXCHNG\_MG was changed from NUMBER(7,3) to NUMBER (8,3)

In this release (6.0.1), the following major modification was made to FIADB 6.0.

- The down woody material (DWM) tables were dropped from the phase 3 user guide because the DWM phase 3 attributes are stored in the phase 2 DWM tables. All the DWM attributes are documented in the phase 2 FIADB user guide.

**Hard-copy printing:**

To print sections from this PDF document, it will be necessary to specify the continuous page number range for the desired section to be printed. Table E outlines the start page and end page for each document section. This guide is intended to be printed on both sides of the paper.

**Table E:** Page range for individual document sections (for hard-copy printing).

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# Chapter 1: Overview

## Chapter Contents:

Section	Heading
1.1	<a href="#">Introduction:</a> <ul style="list-style-type: none"><li>• <a href="#">Purpose of This Guide</a></li><li>• <a href="#">Plot Location</a></li></ul>
1.2	<a href="#">Database Structure:</a> <ul style="list-style-type: none"><li>• <a href="#">Keys Presented with the Tables</a></li><li>• <a href="#">Oracle Data Types</a></li></ul>

## 1.1 Introduction

### 1.1.1 Purpose of This Guide

This guide is the definitive guide to the Forest Inventory and Analysis database (FIADB) for phase 3 (P3) indicators and is an update to The Forest Inventory and Analysis Database: Database Description and Users Manual, Version 4.0 for P3 (Woodall et al. 2010). This document is a companion to The Forest Inventory and Analysis Database: Database Description and User Guide, Version 6.0.1 for P2. To use the Forest Inventory and Analysis Database (FIADB) effectively, users should acquire a basic understanding of Forest Inventory and analysis (FIA) sampling and estimation procedures. Generally described, FIA uses as a three-phase sampling scheme. Phase 1 (P1) is used for stratification, while P2 (P2) consists of plots that are visited or photo-interpreted. A subset of P2 plots are designated as phase 3 (P3) plots, which were formerly known as Forest Health Monitoring (FHM) plots, where additional health indicator attributes are collected. Phase 3 is described in this chapter, but phases 1 and 2 are described in a separate user guide (O'Connell et al. 2014, online). The exception is P3 crown attributes, which are described in the TREE table of the P2 document ([available online](http://www.fia.fs.fed.us) at [www.fia.fs.fed.us](http://www.fia.fs.fed.us).)

Although the FIADB is used widely within the FIA program, much if not most of the intended audience includes those outside FIA who are interested in using FIA data for their own analyses. Awareness of the potential uses of FIA data by users outside the FIA community is growing, and the data become increasingly useful as additional data are collected. However, as is the case with any data source, the user needs to understand not only the data definitions and acquisition methods, but also the context in which the data were collected. This guide is intended to help current and potential users understand the necessary details of the FIADB.

For specific questions about the data from a particular P3 indicator, please contact the individuals listed in table 1-1.

**Table 1-1:** Contacts for phase 3 indicators.

Phase 3 Indicator	Phase 3 Contacts	Phone	Email
Crowns (in P2 user guide)	KaDonna Randolph	865-862-2024	krandolph@fs.fed.us
Ozone Bioindicator	John Coulston	865-862-2008	jcoulston@fs.fed.us
Lichen	Sarah Jovan	503-808-2070	sjovan@fs.fed.us
Soils	Charles Perry Michael Amacher	651-649-5191 435-755-3560	charlesperry@fs.fed.us mamacher@fs.fed.us
Vegetation Structure	Beth Schulz	907-743-9424	bschulz@fs.fed.us
Down Woody Material (in P2 user guide)	Christopher Woodall	651-649-5141	cwoodall@fs.fed.us

Additional information about the P3 indicators is also available in the following publications:

- Crown condition classification: a guide to data collection and analysis (Schomaker et al. 2007)
- Ozone bioindicator: sampling and estimation (Smith et al. 2007); data analysis and interpretation (Smith et al. 2008)

- Soils as an indicator of forest health: a guide to the collection, analysis, and interpretation of soil indicator data in the Forest Inventory and Analysis Program (O'Neill et al. 2005)
- Sampling protocols, estimation procedures, and analytical guidelines for down woody materials indicator of the Forest Inventory and Analysis Program, 2nd edition (Woodall and Monleon 2008)
- Sampling and estimation procedures for the vegetation diversity and structure indicator (Schulz et al. 2009)
- General P3 program overview and update (Woodall et al. 2011)

### 1.1.2 Plot Location

The FIADB includes coordinates for every plot location in the database, whether it is forested or not, but these are not the precise locations of the plot centers. In an amendment to the Food Security Act of 1985 (reference 7 USC 2276 § 1770), Congress directed FIA to ensure the privacy of private landowners. Exact plot coordinates could be used in conjunction with other publicly available data to link plot data to specific landowners, in violation of the new requirements set by Congress. In addition to the issue of private landowner privacy, the FIA program had concerns about plot integrity and vandalism of plot locations on public lands. Because of these concerns, FIA temporarily stopped providing public access to plot coordinates. However, a revised policy has been implemented and new methods have been developed for making approximate coordinates available for all plots. These methods are collectively known as "fuzzing and swapping" (Lister et al. 2005).

In the past, FIA provided approximate coordinates for its periodic data in the FIADB. These coordinates were within 1.0 mile of the exact plot location (this is called fuzzing). However, because some private individuals own extensive amounts of land in certain counties, the data could still be linked to these owners. To maintain the privacy requirements specified in the amendments to the Food Security Act of 1985, up to 20 percent of the private plot coordinates are swapped with another similar private plot within the same county (this is called swapping). This method creates sufficient uncertainty at the scale of the individual landowner to meet privacy requirements. It also ensures that county summaries and any breakdowns by categories, such as ownership class, will be the same as when using the true plot locations because only the coordinates of the plot are swapped - all the other plot characteristics remain the same. The only difference will occur when users want to subdivide a county using a polygon. Even then, results will be similar because swapped plots are chosen to be similar based on attributes such as forest type, stand-size class, latitude, and longitude (each FIA unit has chosen its own attributes for defining similarity).

For plot data collected under the new annual system, plot numbers are reassigned to sever the link to other coordinates stored in the FIADB before the change in the law. Private plots are also swapped using the method described above - remeasured annual plots are swapped independently of the periodic data. All annual plot coordinates are fuzzed, but less than before: within 0.5 miles for most plots and up to 1.0 mile on a small subset of them. This makes it difficult to locate the plot on the ground, while maintaining a good correlation between the plot data and map-based characteristics.

For most user applications, such as woodbasket analyses and estimates of other large areas, fuzzed and swapped coordinates provide a sufficient level of accuracy. However,

some FIA customers require more precision of plot locations for performing analyses by user-defined polygons and for relating FIA plot data to other map-based information, such as soils maps and satellite imagery. To accommodate this need, FIA provides spatial data services that allow most of the desired analyses while meeting privacy requirements. The possibilities and limitations for these types of analyses are case-specific, so interested users should contact their local FIA work unit for more information.

## 1.2 Database Structure

This section provides information about the database tables, including detailed descriptions of all attributes within the tables. Each column or attribute in a table is listed with its unabbreviated name, followed by a description of the attribute. Attributes that are coded include a list of the codes and their meanings. The "Index of Column Names" contains an alphabetized list of all of the column names (attributes) in the database tables included within this user guide.

### 1.2.1 Keys Presented with the Tables

Each summarized table in chapters 2 through 5 has a list of keys just below the bottom of the table. These keys are used to join data from different tables. The following provides a general definition of each kind of key.

#### Primary key

A single column in a table whose values uniquely identify each row in an Oracle table. The primary key in each FIADB table is the CN column.

The name of the primary key for each table is listed in the table description. It follows the nomenclature of 'TABLEABBREVIATION'\_PK. The table abbreviations are:

Table name	Table abbreviation
OZONE_PLOT	NOP
OZONE_VISIT	OVT
OZONE_VALIDATION	OVN
OZONE_BIOSITE_SUMMARY	OBS
OZONE_PLOT_SUMMARY	OPS
OZONE_SPECIES_SUMMARY	OSY
LICHEN_VISIT	LVT
LICHEN_LAB	LCH
LICHEN_PLOT_SUMMARY	LPS
LICHEN_SPECIES_SUMMARY	LSY
REF_LICHEN_SPECIES	LNS
REF_LICHEN_SPP_COMMENTS	LCM
SOILS_VISIT	SVT
SOILS_EROSION	SEN
SOILS_SAMPLE_LOC	SSL
SOILS_LAB	SLB



Table name	Table abbreviation
VEG_VISIT	VVT
VEG_PLOT_SPECIES	VPS
VEG_SUBPLOT	VSF
VEG_QUADRAT	VQT
VEG_SUBPLOT_SPP	VSS
REF_PLANT_DICTIONARY	RPD2010

### Unique key

Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.

The unique key varies for each FIADB table. The unique key for the OZONE\_PLOT table is STATECD, COUNTYCD, O3PLOT, and INVYR. The unique key for the OZONE\_VALIDATION table is PLT\_CN and BIOSPCD.

The name of the unique key for each table is listed in the table description. It follows the nomenclature of 'TABLEABBREVIATION'\_UK.

### Natural key

A type of unique key made from existing attributes in the table. It is stored as an index in this database.

Not all FIADB tables have a natural key. For example, there is no natural key in the OZONE\_PLOT table, rather the natural key and the unique key are the same.

The name of the natural key for each table is listed in the table description. It follows the nomenclature of 'TABLEABBREVIATION'\_NAT\_I.

### Foreign key

A column in a table that is used as a link to a matching column in another Oracle table.

A foreign key connects a record in one table to only one record in another table. Foreign keys are used both to link records between data tables and as a check (or constraint) to prevent "unrepresented data." For example, if there are rows of data in the LICHEN\_VISIT table for a specific plot, there needs to be a corresponding data row for that same plot in the PLOT table (P2). The foreign key in the LICHEN\_VISIT table is the attribute PLT\_CN, which links specific rows in the LICHEN\_VISIT table to one record in the PLOT table using the plot attribute CN.

The name of the foreign key for each table is listed in the table description. It follows the nomenclature of SOURCETABLEABBREVIATION\_MATCHINGTABLEABBREVIATION\_FK, where the source table is the table containing the foreign key and the matching table is the table the foreign key matches. The foreign key usually matches the CN column of the matching table. Some tables have only one foreign key, but tables can have multiple foreign keys.

## 1.2.2 Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY. For example, 29-AUG-2012.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	<p>A data type that contains only numbers up to a specified maximum size. The maximum size (<i>and optional fixed decimal point</i>) is specified by the value(s) listed in the parentheses.</p> <p>For example, an attribute with a data type specified as "NUMBER(2)" indicates that the attribute may contain a maximum of two digits (<i>for example</i>, "11" or "5"), however, none of the digits are decimals. An attribute with a data type specified as "NUMBER(3,1)" may contain a maximum of three digits, however, the last digit is a fixed decimal (<i>for example</i>, "4.0" or "12.7"). Likewise, "NUMBER(6,4)" would indicate that an attribute may contain a maximum of six digits, however, the last four digits are part of a fixed decimal (<i>for example</i>, "18.7200"). <b>Note:</b> When needed, digits to the right of a fixed decimal point are filled in with zero(s).</p>
VARCHAR2(SIZE)	<p>A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.</p> <p>For example, an attribute with a data type specified as "VARCHAR2(8)" indicates that the attribute may contain a maximum of eight alphanumeric characters.</p>

# Chapter 2: Database Tables - Ozone Bioindicator

## Chapter Contents:

Section	Database table
2.1	<a href="#">Ozone Plot Table</a>
2.2	<a href="#">Ozone Visit Table</a>
2.3	<a href="#">Ozone Validation Table</a>
2.4	<a href="#">Ozone Biosite Summary Table</a>
2.5	<a href="#">Ozone Plot Summary Table</a>
2.6	<a href="#">Ozone Species Summary Table</a>

## Ozone Bioindicator General Information

Unlike other FIA data where only a portion of the plots are sampled each year, every ozone site is sampled annually. Therefore, the ozone bioindicator data provide annual statistics that can be used to report on regional trends in ozone stress. The terms biosite or ozone biomonitoring site are used to refer to the ozone plot or ground location where ozone data are collected. The biosite summary table (OZONE\_BIOSITE\_SUMMARY) provides ozone summary statistics for each ozone plot or biosite. The plot summary table (OZONE\_PLOT\_SUMMARY) provides summary statistics for each ground location. Ground location differs from biosite when the data from two nearby locations are combined for a given biosite to meet the site selection requirements for the ozone indicator. The species summary table (OZONE\_SPECIES\_SUMMARY) provides summary statistics by species, at each ground location. The validation table (OZONE\_VALIDATION) contains the results of the expert review of the leaf voucher samples. The ozone visit table (OZONE\_VISIT) includes a record of plot (a single location) characteristics and measurement status. For each table, the attribute codes, computation specifications, and definitions are fully described. General guidelines for data use are presented at the beginning of each table. Annual summary statistics may be compiled by species or by biosite and reported by county, state, region, or ecoregion.

For most analyses, the biosite-level ozone injury index (BI) or BIOSITE\_INDEX is the calculated attribute that is the most useful. The biosite index is derived each year from the validated crew data and presented in the biosite summary table. The annual BI provides an indication of ozone stress for a given year, but should not be used alone to make definitive statements about ozone air quality. An examination of regional trends in ozone stress should be based on a 5-year rolling average of the biosite index. For a given 5-year period, ambient ozone concentrations may fluctuate from above normal to below normal. Calculating an average biosite index for a multi-year period ensures that the injury index used to describe plant response to ozone is a truly representative value.

In addition to the summary tables, two map products are made available annually to FIA analysts and other users. The map products are derived from weighted data that are not readily available (contact the National Ozone Indicator Advisor for more information), and true plot locations that are not in the public domain. The first map product is the national ozone risk map. Every year, geostatistical procedures are applied to the 5-year rolling average of the biosite index to interpolate a surface of biological response to ozone across the landscape. The resulting ozone risk map can be used to assign an estimated biosite index value to any mapped surface, including the FIA P2 (P2) sample. The second map product is an interpolated surface of ambient ozone concentrations (e.g., SUM06 data, which are hourly ozone concentrations greater than or equal to 0.06 parts per million O<sub>3</sub>). Regional analysts can clip their area of interest (e.g., State, region, or ecoregion) from these two map products, and use the procedures outlined in the ozone estimation document (Smith et al. 2007) and user guide (Smith et al. 2008) to calculate and interpret population metrics for the ozone indicator. Population metrics for the ozone indicator include, but are not limited to (1) the acres of forest land at low, moderate, and high risk of ozone injury, and (2) the volume of ozone susceptible species at low, moderate, and high risk of ozone injury.

FIA uses the national ozone risk map to generate an estimated BI value for forested ground plots on the FIA P2 grid. Using the map surface and the interpolated biosite index, any user can examine relationships between the ozone indicator and other FIA indicators of tree growth, forest health, and forest condition. Similarly, the national ozone risk map

(first map product) can be used in conjunction with the interpolated surface of ambient ozone concentrations (second map product) to help interpret FIA findings. Overlays are also possible with other external databases or map surfaces such as climate or seasonal drought. The goal is to ensure national consistency in published map products and interpretive reports on the ozone indicator.

Two general technical reports published by FIA include detailed information on historical changes to the ozone grid sample and specific guidance on analyzing and interpreting ozone indicator variables and associated data bases (Smith et al. 2007, Smith et al. 2008). A peer-reviewed publication gives an example of how to use the BI data to assess regionwide ozone effects on ozone-sensitive tree species (Coulston et al. 2003). To download these and other documents relevant to the ozone indicator go to the [FIA website](http://fia.fs.fed.us) [http://fia.fs.fed.us], and click on Program Features, Forest Health Indicators, Ozone, Ozone Indicator Website (bottom of page) and then click on the publications link on the right side of the page.

## Definitions for database tables:

For further detail and examples, refer to the Overview (chapter 1).

### Keys Presented with the Tables

Key type	Definition
Primary	A single column in a table whose values uniquely identify each row in an Oracle table.
Unique	Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.
Natural	A type of unique key made from existing attributes in the table. It is stored as an index in this database.
Foreign	A column in a table that is used as a link to a matching column in another Oracle table.

### Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	A data type that contains only numbers up to a specified maximum size. The maximum size ( <i>and optional fixed decimal point</i> ) is specified by the value(s) listed in the parentheses.
VARCHAR2(SIZE)	A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.



## 2.1 Ozone Plot Table

(Oracle table name: OZONE\_PLOT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.1.1	CN	Sequence number	VARCHAR2(34)
2.1.2	SRV_CN	Survey sequence number	VARCHAR2(34)
2.1.3	CTY_CN	County sequence number	VARCHAR2(34)
2.1.4	INVYR	Inventory year	NUMBER(4)
2.1.5	STATECD	State code	NUMBER(4)
2.1.6	UNITCD	Unit code	NUMBER(2)
2.1.7	COUNTYCD	County code	NUMBER(3)
2.1.8	O3PLOT	Ozone plot	NUMBER
2.1.9	FIELD_ID	Field identification number	NUMBER(7)
2.1.10	SPLIT_PLOTID	Split plot identification	NUMBER(1)
2.1.11	MEASYEAR	Measurement year	NUMBER(4)
2.1.12	MEASMON	Measurement month	NUMBER(2)
2.1.13	MEASDAY	Measurement day	NUMBER(2)
2.1.14	LAT	Latitude	NUMBER(8,6)
2.1.15	LON	Longitude	NUMBER(9,6)
2.1.16	ELEVATION	Elevation	NUMBER
2.1.17	MANUAL	Field guide (manual) version number	NUMBER(3,1)
2.1.18	QA_STATUS	Quality assurance status	NUMBER(1)
2.1.19	CREATED_BY	Created by	VARCHAR2(30)
2.1.20	CREATED_DATE	Created date	DATE
2.1.21	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
2.1.22	MODIFIED_BY	Modified by	VARCHAR2(30)
2.1.23	MODIFIED_DATE	Modified date	DATE
2.1.24	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)
2.1.25	CYCLE	Inventory cycle number	NUMBER(2)
2.1.26	SUBCYCLE	Inventory subcycle number	NUMBER(2)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	NOP_PK
Unique	STATECD, INVYR, COUNTYCD, O3PLOT, FIELD_ID, SPLIT_PLOTID	N/A	NOP_UK
Foreign	SRV_CN	OZONE_PLOT to SURVEY	NOP_SRV_FK
Foreign	CTY_CN	OZONE_PLOT to COUNTY	NOP_CTY_FK

- 2.1.1 CN**  
**Sequence number.** A unique sequence number used to identify an ozone plot record.
- 2.1.2 SRV\_CN**  
**Survey sequence number.** Foreign key linking the plot record to the survey record.
- 2.1.3 CTY\_CN**  
**County sequence number.** Foreign key linking the ozone plot record to the county record. The COUNTY table is described in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).
- 2.1.4 INVYR**  
**Inventory year.** The year in which ozone data were collected.
- 2.1.5 STATECD**  
**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).
- 2.1.6 UNITCD**  
**Unit code.** Forest Inventory and Analysis survey unit identification number. Survey units are usually groups of counties within each state. For periodic inventories, survey units may be made up of lands of particular owners. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).
- 2.1.7 COUNTYCD**  
**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).
- 2.1.8 O3PLOT**  
**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biomonitoring site. When a biosite is split, O3PLOT is the same for both locations, except for the last digit, which will be a 1 or 2.
- 2.1.9 FIELD\_ID**  
**Field identification number.** A system-generated number used to identify a biosite. There will be more than one record with a given FIELD\_ID value when two locations are sampled for one biosite.



**2.1.10 SPLIT\_PLOTID**

**Split plot identification.** A number used to identify the distinct locations sampled for a particular biosite. SPLIT\_PLOTID = 1 identifies either a single location biosite or the first location of a biosite split between two locations. SPLIT\_PLOTID = 2 identifies the second location of a biosite split between two locations. The second location is added by the field crew to increase species and plant counts for an ozone biosite.

**2.1.11 MEASYEAR**

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

**2.1.12 MEASMON**

**Measurement month.** The day of the month in which the plot was completed.

**Codes: MEASMON**

Code	Description
01	January.
02	February.
03	March.
04	April.
05	May.
06	June.
07	July.
08	August.
09	September.
10	October.
11	November.
12	December.

**2.1.13 MEASDAY**

**Measurement day.** The day of the month in which the plot was completed.

**2.1.14 LAT**

**Latitude.** The approximate latitude of the plot in decimal degrees using NAD 83 datum. Actual plot coordinates cannot be released because of a privacy provision enacted by Congress in the Food Security Act of 1985. Therefore, this attribute is within +/- 8.5 miles of the actual latitude and longitude, and the attribute is in the correct county.

**2.1.15 LON**

**Longitude.** The approximate longitude of the plot in decimal degrees using NAD 83 datum. Actual plot coordinates cannot be released because of a privacy provision enacted by Congress in the Food Security Act of 1985. Therefore, this attribute is within +/- 8.5 miles of the actual latitude and longitude, and the attribute is in the correct county.

**2.1.16 ELEVATION**

**Elevation.** Elevation data are obtained either by using a global positioning system (GPS) unit or a USGS topographic map (generally the 7½ minute series quadrangle). Field crews

locate the area where most of the bioindicator species are growing and record elevation to the nearest foot.

### 2.1.17 **MANUAL**

**Manual (field guide) version number.** Version number of the field guide used to describe procedures for collecting data on the plot.

### 2.1.18 **QA\_STATUS**

**QA status.** A code indicating the type of plot data collected. Production plots have QA\_STATUS = 1 or 7.

**Codes: MEASMON**

Code	Description
1	Standard ozone plot.
2	Cold check.
4	Training/practice plot (off grid).
5	Botched plot file.
6	Blind check.
7	Production plot (hot check).

### 2.1.19 **CREATED\_BY**

**Created by.** The employee who created the record. This attribute is intentionally left blank in download files.

### 2.1.20 **CREATED\_DATE**

**Created date.** The date the record was created. Date will be in the form DD-MON-YYYY.

### 2.1.21 **CREATED\_IN\_INSTANCE**

**Created in instance.** The database instance in which the record was created. Each computer system has a unique database instance code and this attribute stores that information to determine on which computer the record was created.

### 2.1.22 **MODIFIED\_BY**

**Modified by.** The employee who modified the record. This field will be blank (null) if the data have not been modified since initial creation. This attribute is intentionally left blank in download files.

### 2.1.23 **MODIFIED\_DATE**

**Modified date.** The date the record was last modified. This field will be blank (null) if the data have not been modified since initial creation. Date will be in the form DD-MON-YYYY.

### 2.1.24 **MODIFIED\_IN\_INSTANCE**

**Modified in instance.** The database instance in which the record was modified. This field will be blank (null) if the data have not been modified since initial creation.

### 2.1.25 **CYCLE**

**Inventory cycle number.** A number assigned to a set of plots, measured over a particular period of time from which a State estimate using all possible plots is obtained. A cycle

number >1 does not necessarily mean that information for previous cycles resides in the database.

#### **2.1.26 SUBCYCLE**

**Inventory subcycle number.** For an annual inventory that takes n years to measure all plots, subcycle shows in which of the n years of the cycle the data were measured. Subcycle is 0 for a periodic inventory. Subcycle 99 may be used for plots that are not included in the estimation process.



## 2.2 Ozone Visit Table

### (Oracle table name: OZONE\_VISIT)

The attributes in this table identify characteristics of the biosite with respect to site conditions evaluated by the field crew and indicates whether the data are part of the production sample or quality assurance sample. Most ozone biosites consist of a single ground location. Occasionally, two locations are used to increase species and plant counts for an ozone biosite. If two locations are used, they are within 3 miles of each other. The field identification number (FIELD\_ID) is the same for both locations, but they have different split plot identification (SPLIT\_PLOTID) numbers. O3PLOT is a concatenation of FIELD\_ID and SPLIT\_PLOTID that can be used in combination with STATECD, COUNTYCD, and INVYR to uniquely identify each plot or ground location. For each ground location, coded site characteristics include plot size (PLTSIZE), aspect (ASPECT), terrain position (TERRPOS), soil depth (SOILDPTH), soil drainage (SOILDRN), plot wetness (PLOTWET), and plot disturbance (PLTDSTRB). These site attributes are defined below. The injury check (INJCHECK) attribute indicates whether or not ozone injury was observed on non-tallied plants or species. For example, the field crew may observe ozone injury on a species after 30 records of no injury (zero values) have already been observed for that species. This attribute allows a biosite to be identified as impacted by ozone (i.e., injury detected on non-tallied plants) even though there are no quantitative data on injury amount or injury severity for trend analyses.

The grid density (GRIDDEN) and sample kind (SMPKND) attributes are artifacts of the conversion from the P3 grid to the 2002 Ozone Grid. They provide information on whether or not the biosite is newly established, and whether or not there is more than one biosite within the boundaries of a given ozone grid polygon. The application of the SMPKND attribute was modified in 2006 so that it could be used in conjunction with geographical coordinates entered by the field crew to signal whether or not new fuzzed coordinates are needed for the FIADB. Field crews are trained to replace sites that become overgrown or disturbed. When SMPKND indicates site replacement and the distance between the previous ground location and the new ground location exceeds 3 miles, new fuzzed coordinates are needed. The distance of 3 miles reflects the area within which it is reasonable to assume a stable air quality regime. Biosites in the southern States, where open areas tend to become rapidly overgrown, are relocated more frequently than in any other region. Changes in ground location are represented by the OZONE\_BIOSITE\_SUMMARY.GROUND\_LOC\_CD, which tracks the number of times the biosite has moved and, in combination with INVYR, tracks the years in which data were collected at each location.

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.2.1	CN	Sequence number	VARCHAR2(34)
2.2.2	PLT_CN	Plot sequence number	VARCHAR2(34)
2.2.3	INVYR	Inventory year	NUMBER(4)
2.2.4	STATECD	State code	NUMBER(4)
2.2.5	COUNTYCD	County code	NUMBER(3)
2.2.6	O3PLOT	Ozone plot	NUMBER

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.2.7	FIELD_ID	Field identification number	NUMBER(7)
2.2.8	SPLIT_PLOTID	Split plot identification	NUMBER(1)
2.2.9	SMPKND CD	Ozone sample kind code	NUMBER(2)
2.2.10	MEASDAY	Measurement day	NUMBER(2)
2.2.11	MEASMON	Measurement month	NUMBER(2)
2.2.12	MEASYEAR	Measurement year	NUMBER(4)
2.2.13	PLT SIZE	Plot size	NUMBER
2.2.14	ASPECT	Aspect	NUMBER(3)
2.2.15	TERRPOS	Terrain position	NUMBER
2.2.16	SOILDP TH	Soil depth	NUMBER
2.2.17	SOILDRN	Soil drainage	NUMBER
2.2.18	PLTDSTRB	Plot disturbance	NUMBER
2.2.19	CRWTPCD	Crew type code	NUMBER(1)
2.2.20	PLOTWET	Plot wetness	NUMBER
2.2.21	INJCHECK	Injury check	NUMBER(2)
2.2.22	GRIDDEN	Ozone grid density	NUMBER(1)
2.2.23	CREATED_BY	Created by	VARCHAR2(30)
2.2.24	CREATED_DATE	Created date	DATE
2.2.25	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
2.2.26	MODIFIED_BY	Modified by	VARCHAR2(30)
2.2.27	MODIFIED_DATE	Modified date	DATE
2.2.28	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	OVT_PK
Unique	PLT_CN	N/A	OVT_UK
Natural	STATECD, INVYR, COUNTYCD, O3PLOT, FIELD_ID, SPLIT_PLOTID	N/A	OVT_NAT_I
Foreign	PLT_CN	OZONE_VISIT to OZONE_PLOT	OVT_NOP_FK

### 2.2.1 CN

**Sequence number.** A unique sequence number used to identify an ozone visit record.

### 2.2.2 PLT\_CN

**Plot sequence number.** A unique sequence number used to relate the ozone visit record to the ozone plot record.

**2.2.3 INVYR**

**Inventory year.** The year in which the ozone data were collected. All the plots in the ozone grid are measured every year.

**2.2.4 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.2.5 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.2.6 O3PLOT**

**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biomonitoring site. When a biosite is split, O3PLOT is the same for both locations except for the last digit, which will be a 1 or 2.

**2.2.7 FIELD\_ID**

**Field identification number.** A system-generated number used to identify a biosite. There will be more than one record with a given FIELD\_ID value when two locations are sampled for one biosite.

**2.2.8 SPLIT\_PLOTID**

**Split plot identification.** A number used to identify the distinct locations sampled for a particular biosite. SPLIT\_PLOTID = 1 identifies either a single location biosite or the first location of a biosite split between two locations. SPLIT\_PLOTID = 2 identifies the second location of a biosite split between two locations. The second location is added by the field crew to increase species and plant counts for an ozone biosite.

**2.2.9 SMPKNDCD**

**Ozone sample kind code.** A code indicating the kind of sample being taken. SMPKNDCD has a value of 1 when an ozone plot is established in a previously empty polygon. SMPKNDCD has a value of 2 when remeasurement occurs at the same location, or when the replacement plot is within 3 miles of the previously established plot. SMPKNDCD has a value of 3 when the replacement plot is more than 3 miles away from the previously established plot.

**Codes: SMPKNDCD**

Code	Description
1	Initial biosite establishment on the base grid or on a newly intensified grid.

Code	Description
2	Remeasurement of a previously established biosite, or replacement biosite within 3 miles of the previously established plot.
3	Replacement biosite; used when the replacement biosite is more than 3 miles from the previously established plot.

**2.2.10 MEASDAY**

**Measurement day.** The day of the month in which the plot was completed.

**2.2.11 MEASMON**

**Measurement month.** The month in which the plot was completed.

**Codes: MEASMON**

Code	Description
01	January.
02	February.
03	March.
04	April.
05	May.
06	June.
07	July.
08	August.
09	September.
10	October.
11	November.
12	December.

**2.2.12 MEASYEAR**

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

**2.2.13 PLTSIZE**

**Plot size.** A code indicating the size of the opening used for biomonitoring. Open areas that are more than 3 acres in size are ideal because they optimize ozone air mixture. Uniform, open areas with a wide selection of bioindicator species are relatively easy to find in eastern FIA regions, but more difficult to find in western FIA regions. For data from 2002 to the present, the PLTSIZE codes are:

**Codes: PLTSIZE**

Code	Description
1	Greater than 3 acres.
2	Greater than 1 acre, but less than 3 acres.

For data before 2002, the PLTSIZE codes are:



**Codes: PLTSIZE**

Code	Description
1	Greater than 3 acres.
2	One-half to 3 acres.
3	Less than half an acre.
4	Under forest canopy, no opening.

**2.2.14 ASPECT**

**Aspect.** The direction of slope, to the nearest degree, for most of the condition. North is recorded as 360. When slope is less than 5%, there is no aspect and ASPECT is set to zero. The majority of biosites in eastern regions have no aspect whereas conditions in western regions are more variable. There are no published reports that suggest the direction of slope has a significant bearing on the ozone indicator. However, in western regions, north- or east-facing slopes indicate drier plot moisture conditions than south- or west-facing slopes, and plot moisture can have a significant influence on plant response to ozone.

**2.2.15 TERRPOS**

**Terrain position.** A code indicating the position of the biosite in relation to the surrounding topography. Eastern biosites are often located on flatland. In the west, the terrain may be more varied.

**Codes: TERRPOS**

Code	Description
1	Ridge top or upper slope.
2	Bench or level area along a slope.
3	Lower slope.
4	Flat land unrelated to slope.
5	Bottom land with occasional flooding.

**2.2.16 SOILDPTH**

**Soil depth.** A code indicating the general depth of the soil where most of the bioindicator species are growing. Soil that is generally shallow may be subject to more frequent and severe drought, thereby mitigating the response of bioindicator species to ambient ozone exposures.

**Codes: SOILDPTH**

Code	Description
1	Bedrock is not exposed.
2	Bedrock is exposed; soil is generally shallow.

**2.2.17 SOILDRN**

**Soil drainage.** A code indicating the general soil drainage conditions where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone

exposures is optimized on soils that are well drained. This attribute is used for eastern FIA regions.

**Codes: SOILDRN**

Code	Description
1	Soil is well drained.
2	Soil is excessively wet.
3	Soil is excessively dry.

### 2.2.18 PLTDSTRB

**Plot disturbance.** A code indicating the presence and kind of disturbance where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone exposures is optimized on sites with no recent or significant disturbance. The area affected by any human-caused or natural disturbance must be clearly visible and recent enough to influence plant health and condition. Disturbance that results in significant soil compaction may mitigate the response of bioindicator species to ambient ozone exposures and is considered especially significant. Crews are trained to replace biosites that have been disturbed.

**Codes: PLTDSTRB**

Code	Description
0	No recent or significant disturbance.
1	Evidence of overuse; human activity causing obvious soil compaction or erosion.
2	Evidence of natural disturbance including fire, wind, flooding, grazing, pests, etc.

### 2.2.19 CRWTYP CD

**Crew type code.** A code indicating the type of crew measuring the plot. If the data collected by the crew are not intended for quality assurance purposes, then the crew is specified as a regular field crew. If the biosite is revisited for quality assurance purposes, then the field crew is specified as a QA field crew.

**Codes: CRWTYP CD**

Code	Description
1	Regular field crew.
2	QA field crew.

### 2.2.20 PLOTWET

**Plot wetness.** A code indicating the degree of wetness where most of the bioindicator species are growing. Very dry or exposed sites may mitigate the response of bioindicator species to ambient ozone exposures. This attribute is used for western FIA regions.

**Codes: PLOTWET**

Code	Description
0	Wet or damp (riparian zones, damp areas along a stream or meadow).
1	Moderately dry (grassland, meadow, or east-facing slopes).
2	Very dry (exposed rocky ledges, desert, and some alpine areas).

**2.2.21 INJCHECK**

**Injury check.** A code indicating whether or not ozone injury was observed on non-tallied plants or species. For example, the field crew may observe ozone injury on a species after 30 records of no injury (i.e., zero values) have been recorded. This attribute allows a biosite to be identified as impacted by ozone even though there are no quantitative data on injury amount or injury severity for trend analyses. A leaf voucher must be collected from the non-tallied plant to validate the injury. The data can be used to map or tabulate the number and distribution of biosites with and without injury across a state or region.

**Codes: INJCHECK**

Code	Description
1	No injury was observed on non-tallied plants or species.
2	Ozone injury was observed on non-tallied plants or species and a leaf voucher collected.

**2.2.22 GRIDDEN**

**Ozone grid density.** A code indicating whether or not the biosite is on the base ozone grid or on an intensified ozone grid. If the grid is intensified, then there is more than one biosite (O3PLOT) in a given polygon on the ozone grid.

**Codes: GRIDDEN**

Code	Description
1	Unique ozone biosite within a polygon (1 biosite:1 polygon).
2	One of two or more ozone biosites within the same polygon.

**2.2.23 CREATED\_BY**

**Created by.** See OZONE\_PLOT.CREATED\_BY description for definition.

**2.2.24 CREATED\_DATE**

**Created date.** See OZONE\_PLOT.CREATED\_DATE description for definition.

**2.2.25 CREATED\_IN\_INSTANCE**

**Created in instance.** See OZONE\_PLOT.CREATED\_IN\_INSTANCE description for definition.

**2.2.26 MODIFIED\_BY**

**Modified by.** See OZONE\_PLOT.MODIFIED\_BY description for definition.

**2.2.27 MODIFIED\_DATE**

**Modified date.** See OZONE\_PLOT.MODIFIED\_DATE description for definition.

**2.2.28 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See OZONE\_PLOT.MODIFIED\_IN\_INSTANCE description for definition.

## 2.3 Ozone Validation Table

### (Oracle table name: OZONE\_VALIDATION)

The attributes in this table are part of the validation file used by the FIA data processor in each region to edit the ozone data files before they are loaded into the ozone summary tables. The biosite summary statistics do not load properly unless the validation table is complete and in accord with the raw data files entered by the field crews. The following steps describe the process. The field crew collects a leaf voucher for every species at every location where ozone injury is recorded. The leaf vouchers are mailed to an expert ozone diagnostician who reviews them, generates the ozone validation file, and returns the validation table to each region for data processing. The ozone validation table (OZONE\_VALIDATION) provides a record of whether or not the ozone injury rated by the field crews was validated for every species (BIOSPCD) at every ground location. O3PLOT is used in combination with STATECD, COUNTYCD, and INVYR to uniquely identify each ground location. In some cases the leaf voucher is missing. If the injury is not validated or is missing, the crew data file is modified to reflect this fact. Occasionally the field crew submits leaf vouchers for plants or species that are not included in the injury data file. These are considered non-tallied leaf vouchers as defined by the OZONE\_VISIT.INJCHECK attribute. If injury on non-tallied plants or species is validated, this is reflected in the validation file. Injury to non-tallied plants or species can be used only to indicate or map presence or absence of ozone injury. Only validated data from tallied plants and species are used in the computation of ozone summary statistics and other risk assessment analyses such as the national ozone risk map.

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.3.1	CN	Sequence number	VARCHAR2(34)
2.3.2	PLT_CN	Plot sequence number	VARCHAR2(34)
2.3.3	INVYR	Inventory year	NUMBER(4)
2.3.4	STATECD	State code	NUMBER(4)
2.3.5	COUNTYCD	County code	NUMBER(3)
2.3.6	O3PLOT	Ozone plot	NUMBER
2.3.7	FIELD_ID	Field Identification number	NUMBER(7)
2.3.8	SPLIT_PLOTID	Split plot identification	NUMBER(1)
2.3.9	BIOSPCD	Bioindicator species code	NUMBER
2.3.10	QASTATCD	Quality assurance status code	NUMBER(1)
2.3.11	CRWTYP	Crew type code	NUMBER(1)
2.3.12	LEAFVCHR	Leaf voucher	NUMBER
2.3.13	INJVALID	Injury validation	NUMBER
2.3.14	O3_STATCD	Ozone status code	NUMBER
2.3.15	MEASYEAR	Measurement year	NUMBER(4)
2.3.16	CREATED_BY	Created by	VARCHAR2(30)
2.3.17	CREATED_DATE	Created date	DATE
2.3.18	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.3.19	MODIFIED_BY	Modified by	VARCHAR2(30)
2.3.20	MODIFIED_DATE	Modified date	DATE
2.3.21	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	OVN_PK
Unique	PLT_CN, BIOSPCD	N/A	OVN_UK
Natural	STATECD, INVYR, COUNTYCD, O3PLOT, FIELD_ID, SPLIT_PLOTID, BIOSPCD	N/A	OVN_NAT_I

**2.3.1 CN**

**Sequence number.** A unique sequence number used to identify an ozone validation record.

**2.3.2 PLT\_CN**

**Plot sequence number.** A unique sequence number used to relate the ozone validation record to the ozone plot record.

**2.3.3 INVYR**

**Inventory year.** The year in which the ozone data were collected. All the plots in the ozone grid are measured every year.

**2.3.4 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Docummentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.3.5 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Docummentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.3.6 O3PLOT**

**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biomonitoring site. When a biosite is split, O3PLOT is the same for both locations except for the last digit, which will be a 1 or 2.

**2.3.7 FIELD\_ID**

**Field identification number.** A system-generated number used to identify a biosite. There will be more than one record with a given FIELD\_ID value when two locations are sampled for one biosite.

**2.3.8 SPLIT\_PLOTID**

**Split plot identification.** A number used to identify the distinct locations sampled for a particular biosite. SPLIT\_PLOTID = 1 identifies either a single location biosite or the first location of a biosite split between two locations. SPLIT\_PLOTID = 2 identifies the second location of a biosite split between two locations. The second location is added by the field crew to increase species and plant counts for an ozone biosite.

**2.3.9 BIOSPCD**

**Bioindicator species code.** A code indicating the bioindicator species on the biosite. Bioindicator species may be a tree, a woody shrub, or a non-woody herb species. All of the species selected for use respond to ambient levels of ozone pollution with distinct visible foliar symptoms that are easy to diagnose.

**Codes: BIOSPCD**

Code	Region <sup>1</sup>	Common Name	Scientific Name
116	I, P	Jeffrey pine. <sup>2</sup>	<i>Pinus jeffreyi</i> .
122	I, P	Ponderosa pine. <sup>3 4</sup>	<i>Pinus ponderosa</i> .
351	I, P	Red alder. <sup>2</sup>	<i>Alnus rubra</i> .
364	N, S	Big Leaf Aster.	<i>Aster macrophyllus: Eurybia macrophylla</i> .
365	N, S	Common and Tall Milkweed.	<i>Asclepias</i> spp.
366	N, S, P	Spreading Dogbane.	<i>Apocynum androsaemifolium</i> .
541	N, S	White Ash.	<i>Fraxinus americana</i> .
611	N, S	Sweetgum.	<i>Liquidambar styraciflua</i> .
621	N, S	Yellow Poplar.	<i>Liriodendron tulipifera</i> .
746	I, P	Quaking aspen.	<i>Populus tremuloides</i> .
761	N, S	Pin Cherry.	<i>Prunus pensylvanica</i> .
762	N, S	Black Cherry.	<i>Prunus serotina</i> .
905	I, P	Ninebark.	<i>Physocarpus malvaceus</i> .
906	P	Pacific Ninebark (WC). <sup>5</sup>	<i>Physocarpus capitatus</i> .
907	I, P	Western wormwood.	<i>Artemisia ludoviciana</i> .
908	P	Mugwort.	<i>Artemisia douglasiana</i> .
909	I, P	Skunk bush.	<i>Rhus trilobata</i> .
915	N, S	Blackberry.	<i>Rubus allegheniensis</i> .
924	I, P	Scouler's willow.	<i>Salix scouleriana</i> .
931	N, S	Sassafras.	<i>Sassafras albidum</i> .
960	I, P	Blue elderberry. <sup>6</sup>	<i>Sambucus mexicana</i> .

Code	Region <sup>1</sup>	Common Name	Scientific Name
961	I, P	Red elderberry.	<i>Sambucus racemosa</i> .
965	I, P	Thin leaf huckleberry.	<i>Vaccinium membranaceum</i> .
968	I, P	Evening primrose.	<i>Oenothera elata</i> .
969	I, P	Snowberry.	<i>Symphoricarpos</i> spp. includes snowberry and coralberry species.

Supplemental species listed below (998):

**Codes: BIOSPCD**

Code	Region <sup>1</sup>	Common Name	Scientific Name
998	-	Silver Maple.	<i>Acer saccharinum</i> .
998	-	Speckled alder.	<i>Alnus rugosa</i> .
998	-	Common ground nut.	<i>Apios americana</i> .
998	-	Showy milkweed.	<i>Asclepias speciosa</i> .
998	-	Trumpet creeper.	<i>Campsis radicans</i> .
998	-	Common buttonbush.	<i>Cephalanthus occidentalis</i> .
998	-	Red bud.	<i>Cercis canadensis</i> .
998	-	White snake root.	<i>Eupatorium rugosum</i> .
998	-	Woodland sunflower.	<i>Helianthus divaricatus</i> .
998	-	Spicebush.	<i>Lindera benzoin</i> .
998	-	Sourwood.	<i>Oxydendron arboreum</i> .
998	-	American plum.	<i>Prunus americana</i> .
998	-	Winged sumac.	<i>Rhus copallinum</i> .
998	-	Black Raspberry.	<i>Rubus occidentalis</i> .
998	-	Cutleaf coneflower.	<i>Rudbeckia laciniata</i> .
998	-	American (common) elderberry.	<i>Sambucus canadensis</i> .
998	-	Cup plant.	<i>Silphium perfoliatum</i> .
998	-	Basswood.	<i>Tilia americana</i> .
998	-	Crownbeard.	<i>Verbesina occidentalis</i> .
998	-	Iron weed.	<i>Vernonia noveboracensis</i> .
998	-	Nannyberry.	<i>Viburnum lentago</i> .
998	-	Northern Fox grape.	<i>Vitis labrusca</i> .
999	-	Unknown.	-

<sup>1</sup> Regions are N = North; S = South; I = Interior; P = Pacific Northwest

<sup>2</sup> In the Interior Region, *Pinus jeffreyi* (NV); *Alnus rubra* (ID)

<sup>3</sup> In the Interior Region, *Pinus ponderosa* var. *scopulorum* (WY, CO)



<sup>4</sup> In the Pacific Northwest Region, *Pinus ponderosa* var. *ponderosa*

<sup>5</sup> In the Pacific Northwest Region, WC = This species is only found west of the Cascades.

<sup>6</sup> In the Pacific Northwest Region, synonym for *S. mexicana* is *S. cerulea*.

### 2.3.10 QASTATCD

**Quality assurance status code.** A code indicating the type of data collected at the biosite and whether or not the data are intended for quality assurance purposes. Each year, 10 biosites in each region are revisited for quality assurance purposes.

**Codes: QASTATCD**

Code	Description
1	Standard field plot; data not intended for quality assurance purposes.
6	QA field plot; data intended for quality assurance purposes.

### 2.3.11 CRWTYPED

**Crew type code.** A code indicating the type of crew measuring the plot. If the data collected by the crew are not intended for quality assurance purposes, then the crew is specified as a regular field crew. If the biosite is revisited for quality assurance purposes, then the field crew collecting the remeasurement data is specified as a QA field crew.

**Codes: CRWTYPED**

Code	Description
1	Standard field crew.
2	QA field crew.

### 2.3.12 LEAFVCHR

**Leaf voucher.** A code indicating whether or not the field crew followed the voucher preparation and mailing procedures outlined in the field guide. If procedures are not followed such that the voucher is missing or compromised by mishandling, the injury ratings for that species and site are discounted.

**Codes: LEAFVCHR**

Code	Description
1	The field crew followed procedures and mailed in a readable voucher.
2	The leaf voucher is missing and the data indicate the crew found injury.
3	The crew did not find injury and the crew mailed in a clean voucher to verify this finding.

### 2.3.13 INJVALID

**Injury validation.** A code indicating the validation status of the leaf voucher. The leaf samples are examined microscopically and subject to additional diagnostic tests to validate the ozone injury symptom. The results of the diagnosis are documented on the voucher data sheet, entered in an electronic file, and returned to the regions for data processing and edit checks.

**Codes: INJVALID**

Code	Description
1	Ozone injury was validated by an expert either by voucher or with an on-site visit.
2	Ozone injury was not validated because the symptoms are clearly not attributable to ozone or because the condition of the leaf sample makes validation questionable.
3	Ozone injury was not validated because the voucher was missing.
4	Ozone injury was not validated because the crew did not find injury and the leaf sample voucher sent in was uninjured.

**2.3.14 O3\_STATCD**

**Ozone status code.** A code indicating whether the voucher leaf samples for this biospecies were verified as positive (i.e., injury is due to ozone exposure) or negative (i.e., injury is due to something other than ozone exposure) for ozone injury. Codes 4 and 5 apply to vouchers from non-tallied plants (see OZONE\_VISIT.INJCHECK).

**Codes: O3\_STATCD**

Code	Ozone status
1	Injury is due to ozone exposure.
2	Injury is not due to ozone exposure.
3	There is insufficient information to determine whether injury is due to ozone exposure (e.g., voucher leaf sample may be compromised or missing).
4	Injury is due to ozone exposure, but no injury data (>0) were recorded for this species.
5	Injury is not due to ozone exposure, but no injury data (>0) were recorded for this species.

If O3\_STATCD = 1, then the field data are included in summary calculations and trend analysis. If O3\_STATCD = 2, then the field data are included in summary calculations and analysis after the injury amount is set to zero and the injury severity to null for each individual of the given species on the biosite. If O3\_STATCD = 3, then the tallied field data for a given species and location are not included in summary calculations and trend analysis. If O3\_STATCD = 4, then OZONE\_VISIT.INJCHECK is set to 1 and all tallied field data are included in summary calculations and trend analysis. If O3\_STATCD = 5, then OZONE\_VISIT.INJCHECK is set to zero and all tallied field data are included in summary calculations and trend analysis.

**2.3.15 MEASYEAR**

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

**2.3.16 CREATED\_BY**

**Created by.** See OZONE\_PLOT.CREATED\_BY description for definition.

**2.3.17 CREATED\_DATE**

**Created date.** See OZONE\_PLOT.CREATED\_DATE description for definition.

**2.3.18 CREATED\_IN\_INSTANCE**

**Created in instance.** See OZONE\_PLOT.CREATED\_IN\_INSTANCE description for definition.

**2.3.19 MODIFIED\_BY**

**Modified by.** See OZONE\_PLOT.MODIFIED\_BY description for definition.

**2.3.20 MODIFIED\_DATE**

**Modified date.** See OZONE\_PLOT.MODIFIED\_DATE description for definition.

**2.3.21 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See OZONE\_PLOT.MODIFIED\_IN\_INSTANCE description for definition.



## 2.4 Ozone Biosite Summary Table

### (Oracle table name: OZONE\_BIOSITE\_SUMMARY)

The attributes in this table summarize ozone indicator data by biosite and year. FIELD\_ID is a system-generated number assigned to a biosite. O3PLOT is a unique identifier used in combination with STATECD, COUNTCD, and INVYR to identify a biosite. O3PLOT is the same as FIELD\_ID except the last digit of O3PLOT equals 1 when the biosite consists of one location, or 2 when the biosite consists of two locations. When two locations are used, the data from both locations are combined for the biosite summary attributes. Each biosite (O3PLOT) is associated with a location count (LOCATION\_CNT) and a ground location (GROUND\_LOC\_CD) attribute. LOCATION\_CNT has a value of 1 or 2 depending on whether the data were collected from one or two locations. GROUND\_LOC\_CD has a value of 1 or more depending on whether the ground location for a biosite has remained the same, or changed from one year to the next. Ground locations change when the open areas used for biomonitoring become overgrown or disturbed and must be replaced.

For each biosite, summary values are tabulated for the total number of species evaluated (SPECIES\_EVAL\_CNT), the total number of plants evaluated (PLANT\_EVAL\_CNT), the total number of plants injured (PLANT\_INJ\_CNT), the ratio of injured to evaluated plants (PLANT\_RATIO), the percent of sampled plants in each injury severity class (SVRTY\_CLASS\_ZERO to SVRTY\_CLASS\_FIVE), and the biosite-level ozone injury index (BIOSITE\_INDEX). These summary statistics may be used in an annual report to list how many biosites were visited, how many plants were evaluated, and how many (or percent) of the total plots and plants sustained ozone injury. Over time, these summary statistics can be used to report on regional trends in ozone stress in terms of significant changes in the number and distribution of biomonitoring plots with ozone injury, changes in injury severity classifications, and increases or decreases in the ozone injury index.

Severity classifications are based on a modified Horsfall-Barrett (HB) scale with breakpoints at 6, 25, 50, 75, and 100 percent (Horsfall and Cowling 1978). Injury severity is an estimate of the mean severity of symptoms on injured foliage as recorded by FIA field crews for individual plant samples. Calculated percents are rounded to the nearest whole number. Severity class zero = no injury; class one = 1-6 percent injury; class two = 7-25 percent; class three = 26-50 percent; class four = 51-75 percent; class 5 = more than 75 percent injury. Providing a table for each FIA reporting unit (e.g., state, ecoregion) and year that displays the number of biosites evaluated, the number of plants sampled, and the percent of sampled plants in each injury severity category is a highly defensible way to present ozone summary statistics.

Guidelines for interpreting the biosite-level ozone injury index are listed in the description of BIOSITE\_INDEX. BIOSITE\_INDEX is formulated from the injury amount and severity ratings recorded for each plant and the numbers of plants and species evaluated at each site. The BIOSITE\_INDEX gives a precise estimate of plant response and the opportunity to calculate thresholds of concern for the ozone indicator.

Ozone cannot injure plants unless it enters the leaves through open stomata. Therefore, visible injury on bioindicator species (BIOSITE\_INDEX > 0) provides a biological record of both high ozone and favorable conditions for ozone flux including adequate light, nutrition, and soil moisture. For this reason, the measured response of bioindicator plants to ambient ozone exposures is a more meaningful indicator of ozone stress and probable impact than ambient ozone concentration data obtained from physical air quality monitoring stations.

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.4.1	CN	Sequence number	VARCHAR2(34)
2.4.2	INVYR	Inventory year	NUMBER(4)
2.4.3	STATECD	State code	NUMBER(4)
2.4.4	COUNTYCD	County code	NUMBER(3)
2.4.5	O3PLOT	Ozone plot	NUMBER
2.4.6	FIELD_ID	Field identification number	NUMBER(7)
2.4.7	LOCATION_CNT	Location count	NUMBER
2.4.8	GROUND_LOC_CD	Ground location code	NUMBER(1)
2.4.9	MEASYEAR	Measurement year	NUMBER(4)
2.4.10	PLANT_INJ_CNT	Plant injury count	NUMBER
2.4.11	PLANT_EVAL_CNT	Plant evaluation count	NUMBER
2.4.12	PLANT_RATIO	Plant ratio	NUMBER
2.4.13	SPECIES_EVAL_CNT	Species evaluation count	NUMBER
2.4.14	BIOSITE_INDEX	Biosite index	NUMBER
2.4.15	BIOSITE_INDEX_MULTIPLIER	Biosite index multiplier	NUMBER
2.4.16	SVRTY_CLASS_ZERO	Severity class zero	NUMBER
2.4.17	SVRTY_CLASS_ONE	Severity class one	NUMBER
2.4.18	SVRTY_CLASS_TWO	Severity class two	NUMBER
2.4.19	SVRTY_CLASS_THREE	Severity class three	NUMBER
2.4.20	SVRTY_CLASS_FOUR	Severity class four	NUMBER
2.4.21	SVRTY_CLASS_FIVE	Severity class five	NUMBER
2.4.22	CREATED_BY	Created by	VARCHAR2(30)
2.4.23	CREATED_DATE	Created date	DATE
2.4.24	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
2.4.25	MODIFIED_BY	Modified by	VARCHAR2(30)
2.4.26	MODIFIED_DATE	Modified date	DATE
2.4.27	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	OBS_PK
Unique	STATECD, INVYR, COUNTYCD, O3PLOT, FIELD_ID	N/A	OBS_UK

### 2.4.1 CN

**Sequence number.** A unique sequence number used to identify an ozone biosite summary record.

**2.4.2 INVYR**

**Inventory year.** The year in which ozone data were collected. All the plots in the ozone grid are measured every year.

**2.4.3 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.4.4 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.4.5 O3PLOT**

**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biomonitoring site. When a biosite is split, O3PLOT is the same for both locations except for the last digit, which will be a 1 or 2.

**2.4.6 FIELD\_ID**

**Field identification number.** A system-generated number used to identify a biosite. There is only one record with a particular FIELD\_ID value because data from multiple locations have been summarized to represent one biosite.

**2.4.7 LOCATION\_CNT**

**Location count.** A number indicating how many locations were sampled for a particular biosite. This attribute equals either 1 or 2. A value of 1 means that the plant count and injury data were collected from a single location and a value of 2 means data were collected from two locations. When two locations are used, the data from both locations are combined in the biosite summary values.

**2.4.8 GROUND\_LOC\_CD**

**Ground location code.** A code indicating the number of times the biosite location has been moved more than 3 miles. The first ground location is coded GROUND\_LOC\_CD = 1. Whenever an ozone biosite location moves to more than 3 miles from the initial location, the GROUND\_LOC\_CD is increased (i.e., incremented) by 1.

**2.4.9 MEASYEAR**

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

**2.4.10 PLANT\_INJ\_CNT**

**Plant injury count.** The number of injured plants at a biosite equals the number of plants that have injury amounts greater than zero. This value is combined across all species. Sensitivity to ozone is strongly influenced by genotype and microhabitat such that

neighboring plants of the same species show very different responses to ozone exposure. At any one location, around 10 percent of a sensitive population will show a visible response to phytotoxic ozone concentrations.

PLANT\_INJ\_CNT = count (plants at an ozone plot that have an injury amount greater than zero).

#### 2.4.11 PLANT\_EVAL\_CNT

**Plant evaluation count.** The number of plants evaluated equals the total number of plants examined at a biosite. This value is combined across all species. Field crews are trained to evaluate up to 30 plants of two or more species. The average number of evaluated plants at western biosites is 75. The average count for eastern biosites is 100, although many have 150 evaluated plants. It takes injury to only one plant of one species to document the occurrence of plant-damaging ozone concentrations. However, the assessment of risk to the surrounding forest is more robust when many plants of more than one species show an ozone injury response.

PLANT\_EVAL\_CNT = count (all plants evaluated at an ozone plot)

#### 2.4.12 PLANT\_RATIO

**Plant ratio.** The plants ratio is the ratio of the number of plants injured to the number of plants evaluated. That is, the plants ratio equals the number of plants injured divided by the number of plants evaluated. Using a ratio allows a direct comparison between biosites, States, or regions that have different sample counts. Examining the relationship between the percent injured plants and the biosite index also provides insight into whether a high injury index is the result of an acute exposure (severe injury to relatively few plants) or the result of moderate injury to a larger sample of the sensitive population.

PLANT\_RATIO = PLANTS\_INJ\_CNT / PLANTS\_EVAL\_CNT

#### 2.4.13 SPECIES\_EVAL\_CNT

**Species evaluation count.** The species evaluation count equals the number of species evaluated at a biosite. Typically the number of species evaluated is 2 in the West and 3 to 5 in the East. The information obtained from different species is combined to make the biosite index a representative value for a given biosite. Furthermore, certain species are good bioindicators of elevated ozone concentrations in growing seasons with above average rainfall and others are good bioindicators in dry seasons. The goal is to maximize the opportunity to capture the ozone stress signal by evaluating as many species and plants as possible in areas close to the forests and subject to the same ozone air quality regime.

SPECIES\_EVAL\_CNT = count (the unique species evaluated at an ozone plot)

#### 2.4.14 BIOSITE\_INDEX

**Biosite index.** The biosite index (BIOSITE\_INDEX) equals the sum of the species index (BIOSPCD\_INDEX) divided by the species evaluation count (SPECIES\_EVAL\_CNT). The information obtained from different species is combined into one injury index to make the BIOSITE\_INDEX a representative value for a given biosite. The index is not intended to be used as a measurement of harm. Rather, it provides a relative value, a gradation of response that quantifies the degree of ozone injury conditions on the FIA detection monitoring plots. In the following table, the BIOSITE\_INDEX is multiplied by 1000 and the result is classified into four categories of risk designed to capture differences in plant



damage to ozone-sensitive tree species in areas of none, low, moderate, and high ozone stress where stress is defined as the confluence of interacting factors (e.g., plant properties and external growth conditions) that determine ozone flux. The assumption of risk assigned to each category represents a relative measure of probable impacts from ambient ozone exposure or a relative measure of ozone air quality with respect to forest health.

$\text{BIOSITE\_INDEX} = \text{summation (BIOSPCD\_INDEX)} / \text{SPECIES\_EVAL\_CNT}$

**Codes: BIOSITE\_INDEX**

Biosite Index (multiplied by 1000)	Bioindicator response	Assumption of risk	Possible impact	Relative air quality
0 to 4.9	Little or no foliar injury.	None.	Visible injury to highly sensitive species, e.g., black cherry.	Good.
5.0 to 14.9	Light to moderate foliar injury.	Low.	Visible injury to moderately sensitive species, e.g., tulip poplar.	Moderate.
15.0 to 24.9	Moderate to severe foliar injury.	Moderate.	Visible and invisible injury; tree-level response.	Unhealthy for sensitive species.
≥ 25	Severe foliar injury.	High.	Visible and invisible injury; ecosystem-level response.	Unhealthy.

#### 2.4.15 BIOSITE\_INDEX\_MULTIPLIER

**Biosite index multiplier.** The biosite index multiplier is the biosite index (BIOSITE\_INDEX) multiplied by 1000 to allow the ozone risk categories to be defined by integers. Use this value in reports rather than the calculated biosite index.

$\text{BIOSITE\_INDEX\_MULTIPLIER} = \text{BIOSITE\_INDEX} * 1000$

#### 2.4.16 SVRTY\_CLASS\_ZERO

**Severity class zero.** The percent of all evaluated plants at a given biosite that have no symptoms of ozone-induced foliar injury.

$\text{SVRTY\_CLASS\_ZERO} = \text{count (all plants with injury severity equal to zero)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$

#### 2.4.17 SVRTY\_CLASS\_ONE

**Severity class one.** The percent of all plants evaluated with an injury severity rating of 1. Injury class one may be considered slight injury. A severity rating of 1 is assigned when, on average, 1 to 6 percent of the leaf area of the injured leaves have ozone damage symptoms.

$\text{SVRTY\_CLASS\_ONE} = \text{count (all plants with injury severity equal to 1)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$

**2.4.18 SVRTY\_CLASS\_TWO**

**Severity class two.** The percent of all plants evaluated with a severity rating of 2. Injury class two may be considered low to moderate ozone injury. A severity rating of 2 is assigned when, on average, 7 to 25 percent of the leaf area of the injured leaves have ozone damage symptoms.

$SVRTY\_CLASS\_TWO = \text{count (all plants with injury severity equal to 2)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$ .

**2.4.19 SVRTY\_CLASS\_THREE**

**Severity class three.** The percent of all plants evaluated with an injury severity rating of 3. Injury class three may be considered moderate ozone injury. A severity rating of 3 is assigned when, on average, 26 to 50 percent of the leaf area of the injured leaves have ozone damage symptoms.

$SVRTY\_CLASS\_THREE = \text{count (all plants with injury severity equal to 3)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$ .

**2.4.20 SVRTY\_CLASS\_FOUR**

**Severity class four.** The percent of all plants evaluated with an injury severity rating of 4. Injury class four may be considered moderate to severe ozone injury. A severity rating of 4 is assigned when, on average, 51 to 75 percent of the leaf area of the injured leaves have ozone damage symptoms.

$SVRTY\_CLASS\_FOUR = \text{count (all plants with injury severity equal to 4)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$ .

**2.4.21 SVRTY\_CLASS\_FIVE**

**Severity class five.** The percent of all plants evaluated with an injury severity rating of 5. Injury class five may be considered severe ozone injury. A severity rating of 5 is assigned when, on average, greater than 75 percent of the leaf area of the injured leaves have ozone damage symptoms.

$SVRTY\_CLASS\_FIVE = \text{count (all plants with injury severity equal to 5)} * 100 / \text{count (all plants evaluated at an ozone plot, i.e., PLANT\_EVAL\_CNT)}$ .

**2.4.22 CREATED\_BY**

**Created by.** See OZONE\_PLOT.CREATED\_BY description for definition.

**2.4.23 CREATED\_DATE**

**Created date.** See OZONE\_PLOT.CREATED\_DATE description for definition.

**2.4.24 CREATED\_IN\_INSTANCE**

**Created in instance.** See OZONE\_PLOT.CREATED\_IN\_INSTANCE description for definition.

**2.4.25 MODIFIED\_BY**

**Modified by.** See OZONE\_PLOT.MODIFIED\_BY description for definition.

**2.4.26 MODIFIED\_DATE**

**Modified date.** See OZONE\_PLOT.MODIFIED\_DATE description for definition.

**2.4.27 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See OZONE\_PLOT.MODIFIED\_IN\_INSTANCE description for definition.



## 2.5 Ozone Plot Summary Table

### (Oracle table name: OZONE\_PLOT\_SUMMARY)

This table provides location-specific information recorded in the field or derived from the field data. The attributes in this table summarize ozone injury, species counts, and site characteristics for each ground location visited by the field crews. Ground location differs from ozone biosite because a small number of ozone biosites consist of two ground locations. Ozone biosites that consist of two locations are referred to as split plots. Two locations are used to increase species and plant counts for a single ozone biosite. If two locations are used, they are within 3 miles of each other. FIELD\_ID is the same for both locations, but they have different split plot identification numbers (SPLIT\_PLOTID).

O3PLOT is a concatenation of FIELD\_ID and SPLIT\_PLOTID and can be used in combination with STATECD, INVYR, and COUNTYCD to uniquely identify each ground location. For each ground location, coded site characteristics include plot size (PLTSIZE), elevation (ELEV), aspect (ASPECT), terrain position (TERRPOS), soil depth (SOILDPATH), soil drainage (SOILDRN), plot wetness (PLOTWET), and plot disturbance (PLTDSTRB).

Ozone plots vary in size and do not have set boundaries. Crews specify the predominant site characteristics where most of the plant species are located. If conditions vary markedly across the site or by species, then this is described in the plot notes or on the site map. Elevation, aspect, terrain position, soil depth, soil drainage, plot wetness, and disturbance are specified for the highest priority species listed in the field guide. The soil depth, soil drainage, plot wetness, and disturbance attributes are intended to describe general conditions on the plot and are not based on actual measurements. Geographical coordinates that have been fuzzed (LAT and LON) are provided for each ground location. Analysts should review the OZONE\_VISIT table for additional information (SMPKND, CRWTPCD, and INJCHECK) on each ground location.

The location-specific attributes in this table provide the opportunity to examine certain site characteristics (e.g., elevation, plot size) more closely. However, for the purposes of detection monitoring reports, the preferred summary statistic is the biosite-level injury index (OZONE\_BIOSITE\_SUMMARY.BIOSITE\_INDEX).

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.5.1	CN	Sequence number	VARCHAR2(34)
2.5.2	INVYR	Inventory year	NUMBER(4)
2.5.3	STATECD	State code	NUMBER(4)
2.5.4	COUNTYCD	County code	NUMBER(3)
2.5.5	O3PLOT	Ozone plot	NUMBER
2.5.6	FIELD_ID	Field identification number	NUMBER(7)
2.5.7	SPLIT_PLOTID	Split plot identification	NUMBER(1)
2.5.8	MEASYEAR	Measurement year	NUMBER(4)
2.5.9	SPECIES_EVAL_CNT	Species evaluation count	NUMBER
2.5.10	BIOSITE_INDEX	Biosite index	NUMBER
2.5.11	ELEV	Elevation	NUMBER(5)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.5.12	PLTSIZE	Plot size	NUMBER
2.5.13	ASPECT	Aspect	NUMBER(3)
2.5.14	TERRPOS	Terrain position	NUMBER
2.5.15	SOILDPTH	Soil depth	NUMBER
2.5.16	SOILDRN	Soil drainage	NUMBER
2.5.17	PLOTWET	Plot wetness	NUMBER
2.5.18	PLTDSTRB	Plot disturbance	NUMBER
2.5.19	BIOSITE_INDEX_MULTIPLIER	Biosite index multiplier	NUMBER
2.5.20	LAT	Latitude	NUMBER(8,6)
2.5.21	LON	Longitude	NUMBER(9,6)
2.5.22	CREATED_BY	Created by	VARCHAR2(30)
2.5.23	CREATED_DATE	Created date	DATE
2.5.24	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
2.5.25	MODIFIED_BY	Modified by	VARCHAR2(30)
2.5.26	MODIFIED_DATE	Modified date	DATE
2.5.27	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	OPS_PK
Unique	STATECD, INVYR, COUNTYCD, O3PLOT, FIELD_ID, SPLIT_PLOTID	N/A	OPS_UK

**2.5.1 CN**

**Sequence number.** A unique sequence number used to identify an ozone plot summary record.

**2.5.2 INVYR**

**Inventory year.** The year in which ozone data were collected. All the plots in the ozone grid are measured every year

**2.5.3 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.5.4 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis

Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 2.5.5 O3PLOT

**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biosite. When a biosite is split, O3PLOT is the same for both locations except for the last digit, which will be a 1 or a 2.

### 2.5.6 FIELD\_ID

**Field identification number.** A system-generated number used to identify a biosite. There will be more than one record with a given FIELD\_ID value when two locations are sampled for one biosite.

### 2.5.7 SPLIT\_PLOTID

**Split plot identification.** A number used to identify the distinct locations sampled for a particular biosite. SPLIT\_PLOTID = 1 identifies either a single location biosite or the first location of a biosite split between two locations. SPLIT\_PLOTID = 2 identifies the second location of a biosite split between two locations. The second location is added by the field crew to increase species and plant counts for a biosite.

### 2.5.8 MEASYEAR

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

### 2.5.9 SPECIES\_EVAL\_CNT

**Species evaluation count.** The species evaluation count equals the number of species evaluated at each ground location visited by the field crews. Typically the number of species evaluated is 2 in the West and 3 to 5 in the East. When the biosite is split between two locations, the number of species evaluated at any one location may be 1.

$\text{SPECIES\_EVAL\_CNT} = \text{count (the unique species evaluated at a ground location)}$

### 2.5.10 BIOSITE\_INDEX

**Biosite index.** The biosite index (BIOSITE\_INDEX) equals the sum of the species index (BIOSPCD\_INDEX) divided by the species evaluation count (SPECIES\_EVAL\_CNT). The information obtained from different species is combined into one injury index to make the BIOSITE\_INDEX a representative value for a given biosite. The index is not intended to be used as a measurement of harm. Rather, it provides a relative value, a gradation of response that quantifies the degree of ozone injury conditions on the FIA detection monitoring plots. In the following table, the BIOSITE\_INDEX is multiplied by 1000 and the result is classified into four categories of risk designed to capture differences in plant damage to ozone-sensitive tree species in areas of none, low, moderate, and high ozone stress where stress is defined as the confluence of interacting factors (e.g., plant properties and external growth conditions) that determine ozone flux. The assumption of risk assigned to each category represents a relative measure of probable impacts from ambient ozone exposure, or a relative measure of ozone air quality with respect to forest health.

$\text{BIOSITE\_INDEX} = \text{summation (BIOSPCD\_INDEX)} / \text{SPECIES\_EVAL\_CNT}$

**Codes: BIOSITE\_INDEX**

<b>Biosite Index (multiplied by 1000)</b>	<b>Bioindicator response</b>	<b>Assumption of risk</b>	<b>Possible impact</b>	<b>Relative air quality</b>
0 to 4.9	Little or no foliar injury.	None.	Visible injury to highly sensitive species, e.g., black cherry.	Good.
5.0 to 14.9	Light to moderate foliar injury.	Low.	Visible injury to moderately sensitive species, e.g., tulip poplar.	Moderate.
15.0 to 24.9	Moderate to severe foliar injury.	Moderate.	Visible and invisible injury; tree-level response.	Unhealthy for sensitive species.
≥ 25	Severe foliar injury.	High.	Visible and invisible injury; ecosystem-level response.	Unhealthy.

**2.5.11 ELEV**

**Elevation.** Elevation data are obtained either by using a global positioning system (GPS) unit or USGS topographic maps (generally the 7½ minute series quadrangle). Field crews locate the area where most of the bioindicator species are growing and record elevation to the nearest foot.

**2.5.12 PLTSIZE**

**Plot size.** A code indicating the size of the opening used for biomonitoring. Open areas that are more than 3 acres in size are ideal because they optimize ozone air mixture. Uniform, open areas with a wide selection of bioindicator species are relatively easy to find in eastern FIA regions, but more difficult to find in western FIA regions. For data from 2002 to the present, the PLTSIZE codes are:

**Codes: PLTSIZE**

<b>Code</b>	<b>Description</b>
1	Greater than 3 acres.
2	Greater than 1 acre, but less than 3 acres.

For data before 2002, the PLTSIZE codes are:

**Codes: PLTSIZE**

<b>Code</b>	<b>Description</b>
1	Greater than 3 acres.
2	One-half to 3 acres.
3	Less than half an acre.
4	Under forest canopy, no opening.



**2.5.13 ASPECT**

**Aspect.** The aspect attribute identifies the direction of slope for land surfaces with at least 5 percent slope as measured with a hand compass to the nearest degree (0° to 360°). The majority of biosites in eastern regions have no aspect whereas conditions in western regions are more variable. There are no published reports that suggest the direction of slope has a significant bearing on the ozone indicator. However, in western regions, north- or east-facing slopes indicate drier plot moisture conditions than south- or west-facing slopes, and plot moisture can have a significant influence on plant response to ozone.

**2.5.14 TERRPOS**

**Terrain position.** A code indicating the position of the biosite in relation to the surrounding topography. Eastern biosites are often located on flat land. In the West, the terrain may be more varied.

**Codes: TERRPOS**

Code	Description
1	Ridge top or upper slope.
2	Bench or level area along a slope.
3	Lower slope.
4	Flat land unrelated to slope.
5	Bottom land with occasional flooding.

**2.5.15 SOILDPTH**

**Soil depth.** A code indicating the general depth of the soil where most of the bioindicator species are growing. Soil that is generally shallow may be subject to more frequent and severe drought, thereby mitigating the response of bioindicator species to ambient ozone exposures.

**Codes: SOILDPTH**

Code	Description
1	Bedrock is not exposed.
2	Bedrock is exposed; soil is generally shallow.

**2.5.16 SOILDRN**

**Soil drainage.** A code indicating the general soil drainage conditions where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone exposures is optimized on soils that are well drained. This attribute is used for eastern FIA regions.

**Codes: SOILDRN**

Code	Description
1	Soil is well drained.
2	Soil is excessively wet.
3	Soil is excessively dry.

**2.5.17 PLOTWET**

**Plot wetness.** A code indicating the degree of wetness where most of the bioindicator species are growing. Very dry or exposed sites may mitigate the response of bioindicator species to ambient ozone exposures. This attribute is used for western FIA regions.

**Codes: PLOTWET**

Code	Description
0	Wet or damp (riparian zones, damp areas along a stream or meadow).
1	Moderately dry (grassland, meadow, or east-facing slopes).
2	Very dry (exposed rocky ledges, desert, and some alpine areas).

**2.5.18 PLTDSTRB**

**Plot disturbance.** A code indicating the presence and kind of disturbance where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone exposures is optimized on sites with no recent or significant disturbance. The area affected by any human-caused or natural disturbance must be clearly visible and recent enough to influence plant health and condition. Disturbance that results in significant soil compaction may mitigate the response of bioindicator species to ambient ozone exposures and is considered especially significant. Crews are trained to replace biosites that have been disturbed.

**Codes: PLTDSTRB**

Code	Description
0	No recent or significant disturbance.
1	Evidence of overuse; human activity causing obvious soil compaction or erosion.
2	Evidence of natural disturbance including fire, wind, flooding, grazing, pests, etc.

**2.5.19 BIOSITE\_INDEX\_MULTIPLIER**

**Biosite index multiplier.** The biosite index multiplier is the biosite index (BIOSITE\_INDEX) multiplied by 1000 to allow the ozone risk categories to be defined by integers. Use this value in reports rather than the calculated biosite index.

$\text{BIOSITE\_INDEX\_MULTIPLIER} = \text{BIOSITE\_INDEX} * 1000$

**2.5.20 LAT**

**Latitude.** The approximate latitude of the plot in decimal degrees using NAD 83 datum. Actual plot coordinates cannot be released because of a privacy provision enacted by Congress in the Food Security Act of 1985. Therefore, this attribute is within +/- 8.5 miles of the actual latitude and longitude, and the attribute is in the correct county.

**2.5.21 LON**

**Longitude.** The approximate longitude of the plot in decimal degrees using NAD 83 datum. Actual plot coordinates cannot be released because of a privacy provision enacted by Congress in the Food Security Act of 1985. Therefore, this attribute is within +/- 8.5 miles of the actual latitude and longitude, and the attribute is in the correct county.

**2.5.22 CREATED\_BY**

**Created by.** See OZONE\_PLOT.CREATED\_BY description for definition.

**2.5.23 CREATED\_DATE**

**Created date.** See OZONE\_PLOT.CREATED\_DATE description for definition

**2.5.24 CREATED\_IN\_INSTANCE**

**Created in instance.** See OZONE\_PLOT.CREATED\_IN\_INSTANCE description for definition.

**2.5.25 MODIFIED\_BY**

**Modified by.** See OZONE\_PLOT.MODIFIED\_BY description for definition.

**2.5.26 MODIFIED\_DATE**

**Modified date.** See OZONE\_PLOT.MODIFIED\_DATE description for definition.

**2.5.27 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See OZONE\_PLOT.MODIFIED\_IN\_INSTANCE description for definition.



## 2.6 Ozone Species Summary Table

### (Oracle table name: OZONE\_SPECIES\_SUMMARY)

The attributes in this table summarize ozone injury and site characteristics for each bioindicator species (BIOSPCD) evaluated at each ground location. Ground location differs from ozone biosite because a small number of ozone biosites consist of two ground locations. Ozone biosites that consist of two locations are referred to as split plots. Two locations are used to increase species and plant counts for a single ozone biosite. If two locations are used, they are within 3 miles of each other. The field identification number (FIELD\_ID) is the same for both locations, but they have different split plot identification (SPLIT\_PLOTID) numbers. O3PLOT is a concatenation of FIELD\_ID and SPLIT\_PLOTID and can be used in combination with STATECD, COUNTYCD, and INVYR to uniquely identify each ground location. When two locations are used, the same species (BIOSPCD) may be evaluated at both locations.

Each plant evaluated by the field crews is rated for amount (AMNT) and severity (SVRTY) of ozone injury. The maximum (AMNT\_MAX, SVRTY\_MAX), minimum (AMNT\_MIN, SVRTY\_MIN), and mean (AMNT\_MEAN, SVRTY\_MEAN) values for these two indices are summarized by species (BIOSPCD). Injury amount is an estimate of the percent injured leaves on each plant. Injury severity is an estimate of the mean severity of symptoms on injured foliage. Both attributes should be considered. Some plants may have slight to moderate injury on all leaves; others may have severe injury on a small number of leaves. The injury pattern may be species specific or may relate to the stage of development at the time of ozone exposure. Injury may also depend on site characteristics (e.g., soil depth, size of opening) that have a greater or lesser influence on amount and severity of injury depending on the species. However, the degree to which site characteristics influence injury amount and severity may also be species dependent. Site characteristics presented by species (BIOSPCD) at each ground location include plot size (PLTSIZE), elevation (ELEV), aspect (ASPECT), terrain position (TERRPOS), soil depth (SOILDPTH), soil drainage (SOILDRN), plot wetness (PLOTWET), and plot disturbance (PLTDSTRB).

A species-level ozone injury index (BIOSPCD\_INDEX) is also presented. This provides an opportunity to make comparisons among biosites using indices derived from the same species. A species-specific analysis may be appropriate for certain studies. However, for the purpose of many monitoring reports, the preferred summary statistic is the biosite-level ozone injury index (OZONE\_BIOSITE\_SUMMARY.BIOSITE\_INDEX).

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.6.1	CN	Sequence number	VARCHAR2(34)
2.6.2	INVYR	Inventory year	NUMBER(4)
2.6.3	STATECD	State code	NUMBER(4)
2.6.4	COUNTYCD	County code	NUMBER(3)
2.6.5	O3PLOT	Ozone plot	NUMBER
2.6.6	FIELD_ID	Field identification number	NUMBER(7)
2.6.7	SPLIT_PLOTID	Split plot identification	NUMBER(1)
2.6.8	GROUND_LOC_CD	Ground location code	NUMBER(1)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
2.6.9	MEASYEAR	Measurement year	NUMBER(4)
2.6.10	BIOSPCD	Bioindicator species code	NUMBER
2.6.11	AMNT_MAX	Amount maximum	NUMBER
2.6.12	AMNT_MIN	Amount minimum	NUMBER
2.6.13	AMNT_MEAN	Amount mean	NUMBER
2.6.14	SVRTY_MAX	Severity maximum	NUMBER
2.6.15	SVRTY_MIN	Severity minimum	NUMBER
2.6.16	SVRTY_MEAN	Severity mean	NUMBER
2.6.17	PLANT_INJ_CNT	Plant injury count	NUMBER
2.6.18	PLANT_EVAL CNT	Plant evaluation count	NUMBER
2.6.19	PLANT_RATIO	Plant ratio	NUMBER
2.6.20	BIOSPCD_SUM	Bioindicator species summary	NUMBER
2.6.21	BIOSPCD_INDEX	Bioindicator species index	NUMBER
2.6.22	ELEV	Elevation	NUMBER(5)
2.6.23	PLTSIZE	Plot size	NUMBER
2.6.24	ASPECT	Aspect	NUMBER(3)
2.6.25	TERRPOS	Terrain position	NUMBER
2.6.26	SOILDPH	Soil depth	NUMBER
2.6.27	SOILDNR	Soil drainage	NUMBER
2.6.28	PLOTWET	Plot wetness	NUMBER
2.6.29	PLTDSTRB	Plot disturbance	NUMBER
2.6.30	CREATED_BY	Created by	VARCHAR2(30)
2.6.31	CREATED_DATE	Created date	DATE
2.6.32	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
2.6.33	MODIFIED_BY	Modified by	VARCHAR2(30)
2.6.34	MODIFIED_DATE	Modified date	DATE
2.6.35	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	OSY_PK
Unique	STATECD, INVYR, COUNTYCD, O3PLOT, BIOSPCD	N/A	OSY_UK

### 2.6.1 CN

**Sequence number.** A unique sequence number used to identify an ozone species summary record.

**2.6.2 INVYR**

**Inventory year.** The year in which ozone data were collected. All the plots in the ozone grid are measured every year.

**2.6.3 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.6.4 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**2.6.5 O3PLOT**

**Ozone plot.** A unique identifier for an ozone biosite that is a concatenation of FIELD\_ID and SPLIT\_PLOTID. It can be used in combination with STATECD, COUNTYCD, and INVYR to identify an ozone biomonitoring site. When a biosite is split, O3PLOT is the same for both locations except for the last digit, which will be a 1 or 2.

**2.6.6 FIELD\_ID**

**Field identification number.** A system-generated number used to identify a biosite. There will be more than one record with a given FIELD\_ID value when two locations are sampled for one biosite.

**2.6.7 SPLIT\_PLOTID**

**Split plot identification.** A number used to identify the distinct locations sampled for a particular biosite. SPLIT\_PLOTID = 1 identifies either a single location biosite or the first location of a biosite split between two locations. SPLIT\_PLOTID = 2 identifies the second location of a biosite split between two locations. The second location is added by the field crew to increase species and plant counts for a biosite.

**2.6.8 GROUND\_LOC\_CD**

**Ground location code.** A code indicating the number of times the biosite location has been moved more than 3 miles. The first ground location will be coded GROUND\_LOC\_CD = 1. Whenever an ozone biosite location moves to more than 3 miles from the initial location, GROUND\_LOC\_CD is increased (i.e., incremented) by 1.

**2.6.9 MEASYEAR**

**Measurement year.** The year in which the plot was completed. For the ozone indicator, MEASYEAR is always the same as INVYR.

**2.6.10 BIOSPCD**

**Bioindicator species code.** A code indicating the bioindicator species on the biosite. Bioindicator species may be a tree, a woody shrub, or a non-woody herb species. All of the species selected for use respond to ambient levels of ozone pollution with distinct

visible foliar symptoms that are easy to diagnose. See code list with OZONE\_VALIDATION.BIOSPCD.

#### 2.6.11 AMNT\_MAX

**Amount maximum.** The maximum amount of injury for a given bioindicator species (BIOSPCD) at an ozone plot equals the maximum value of all the injury amounts for that species. If there are no injured plants within the species, the maximum amount of injury for the species equals zero.

AMNT\_MAX = maximum (injury amounts for a given species at an ozone plot)

#### 2.6.12 AMNT\_MIN

**Amount minimum.** The minimum amount of injury for a given bioindicator species (BIOSPCD) at an ozone plot equals the minimum value of all the injury amounts for that species. If there are no injured plants within the species, the minimum amount of injury for the species equals zero.

AMNT\_MIN = minimum (injury amounts for a given species at an ozone plot)

#### 2.6.13 AMNT\_MEAN

**Amount mean.** The mean amount of injury for a given bioindicator species (BIOSPCD) at an ozone plot equals the arithmetic mean of all the injury amounts greater than zero. If there are no injured plants within the species, the mean amount of injury for the species equals zero.

AMNT\_MEAN = summation (injury amounts for a given species at an ozone plot that are greater than zero) / number of injured plants

#### 2.6.14 SVRTY\_MAX

**Severity maximum.** The maximum amount of injury severity for a given bioindicator species (BIOSPCD) at an ozone plot equals the maximum value of all the injury severity amounts for that species. If there are no injured plants within the species, the maximum amount of injury severity for the species equals zero.

SVRTY\_MAX = maximum (injury severity amounts for a given species at an ozone plot)

#### 2.6.15 SVRTY\_MIN

**Severity minimum.** The minimum amount of injury severity for a given bioindicator species (BIOSPCD) at an ozone plot equals the minimum value of all the injury severity amounts for that species. If there are no injured plants within the species, the minimum amount of injury severity for the species equals zero.

SVRTY\_MIN = minimum (injury severity amounts for a given species at an ozone plot)

#### 2.6.16 SVRTY\_MEAN

**Severity mean.** The mean amount of injury severity for a given bioindicator species (BIOSPCD) at an ozone plot equals the arithmetic mean of all the injury severity amounts greater than zero. If there are no damaged plants (injury severity amount is null) within the species, the mean amount of injury severity for the species equals zero.

SVRTY\_MEAN = summation (injury severity amounts for a given species at an ozone plot that are greater than zero) / number of injured plants



**2.6.17 PLANT\_INJ\_CNT**

**Plant injury count.** Plant injury count. The number of injured plants for a given bioindicator species (BIOSPCD) at an ozone plot equals the number of plants that have injury amounts greater than zero.

$PLANT\_INJ\_CNT = \text{count (plants within a given species at an ozone plot that have an injury amount greater than zero)}$

**2.6.18 PLANT\_EVAL\_CNT**

**Plant evaluation count.** The number of plants evaluated equals the total number of plants examined for a given bioindicator species (BIOSPCD) at an ozone plot.

$PLANT\_EVAL\_CNT = \text{count (all plants evaluated for a given species at an ozone plot)}$

**2.6.19 PLANT\_RATIO**

**Plant ratio.** The plants ratio is the ratio of the number of plants injured to the number of plants evaluated for a given bioindicator species (BIOSPCD) at an ozone plot. That is, the plant ratio equals the number of plants injured divided by the number of plants evaluated.

$PLANT\_RATIO = PLANTS\_INJ\_CNT / PLANTS\_EVAL\_CNT$

**2.6.20 BIOSPCD\_SUM**

**Bioindicator species sum.** The biospecies sum for a given bioindicator species at an ozone plot equals the sum of the products of the plants' injury amount and injury severity values divided by the number of plants injured. If there are no injured plants within the species, the species sum equals zero.

$BIOSPCD\_SUM = \text{summation ((plant's injury amount) * (plant's injury severity))} / PLANT\_INJ\_CNT$

**2.6.21 BIOSPCD\_INDEX**

**Bioindicator species index.** The biospecies index for a given bioindicator species at an ozone plot equals the product of the plant ratio and the biospecies sum. This species-level ozone injury index (BIOSPCD\_INDEX) provides an opportunity to make comparisons among plots or regions using an injury index derived from the same species or group of species. A species-specific analysis may be appropriate for certain evaluation monitoring studies.

$BIOSPCD\_INDEX = PLANT\_RATIO * BIOSPCD\_SUM$

**2.6.22 ELEV**

**Elevation.** Elevation data are obtained either by using a global positioning system (GPS) unit or USGS topographic maps (generally the 7½ minute series quadrangle). Field crews locate the area where most of the bioindicator species are growing and record elevation to the nearest foot.

**2.6.23 PLTSIZE**

**Plot size.** A code indicating the size of the opening used for biomonitoring. Open areas that are more than 3 acres in size are ideal because they optimize ozone air mixture. Crews are trained to replace sites that are overgrown. For data from 2002 to the present, the PLTSIZE codes are:

**Codes: PLTSIZE**

Code	Description
1	Greater than 3 acres.
2	Greater than 1 acre, but less than 3 acres.

For data before 2002, the PLTSIZE codes are:

**Codes: PLTSIZE**

Code	Description
1	Greater than 3 acres.
2	One-half to 3 acres.
3	Less than half an acre.
4	Under forest canopy, no opening.

**2.6.24 ASPECT**

**Aspect.** The aspect attribute identifies the direction of slope for land surfaces with at least 5 percent slope as measured with a hand compass to the nearest degree (0° to 360°). The majority of biosites in eastern regions have no aspect whereas conditions in western regions are more variable. There are no published reports that suggest the direction of slope has a significant bearing on the ozone indicator. However, in western regions, north- or east-facing slopes indicate drier plot moisture conditions than south- or west-facing slopes, and plot moisture can have a significant influence on plant response to ozone.

**2.6.25 TERRPOS**

**Terrain position.** A code indicating the position of the biosite in relation to the surrounding topography. Eastern biosites are often located on flat land. In the west, the terrain may be more varied.

**Codes: TERRPOS**

Code	Description
1	Ridge top or upper slope.
2	Bench or level area along a slope.
3	Lower slope.
4	Flat land unrelated to slope.
5	Bottom land with occasional flooding.

**2.6.26 SOILDPTH**

**Soil depth.** A code indicating the general depth of the soil where most of the bioindicator species are growing. Soil that is generally shallow may be subject to more frequent and severe drought, thereby mitigating the response of bioindicator species to ambient ozone exposures.

**Codes: SOILDPH**

Code	Description
1	Bedrock is not exposed.
2	Bedrock is exposed; soil is generally shallow.

**2.6.27 SOILDRN**

**Soil drainage.** A code indicating the general soil drainage conditions where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone exposures is optimized on soils that are well drained. This attribute is used for eastern FIA regions.

**Codes: SOILDRN**

Code	Description
1	Soil is well drained.
2	Soil is excessively wet.
3	Soil is excessively dry.

**2.6.28 PLOTWET**

**Plot wetness.** A code indicating the degree of wetness where most of the bioindicator species are growing. Very dry or exposed sites may mitigate the response of bioindicator species to ambient ozone exposures. This attribute is used for western FIA regions.

**Codes: PLOTWET**

Code	Description
0	Plot is wet; riparian zone or bottomland.
1	Plot is moderately dry; meadow or northeast-facing slopes.
2	Plot is very dry; exposed ledges, desert, or alpine areas.

**2.6.29 PLTDSTRB**

**Plot disturbance.** A code indicating the presence and kind of disturbance where most of the bioindicator species are growing. The response of bioindicator species to ambient ozone exposures is optimized on sites with no recent or significant disturbance. The area affected by any human-caused or natural disturbance must be clearly visible and recent enough to influence plant health and condition. Disturbance that results in significant soil compaction may mitigate the response of bioindicator species to ambient ozone exposures and is considered especially significant. Crews are trained to replace biosites that have been disturbed.

**Codes: PLTDSTRB**

Code	Description
0	No recent or significant disturbance.
1	Evidence of overuse; human activity causing obvious soil compaction or erosion.
2	Evidence of natural disturbance including fire, wind, flooding, grazing, pests, etc.

**2.6.30    CREATED\_BY**

**Created by.** See OZONE\_PLOT.CREATED\_BY description for definition.

**2.6.31    CREATED\_DATE**

**Created date.** See OZONE\_PLOT.CREATED\_DATE description for definition.

**2.6.32    CREATED\_IN\_INSTANCE**

**Created in instance.** See OZONE\_PLOT.CREATED\_IN\_INSTANCE description for definition.

**2.6.33    MODIFIED\_BY**

**Modified by.** See OZONE\_PLOT.MODIFIED\_BY description for definition.

**2.6.34    MODIFIED\_DATE**

**Modified date.** See OZONE\_PLOT.MODIFIED\_DATE description for definition.

**2.6.35    MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See OZONE\_PLOT.MODIFIED\_IN\_INSTANCE description for definition.

# Chapter 3: Database Tables - Lichen Indicators

## Chapter Contents:

Section	Database table
3.1	<a href="#">Lichen Visit Table</a>
3.2	<a href="#">Lichen Lab Table</a>
3.3	<a href="#">Lichen Plot Summary Table</a>
3.4	<a href="#">Lichen Species Summary Table</a>
3.5	<a href="#">Lichen Species Reference Table</a>
3.6	<a href="#">Lichen Species Comments Table</a>

## Definitions for database tables:

For further detail and examples, refer to the Overview (chapter 1).

### Keys Presented with the Tables

Key type	Definition
Primary	A single column in a table whose values uniquely identify each row in an Oracle table.
Unique	Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.
Natural	A type of unique key made from existing attributes in the table. It is stored as an index in this database.
Foreign	A column in a table that is used as a link to a matching column in another Oracle table.

### Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	A data type that contains only numbers up to a specified maximum size. The maximum size ( <i>and optional fixed decimal point</i> ) is specified by the value(s) listed in the parentheses.
VARCHAR2(SIZE)	A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.

## 3.1 Lichen Visit Table

(Oracle table name: LICHEN\_VISIT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.1.1	CN	Sequence number	VARCHAR2(34)
3.1.2	PLT_CN	Plot sequence number	VARCHAR2(34)
3.1.3	INVYR	Inventory year	NUMBER(4)
3.1.4	STATECD	State code	NUMBER(4)
3.1.5	COUNTYCD	County code	NUMBER(3)
3.1.6	PLOT	Phase 2 plot number	NUMBER(5)
3.1.7	MEASDAY	Measurement day	NUMBER(2)
3.1.8	MEASMON	Measurement month	NUMBER(2)
3.1.9	MEASYEAR	Measurement year	NUMBER(4)
3.1.10	LICHEN_STATCD	Lichen status code	NUMBER(2)
3.1.11	LIPROJCD	Lichen project code	NUMBER(2)
3.1.12	SMPLSTRT	Sample start time	NUMBER(4)
3.1.13	SMPLSTP	Sample stop time	NUMBER(4)
3.1.14	SMPLTIME	Sample time	NUMBER(4)
3.1.15	SFTWDPCT	Softwood percent (percent conifers)	NUMBER(3)
3.1.16	HRDWDPCT	Hardwood percent	NUMBER(3)
3.1.17	SHRUBPCT	Shrub percent	NUMBER(3)
3.1.18	GAPPCT	Gap percent	NUMBER(3)
3.1.19	GAPRCNT	Gap recent	NUMBER(2)
3.1.20	TALLSHRB	Tall shrubs	NUMBER(2)
3.1.21	FTRCD1	Feature code 1	NUMBER
3.1.22	FTRCD2	Feature code 2	NUMBER
3.1.23	FTRCD3	Feature code 3	NUMBER
3.1.24	FTRCD4	Feature code 4	NUMBER
3.1.25	ISSUECD1	Issue code 1	NUMBER
3.1.26	ISSUECD2	Issue code 2	NUMBER
3.1.27	ISSUECD3	Issue code 3	NUMBER
3.1.28	ISSUECD4	Issue code 4	NUMBER
3.1.29	SZCLSCD1	Size class code 1	NUMBER(2)
3.1.30	SZCLSCD2	Size class code 2	NUMBER(2)
3.1.31	SZCLSCD3	Size class code 3	NUMBER(2)
3.1.32	CREATED_BY	Created by	VARCHAR2(30)
3.1.33	CREATED_DATE	Created date	DATE
3.1.34	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.1.35	MODIFIED_BY	Modified by	VARCHAR2(30)
3.1.36	MODIFIED_DATE	Modified date	DATE
3.1.37	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LVT_PK
Unique	PLT_CN	N/A	LVT_UK
Natural	STATECD, INVYR, PLOT, COUNTYCD	N/A	LVT_NAT_I
Foreign	PLT_CN	LICHEN_VISIT to PLOT	LVT_PLT_FK

### 3.1.1 CN

**Sequence number.** A unique sequence number used to identify a lichen visit record.

### 3.1.2 PLT\_CN

**Plot sequence number.** Foreign key linking the lichen visit record to the plot record.

### 3.1.3 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

### 3.1.4 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 3.1.5 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used.



Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 3.1.6 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, COUNTYCD and/or some other combinations of variables, PLOT may be used to uniquely identify a plot.

### 3.1.7 MEASDAY

**Measurement day.** The day on which the lichen plot was surveyed to provide the data presented.

### 3.1.8 MEASMON

**Measurement month.** The month in which the lichen plot was surveyed to provide the data presented.

### 3.1.9 MEASYEAR

**Measurement year.** The year in which the lichen plot was surveyed to provide the data presented. MEASYEAR may differ from INVYR.

### 3.1.10 LICHEN\_STATCD

**Lichen status code.** A code indicating whether or not lichens were collected and, if not collected, why not.

**Codes: LICHEN\_STATCD**

Code	Description
1	Lichens collected.
2	Plot searched, no lichens found.
3	Not collected - no measurements taken - plot harvested.
4	Not collected - no measurements taken - plot dangerous.
5	Not collected - ran out of time.
6	Not collected - rain/storm.
7	Not collected - left plot for emergency.
8	Lichens not scheduled for collection on the plot.
9	Not collected for other reason.

### 3.1.11 LIPROJCD

**Lichen project code.** A code indicating the type of lichen project for which these data are collected.

**Codes: LIPROJCD**

Code	Lichen project
1	Standard production plot.
2	Special study.

Code	Lichen project
3	Gradient study.
4	Evaluation Monitoring.

**3.1.12 SMPLSTRT**

**Sample start time.** The time lichen sampling began entered as HHMM, where HH is hour and MM is minutes. Military time is used (e.g., 1:45 pm is 1345).

**3.1.13 SMPLSTP**

**Sample stop time.** The time lichen sampling ended entered as HHMM, where HH is hour and MM is minutes. Military time is used (e.g., 1:45 pm is 1345).

**3.1.14 SMPLTIME**

**Sample time.** The total time used for sampling calculated as SMPLSTP minus SMPLSTRT, reported as HHMM, where HH is hour and MM is minutes (e.g., 0145 is total elapsed time of 1 hour and 45 minutes).

**3.1.15 SFTWDPCT**

**Softwood percent (percent conifers).** Percent canopy cover of the lichen plot in overstory conifers (not of lichens) estimated (not measured) in 5-percent classes.

**3.1.16 HRDWDPC**

**Hardwood percent.** Percent canopy cover of the lichen plot in overstory hardwoods (not of lichens) estimated (not measured) in 5-percent classes.

**3.1.17 SHRUBPCT**

**Shrub percent.** Percent of the lichen plot with shrubs estimated (not measured) in 5-percent classes.

**3.1.18 GAPPCT**

**Gap percent.** Percent gap recorded in 5-percent classes. To be a gap, there must be markedly different terrestrial vegetation than on forest floor; lack of trees on at least 3 to 5 percent of plot; and canopy opening whose length or width is at least one tree length. Note: gaps are caused by disturbance, not just low density of tree establishment.

**3.1.19 GAPRCNT**

**Gap recent.** A code indicating whether or not the gap appeared to be less than 5 years old (e.g., caused by recent disturbance).

Codes: GAPRCNT

Code	Description
0	≥ 5 yr old.
1	< 5 yr old.

**3.1.20 TALLSHRB**

**Tall shrubs.** A code indicating whether or not the gap had > 40 percent cover of tall shrubs (i.e., > 3.3 ft (1 m) tall). Broadleaf shrubs in gaps of conifer forest are often especially rich areas for lichen diversity.

**Codes: TALLSHRB**

Code	Description
0	No tall shrubs.
1	Tall shrubs present.

**3.1.21 FTRCD1**

**Feature code 1.** A code indicating important plot features such as substrate species or conditions that had the most impact on lichen diversity of the plot (e.g., recently clearcut, riparian with large hardwoods, old growth). If any FTRCDx = 00, no other values will be retained.

**Codes: FTRCD1**

Code	Description
00	No significant features.
01	High diversity: Stand appears relatively old for its forest type.
02	High diversity: Old remnant trees in otherwise young stand.
03	High diversity: Riparian.
04	High diversity: Gap in forest.
05	High diversity: Moist areas on plot with open structure and high light.
06	High diversity: Abundance of tall shrubs hosting high lichen diversity.
07	High diversity: Hardwoods within conifer forest had high diversity and/or different species.
08	High diversity: Conifers within hardwood forest had high diversity and/or different species.
09	High diversity: Presence of exceptionally good lichen substrate species (differs by region).
10	High diversity: Other.
11	Low diversity: Very young forest or recently regenerating clearcut.
12	Low diversity: Clearcut.
13	Low diversity: Recently burned - lichens apparently removed by fire.
14	Low diversity: Too dry for good lichen growth.
15	Low diversity: Too exposed or open for good lichen growth.
16	Low diversity: Some of plot nonforest.
17	Low diversity: Most of trees on plot were poor lichen substrates (differs by region).
18	Low diversity: Most of the diversity was on a few trees or less.
19	Low diversity: Other.

**3.1.22 FTRCD2**

**Feature code 2.** A code indicating important plot features such as substrate species or conditions that had the most impact on lichen diversity of the plot (e.g., recently clearcut,

riparian with large hardwoods, old growth). If any FTRCDx = 00, no other values will be retained. See FTRCD1 for codes.

### 3.1.23 FTRCD3

**Feature code 3.** A code indicating important plot features such as substrate species or conditions that had the most impact on lichen diversity of the plot (e.g., recently clearcut, riparian with large hardwoods, old growth). If any FTRCDx = 00, no other values will be retained. See FTRCD1 for codes.

### 3.1.24 FTRCD4

**Feature code 4.** A code indicating important plot features such as substrate species or conditions that had the most impact on lichen diversity of the plot (e.g., recently clearcut, riparian with large hardwoods, old growth). If any FTRCDx = 00, no other values will be retained. See FTRCD1 for codes.

### 3.1.25 ISSUECD1

**Issue code 1.** A code indicating a major problem that negatively impacted the collection effort. If any ISSUECDx = 0, no other values will be retained.

**Codes: ISSUECD1**

Code	Description
0	No significant issues.
1	Too wet to see lichens well.
2	Too dark to see lichens well.
3	Sampling compromised by heat.
4	Sampling compromised by other extreme weather (e.g., hail, lightning, snow).
5	Very steep slope hindered thorough plot access.
6	Access to some or all of plot blocked by natural obstacles (e.g., lingering snowpack, high water, landslide, large blowdowns).
7	Other.

### 3.1.26 ISSUECD2

**Issue code 2.** A code indicating a major problem that negatively impacted the collection effort. If any ISSUECDx = 0, no other values will be retained. See ISSUECD1 for codes.

### 3.1.27 ISSUECD3

**Issue code 3.** A code indicating a major problem that negatively impacted the collection effort. If any ISSUECDx = 0, no other values will be retained. See ISSUECD1 for codes.

### 3.1.28 ISSUECD4

**Issue code 4.** A code indicating a major problem that negatively impacted the collection effort. If any ISSUECDx = 0, no other values will be retained. See ISSUECD1 for codes.

### 3.1.29 SZCLSCD1

**Size class 1.** A code indicating the size class of the first of the three largest trees on the entire lichen plot.

Codes: SZCLSCD1

Code	Description
1	<10
2	10-20
3	21-30
4	31-40
5	>40

**3.1.30 SZCLSCD2**

**Size class 2.** A code indicating the size class of the second of the three largest trees on the entire lichen plot. See SZCLSCD1 for codes.

**3.1.31 SZCLSCD3**

**Size class 3.** A code indicating the size class of the third of the three largest trees on the entire lichen plot. See SZCLSCD1 for codes.

**3.1.32 CREATED\_BY**

**Created by.** The employee who created the record. This attribute is intentionally left blank in download files.

**3.1.33 CREATED\_DATE**

**Created date.** The date on which the record was created. Date will be in the form DD-MON-YYYY.

**3.1.34 CREATED\_IN\_INSTANCE**

**Created in instance.** The database instance in which the record was created. Each computer system has a unique database instance code, and this attribute stores that information to determine on which computer the record was created.

**3.1.35 MODIFIED\_BY**

**Modified by.** The employee who modified the record. This field will be null if the data have not been modified since initial creation. This attribute is intentionally left blank in download files.

**3.1.36 MODIFIED\_DATE**

**Modified date.** The date on which the record was last modified. This field will be null if the data have not been modified since initial creation. Date will be in the form DD-MON-YYYY.

**3.1.37 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** The database instance in which the record was modified. This field will be null if the data have not been modified since initial creation.



## 3.2 Lichen Lab Table

(Oracle table name: LICHEN\_LAB)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.2.1	CN	Sequence number	VARCHAR2(34)
3.2.2	PLT_CN	Plot sequence number	VARCHAR2(34)
3.2.3	INVYR	Inventory year	NUMBER(4)
3.2.4	STATECD	State code	NUMBER
3.2.5	COUNTYCD	County code	NUMBER(3)
3.2.6	PLOT	Phase 2 plot number	NUMBER(5)
3.2.7	LICH_SPPCD	Lichen species code	NUMBER(5)
3.2.8	MEASYEAR	Measurement year	NUMBER(4)
3.2.9	ABUNDANCE_CLASS	Abundance class	NUMBER(4)
3.2.10	ORIGIN_FLAG	Origin flag	NUMBER(1)
3.2.11	SPP_COMMENTS	Species comments	VARCHAR2(2000)
3.2.12	CREATED_BY	Created by	VARCHAR2(30)
3.2.13	CREATED_DATE	Created date	DATE
3.2.14	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
3.2.15	MODIFIED_BY	Modified by	VARCHAR2(30)
3.2.16	MODIFIED_DATE	Modified date	DATE
3.2.17	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LCH_PK
Unique	PLT_CN, LICH_SPPCD	N/A	LCH_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT, LICH_SPPCD	N/A	LCH_NAT_I
Foreign	PLT_CN	LICHEN_LAB to PLOT	LCH_PLT_FK

### 3.2.1 CN

**Sequence number.** A unique sequence number used to identify a lichen lab record.

### 3.2.2 PLT\_CN

**Plot sequence number.** Foreign key linking the lichen lab record to the plot record.

### 3.2.3 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable,

subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

### 3.2.4 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 3.2.5 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 3.2.6 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

### 3.2.7 LICH\_SPPCD

**Lichen species code.** A numeric code used for a particular lichen taxon. To determine which species the code represents, this code should be linked with either the SPP\_ACRONYM or a unique combination of GENUS and SPECIES in table REF\_LICHEN\_SPECIES.

### 3.2.8 MEASYEAR

**Measurement year.** The year in which the lichen plot samples were collected to provide the data presented. MEASYEAR may differ from INVYR.

### 3.2.9 ABUNDANCE\_CLASS

**Abundance class.** A code indicating the abundance class assigned to LICH\_SPPCD in this sample. Abundance class is assigned in the field according to the following scheme:

Codes: ABUNDANCE\_CLASS

Code	Description
1	Rare (1-3 individuals in area).
2	Uncommon (4-10 individuals in area).



Code	Description
3	Common (> 10 individuals in area but less than half of the boles and branches have that species present).
4	Abundant (more than half of boles and branches have the subject species present). Note: this code is not frequently assigned, but is valid. Make sure that more than one out of every 2 boles, branches, and twigs host this species.

Abundance class is modified in the lab if the taxon is represented by two or more field collections, according to the following scheme:

**Codes: Modification scheme**

Recorded values	Final abundance
1 + 1	2
1 + 1 + 1 + 1 + 1	2
More than five is	3
1 + 2	2
2 + 2	2
1 + 1 + 2	2
1 + 1 + 1 + 2	3
1 + 2 + 2	3
3 + any others	3
4 + any others	4
0 + 1	3
0 + 2	3
0 + 3	3
0 + 4	4
0 (any number of 0s with no other values)	0.01

Any sample with no assigned field abundance is assigned a lab abundance code of 0. If this species has no other abundance code >0, the lab enters the code 0.01. When data are uploaded to the FIA database, a default abundance code of 3 is entered into the database for a species with abundance code 0.01. When ORIGIN\_FLAG is fully implemented, this code will signal that ORIGIN\_FLAG is to be set to an as yet unassigned value for non-field origin of the abundance code.

### 3.2.10 ORIGIN\_FLAG

**Origin flag.** Flag denoting whether abundance class was assigned based on field designation (ORIGIN\_FLAG value = 1) or was assigned a value in the lab because no abundance class was assigned in the field (ORIGIN\_FLAG value as yet unassigned). Currently all records are assigned origin value = 1 when loaded, regardless of ABUNDANCE\_CLASS value at loading. Currently not implemented.

### 3.2.11 SPP\_COMMENTS

**Species comments.** Comments about this species on this plot by the lichen identification specialist. For instance 'cf' in the comment field means the identification was tentative. For

a species identified only to genus, this field might list some morphological characters. Currently not populated.

**3.2.12 CREATED\_BY**

**Created by.** See LICHEN\_VISIT.CREATED\_BY description for definition.

**3.2.13 CREATED\_DATE**

**Created date.** See LICHEN\_VISIT.CREATED\_DATE description for definition.

**3.2.14 CREATED\_IN\_INSTANCE**

**Created in instance.** See LICHEN\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**3.2.15 MODIFIED\_BY**

**Modified by.** See LICHEN\_VISIT.MODIFIED\_BY description for definition.

**3.2.16 MODIFIED\_DATE**

**Modified date.** See LICHEN\_VISIT.MODIFIED\_DATE description for definition.

**3.2.17 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See LICHEN\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.

### 3.3 Lichen Plot Summary Table

(Oracle table name: LICHEN\_PLOT\_SUMMARY)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.3.1	CN	Sequence number	VARCHAR2(34)
3.3.2	PLT_CN	Plot sequence number	VARCHAR2(34)
3.3.3	INVYR	Inventory year	NUMBER(4)
3.3.4	STATECD	State code	NUMBER(4)
3.3.5	COUNTYCD	County code	NUMBER(3)
3.3.6	PLOT	Phase 2 plot number	NUMBER(5)
3.3.7	MEASYEAR	Measurement year	NUMBER(4)
3.3.8	SUMMATION	Summation	NUMBER(7,4)
3.3.9	RICHNESS	Richness	NUMBER(2)
3.3.10	EVENNESS	Evenness	NUMBER(5,4)
3.3.11	DIVERSITY	Diversity	NUMBER(5,4)
3.3.12	CREATED_BY	Created by	VARCHAR2(30)
3.3.13	CREATED_DATE	Created date	DATE
3.3.14	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
3.3.15	MODIFIED_BY	Modified by	VARCHAR2(30)
3.3.16	MODIFIED_DATE	Modified date	DATE
3.3.17	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LPS_PK
Unique	PLT_CN	N/A	LPS_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT	N/A	LPS_NAT_I
Foreign	PLT_CN	LICHEN_PLOT_SUMMARY to PLOT	LPS_PLT_FK

#### 3.3.1 CN

**Sequence number.** A unique sequence number used to identify a lichen plot summary record.

#### 3.3.2 PLT\_CN

**Plot sequence number.** Foreign key linking the lichen plot summary record to the plot record.

**3.3.3 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

**3.3.4 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**3.3.5 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**3.3.6 PLOT**

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

**3.3.7 MEASYEAR**

**Measurement year.** The year in which the lichen plot samples were collected to provide the data summarized. MEASYEAR may differ from INVYR.

**3.3.8 SUMMATION**

**Summation.** Sum of abundance values for all lichen species on plot. Abundance values are 1 = 1-3 individuals; 2 = 4-10 individuals; 3 = >10 individuals but on less than half the available substrates (boles, branches, shrubs, saplings, snags); 4 = species found on more than half the available substrates.

**3.3.9 RICHNESS**

**Richness.** The number of lichen species on a plot. Lichens identified only to genus are included in this count; a lichen listed by genus only is known to be different from any other species found on the plot.

**3.3.10 EVENNESS**

**Evenness.** Evenness of species abundance. A measure of how evenly abundance is distributed among species, calculated as  $(\text{DIVERSITY} = H') / \ln(\text{RICHNESS})$ .

**3.3.11 DIVERSITY**

**Diversity.** Diversity is the Shannon-Wiener Diversity Index:

$$H' = - \sum (P_i * \ln(P_i)) \text{ for all species } 1 \text{ to } i \text{ on a plot}$$

where  $P_i$  is the proportion of total abundance for species  $i$  on that plot.  $P_i = (\text{ABUNDANCE for species } i \text{ on that plot}) / \text{SUMMATION}$ .

**3.3.12 CREATED\_BY**

**Created by.** See LICHEN\_VISIT.CREATED\_BY description for definition.

**3.3.13 CREATED\_DATE**

**Created date.** See LICHEN\_VISIT.CREATED\_DATE description for definition.

**3.3.14 CREATED\_IN\_INSTANCE**

**Created in instance.** See LICHEN\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**3.3.15 MODIFIED\_BY**

**Modified by.** See LICHEN\_VISIT.MODIFIED\_BY description for definition.

**3.3.16 MODIFIED\_DATE**

**Modified date.** See LICHEN\_VISIT.MODIFIED\_DATE description for definition.

**3.3.17 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See LICHEN\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 3.4 Lichen Species Summary Table

(Oracle table name: LICHEN\_SPECIES\_SUMMARY)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.4.1	CN	Sequence number	VARCHAR2(34)
3.4.2	INVYR	Inventory year	NUMBER(4)
3.4.3	LICHEN_REGION	Lichen region	NUMBER(4)
3.4.4	LICH_SPPCD	Lichen species code	NUMBER(5)
3.4.5	MEASYEAR	Measurement year	NUMBER(4)
3.4.6	LICHEN_REGION_DESCR	Lichen region description	VARCHAR2(80)
3.4.7	SPP_ACRONYM	Species acronym	VARCHAR2(6)
3.4.8	GENUS	Genus	VARCHAR2(40)
3.4.9	SUM_ABUNDANCE	Sum of abundance	NUMBER(7,4)
3.4.10	FREQUENCY_PCT	Frequency percent	NUMBER(3)
3.4.11	SPECIES	Species	VARCHAR2(50)
3.4.12	PLOTS_IN_REGION	Plots in region (number)	NUMBER(4)
3.4.13	CREATED_BY	Created by	VARCHAR2(30)
3.4.14	CREATED_DATE	Created date	DATE
3.4.15	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
3.4.16	MODIFIED_BY	Modified by	VARCHAR2(30)
3.4.17	MODIFIED_DATE	Modified date	DATE
3.4.18	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LSY_PK
Unique	INVYR, LICHEN_REGION, LICH_SPPCD	N/A	LSY_UK

### 3.4.1 CN

**Sequence number.** A unique sequence number used to identify a lichen species summary record.

### 3.4.2 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

### 3.4.3 LICHEN\_REGION

**Lichen region.** A code indicating the lichen region (see table below). The numerical code for the FIA region or subregion across which lichen species distribution is summarized; boundaries usually coincide with state boundaries. This region is not the same as a lichen gradient model.

**Codes: LICHEN\_REGION**

Code	Region name	Included states
1	Northeastern	STATECD = 9, 23, 25, 33, 36, 44, 50
2	Southeastern	STATECD = 1, 12, 13, 21, 37, 45, 47, 51
3	Interior West	STATECD = 4, 8, 16, 30, 32, 35, 49, 56
4	West Coast	STATECD = 2, 6, 15, 41, 53
5	Mid-South	STATECD = 5, 22, 28, 40, 48
6	Mid-Atlantic	STATECD = 10, 24, 34, 39, 42, 54
7	North Central	STATECD = 17, 18, 19, 20, 26, 27, 29, 31, 38, 46, 55

### 3.4.4 LICH\_SPPCD

**Lichen species code.** A numeric code used for a particular lichen taxon. To determine which species the code represents, this code should be linked with either the SPP\_ACRONYM or a unique combination of GENUS and SPECIES in table REF\_LICHEN\_SPECIES.

### 3.4.5 MEASYEAR

**Measurement year.** The year in which the lichen plot samples were collected to provide the data presented. MEASYEAR may differ from INVYR.

### 3.4.6 LICHEN\_REGION\_DESCR

**Lichen region description.** The name (see table above) for the FIA region or subregion for which data are summarized (e.g., Northeastern, Mid-Atlantic, Southeastern).

### 3.4.7 SPP\_ACRONYM

**Species acronym.** Three- to six-letter acronym for lichen species. See Table REF\_LICHEN\_SPECIES for a complete list of numerical codes, species acronyms, and species names used in the program, and see table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the program.

### 3.4.8 GENUS

**Genus.** The lichen genus name. See table REF\_LICHEN\_SPECIES for a complete list of numerical codes, species acronyms, and species names used in the program, and see table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the program.



**3.4.9 SUM\_ABUNDANCE**

**Sum of abundance.** Sum of abundance values on all plots in the region. Abundance values are 1 = 1-3 individuals; 2 = 4-10 individuals; 3 = >10 individuals but on less than half the available substrates (boles, branches, shrubs, saplings, snags); 4 = species found on more than half the available substrates.

**3.4.10 FREQUENCY\_PCT**

**Frequency percent.** Percent of searched plots in region with species present. This is calculated as  $100 * (\# \text{ plots with species present}) / \text{PLOTS\_IN\_REGION}$ . Note that plots searched and found to have no lichens are counted for the denominator.

**3.4.11 SPECIES**

**Species.** The lichen species epithet (second part of Latin scientific specific name). May include subspecies, variety, or form if needed. A complete list of numerical codes, species acronyms, and species names used in the FIA program can be found in the table REF\_LICHEN\_SPECIES. See table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the FIA Program.

**3.4.12 PLOTS\_IN\_REGION**

**Plots in region.** Number of plots in LICHEN\_REGION searched for lichens. This is the number of plots searched for lichens in the region being summarized. Plots searched and found to have no lichens are included in this count. Plots not searched for lichens, for any reason, are not included in this count.

**3.4.13 CREATED\_BY**

**Created by.** See LICHEN\_VISIT.CREATED\_BY description for definition.

**3.4.14 CREATED\_DATE**

**Created date.** See LICHEN\_VISIT.CREATED\_DATE description for definition.

**3.4.15 CREATED\_IN\_INSTANCE**

**Created in instance.** See LICHEN\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**3.4.16 MODIFIED\_BY**

**Modified by.** See LICHEN\_VISIT.MODIFIED\_BY description for definition.

**3.4.17 MODIFIED\_DATE**

**Modified date.** See LICHEN\_VISIT.MODIFIED\_DATE description for definition.

**3.4.18 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See LICHEN\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 3.5 Lichen Species Reference Table

(Oracle table name: REF\_LICHEN\_SPECIES)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.5.1	LICH_SPPCD	Lichen species code	NUMBER(5)
3.5.2	YEARSTART	Year start	NUMBER(4)
3.5.3	YEAREND	Year end	NUMBER(4)
3.5.4	SPP_ACRONYM	Species acronym	VARCHAR2(6)
3.5.5	GENUS	Genus	VARCHAR2(40)
3.5.6	SPECIES	Species	VARCHAR2(50)
3.5.7	CN	Sequence number	VARCHAR2(34)
3.5.8	CREATED_BY	Created by	VARCHAR2(30)
3.5.9	CREATED_DATE	Created date	DATE
3.5.10	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
3.5.11	MODIFIED_BY	Modified by	VARCHAR2(30)
3.5.12	MODIFIED_DATE	Modified date	DATE
3.5.13	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LNS_PK
Unique	LICH_SPPCD, SPP_ACRONYM, GENUS, YEARSTART	N/A	LNS_UK

### 3.5.1 LICH\_SPPCD

**Lichen species code.** A unique numerical code for each lichen species name used in the program. Only one particular combination of LICH\_SPPCD and SPP\_ACRONYM with a GENUS and SPECIES is in use in the program at any one time. A taxon is tracked through time with LICH\_SPPCD and SPP\_ACRONYM; GENUS and SPECIES may change without interfering with tracking the taxon through time. LICH\_SPPCD links this table with table REF\_LICHEN\_SPP\_COMMENTS that includes important notes about taxonomic usage and documents changes in taxonomic usage in the program.

### 3.5.2 YEARSTART

**Year start.** The year a particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES was put into use. Default start year for most species is 1993. LICHEN\_LAB entries with MEASYEAR = YEARSTART use that particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES as needed.

### 3.5.3 YEAREND

**Year end.** The year a particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES was retired from use. LICHEN\_LAB entries with MEASYEAR = YEAREND do not use that particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES.

Records in this table with YEAREND not null should be deleted before matching this table with any LICHEN\_LAB table.

### 3.5.4 SPP\_ACRONYM

**Species acronym.** A unique three- to six-letter acronym for each lichen species used in the program. Only one particular combination of LICH\_SPPCD and SPP\_ACRONYM with a GENUS and SPECIES is in use in the program at any one time. A taxon is tracked through time with LICH\_SPPCD and SPP\_ACRONYM; GENUS and SPECIES may change without interfering with tracking the taxon through time. See table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the program.

### 3.5.5 GENUS

**Genus.** The lichen genus name. Only one particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES is in use in the program at any one time. A taxon is tracked through time with LICH\_SPPCD and SPP\_ACRONYM; GENUS and SPECIES may change without interfering with tracking the taxon through time. See table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the program.

### 3.5.6 SPECIES

**Species.** The lichen species name (including subspecies, variety, or form if needed). Only one particular combination of LICH\_SPPCD, SPP\_ACRONYM, GENUS, and SPECIES is in use in the program at any one time. A taxon is tracked through time with LICH\_SPPCD and SPP\_ACRONYM; GENUS and SPECIES may change without interfering with tracking the taxon through time. See table REF\_LICHEN\_SPP\_COMMENTS for a history of taxonomic usage in the program.

### 3.5.7 CN

**Sequence number.** A unique sequence number used to identify a lichen reference lichen species record.

### 3.5.8 CREATED\_BY

**Created by.** See LICHEN\_VISIT.CREATED\_BY description for definition.

### 3.5.9 CREATED\_DATE

**Created date.** See LICHEN\_VISIT.CREATED\_DATE description for definition.

### 3.5.10 CREATED\_IN\_INSTANCE

**Created in instance.** See LICHEN\_VISIT.CREATED\_IN\_INSTANCE description for definition.

### 3.5.11 MODIFIED\_BY

**Modified by.** See LICHEN\_VISIT.MODIFIED\_BY description for definition.

### 3.5.12 MODIFIED\_DATE

**Modified date.** See LICHEN\_VISIT.MODIFIED\_DATE description for definition.

### 3.5.13 MODIFIED\_IN\_INSTANCE

**Modified in instance.** See LICHEN\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.

## 3.6 Lichen Species Comments Table

(Oracle table name: REF\_LICHEN\_SPP\_COMMENTS)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
3.6.1	LICH_SPPCD	Lichen species code	NUMBER(5)
3.6.2	SPP_NAME	Species name	VARCHAR2(80)
3.6.3	YEAREND	Year end	NUMBER(4)
3.6.4	YEARSTART	Year start	NUMBER(4)
3.6.5	SPP_COMMENTS	Species comments	VARCHAR2(2000)
3.6.6	CN	Sequence number	VARCHAR2(34)
3.6.7	CREATED_BY	Created by	VARCHAR2(30)
3.6.8	CREATED_DATE	Created date	DATE
3.6.9	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
3.6.10	MODIFIED_BY	Modified by	VARCHAR2(30)
3.6.11	MODIFIED_DATE	Modified date	DATE
3.6.12	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	LCM_PK
Unique	LICH_SPPCD, SPP_NAME, YEARSTART	N/A	LCM_UK

### 3.6.1 LICH\_SPPCD

**Lichen species code.** A unique numerical code for each lichen species name used in the program. Only one particular combination of LICH\_SPPCD and REF\_LICHEN\_SPECIES.SPP\_ACRONYM with a REF\_LICHEN\_SPECIES.GENUS and REF\_LICHEN\_SPECIES.SPECIES is in use in the program at any one time. A taxon is tracked through time with LICH\_SPPCD and REF\_LICHEN\_SPECIES.SPP\_ACRONYM; GENUS and SPECIES may change without interfering with tracking the taxon through time. LICH\_SPPCD links this table with table REF\_LICHEN\_SPECIES, a master list of all species codes and names used in the program.

### 3.6.2 SPP\_NAME

**Species name.** This field includes the full species name corresponding to LICH\_SPPCD; it includes both REF\_LICHEN\_SPECIES.GENUS and REF\_LICHEN\_SPECIES.SPECIES. Only one particular combination of LICH\_SPPCD and REF\_LICHEN\_SPECIES.SPP\_ACRONYM with a REF\_LICHEN\_SPECIES.GENUS and REF\_LICHEN\_SPECIES.SPECIES is in use in the program at any one time.

### 3.6.3 YEAREND

**Year end.** The year a particular combination of LICH\_SPPCD, REF\_LICHEN\_SPECIES.SPP\_ACRONYM, REF\_LICHEN\_SPECIES.GENUS, and

REF\_LICHEN\_SPECIES.SPECIES (the latter two represented in this table by SPP\_NAME) was retired from use. LICHEN\_LAB entries with MEASYEAR = YEAREND do not use that particular combination of LICH\_SPPCD, REF\_LICHEN\_SPECIES.SPP\_ACRONYM, REF\_LICHEN\_SPECIES.GENUS, and REF\_LICHEN\_SPECIES.SPECIES.

### 3.6.4 YEARSTART

**Year start.** The year a particular combination of LICH\_SPPCD, REF\_LICHEN\_SPECIES.SPP\_ACRONYM, REF\_LICHEN\_SPECIES.GENUS, and REF\_LICHEN\_SPECIES.SPECIES (the latter two represented in this table by SPP\_NAME) was put into use. Default start year for most species is 1993. LICHEN\_LAB entries with MEASYEAR = YEARSTART use that particular combination of LICH\_SPPCD, REF\_LICHEN\_SPECIES.SPP\_ACRONYM, REF\_LICHEN\_SPECIES.GENUS, and REF\_LICHEN\_SPECIES.SPECIES as needed.

### 3.6.5 SPP\_COMMENTS

**Species comments.** This field includes informational comments, explanations of changes in taxonomic usage between years, and actions to perform before analyzing data. For most changes (even those with action code 0 = no action), there are individual records for each unique combination of LICH\_SPPCD, REF\_LICHEN\_SPECIES.SPP\_ACRONYM, REF\_LICHEN\_SPECIES.GENUS, and REF\_LICHEN\_SPECIES.SPECIES (the latter two represented in this table by SPP\_NAME) involved in the change and/or action. FIA does not use thin layer chromatography (TLC) or examinations of thin sections for identification of lichen specimens. Lichen species whose identification requires these techniques are so noted; they are then grouped under the name of a look-alike species identifiable from morphology visible with a dissecting microscope, chemical spot tests, and/or examination with a long-wave UV (ultraviolet) lamp. Simple corrections to spelling of genus or species name are not represented by comments in this file, although they are recorded by REF\_LICHEN\_SPECIES.YEARSTART and REF\_LICHEN\_SPECIES.YEAREND. If data from a single LICHEN\_LAB.MEASYEAR are to be analyzed, action codes 1 and 2 apply, action codes 3 and 4 do not apply, and action codes 5, 6, and 7 should be checked to see if parts apply. If data from both the East and West are to be combined for analysis, the analyst should consult the Lichens Indicator Advisor for advice on how to reconcile actions between regions, for all taxa with action code 5 listed.

#### Codes: Action codes

Code	Description
0	No action.
1	Exclude for most analysis.
2	Always combine.
3	'crossing [YEAR]' conditional combine.
4	Subset before or after [YEAR] conditional combine.
5	Regional conditional combine.
6	Unique complicated combination of actions 1-5.
7	Complicated action not definable as a combination of other action codes.

For year conditional combines, the phrase 'crossing [YEAR]' should be interpreted as 'data with MEASYEAR=[YEAR] and/or later, compared to data with MEASYEAR=[YEAR]-1

and/or earlier.' The phrase 'before [YEAR]' means data with MEASYEAR=[YEAR]-1 and/or earlier; 'after [YEAR]' means data with MEASYEAR=[YEAR]+1 and/or later.

For action codes 5 and 6, other action codes for specific regions or years are listed after that code. If a region conditional action is one of the actions under action code 6, action code 5 is listed just before action codes 0-4 for within a region.

Region definitions:

East = Northern (N) and Southern (S) FIA Regions

West = Interior West (IW) and Pacific Northwest (PNW) FIA Regions

For any action (codes 2, 3, 4) that involves combining two or more taxa by LICH\_SPPCD and REF\_LICHEN\_SPECIES.SPP\_ACRONYM, if more than one of these LICH\_SPPCD or REF\_LICHEN\_SPECIES.SPP\_ACRONYM occur on a single plot, then field abundances (LICHEN\_LAB.ABUNDANCE\_CLASS) for the original taxa must be combined by the following rules to become the abundance for the 'combined into' LICH\_SPPCD and REF\_LICHEN\_SPECIES.SPP\_ACRONYM on that plot:

**Codes: Rules of combination**

Abundance for individual taxa	Abundance for final combined taxon
1 + 1	2
1 + 1 + 1 + 1 + 1	2
More than five is	3
1 + 2	2
2 + 2	2
1 + 1 + 2	2
1 + 1 + 1 + 2	3
1 + 2 + 2	3
3 + any others	3
4 + any others	4

### 3.6.6 CN

**Sequence number.** A unique sequence number used to identify a lichen species comments record.

### 3.6.7 CREATED\_BY

**Created by.** See LICHEN\_VISIT.CREATED\_BY description for definition.

### 3.6.8 CREATED\_DATE

**Created date.** See LICHEN\_VISIT.CREATED\_DATE description for definition.

### 3.6.9 CREATED\_IN\_INSTANCE

**Created in instance.** See LICHEN\_VISIT.CREATED\_IN\_INSTANCE description for definition.

### 3.6.10 MODIFIED\_BY

**Modified by.** See LICHEN\_VISIT.MODIFIED\_BY description for definition.

**3.6.11 MODIFIED\_DATE**

**Modified date.** See LICHEN\_VISIT.MODIFIED\_DATE description for definition.

**3.6.12 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See LICHEN\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



# Chapter 4: Database Tables - Soils Indicator

## Chapter Contents:

Section	Database table
4.1	<a href="#">Soils Visit Table</a>
4.2	<a href="#">Soils Erosion Table</a>
4.3	<a href="#">Soils Sample Location Table</a>
4.4	<a href="#">Soils Lab Table</a>

## Definitions for database tables:

For further detail and examples, refer to the Overview (chapter 1).

### Keys Presented with the Tables

Key type	Definition
Primary	A single column in a table whose values uniquely identify each row in an Oracle table.
Unique	Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.
Natural	A type of unique key made from existing attributes in the table. It is stored as an index in this database.
Foreign	A column in a table that is used as a link to a matching column in another Oracle table.

### Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	A data type that contains only numbers up to a specified maximum size. The maximum size ( <i>and optional fixed decimal point</i> ) is specified by the value(s) listed in the parentheses.
VARCHAR2(SIZE)	A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.

## 4.1 Soils Visit Table

(Oracle table name: SOILS\_VISIT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.1.1	CN	Sequence number	VARCHAR2(34)
4.1.2	PLT_CN	Plot sequence number	VARCHAR2(34)
4.1.3	INVYR	Inventory year	NUMBER(4)
4.1.4	STATECD	State code	NUMBER(4)
4.1.5	COUNTYCD	County code	NUMBER(3)
4.1.6	PLOT	Phase 2 plot number	NUMBER(5)
4.1.7	MEASDAY	Measurement day	NUMBER(2)
4.1.8	MEASMON	Measurement month	NUMBER(2)
4.1.9	MEASYEAR	Measurement year	NUMBER(4)
4.1.10	CREATED_BY	Created by	VARCHAR2(30)
4.1.11	CREATED_DATE	Created date	DATE
4.1.12	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
4.1.13	MODIFIED_BY	Modified by	VARCHAR2(30)
4.1.14	MODIFIED_DATE	Modified date	DATE
4.1.15	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	SVT_PK
Unique	PLT_CN	N/A	SVT_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT,	N/A	SVT_NAT_I
Foreign	PLT_CN	SOILS_VISIT to PLOT	SVT_PLT_FK

### 4.1.1 CN

**Sequence number.** A unique sequence number used to identify a soils visit record.

### 4.1.2 PLT\_CN

**Plot sequence number.** Foreign key linking the soils visit record to the P2 plot record.

### 4.1.3 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the

years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

#### 4.1.4 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.1.5 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.1.6 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

#### 4.1.7 MEASDAY

**Measurement day.** The day of the month in which the plot was completed.

#### 4.1.8 MEASMON

**Measurement month.** The month in which the plot was completed.

**Codes: MEASMON**

Code	Description
01	January.
02	February.
03	March.
04	April.
05	May.
06	June.
07	July.
08	August.
09	September.
10	October.

Code	Description
11	November.
12	December.

**4.1.9 MEASYEAR**

**Measurement year.** The year in which the plot was completed. MEASYEAR may differ from INVYR.

**4.1.10 CREATED\_BY**

**Created by.** The employee who created the record. This attribute is intentionally left blank in download files.

**4.1.11 CREATED\_DATE**

**Created date.** The date on which the record was created. Date will be in the form DD-MON-YYYY.

**4.1.12 CREATED\_IN\_INSTANCE**

**Created in instance.** The database instance in which the record was created. Each computer system has a unique database instance code, and this attribute stores that information to determine on which computer the record was created.

**4.1.13 MODIFIED\_BY**

**Modified by.** The employee who modified the record. This field will be null if the data have not been modified since initial creation. This attribute is intentionally left blank in download files.

**4.1.14 MODIFIED\_DATE**

**Modified date.** The date on which the record was last modified. This field will be null if the data have not been modified since initial creation. Date will be in the form DD-MON-YYYY.

**4.1.15 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** The database instance in which the record was modified. This field will be null if the data have not been modified since initial creation.



## 4.2 Soils Erosion Table

(Oracle table name: SOILS\_EROSION)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.2.1	CN	Sequence number	VARCHAR2(34)
4.2.2	PLT_CN	Plot sequence number	VARCHAR2(34)
4.2.3	INVYR	Inventory year	NUMBER(4)
4.2.4	STATECD	State code	NUMBER(4)
4.2.5	COUNTYCD	County code	NUMBER(3)
4.2.6	PLOT	Phase 2 plot number	NUMBER(5)
4.2.7	SUBP	Subplot number	NUMBER
4.2.8	MEASYEAR	Measurement year	NUMBER(4)
4.2.9	SOILSPCT	Soils percent (percent bare soil)	NUMBER
4.2.10	COMPCPCT	Compact percent (percent compacted area)	NUMBER
4.2.11	TYPRTDCD	Type rutted trail code	NUMBER
4.2.12	TYPCMPCD	Type compacted trail code	NUMBER
4.2.13	TYPEAREACD	Type compacted area code	NUMBER
4.2.14	TYPEOTHRCD	Type other code	NUMBER
4.2.15	CREATED_BY	Created by	VARCHAR2(30)
4.2.16	CREATED_DATE	Created date	DATE
4.2.17	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
4.2.18	MODIFIED_BY	Modified by	VARCHAR2(30)
4.2.19	MODIFIED_DATE	Modified date	DATE
4.2.20	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	SEN_PK
Unique	PLT_CN, SUBP	N/A	SEN_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT, SUBP	N/A	SEN_NAT_I

**4.2.1 CN**  
**Sequence number.** A unique sequence number used to identify a soils erosion record.

**4.2.2 PLT\_CN**  
**Plot sequence number.** Foreign key linking the soils erosion record to the P2 plot record.

**4.2.3 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

**4.2.4 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**4.2.5 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**4.2.6 PLOT**

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

**4.2.7 SUBP**

**Subplot number.** The number assigned to the subplot where soils data were collected.

Codes: SUBP

Code	Description
1	Center subplot.
2	North subplot.
3	Southeast subplot.
4	Southwest subplot.

**4.2.8 MEASYEAR**

**Measurement year.** The year in which the plot was completed. MEASYEAR may differ from INVYR.



#### 4.2.9 SOILSPCT

**Soils percent (percent bare soil).** Indicates the percentage of the subplot that is covered by bare soil (mineral or organic). Fine gravel [0.08-0.20 inch (2-5 mm)] is considered part of the bare soil. However, large rocks protruding through the soil (e.g., bedrock outcrops) are not included in this category because these are not erodible surfaces. For the soil indicator, cryptobiotic crusts are not considered bare soil.

If the subplot includes non-forested areas, the percent cover of bare soil in the forested part of the subplot is multiplied by the percent of the subplot that is in forested area. For example, if 50 percent of the subplot is forested and the percent cover of bare soil of the forested part is 30 percent, then the percent cover of bare soil for the entire subplot is 15 percent.

##### Codes: SOILSPCT

Code	Description
00	Absent
01	Trace
05	1 to 5 %
10	6-10 %
15	11-15 %
20	16-20 %
25	21-25 %
30	26-30 %
35	31-35 %
40	36-40 %
45	41-45 %
50	46-50 %
55	51-55 %
60	56-60 %
65	61-65 %
70	66-70 %
75	71-75 %
80	76-80 %
85	81-85 %
90	86-90 %
95	91-95 %
99	96-100 %

#### 4.2.10 COMPCPCT

**Compacted percent (percent compacted area).** Indicates the percentage of the subplot that exhibits evidence of compaction. Soil compaction is assessed relative to the conditions of adjacent undisturbed soil. Improved roads are not included in the evaluation.

**Codes: COMPCPCT**

Code	Description
00	Absent
01	Trace
05	1 to 5 %
10	6-10 %
15	11-15 %
20	16-20 %
25	21-25 %
30	26-30 %
35	31-35 %
40	36-40 %
45	41-45 %
50	46-50 %
55	51-55 %
60	56-60 %
65	61-65 %
70	66-70 %
75	71-75 %
80	76-80 %
85	81-85 %
90	86-90 %
95	91-95 %
99	96-100 %

**4.2.11 TYPRTDCD**

**Type rutted trail code.** A code indicating the type of compaction that is a rutted trail. Ruts must be at least 2 inches deep into mineral soil or 6 inches deep from the undisturbed forest litter surface.

**Codes: TYPRTDCD**

Code	Description
1	Present.
0	Not present.

**4.2.12 TYPCMPCD**

**Type compacted trail code.** A code indicating the type of compaction that is a compacted trail (usually the result of many passes of heavy machinery, vehicles, or large animals).

**Codes: TYPCMPCD**

Code	Description
1	Present.
0	Not present.

**4.2.13 TYPAREACD**

**Type compacted area code.** A code indicating the type of compaction that is a compacted area. Examples include the junction areas of skid trails, landing areas, work areas, animal bedding areas, heavily grazed areas, etc.

**Codes: TYPAREACD**

Code	Description
1	Present.
0	Not present.

**4.2.14 TYPOTHRCD**

**Type other code.** A code indicating the type of compaction that is some other form. An explanation must be entered in the plot notes.

**Codes: TYPOTHRCD**

Code	Description
1	Present.
0	Not present.

**4.2.15 CREATED\_BY**

**Created by.** See SOILS\_VISIT.CREATED\_BY description for definition.

**4.2.16 CREATED\_DATE**

**Created date.** See SOILS\_VISIT.CREATED\_DATE description for definition.

**4.2.17 CREATED\_IN\_INSTANCE**

**Created in instance.** See SOILS\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**4.2.18 MODIFIED\_BY**

**Modified by.** See SOILS\_VISIT.MODIFIED\_BY description for definition.

**4.2.19 MODIFIED\_DATE**

**Modified date.** See SOILS\_VISIT.MODIFIED\_DATE description for definition.

**4.2.20 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See SOILS\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 4.3 Soils Sample Location Table

(Oracle table name: SOILS\_SAMPLE\_LOC)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.3.1	CN	Sequence number	VARCHAR2(34)
4.3.2	PLT_CN	Plot sequence number	VARCHAR2(34)
4.3.3	INVYR	Inventory year	NUMBER(4)
4.3.4	STATECD	State code	NUMBER(4)
4.3.5	COUNTYCD	County code	NUMBER(3)
4.3.6	PLOT	Phase 2 plot number	NUMBER(5)
4.3.7	SMPLNNBR	Sample line number	NUMBER(1)
4.3.8	MEASYEAR	Measurement year	NUMBER(4)
4.3.9	FORFLTHK	Average forest floor thickness for the subplot	NUMBER
4.3.10	LTRLRTHK	Average litter layer thickness for the subplot	NUMBER
4.3.11	FORFLTHKN	Forest floor thickness north (at the north edge of the sampling frame)	NUMBER
4.3.12	LTRLRTHKN	Litter layer thickness north (at the north edge of the sampling frame)	NUMBER
4.3.13	FORFLTHKS	Forest floor thickness south (at the south edge of the sampling frame)	NUMBER
4.3.14	LTRLRTHKS	Litter layer thickness south (at the south edge of the sampling frame)	NUMBER
4.3.15	FORFLTHKE	Forest floor thickness east (at the east edge of the sampling frame)	NUMBER
4.3.16	LTRLRTHKE	Litter layer thickness east (at the east edge of the sampling frame)	NUMBER
4.3.17	FORFLTHKW	Forest floor thickness west (at the west edge of the sampling frame)	NUMBER
4.3.18	LTRLRTHKW	Litter layer thickness west (at the west edge of the sampling frame)	NUMBER
4.3.19	CONDID	Condition class number	NUMBER(1)
4.3.20	VSTNBR	Visit number	NUMBER(1)
4.3.21	TXTRLR1	Texture layer 1	NUMBER
4.3.22	TXTRLR2	Texture layer 2	NUMBER
4.3.23	DPTHBSL	Depth to a restricted layer	NUMBER
4.3.24	SOILS_STATCD	Soil sampling status code	NUMBER(2)
4.3.25	CREATED_BY	Created by	VARCHAR2(30)
4.3.26	CREATED_DATE	Created date	DATE
4.3.27	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.3.28	MODIFIED_BY	Modified by	VARCHAR2(30)
4.3.29	MODIFIED_DATE	Modified date	DATE
4.3.30	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	SSL_PK
Unique	PLT_CN, SMPLNNBR	N/A	SSL_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT, SMPLNNBR	N/A	SSL_NAT_I

#### 4.3.1 CN

**Sequence number.** A unique sequence number used to identify a soils sample location record.

#### 4.3.2 PLT\_CN

**Plot sequence number.** Foreign key linking the soils sample location record to the P2 plot record.

#### 4.3.3 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

#### 4.3.4 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.3.5 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used.

Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.3.6 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

#### 4.3.7 SMPLNNBR

**Sample line number.** The number corresponding to the subplot where the sample was collected. SMPLNNBR equals the subplot number (SUBP). Values are 2, 3, 4.

#### 4.3.8 MEASYEAR

**Measurement year.** The year in which the plot was completed. MEASYEAR may differ from INVYR.

#### 4.3.9 FORFLTHK

**Average forest floor thickness for the subplot.** Recorded in inches.

$$\text{FORFLTHK} = (\text{FORFLTHKE} + \text{FORFLTHKW} + \text{FORFLTHKN} + \text{FORFLTHKS}) / 4$$

#### 4.3.10 LTRLRTHK

**Average litter layer thickness for the subplot.** Recorded in inches.

$$\text{LTRLRTHK} = (\text{LTRLRTHKE} + \text{LTRLRTHKW} + \text{LTRLRTHKN} + \text{LTRLRTHKS}) / 4$$

#### 4.3.11 FORFLTHKN

**Forest floor thickness north (at the north edge of the sampling frame).** The thickness (to the nearest 0.1 inch) of the forest floor measured from the top of the litter layer to the boundary between the forest floor and mineral soil; measured to a maximum depth of 20.0 inches. If the thickness of the forest floor is greater than 20.0 inches, then the code 20.0 is used. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

#### 4.3.12 LTRLRTHKN

**Litter layer thickness north (at the north edge of the sampling frame).** The thickness of the litter layer (to the nearest 0.1 inch) at the north location within the sampling frame. The bottom of the litter layer can be distinguished as the boundary where plant parts (such as leaves or needles) are no longer recognizable as such because of decomposition. Another criterion is that the organic layer may contain plant roots, but the litter layer will probably not. At some locations, the depth of the forest floor and the depth of the litter layer may be the same. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

#### 4.3.13 FORFLTHKS

**Forest floor thickness south (at the south edge of the sampling frame).** The thickness (to the nearest 0.1 inch) of the forest floor measured from the top of the litter layer to the boundary between the forest floor and mineral soil; measured to a maximum depth of 20.0 inches. If the thickness of the forest floor is greater than 20.0 inches, then the code 20.0 is used. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.14 LTRLRTHKS**

**Litter layer thickness south (at the south edge of the sampling frame).** The thickness of the litter layer (to the nearest 0.1 inch) at the north location within the sampling frame. The bottom of the litter layer can be distinguished as the boundary where plant parts (such as leaves or needles) are no longer recognizable as such because of decomposition. Another criterion is that the organic layer may contain plant roots, but the litter layer will probably not. At some locations, the depth of the forest floor and the depth of the litter layer may be the same. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.15 FORFLTHKE**

**Forest floor thickness east (at the east edge of the sampling frame).** The thickness (to the nearest 0.1 inch) of the forest floor measured from the top of the litter layer to the boundary between the forest floor and mineral soil; measured to a maximum depth of 20.0 inches. If the thickness of the forest floor is greater than 20.0 inches, then the code 20.0 is used. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.16 LTRLRTHKE**

**Litter layer thickness east (at the east edge of the sampling frame).** The thickness of the litter layer (to the nearest 0.1 inch) at the north location within the sampling frame. The bottom of the litter layer can be distinguished as the boundary where plant parts (such as leaves or needles) are no longer recognizable as such because of decomposition. Another criterion is that the organic layer may contain plant roots, but the litter layer will probably not. At some locations, the depth of the forest floor and the depth of the litter layer may be the same. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.17 FORFLTHKW**

**Forest floor thickness west (at the west edge of the sampling frame).** The thickness (to the nearest 0.1 inch) of the forest floor measured from the top of the litter layer to the boundary between the forest floor and mineral soil; measured to a maximum depth of 20.0 inches. If the thickness of the forest floor is greater than 20.0 inches, then the code 20.0 is used. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.18 LTRLRTHKW**

**Litter layer thickness west (at the west edge of the sampling frame).** The thickness of the litter layer (to the nearest 0.1 inch) at the west location within the sampling frame. The bottom of the litter layer can be distinguished as the boundary where plant parts (such as leaves or needles) are no longer recognizable as such because of decomposition. Another criterion is that the organic layer may contain plant roots, but the litter layer will probably not. At some locations, the depth of the forest floor and the depth of the litter layer may be the same. For locations where bare soil or bedrock material is exposed, 00.0 inches depth is entered.

**4.3.19 CONDID**

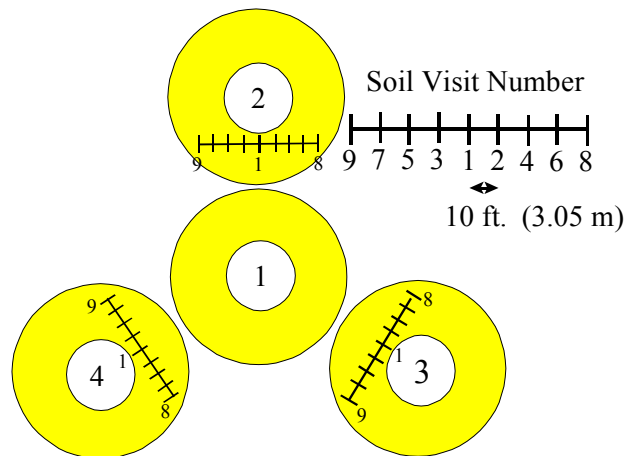
**Condition class number.** Unique identifying number assigned to each condition on a plot. This attribute is blank (null) if no soils sample was taken (nonsampled). A condition is initially defined by condition class status. Differences in reserved status, owner group,



forest type, stand-size class, regeneration status, and stand density further define condition for forest land. Mapped nonforest conditions are also assigned numbers. At the time of the plot establishment, the condition class at plot center (the center of subplot 1) is usually designated as condition class 1. Other condition classes are assigned numbers sequentially at the time each condition class is delineated. On a plot, each sampled condition class must have a unique number that can change at remeasurement to reflect new conditions on the plot.

#### 4.3.20 VSTNBR

**Visit number.** The number of the soil sampling location at which the soil sample was collected. Values are 1 - 9.



**Figure 4-1:** Location of soil sampling site. Figure 11 from the [Forest Inventory and Analysis National Core Field Guide \(Phase 3, version 3.0\)](http://www.fia.fs.fed.us/library/field-guides-methods-proc/) (see <http://www.fia.fs.fed.us/library/field-guides-methods-proc/>)

#### 4.3.21 TXTRLR1

**Texture layer 1.** A code indicating the soil texture of the 0-4 inch layer estimated in the field.

**Codes: TXTRLR1**

Code	Description
0	Organic.
1	Loamy.
2	Clayey.
3	Sandy.
4	Coarse sand.
9	Not measured - make plot notes.

**4.3.22 TXTRLR2**

**Texture layer 2.** A code indicating the soil texture of the 4-8 inch layer estimated in the field.

**Codes: TXTRLR2**

Code	Description
0	Organic.
1	Loamy.
2	Clayey.
3	Sandy.
4	Coarse sand.
9	Not measured - make plot notes.

**4.3.23 DPTHBSL**

**Depth to a restricted layer.** Indicates the median depth of five locations within the soil sampling area (center, north, east, south, and west edges) to a restrictive layer (to the nearest 0.1 inch). The maximum depth for testing for a restrictive horizon is 20.0 inches. If a restrictive layer is encountered within the 20.0 inches, the median depth (to the nearest 0.1 inch) to the restrictive horizon of the five locations probed is recorded. Other possible values are

20.0 if a restrictive horizon is not encountered

00.0 if superficial bedrock is present

999 if too many rock fragments or cobbles prevent inserting soil probe

**4.3.24 SOILS\_STATCD**

**Soil sampling status.** A code indicating whether or not a forest floor or mineral soil sample was collected at the soil sampling location. For both forest floor and mineral samples, it is the condition of the soil sampling sites in the annular plot that determines whether soil samples are collected. Samples are collected if, and only if, the soil sampling site is in a forested condition (regardless of the condition class of the subplot). For example, in cases where the subplot has at least one forested condition class and the soil sampling site is not in a forested condition class, soil samples are not collected. Similarly, in cases where the soil sampling site is in a forested condition class and the subplot does not have at least one forested condition class, soil samples are collected.

**Codes: SOILS\_STATCD**

Code	Description
1	Sampled.
2	Not sampled: nonforest.
3	Forest condition not sampled: too rocky to sample.
4	Forest condition not sampled: water or boggy.
5	Forest condition not sampled: access denied.
6	Forest condition not sampled: too dangerous to sample.
7	Forest condition not sampled: obstruction in sampling area.

Code	Description
8	Forest condition not sampled: broken or lost equipment.
9	Forest condition not sampled: other - enter reason in plot notes.
11	Forest condition sampled: forest that has not been identified as a condition on the plot.

**4.3.25 CREATED\_BY**

**Created by.** See SOILS\_VISIT.CREATED\_BY description for definition.

**4.3.26 CREATED\_DATE**

**Created date.** See SOILS\_VISIT.CREATED\_DATE description for definition.

**4.3.27 CREATED\_IN\_INSTANCE**

**Created in instance.** See SOILS\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**4.3.28 MODIFIED\_BY**

**Modified by.** See SOILS\_VISIT.MODIFIED\_BY description for definition.

**4.3.29 MODIFIED\_DATE**

**Modified date.** See SOILS\_VISIT.MODIFIED\_DATE description for definition.

**4.3.30 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See SOILS\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 4.4 Soils Lab Table

(Oracle table name: SOILS\_LAB)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.4.1	CN	Sequence number	VARCHAR2(34)
4.4.2	PLT_CN	Plot sequence number	VARCHAR2(34)
4.4.3	INVYR	Inventory year	NUMBER(4)
4.4.4	STATECD	State code	NUMBER(4)
4.4.5	COUNTYCD	County code	NUMBER(3)
4.4.6	PLOT	Phase 2 plot number	NUMBER(5)
4.4.7	SMPLNNBR	Sample line number	NUMBER(3)
4.4.8	VSTNBR	Visit number	NUMBER(1)
4.4.9	LAYER_TYPE	Layer type	VARCHAR2(10)
4.4.10	SAMPLER_TYPE	Sampler type	VARCHAR2(2)
4.4.11	QASTATCD	Quality assurance status code	NUMBER(1)
4.4.12	SAMPLE_DATE	Sample date	DATE
4.4.13	LAB_ID	Laboratory identification	VARCHAR2(10)
4.4.14	SAMPLE_ID	Sample identification	VARCHAR2(12)
4.4.15	FIELD_MOIST_SOIL_WT	Field moist soil weight	NUMBER(7,2)
4.4.16	AIR_DRY_SOIL_WEIGHT	Air-dry soil weight	NUMBER(7,2)
4.4.17	OVEN_DRY SOIL_WT	Oven-dry soil weight	NUMBER(7,2)
4.4.18	FIELD_MOIST_WATER_CONTENT_PCT	Field moist water content percent	NUMBER(6,2)
4.4.19	RESIDUAL_WATER_CONTENT_PCT	Residual water content percent	NUMBER(6,2)
4.4.20	TOTAL_WATER_CONTENT_PCT	Total water content in percent	NUMBER(6,2)
4.4.21	BULK_DENSITY	Bulk density	NUMBER(7,3)
4.4.22	COARSE_FRACTION_PCT	Coarse fraction percent	NUMBER(7,3)
4.4.23	C_ORG_PCT	Carbon organic percent	NUMBER(7,3)
4.4.24	C_INORG_PCT	Carbon inorganic percent	NUMBER(7,3)
4.4.25	C_TOTAL_PCT	Carbon total percent	NUMBER(7,3)
4.4.26	N_TOTAL_PCT	Nitrogen total percent	NUMBER(7,3)
4.4.27	PH_H2O	pH measured in water	NUMBER(7,3)
4.4.28	PH_CACL2	pH measured in calcium chloride	NUMBER(7,3)
4.4.29	EXCHNG_NA	Exchangeable sodium	NUMBER(8,3)
4.4.30	EXCHNG_K	Exchangeable potassium	NUMBER(7,3)
4.4.31	EXCHNG_MG	Exchangeable magnesium	NUMBER(8,3)
4.4.32	EXCHNG_CA	Exchangeable calcium	NUMBER(8,3)
4.4.33	EXCHNG_AL	Exchangeable aluminum	NUMBER(7,3)
4.4.34	ECEC	Effective cation exchange capacity	NUMBER(7,3)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
4.4.35	EXCHNG_MN	Exchangeable manganese	NUMBER(7,3)
4.4.36	EXCHNG_FE	Exchangeable iron	NUMBER(7,3)
4.4.37	EXCHNG_NI	Exchangeable nickel	NUMBER(7,3)
4.4.38	EXCHNG_CU	Exchangeable copper	NUMBER(7,3)
4.4.39	EXCHNG_ZN	Exchangeable zinc	NUMBER(7,3)
4.4.40	EXCHNG_CD	Exchangeable cadmium	NUMBER(7,3)
4.4.41	EXCHNG_PB	Exchangeable lead	NUMBER(7,3)
4.4.42	EXCHNG_S	Exchangeable sulfur	NUMBER(8,3)
4.4.43	BRAY1_P	Bray 1 phosphorus	NUMBER(7,3)
4.4.44	OLSEN_P	Olsen phosphorus	NUMBER(7,3)
4.4.45	MEASYEAR	Measurement year	NUMBER(4)
4.4.46	MODIFIED_BY	Modified by	VARCHAR2(30)
4.4.47	MODIFIED_DATE	Modified date	DATE
4.4.48	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)
4.4.49	CREATED_BY	Created by	VARCHAR2(30)
4.4.50	CREATED_DATE	Created date	DATE
4.4.51	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	SLB_PK
Unique	PLT_CN, SMPLNNBR, LAYER_TYPE	N/A	SLB_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT, SMPLNNBR, LAYER_TYPE	N/A	SLB_NAT_I

**4.4.1 CN**

**Sequence number.** A unique sequence number used to identify a soils lab record.

**4.4.2 PLT\_CN**

**Plot sequence number.** Foreign key linking the soils lab record to the P2 plot record.

**4.4.3 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

#### 4.4.4 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each State. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.4.5 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a State. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

#### 4.4.6 PLOT

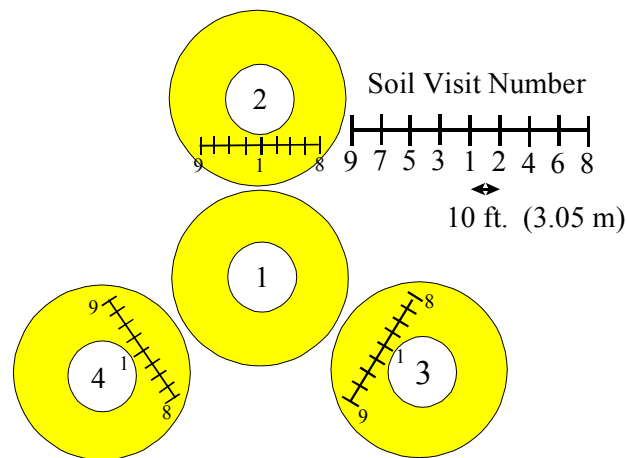
**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

#### 4.4.7 SMPLNNBR

**Sample line number.** The number corresponding to the subplot where the sample was collected. SMPLNNBR equals the subplot number (SUBP). Values are 2, 3, 4.

**4.4.8 VSTNBR**

**Visit number.** The number of the soil sampling location at which the soil sample was collected. Values are 1 - 9.



**Figure 4-2:** Location of soil sampling site. Figure 11 from the [Forest Inventory and Analysis National Core Field Guide \(Phase 3, version 3.0\)](http://www.fia.fs.fed.us/library/field-guides-methods-proc/) (see <http://www.fia.fs.fed.us/library/field-guides-methods-proc/>)

**4.4.9 LAYER\_TYPE**

**Layer type.** Indicates the soil layer type.

**Codes: LAYER\_TYPE**

Code	Description
FF_TOTAL	Total forest floor: litter + humus (duff).
L_ORG	Organic soil litter layer.
MIN_1	0-4 inch mineral soil layer.
MIN_2	4-8 inch mineral soil layer.
ORG_1	0-4 inch organic soil layer.
ORG_2	4-8 inch organic soil layer.

**4.4.10 SAMPLER\_TYPE**

**Sampler type.** A code indicating the type of soil sampler used.

**Codes: SAMPLER\_TYPE**

Code	Description
SF	Sample frame.
BD	Bulk density sampler.
O	Other.



**4.4.11 QASTATCD**

**Quality assurance status.** A code indicating the type of plot data collected. Populated for all forested subplots using the National Field Guide protocols (MANUAL ≥1.0).

**Codes: QASTATCD**

Code	Description
1	Standard production plot.
2	Cold check.
3	Reference plot (off-grid).
4	Training/practice (off-grid).
5	Botched plot file (disregard during data processing).
6	Blind check.
7	Production plot (hot check).

**4.4.12 SAMPLE\_DATE**

**Sample date.** Indicates the date of soil measurements and sampling.

**4.4.13 LAB\_ID**

**Laboratory identification.** Indicates the laboratory where the analyses were done.

**4.4.14 SAMPLE\_ID**

**Sample identification.** Internal lab sample identification number used to identify samples, match to plot identifier data, and track samples.

**4.4.15 FIELD\_MOIST\_SOIL\_WT**

**Field moist soil weight.** The weight of the soil sample as received from the field in grams.

**4.4.16 AIR\_DRY\_SOIL\_WEIGHT**

**Air-dry soil weight.** The weight of the soil sample after air-drying at ambient temperature in grams.

**4.4.17 OVEN\_DRY SOIL\_WT**

**Oven-dry soil weight.** The calculated weight of the soil sample based on an oven-dried subsample in grams.

**4.4.18 FIELD\_MOIST\_WATER\_CONTENT\_PCT**

**Field moist water content percent.** The field-moist to air-dry water content in percent.

**4.4.19 RESIDUAL\_WATER\_CONTENT\_PCT**

**Residual water content percent.** The air-dry to oven-dry water content in percent.

**4.4.20 TOTAL\_WATER\_CONTENT\_PCT**

**Total water content percent.** The field-moist to air-dry + air-dry to oven-dry water contents in percent.

**4.4.21 BULK\_DENSITY**

**Bulk density.** The soil bulk density calculated as weight per unit volume of soil, g/cm<sup>3</sup>.

- 4.4.22 COARSE\_FRACTION\_PCT**  
**Coarse fraction percent.** The percentage of mineral soil greater than 2 mm in size.
- 4.4.23 C\_ORG\_PCT**  
**Carbon organic percent.** Organic carbon in percent.
- 4.4.24 C\_INORG\_PCT**  
**Carbon inorganic percent.** Inorganic carbon (carbonates) in percent.
- 4.4.25 C\_TOTAL\_PCT**  
**Carbon total percent.** Total carbon (organic + inorganic) in percent.
- 4.4.26 N\_TOTAL\_PCT**  
**Nitrogen total percent.** Total nitrogen in percent.
- 4.4.27 PH\_H2O**  
**pH in water.** Soil pH in a 1:1 soil/water suspension.
- 4.4.28 PH\_CACL2**  
**pH in calcium chloride.** Soil pH in 0.01 M CaCl<sub>2</sub> solution.
- 4.4.29 EXCHNG\_NA**  
**Exchangeable sodium.** Exchangeable sodium in mg/kg.
- 4.4.30 EXCHNG\_K**  
**Exchangeable potassium.** Exchangeable potassium in mg/kg.
- 4.4.31 EXCHNG\_MG**  
**Exchangeable magnesium.** Exchangeable magnesium in mg/kg.
- 4.4.32 EXCHNG\_CA**  
**Exchangeable calcium.** Exchangeable calcium in mg/kg.
- 4.4.33 EXCHNG\_AL**  
**Exchangeable aluminum.** Exchangeable aluminum in mg/kg.
- 4.4.34 ECEC**  
**Effective cation exchange capacity.** Exchangeable Na + K + Mg + Ca + Al) in cmol<sub>c</sub>/kg.
- 4.4.35 EXCHNG\_MN**  
**Exchangeable manganese.** Exchangeable manganese in mg/kg.
- 4.4.36 EXCHNG\_FE**  
**Exchangeable iron.** Exchangeable iron in mg/kg.
- 4.4.37 EXCHNG\_NI**  
**Exchangeable nickel.** Exchangeable nickel in mg/kg.
- 4.4.38 EXCHNG\_CU**  
**Exchangeable copper.** Exchangeable copper in mg/kg.

- 4.4.39 EXCHNG\_ZN**  
**Exchangeable zinc.** Exchangeable zinc in mg/kg.
- 4.4.40 EXCHNG\_CD**  
**Exchangeable cadmium.** Exchangeable cadmium in mg/kg.
- 4.4.41 EXCHNG\_PB**  
**Exchangeable lead.** Exchangeable lead in mg/kg.
- 4.4.42 EXCHNG\_S**  
**Exchangeable sulfur.** Exchangeable sulfur in mg/kg.
- 4.4.43 BRAY1\_P**  
**Bray 1 phosphorus.** Bray 1 extractable phosphorus in mg/kg.
- 4.4.44 OLSEN\_P**  
**Olsen phosphorus.** Olsen extractable phosphorus in mg/kg.
- 4.4.45 MEASYEAR**  
**Measurement year.** The year in which the plot was completed. MEASYEAR may differ from INVYR.
- 4.4.46 MODIFIED\_BY**  
**Modified by.** See SOILS\_VISIT.MODIFIED\_BY description for definition.
- 4.4.47 MODIFIED\_DATE**  
**Modified date.** See SOILS\_VISIT.MODIFIED\_DATE description for definition.
- 4.4.48 MODIFIED\_IN\_INSTANCE**  
**Modified in instance.** See SOILS\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.
- 4.4.49 CREATED\_BY**  
**Created by.** See SOILS\_VISIT.CREATED\_BY description for definition.
- 4.4.50 CREATED\_DATE**  
**Created date.** See SOILS\_VISIT.CREATED\_DATE description for definition.
- 4.4.51 CREATED\_IN\_INSTANCE**  
**Created in instance.** See SOILS\_VISIT.CREATED\_IN\_INSTANCE description for definition.



# Chapter 5: Database Tables - Vegetation Diversity and Structure

## Chapter Contents:

Section	Database table
5.1	<a href="#">Vegetation Visit Table</a>
5.2	<a href="#">Vegetation Plot Species Table</a>
5.3	<a href="#">Vegetation Subplot Table</a>
5.4	<a href="#">Vegetation Quadrat Table</a>
5.5	<a href="#">Vegetation Subplot Species Table</a>

## Definitions for database tables:

For further detail and examples, refer to the Overview (chapter 1).

### Keys Presented with the Tables

Key type	Definition
Primary	A single column in a table whose values uniquely identify each row in an Oracle table.
Unique	Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.
Natural	A type of unique key made from existing attributes in the table. It is stored as an index in this database.
Foreign	A column in a table that is used as a link to a matching column in another Oracle table.

### Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	A data type that contains only numbers up to a specified maximum size. The maximum size ( <i>and optional fixed decimal point</i> ) is specified by the value(s) listed in the parentheses.
VARCHAR2(SIZE)	A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.

## 5.1 Vegetation Visit Table

(Oracle table name: VEG\_VISIT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.1.1	CN	Sequence number	VARCHAR2(34)
5.1.2	PLT_CN	Plot sequence number	VARCHAR2(34)
5.1.3	INVYR	Inventory year	NUMBER(4)
5.1.4	STATECD	State code	NUMBER(4)
5.1.5	COUNTYCD	County code	NUMBER(3)
5.1.6	PLOT	Phase 2 plot number	NUMBER(5)
5.1.7	VEG_QA_STATUS	Vegetation quality assurance status	NUMBER(1)
5.1.8	VEG_KINDCD	Vegetation sample kind code	NUMBER(2)
5.1.9	VEG_MANUAL	Vegetation manual (field guide) version number	VARCHAR2(8)
5.1.10	TRACE_COVER_ALLOWED	Trace cover allowed	NUMBER(1)
5.1.11	VEG_MEASYEAR	Vegetation measurement year	NUMBER(4)
5.1.12	VEG_MEASMON	Vegetation measurement month	NUMBER(2)
5.1.13	VEG_MEASDAY	Vegetation measurement day	NUMBER(2)
5.1.14	VEG_SAMPLE_BASIS	Vegetation sample basis	NUMBER(1)
5.1.15	CREATED_BY	Created by	VARCHAR2(30)
5.1.16	CREATED_DATE	Created date	DATE
5.1.17	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
5.1.18	MODIFIED_BY	Modified by	VARCHAR2(30)
5.1.19	MODIFIED_DATE	Modified date	DATE
5.1.20	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	VVT_PK
Unique	PLT_CN	N/A	VVT_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT	N/A	VVT_NAT_I
Foreign	PLT_CN	VEG_VISIT to PLOT	VVT_PLT_FK

### 5.1.1 CN

**Sequence number.** A unique sequence number used to identify a vegetation visit record. Other tables will reference this as VVT\_CN (VEG\_VISIT CN).

**5.1.2 PLT\_CN**

**Plot sequence number.** Foreign key linking the vegetation visit record to the P2 plot record (via PLOT.CN).

**5.1.3 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

**5.1.4 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.1.5 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.1.6 PLOT**

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

**5.1.7 VEG\_QA\_STATUS**

**Vegetation quality assurance status.** A code indicating the type of vegetation measurement conducted. Production plots have VEG\_QA\_STATUS = 1 or 7.

**Codes: VEG\_QA\_STATUS**

Code	Description
1	Standard field production plot.
2	Cold check.
3	Reference plot (off grid).
4	Training/practice plot (off grid).



Code	Description
5	Botched plot file (disregard during data processing).
6	Blind check.
7	Production plot (hot check).

**5.1.8 VEG\_KINDCD**

**Vegetation sample kind code.** A code indicating the kind of vegetation plot that was measured.

**Codes: VEG\_KINDCD**

Code	Description
1	Initial P3 VEG plot establishment.
2	Remeasurement of previously established P3 VEG plot.
3	Replacement P3 VEG plot.

**5.1.9 VEG\_MANUAL**

**Vegetation manual (field guide).** Field guide version used to collect the P3 Vegetation Diversity and Structure data. Typically, this will be the same as the P2 field guide version, after version 2.0.1.

NOTE: Version 1.7 of the field guide was used in 2001-2003. Version 2.0, first used in 2004, introduced a new protocol with significant changes in the vegetation sample basis. Version 2.0.1 and later versions modify the 2.0 protocol to allow recording of a separate value for plant covers with less than one percent as less than one percent (trace). The primary differences between the 1.7 and 2.0 and later protocols are noted under VEG\_SAMPLE\_BASIS, TRACE\_COVER\_ALLOWED and "\*\_PRE2004" columns.

**5.1.10 TRACE\_COVER\_ALLOWED**

**Trace cover allowed.** A code indicating whether plant cover values of less than one percent were recorded as 1 or 0.01 percent (collected as "t" in the field). The ability to enter trace as 0.01 percent was added starting with VEG\_MANUAL = 2.0.1.

**Codes: TRACE\_COVER\_ALLOWED**

Code	Description
0	Trace cover value (0.01 percent, recorded as "t" in the field) not allowed; trace cover entered as full one percent (VEG_MANUAL = 2.0 and earlier).
1	Trace cover value (0.01 percent, recorded as "t" in the field) allowed for species canopy cover records (VEG_MANUAL = 2.0.1 and later).

**5.1.11 VEG\_MEASYEAR**

**Vegetation measurement year.** Year in which the plot was measured for P3 Vegetation Diversity and Structure data.

**5.1.12 VEG\_MEASMON**

**Vegetation measurement day.** Month in which the plot was measured for P3 Vegetation Diversity and Structure data.

**5.1.13 VEG\_MEASDAY**

**Vegetation measurement month.** Day on which the plot was measured for P3 Vegetation Diversity and Structure data.

**5.1.14 VEG\_SAMPLE\_BASIS**

**Vegetation sample basis.** A code indicating whether P3 Vegetation and Diversity Structure data were collected on both forested and nonforested portions of a subplot with at least 50 percent accessible forest, or on accessible forest conditions only. This code affects how data are compiled to determine (a) the total canopy cover by layer or (b) the cover of a species as a percent of the accessible forested portion of a subplot for those subplots with VEG\_SUBPLOT.SUBP\_ACCESSIBLE\_FOREST\_PCT < 100.

The effects of VEG\_SAMPLE\_BASIS when adjusting ocular measures of canopy cover on partially forested subplots:

When VEG\_SAMPLE\_BASIS = 1, and SUBP\_ACCESSIBLE\_FOREST\_PCT is less than 100, we make the assumption that cover is spread evenly over the entire subplot in order to calculate the total canopy cover in **accessible forest**. To calculate the total canopy cover (in any layer) in accessible forest conditions, multiply total canopy cover recorded by the proportion of subplot in forested condition (SUBP\_ACCESSIBLE\_FOREST\_PCT/100%).

When VEG\_SAMPLE\_BASIS = 2, and SUBP\_ACCESSIBLE\_FOREST\_PCT is less than 100, calculate total cover on the accessible forested conditions by dividing the recorded total canopy cover (in any layer) by the proportion of subplot in accessible forested condition (SUBP\_ACCESSIBLE\_FOREST\_PCT/100%).

Example:

A subplot is 70 percent in accessible forested condition. The proportion of subplot area in forest condition is 0.70. Species A is present on the subplot with a total cover of 10 percent, with half its cover on the non-forested portion of the subplot. If this subplot was measured under VEG\_SAMPLE\_BASIS = 1, cover for species A would have been recorded as 10 percent. Under VEG\_SAMPLE\_BASIS = 2, species A would be recorded as 5 percent. To determine the percent cover of species A in the forested area of the plot:

VEG\_SAMPLE\_BASIS = 1:

Cover species A in forested area = 10% × 0.7 = 7%

VEG\_SAMPLE\_BASIS = 2

Cover species A in forested area = 5% ÷ 0.7 = 7%

**Codes: VEG\_SAMPLE\_BASIS**

Code	Description
1	Data collected across entire subplot where percent accessible forest conditions is greater than or equal to 50 percent (VEG_MANUAL = 1.7). May include non-forest, hazardous, or access denied conditions.
2	Data collected on accessible forest conditions only (VEG_MANUAL = 2.0 and higher).

**5.1.15 CREATED\_BY**

**Created by.** The employee who created the record. This attribute is intentionally left blank in download files.

**5.1.16 CREATED\_DATE**

**Created date.** The date on which the record was created. Date will be in the form DD-MON-YYYY.

**5.1.17 CREATED\_IN\_INSTANCE**

**Created in instance.** The database instance in which the record was created. Each computer system has a unique database instance code, and this attribute stores that information to determine on which computer the record was created.

**5.1.18 MODIFIED\_BY**

**Modified by.** The employee who modified the record. This field will be null if the data have not been modified since initial creation. This attribute is intentionally left blank in download files.

**5.1.19 MODIFIED\_DATE**

**Modified date.** The date on which the record was last modified. This field will be null if the data have not been modified since initial creation. Date will be in the form DD-MON-YYYY.

**5.1.20 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** The database instance in which the record was modified. This field will be null if the data have not been modified since initial creation.



## 5.2 Vegetation Plot Species Table

(Oracle table name: VEG\_PLOT\_SPECIES)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.2.1	CN	Sequence number	VARCHAR2(34)
5.2.2	PLT_CN	Plot sequence number	VARCHAR2(34)
5.2.3	VVT_CN	Vegetation visit sequence number	VARCHAR2(34)
5.2.4	INVYR	Inventory year	NUMBER(4)
5.2.5	STATECD	State code	NUMBER(4)
5.2.6	COUNTYCD	County code	NUMBER(3)
5.2.7	PLOT	Phase 2 plot number	NUMBER(5)
5.2.8	VEG_FLDSPCD	Vegetation field species code	VARCHAR2(16)
5.2.9	UNIQUE_SP_NBR	Unique species number	NUMBER(2)
5.2.10	VEG_SPCD	Vegetation species code	VARCHAR2(16)
5.2.11	SPECIMEN_COLLECTED	Specimen officially collected	VARCHAR2(1)
5.2.12	SPECIMEN_LABEL_NBR	Specimen label number	NUMBER
5.2.13	SPECIMEN_NOT_COLLECTED_REASON	Specimen not collected reason	NUMBER(2)
5.2.14	SPECIMEN_RESOLVED	Specimen resolved	VARCHAR2(1)
5.2.15	CREATED_BY	Created by	VARCHAR2(30)
5.2.16	CREATED_DATE	Created date	DATE
5.2.17	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
5.2.18	MODIFIED_BY	Modified by	VARCHAR2(30)
5.2.19	MODIFIED_DATE	Modified date	DATE
5.2.20	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	VPS_PK
Unique	PLT_CN, VVT_CN, VEG_FLDSPCD, UNIQUE_SP_NBR	N/A	VPS_UK
Unique	PLT_CN, VVT_CN, CN	N/A	VPS_UK2
Natural	STATECD, INVYR, COUNTYCD, PLOT, VEG_FLDSPCD, UNIQUE_SP_NBR	N/A	VPS_NAT_I

### 5.2.1 CN

**Sequence number.** A unique sequence number used to identify a vegetation plot species record. Other tables will reference this as VPS\_CN.

**5.2.2 PLT\_CN**

**Plot sequence number.** Foreign key linking the vegetation plot species record to the P2 plot record (via PLOT.CN).

**5.2.3 VVT\_CN**

**Vegetation visit sequence number.** Foreign key linking the vegetation plot species record to the vegetation visit record (via VEG\_VISIT.CN).

**5.2.4 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

**5.2.5 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.2.6 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.2.7 PLOT**

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

**5.2.8 VEG\_FLDSPCD**

**Vegetation field species code.** Field recorded vegetation species code for each vascular plant species found rooted in or overhanging a subplot. Combined with UNIQUE\_SP\_NBR to identify what was believed in the field to be a unique species on the plot. For VEG\_VISIT.VEG\_MANUAL = 2.0.1 and higher, codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2010 version to represent species, genus, or unknown plants. Identification to species only is

expected. However, if subspecies information is known, the appropriate NRCS code may be entered. This attribute is assigned in the field and never changes. Updates to unknown species codes are recorded in VEG\_SPCD.

For VEG\_VISIT.VEG\_MANUAL = 1.7, the VEG\_FLDSPCD may not be a valid NRCS code for unknown plant species, as these were typically recorded as UN; however, these codes are resolved to valid NRCS codes in VEG\_SPCD.

### 5.2.9 UNIQUE\_SP\_NBR

**Unique species number.** This code combined with VEG\_FLDSPCD identifies what was believed to be a unique species on the plot. It identifies the number of species recorded for each NRCS genus or unknown code. For example, two unidentifiable *Carex* spp. would be entered as two separate records with VEG\_FLDSPCD = 'CAREX' and differing UNIQUE\_SP\_NBRs to show that they are not the same species. If the VEG\_FLDSPCD entered already identifies a specific species (e.g., PIST for *Pinus strobus*), then UNIQUE\_SP\_NBR = 1.

### 5.2.10 VEG\_SPCD

**Vegetation species code.** Final edited species code, including any resolution of collected unknown plant specimens (e.g., herbarium-resolved species) and conforming to the NRCS PLANTS database as downloaded in January 2010.

### 5.2.11 SPECIMEN\_COLLECTED

**Specimen collected.** A code indicating whether or not a specimen was collected.

**Codes: SPECIMEN\_COLLECTED**

Code	Description
0	No, a specimen was not collected.
1	Yes, a specimen was collected.

### 5.2.12 SPECIMEN\_LABEL\_NBR

**Specimen label number.** For any unknown specimen collected, this is the corresponding specimen label number.

### 5.2.13 SPECIMEN\_NOT\_COLLECTED\_REASON

**Specimen not collected reason.** A code indicating the reason a specimen was not collected when VEG\_FLDSPCD is an NRCS genus or unknown code and a specimen was not collected.

**Codes: SPECIMEN\_NOT\_COLLECTED\_REASON**

Code	Description
01	Species is locally sparse.
02	Species has < 1 percent canopy cover on the subplot and no mature foliage or reproductive parts are present.
03	Hazardous situation.
04	Time limitation.
05	Already collected with previous entry of genus or unknown code with the same unique species number.

Code	Description
06	Specimen collected for immediate/local identification.
10	Other (explain in notes).

#### 5.2.14 SPECIMEN\_RESOLVED

**Specimen resolved.** A derived code indicating the status of unknown or genus specimen that was collected for identification. That is, if VEG\_FLDSPCD is an unknown or genus code, and SPECIMEN\_COLLECTED = 1, SPECIMEN\_RESOLVED must be recorded. If the specimen was identified in the field to the species level and still collected (e.g., for local plant library or training purposes), then VEG\_FLDSPCD will identify the plant to the species level and this variable will be left blank (null); no resolution is required.

**Codes: SPECIMEN\_RESOLVED**

Code	Description
0	No, specimen not resolved. The unknown specimen (i.e., VEG_FLDSPCD contains an unknown or genus code) has not yet been identified and updated in VEG_SPCD.
1	Yes, specimen resolved. The unknown specimen has been identified and VEG_SPCD has been updated.
Blank (null)	Specimen resolution not required.

#### 5.2.15 CREATED\_BY

**Created by.** See VEG\_VISIT.CREATED\_BY description for definition.

#### 5.2.16 CREATED\_DATE

**Created date.** See VEG\_VISIT.CREATED\_DATE description for definition.

#### 5.2.17 CREATED\_IN\_INSTANCE

**Created in instance.** See VEG\_VISIT.CREATED\_IN\_INSTANCE description for definition.

#### 5.2.18 MODIFIED\_BY

**Modified by.** See VEG\_VISIT.MODIFIED\_BY description for definition.

#### 5.2.19 MODIFIED\_DATE

**Modified date.** See VEG\_VISIT.MODIFIED\_DATE description for definition.

#### 5.2.20 MODIFIED\_IN\_INSTANCE

**Modified in instance.** See VEG\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 5.3 Vegetation Subplot Table

(Oracle table name: VEG\_SUBPLOT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.3.1	CN	Sequence number	VARCHAR2(34)
5.3.2	PLT_CN	Plot sequence number	VARCHAR2(34)
5.3.3	VVT_CN	Vegetation visit sequence number	VARCHAR2(34)
5.3.4	INVYR	Inventory year	NUMBER(4)
5.3.5	STATECD	State code	NUMBER(4)
5.3.6	COUNTYCD	County code	NUMBER(3)
5.3.7	PLOT	Phase 2 plot number	NUMBER(5)
5.3.8	SUBP	Subplot number	NUMBER(1)
5.3.9	VEG_SUBP_STATUS_CD	Vegetation subplot status code	NUMBER(1)
5.3.10	VEG_SUBP_NONSAMPLE_REASN_CD	Vegetation subplot nonsampled reason code	NUMBER(2)
5.3.11	SUBP_ACCESSIBLE_FOREST_PCT	Subplot accessible forest percent	NUMBER(3)
5.3.12	DETAILED_NONFOREST_LAND_USE	Detailed nonforest land use	NUMBER(2)
5.3.13	TOTAL_CANOPY_COVER_LAYER_1	Total canopy cover layer 1	NUMBER(3)
5.3.14	TOTAL_CANOPY_COVER_LAYER_2	Total canopy cover layer 2	NUMBER(3)
5.3.15	TOTAL_CANOPY_COVER_LAYER_3	Total canopy cover layer 3	NUMBER(3)
5.3.16	TOTAL_CANOPY_COVER_LAYER_4	Total canopy cover layer 4	NUMBER(3)
5.3.17	CRYPTO_CRUST_COVER_PCT	Cryptobiotic crust cover percent	NUMBER(3)
5.3.18	LICHEN_COVER_PCT	Lichen cover percent	NUMBER(3)
5.3.19	LITTER_DUFF_COVER_PCT	Litter and duff cover percent	NUMBER(3)
5.3.20	MINERAL_SOIL_COVER_PCT	Mineral soil cover percent	NUMBER(3)
5.3.21	MOSS_COVER_PCT	Moss cover percent	NUMBER(3)
5.3.22	ROAD_TRAIL_COVER_PCT	Road and trail cover percent	NUMBER(3)
5.3.23	ROCK_COVER_PCT	Rock cover percent	NUMBER(3)
5.3.24	STANDING_WATER_COVER_PCT	Standing water cover percent	NUMBER(3)
5.3.25	STREAM_LAKE_COVER_PCT	Stream and lake cover percent	NUMBER(3)
5.3.26	TRASH_JUNK_COVER_PCT	Trash and junk cover percent	NUMBER(3)
5.3.27	WOOD_COVER_PCT	Wood cover percent	NUMBER(3)
5.3.28	VEG_SUBP_STATUS_CD_PRE2004	Vegetation subplot status code, pre2004	NUMBER(1)
5.3.29	VEG_SUBP_NONSMP_RSN_CD_PRE2004	Vegetation subplot nonsampled reason code, pre2004	NUMBER(2)
5.3.30	CREATED_BY	Created by	VARCHAR2(30)
5.3.31	CREATED_DATE	Created date	DATE
5.3.32	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.3.33	MODIFIED_BY	Modified by	VARCHAR2(30)
5.3.34	MODIFIED_DATE	Modified date	DATE
5.3.35	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	VSF_PK
Unique	PLT_CN, VVT_CN, SUBP	N/A	VSF_UK
Unique	PLT_CN, VVT_CN, CN	N/A	VSF_UK2
Natural	STATECD, INVYR, COUNTYCD, PLOT, SUBP	N/A	VSF_NAT_I

### 5.3.1 CN

**Sequence number.** A unique sequence number used to identify a vegetation subplot record. Other tables reference this as VSF\_CN.

### 5.3.2 PLT\_CN

**Plot sequence number.** Foreign key linking the vegetation subplot record to the P2 plot record (via PLT.CN).

### 5.3.3 VVT\_CN

**Vegetation visit sequence number.** Foreign key linking the vegetation subplot record to the vegetation visit record (via VEG\_VISIT.CN).

### 5.3.4 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

### 5.3.5 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for

P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 5.3.6 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 5.3.7 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

### 5.3.8 SUBP

**Subplot number.** The number assigned to the subplot where P2 vegetation data were collected.

#### Codes: SUBP

Code	Description
1	Center subplot.
2	North subplot.
3	Southeast subplot.
4	Southwest subplot.

### 5.3.9 VEG\_SUBP\_STATUS\_CD

**Vegetation subplot status code.** A code indicating the vegetation subplot status as recorded when VEG\_VISIT.VEG\_MANUAL = 2.0 and higher. This value is derived when VEG\_VISIT.VEG\_MANUAL = 1.7 from P2 condition data, plot notes, and availability of various field-recorded records (e.g., subplot species and subplot totals).

#### Codes: VEG\_SUBP\_STATUS\_CD

Code	Description
1	Sampled - at least one accessible forest land condition present.
2	Sampled - no accessible forest land condition present on subplot.
3	Nonsampled.

### 5.3.10 VEG\_SUBP\_NONSAMPLE\_REASN\_CD

**Vegetation subplot nonsampled reason code.** A code indicating why a subplot cannot be sampled when VEG\_SUBP\_STATUS\_CD = 3. Codes 1-4 can be assigned to entire plots or portions of plots that are not sampled. Code 5 is assigned only when the entire plot is affected. If VEG\_SUBP\_STATUS\_CD = 1 or 2, this variable is not recorded. This value is derived for data collected with VEG\_VISIT.VEG\_MANUAL = 1.7.

**Codes: VEG\_SUBP\_NONSAMPLE\_REASN\_CD**

Code	Description
1	Outside U.S. boundary.
2	Denied access area.
3	Hazardous situation.
4	Time limitation.
5	Lost data (office use only).
10	Other.

**5.3.11 SUBP\_ACCESSIBLE\_FOREST\_PCT**

**Subplot accessible forest percent.** The percent of the subplot area in an accessible forested condition as estimated by the vegetation specialist when VEG\_VISIT.VEG\_MANUAL = 2.0 and higher. This value is derived from P2 subplot and condition data when VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.12 DETAILED\_NONFOREST\_LAND\_USE**

**Detailed nonforest land use.** A code indicating the NONFOREST land use of the portion of the subplot that is not forest. If more than one nonforest land use is present, the code that best describes the land use occurring closest to subplot center is recorded.

**Codes: DETAILED\_NONFOREST\_LAND\_USE**

Code	Description
10	Agriculture.
11	Cropland.
12	Pasture.
13	Idle farmland.
14	Orchard.
15	Christmas tree plantation.
20	Rangeland.
30	Developed.
31	Cultural (business, residential, urban buildup).
32	Rights-of-way (improved roads, railway, power lines, canals).
33	Recreation (parks, ski areas, golf courses, etc).
40	Other (beach, desert, noncensus water, marsh, bog).

**5.3.13 TOTAL\_CANOPY\_COVER\_LAYER\_1**

**Total canopy cover layer 1.** Estimated total canopy cover of the foliage of all vascular plants in Layer 1 within the accessible forested conditions on the subplot. A rapid canopy cover estimate is made, ignoring overlap among species. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 2, the assessment is made only within the accessible forested conditions on the subplot. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 1 and SUBP\_ACCESSIBLE\_FOREST\_PCT is at least 50 percent, the assessment is made over the entire subplot, including all conditions. See VEG\_VISIT.VEG\_SAMPLE\_BASIS for details.

**5.3.14 TOTAL\_CANOPY\_COVER\_LAYER\_2**

**Total canopy cover layer 2.** Estimated total canopy cover of the foliage of all vascular plants in Layer 2. A rapid canopy cover estimate is made, ignoring overlap among species. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 2, the assessment is made only within the accessible forested conditions on the subplot. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 1 and SUBP\_ACCESSIBLE\_FOREST\_PCT is at least 50 percent, the assessment is made over the entire subplot, including all conditions. See VEG\_VISIT.VEG\_SAMPLE\_BASIS for details.

**5.3.15 TOTAL\_CANOPY\_COVER\_LAYER\_3**

**Total canopy cover layer 3.** Estimated total canopy cover of the foliage of all vascular plants in Layer 3. A rapid canopy cover estimate is made, ignoring overlap among species. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 2, the assessment was made only within the accessible forested conditions on the subplot. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 1 and SUBP\_ACCESSIBLE\_FOREST\_PCT is at least 50 percent, the assessment is made over the entire subplot, including all conditions. See VEG\_VISIT.VEG\_SAMPLE\_BASIS for details.

**5.3.16 TOTAL\_CANOPY\_COVER\_LAYER\_4**

**Total canopy cover layer 4.** Estimate the total canopy cover of the foliage of all vascular plants in Layer 4. A rapid canopy cover estimate is made, ignoring overlap among species. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 2, the assessment was made only within the accessible forested conditions on the subplot. When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 1 and SUBP\_ACCESSIBLE\_FOREST\_PCT is at least 50 percent, the assessment is made over the entire subplot, including all conditions. See VEG\_VISIT.VEG\_SAMPLE\_BASIS for details.

**5.3.17 CRYPTO\_CRUST\_COVER\_PCT**

**Cryptobiotic crust cover percent.** The percent cryptobiotic crust cover on portions of the subplot designated as accessible forest condition. Cryptobiotic crust is a layer of symbiotic lichens and algae on the soil surface (common in arid regions). This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.18 LICHEN\_COVER\_PCT**

**Lichen cover percent.** The percent lichen cover on portions of the subplot floor designated as accessible forest condition. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.19 LITTER\_DUFF\_COVER\_PCT**

**Litter and duff cover percent.** The percent litter and duff cover on portions of the subplot floor designated as accessible forest condition. This is a continuous layer of accumulated organic matter over forest mineral soil (e.g., scattered leaves over mineral soil is coded mineral soil). This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.20 MINERAL\_SOIL\_COVER\_PCT**

**Mineral soil cover percent.** The percent mineral soil cover on portions of the subplot floor designated as accessible forest condition. This is physically weathered soil parent material that may or may not also be chemically and biologically altered. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.21 MOSS\_COVER\_PCT**

**Moss cover percent.** The percent moss cover, including liverworts, on portions of the subplot floor designated as accessible forest condition. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.22 ROAD\_TRAIL\_COVER\_PCT**

**Road and trail cover percent.** The percent road/trail cover on the portions of the subplot floor designated as accessible forest condition, including any areas compacted and unvegetated from regular use by foot travel or small motorized vehicles. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.23 ROCK\_COVER\_PCT**

**Rock cover percent.** The percent rock cover on portions of the subplot floor designated as accessible forest condition, including any rocks, boulders, or accumulations of gravel (> 1/4 inch diameter) or pebbles. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.24 STANDING\_WATER\_COVER\_PCT**

**Standing water cover percent.** The percent standing water/flooded cover on portions of the subplot designated as accessible forest condition, including any ponding or flowing water that is not contained within banks. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.25 STREAM\_LAKE\_COVER\_PCT**

**Stream and lake cover percent.** The percent stream/lake cover on portions of the subplot designated as accessible forest condition, including any body of water contained within banks that is within a forested condition. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.26 TRASH\_JUNK\_COVER\_PCT**

**Trash and junk cover percent.** The percent trash/junk/other cover on portions of the subplot floor designated as accessible forest condition. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.27 WOOD\_COVER\_PCT**

**Wood cover percent.** The percent wood cover on portions of the subplot floor designated as accessible forest condition, including stumps, live trunks, roots, and wood pieces that average greater than 3 inches in diameter and are in contact with the ground. This variable was not collected under VEG\_VISIT.VEG\_MANUAL = 1.7.

**5.3.28 VEG\_SUBP\_STATUS\_CD\_PRE2004**

**Vegetation subplot status code, pre2004.** A code indicating the Vegetation Subplot Status Code consistent with VEG\_VISIT.VEG\_MANUAL = 1.7. The version 1.7 sample design required a subplot to be at least 50 percent forested in order to be sampled. If at least 50 percent of subplot area was accessible forest, the entire subplot was sampled, including all conditions. This variable is derived. For plots with VEG\_VISIT.VEG\_MANUAL = 1.7, this value is derived from P2 condition data, plot notes, and availability of various field-recorded records (e.g., subplot species and subplot totals.) For plots with VEG\_VISIT.VEG\_MANUAL = 2.0 and later, this value is derived in part from the field-collected SUBP\_ACCESSIBLE\_FOREST\_PCT.

**Codes: VEG\_SUBP\_STATUS\_CD\_PRE2004**

Code	Description
1	Sampled - subplot accessible forest condition is greater than or equal to 50 percent of subplot.
2	Sampled - subplot accessible forest condition is less than 50 percent of subplot.
3	Nonsampled.

**5.3.29 VEG\_SUBP\_NONSMP\_RSN\_CD\_PRE2004**

**Vegetation subplot nonsampled reason code, pre2004.** A code indicating the Vegetation Subplot Nonsampled Reason Code consistent with VEG\_VISIT.VEG\_MANUAL = 1.7 to describe reason for VEG\_SUBP\_NONSAMPLE\_REASN\_CD, P2 condition data, plot notes, and availability of various field-recorded records (e.g., subplot species and subplot totals).

**Codes: VEG\_SUBP\_NONSMP\_RSN\_CD\_PRE2004**

Code	Description
1	Outside U.S. boundary.
2	Denied access area.
3	Hazardous situation.
4	Time limitation.
5	Lost data (office use only).
10	Other.

**5.3.30 CREATED\_BY**

**Created by.** See VEG\_VISIT.CREATED\_BY description for definition.

**5.3.31 CREATED\_DATE**

**Created date.** See VEG\_VISIT.CREATED\_DATE description for definition.

**5.3.32 CREATED\_IN\_INSTANCE**

**Created in instance.** See VEG\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**5.3.33 MODIFIED\_BY**

**Modified by.** See VEG\_VISIT.MODIFIED\_BY description for definition.

**5.3.34 MODIFIED\_DATE**

**Modified date.** See VEG\_VISIT.MODIFIED\_DATE description for definition.

**5.3.35 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See VEG\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.





## 5.4 Vegetation Quadrat Table

(Oracle table name: VEG\_QUADRAT)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.4.1	CN	Sequence number	VARCHAR2(34)
5.4.2	PLT_CN	Plot sequence number	VARCHAR2(34)
5.4.3	VVT_CN	Vegetation visit sequence number	VARCHAR2(34)
5.4.4	VSF_CN	Vegetation subplot sequence number	VARCHAR2(34)
5.4.5	INVYR	Inventory year	NUMBER(4)
5.4.6	STATECD	State code	NUMBER(4)
5.4.7	COUNTYCD	County code	NUMBER(3)
5.4.8	PLOT	Phase 2 plot number	NUMBER(5)
5.4.9	SUBP	Subplot number	NUMBER(1)
5.4.10	QUADRAT	Quadrat number	NUMBER(1)
5.4.11	CONDID	Forest condition class	NUMBER(1)
5.4.12	QUADRAT_STATUS	Quadrat status	NUMBER(1)
5.4.13	QUADRAT_STATUS_PRE2004	Quadrat status of quadrats sampled before 2004	NUMBER(1)
5.4.14	TRAMPLING	Trampling	NUMBER(1)
5.4.15	CREATED_BY	Created by	VARCHAR2(30)
5.4.16	CREATED_DATE	Created date	DATE
5.4.17	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
5.4.18	MODIFIED_BY	Modified by	VARCHAR2(30)
5.4.19	MODIFIED_DATE	Modified date	DATE
5.4.20	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	VQT_PK
Unique	PLT_CN, VVT_CN, VSB_CN, QUADRAT	N/A	VQT_UK
Unique	PLT_CN, VVT_CN, VSB_CN, CN	N/A	VQT_UK2
Natural	STATECD, INVYR, COUNTYCD, PLOT, SUBP, QUADRAT	N/A	VQT_NAT_I
Foreign	PLT_CN, VVT_CN, VSB_CN	VEG_QUADRAT to VEG_SUBPLOT	VQT_VSB_FK

**5.4.1 CN**

**Sequence number.** A unique sequence number used to identify a vegetation quadrat record. Other tables will reference this as VQT\_CN.

**5.4.2 PLT\_CN**

**Plot sequence number.** Foreign key linking the vegetation quadrat record to the P2 plot record (via PLOT\_CN).

**5.4.3 VVT\_CN**

**Vegetation visit sequence number.** Foreign key linking the vegetation quadrat record to the vegetation visit record (via VEG\_VISIT\_CN).

**5.4.4 VSB\_CN**

**Vegetation subplot sequence number.** Foreign key linking the vegetation quadrat record to the vegetation subplot record (via VEG\_SUBPLOT\_CN).

**5.4.5 INVYR**

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in performing certain P3 data analyses should access plots with this anomalous value in INVYR.

**5.4.6 STATECD**

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.4.7 COUNTYCD**

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

**5.4.8 PLOT**

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

**5.4.9 SUBP**

**Subplot number.** A code indicating the number of the subplot where the quadrat was sampled.

**Codes: SUBP**

Code	Description
1	Center subplot.
2	North subplot.
3	Southeast subplot.
4	Southwest subplot.

**5.4.10 QUADRAT**

**Quadrat.** A code indicating the number of the quadrat as determined by the transect originating from subplot center.

**Codes: QUADRAT**

Code	Description
1	Quadrat on 30 degree subplot transect.
2	Quadrat on 150 degree subplot transect.
3	Quadrat on 270 degree subplot transect.

**5.4.11 CONDID**

**Condition class number.** A code representing the condition with the greatest area in the quadrat. It is one of the unique identifying numbers assigned to each condition on a plot. A condition is initially defined by condition class status. Differences in reserved status, owner group, forest type, stand-size class, regeneration status, and stand density further define condition for forest land. Mapped nonforest conditions are also assigned numbers. At the time of plot establishment, the condition class at plot center (the center of subplot 1) is usually designated as condition class 1. Other condition classes are assigned numbers sequentially at the time each condition class is delineated. On a plot, each sampled condition class must have a unique number that can change at remeasurement to reflect new conditions on the plot.

**5.4.12 QUADRAT\_STATUS**

**Quadrat status.** A code indicating how the quadrat was sampled consistent with VEG\_VISIT.VEG\_MANUAL = 2.0 and higher. If QUADRAT\_STATUS is 1 or 3, the quadrat is sampled and data are collected even if no vascular plants are present. If the value entered is 2, 4, or 5, the quadrat is not sampled. This value is derived for VEG\_VISIT.VEG\_MANUAL = 1.7 plots.

**Codes: QUADRAT\_STATUS**

Code	Description
1	Quadrat sampled (most of the quadrat is in an accessible forest condition).
2	Quadrat not sampled because most or all of it does not fall in an accessible forested condition class.

Code	Description
3	Quadrat sampled, no vascular plants rooted in or overhanging within 6 feet of the ground surface.
4	Quadrat not sampled, hazard present on quadrat.
5	Quadrat not sampled, other reason - enter in plot notes.

#### 5.4.13 QUADRAT\_STATUS\_PRE2004

**Quadrat status of quadrats sampled pre2004.** This code for quadrat status was collected when VEG\_VISIT.VEG\_MANUAL = 1.7 where data were collected on both forested and nonforested portions of a subplot with at least 50 percent accessible forest. This variable is not available for VEG\_VISIT.VEG\_MANUAL = 2.0 and higher.

**Codes: QUADRAT\_STATUS\_PRE2004**

Code	Description
1	Quadrat sampled (at least 50 percent of the subplot is in an accessible forest condition; quadrat may be nonforest or other condition).
2	Quadrat not sampled because the sum of all forested condition classes make up <50 percent of the subplot area.
3	Quadrat sampled, no vascular plants rooted in or overhanging within 6 feet of the ground surface.
4	Quadrat not sampled, hazard present on quadrat.
5	Quadrat not sampled, other reason - enter in plot notes.

#### 5.4.14 TRAMPLING

**Trampling.** A code indicating the amount of trampling present in each quadrat at the start of vegetation diversity measurements. Trampling is defined as damage to plants or disturbance of the ground layer by humans, livestock, or wildlife.

**Codes: TRAMPLING**

Code	Description
1	Low: 0-10 percent of quadrat trampled: pristine to relatively undisturbed.
2	Moderate: 10-50 percent of quadrat trampled: trampling by animals or field crew.
3	Heavy: >50 percent of quadrat trampled: hiking trail or heavily grazed.

#### 5.4.15 CREATED\_BY

**Created by.** See VEG\_VISIT.CREATED\_BY description for definition.

#### 5.4.16 CREATED\_DATE

**Created date.** See VEG\_VISIT.CREATED\_DATE description for definition.

#### 5.4.17 CREATED\_IN\_INSTANCE

**Created in instance.** See VEG\_VISIT.CREATED\_IN\_INSTANCE description for definition.

#### 5.4.18 MODIFIED\_BY

**Modified by.** See VEG\_VISIT.MODIFIED\_BY description for definition.

**5.4.19 MODIFIED\_DATE**

**Modified date.** See VEG\_VISIT.MODIFIED\_DATE description for definition.

**5.4.20 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See VEG\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.



## 5.5 Vegetation Subplot Species Table

(Oracle table name: VEG\_SUBPLOT\_SPP)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
5.5.1	CN	Sequence number	VARCHAR2(34)
5.5.2	PLT_CN	Plot sequence number	VARCHAR2(34)
5.5.3	VVT_CN	Vegetation visit sequence number	VARCHAR2(34)
5.5.4	VSB_CN	Vegetation subplot sequence number	VARCHAR2(34)
5.5.5	VPS_CN	Vegetation plot species sequence number	VARCHAR2(34)
5.5.6	INVYR	Inventory year	NUMBER(4)
5.5.7	STATECD	State code	NUMBER(4)
5.5.8	COUNTYCD	County code	NUMBER(3)
5.5.9	PLOT	Phase 2 plot number	NUMBER(5)
5.5.10	SUBP	Subplot number	NUMBER(1)
5.5.11	VEG_FLDSPCD	Vegetation field species code	VARCHAR2(16)
5.5.12	UNIQUE_SP_NBR	Unique species number	NUMBER(2)
5.5.13	VEG_SPCD	Vegetation species code	VARCHAR2(16)
5.5.14	SP_CANOPY_COVER_TOTAL	Subplot species canopy cover total	NUMBER(5,2)
5.5.15	SP_CANOPY_COVER_LAYER_1_2	Subplot species canopy cover layers 1 and 2	NUMBER(5,2)
5.5.16	SP_CANOPY_COVER_LAYER_3	Subplot species canopy cover layer 3	NUMBER (5,2)
5.5.17	SP_CANOPY_COVER_LAYER_4	Subplot species canopy cover layer 4	NUMBER(5,2)
5.5.18	QUAD_1_PRESENCE	Quadrat 1 presence	NUMBER(1)
5.5.19	QUAD_2_PRESENCE	Quadrat 2 presence	NUMBER(1)
5.5.20	QUAD_3_PRESENCE	Quadrat 3 presence	NUMBER(1)
5.5.21	DUMMY_SUBP_COVER_PRE2004	Dummy subplot cover for data collected prior to 2004	NUMBER(1)
5.5.22	MAX_COVER_LAYER_NBR_PRE2004	Maximum cover layer number for data collected prior to 2004	NUMBER(1)
5.5.23	CREATED_BY	Created by	VARCHAR2(30)
5.5.24	CREATED_DATE	Created date	DATE
5.5.25	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
5.5.26	MODIFIED_BY	Modified by	VARCHAR2(30)
5.5.27	MODIFIED_DATE	Modified date	DATE
5.5.28	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	VSS_PK
Unique	PLT_CN, VVT_CN, VPS_CN, VSB_CN	N/A	VSS_UK
Natural	STATECD, INVYR, COUNTYCD, PLOT, SUBP, UNIQUE_SP_NBR, VEG_SPCD	N/A	VSS_NAT_I
Foreign	PLT_CN, VVT_CN, VSB_CN	VEG_SUBPLOT_SPP to VEG_SUBPLOT	VSS_VSB_FK
Foreign	PLT_CN, VVT_CN, VPS_CN	VEG_SUBPLOT_SPP to VEG_PLOT_SPECIES	VSS_VPS_FK

### 5.5.1 CN

**Sequence number.** A unique sequence number used to identify a vegetation subplot species record in this table.

### 5.5.2 PLT\_CN

**Plot sequence number.** Foreign key linking the vegetation subplot species record to the P2 plot record (via PLOT.CN).

### 5.5.3 VVT\_CN

**Vegetation visit sequence number.** Foreign key linking the vegetation subplot species record to the vegetation visit record (via VEG\_VISIT.CN).

### 5.5.4 VSB\_CN

**Vegetation subplot sequence number.** Foreign key linking the vegetation subplot species record to the vegetation subplot record (via VEG\_SUBPLOT.CN).

### 5.5.5 VPS\_CN

**Vegetation plot species sequence number.** Foreign key linking the vegetation subplot species record to the vegetation plot species record (via VEG\_PLOT\_SPECIES.CN).

### 5.5.6 INVYR

**Inventory year.** The year that best represents when the inventory data were collected. Under the annual inventory system, a group of plots is selected each year for sampling. The selection is based on a panel system. INVYR is the year in which the majority of plots in that group were collected (plots in the group have the same panel and, if applicable, subpanel). Under periodic inventory, a reporting inventory year was selected, usually based on the year in which the majority of the plots were collected or the mid-point of the years over which the inventory spanned. For either annual or periodic inventory, INVYR is not necessarily the same as MEASYEAR.

Exceptions:

INVYR = 9999. INVYR is set to 9999 to distinguish those Western P3 plots that are "off subpanel" because of differences in measurement intervals between P3 (measurement interval=5 years) and P2 (measurement interval=10 years) plots. Only users interested in



performing certain P3 data analyses should access plots with this anomalous value in INVYR.

### 5.5.7 STATECD

**State code.** Bureau of the Census Federal Information Processing Standards (FIPS) two-digit code for each state. Refer to appendix B in the P2 document (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 5.5.8 COUNTYCD

**County code.** The identification number for a county, parish, watershed, borough, or similar governmental unit in a state. FIPS codes from the Bureau of the Census are used. Refer to appendix B in the P2 document for codes (The Forest Inventory and Analysis Database: Database Description and User Guide Version 6.0.1 for P2, available at [FIA Data and Tools-Documentation](http://www.fia.fs.fed.us/library/database-documentation/) [http://www.fia.fs.fed.us/library/database-documentation/]).

### 5.5.9 PLOT

**Phase 2 plot number.** An identifier for a plot. Along with STATECD, INVYR, and COUNTYCD, PLOT may be used to uniquely identify a plot.

### 5.5.10 SUBP

**Subplot number.** A code indicating the number of the subplot center that was sampled.

**Codes: SUBP**

Code	Description
1	Center subplot.
2	North subplot.
3	Southeast subplot.
4	Southwest subplot.

### 5.5.11 VEG\_FLDSPCD

**Vegetation field species code.** Field-recorded vegetation species code for each vascular plant species found rooted in or overhanging a subplot. Combined with UNIQUE\_SP\_NBR to identify what was believed in the field to be a unique species on the plot. For VEG\_VISIT.VEG\_MANUAL = 2.0.1 and higher, codes are the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2010 version to represent species, genus, or unknown plants. Identification to species only is expected. However, if subspecies information is known, the appropriate NRCS code is entered. This attribute is assigned in the field and never changes. Updates to unknown species codes are recorded in VEG\_SPCD. For VEG\_VISIT.VEG\_MANUAL = 1.7, the VEG\_FLDSPCD may not be a valid NRCS code for unknown plant species, as these were typically recorded as UN; however, these codes are resolved to valid NRCS codes in VEG\_SPCD.

### 5.5.12 UNIQUE\_SP\_NBR

**Unique species number.** This code combined with VEG\_FLDSPCD identifies what was believed to be a unique species on the plot. Specifically, it identifies the number of species recorded for each NRCS genus or unknown code. For example, two unidentifiable *Carex*

spp. would be entered as two separate records with VEG\_FLDSPCD = 'CAREX' and differing UNIQUE\_SP\_NBRs to show that they are not the same species. If the VEG\_FLDSPCD entered already identifies a specific species (e.g., PIST for *Pinus strobus*), then UNIQUE\_SP\_NBR = 1.

### 5.5.13 VEG\_SPCD

**Vegetation species code.** Final edited species code, including any resolution of collected unknown plant specimens (e.g., herbarium-resolved species) and conforming to the NRCS PLANTS database as downloaded in January 2010.

### 5.5.14 SP\_CANOPY\_COVER\_TOTAL

**Subplot species canopy cover total.** Ocular estimate of percent canopy cover of species on the subplot. Total cover estimate is always based on the area of a 24-foot-radius circle. That is, if a species total cover is about equal to a circle with a radius of 5.3 feet in the area of the subplot assessed, the subplot species canopy cover is recorded as 5 percent, regardless of the total percent accessible forest on the subplot. However, for plots collected with VEG\_VISIT.VEG\_SAMPLE\_BASIS = 1, if a subplot was at least 50 percent forested, the entire subplot area was assessed (and so the species cover may occur over nonforest, hazardous, or access-denied areas as well as the accessible forest). When VEG\_VISIT.VEG\_SAMPLE\_BASIS = 2, only accessible forest is assessed. The difference between VEG\_SAMPLE\_BASIS = 1 and VEG\_SAMPLE\_BASIS = 2 affects how data are compiled to determine cover of a species as a percent of the accessible forested portion of a subplot. See VEG\_VISIT.VEG\_SAMPLE\_BASIS for details.

### 5.5.15 SP\_CANOPY\_COVER\_LAYER\_1\_2

**Subplot species canopy cover layers 1 and 2.** Species canopy cover percent within a layer from the ground to 6 feet in height across all accessible forest land on subplot, based on the area of a 24-foot-radius circle. This variable is blank (null) when VEG\_VISIT.VEG\_MANUAL = 1.7.

### 5.5.16 SP\_CANOPY\_COVER\_LAYER\_3

**Subplot species canopy cover layer 3.** Species canopy cover percent within a layer from 6 to 16 feet in height across all accessible forest land on subplot, based on the area of a 24-foot-radius circle. This variable is blank (null) when VEG\_VISIT.VEG\_MANUAL = 1.7.

### 5.5.17 SP\_CANOPY\_COVER\_LAYER\_4

**Subplot species canopy cover layer 4.** Species canopy cover percent within a layer from 16 feet in height and above across all accessible forest land on subplot, based on the area of a 24-foot radius circle. This variable is blank (null) when VEG\_VISIT.VEG\_MANUAL = 1.7.

### 5.5.18 QUAD\_1\_PRESENCE

**Quadrat 1 presence.** A code indicating whether the species is found on quadrat 1 of the current subplot.

Codes: QUAD\_1\_PRESENCE

Code	Description
0	No, the species is not present.
1	Yes, the species is present.

**5.5.19 QUAD\_2\_PRESENCE**

**Quadrat 2 presence.** A code indicating whether the species is found on quadrat 2 of the current subplot.

**Codes: QUAD\_2\_PRESENCE**

Code	Description
0	No, the species is not present.
1	Yes, the species is present.

**5.5.20 QUAD\_3\_PRESENCE**

**Quadrat 3 presence.** A code indicating whether the species is found on quadrat 3 of the current subplot.

**Codes: QUAD\_3\_PRESENCE**

Code	Description
0	No, the species is not present.
1	Yes, the species is present.

**5.5.21 DUMMY\_SUBP\_COVER\_PRE2004**

**Dummy subplot cover for data collected prior to 2004.** This code indicates whether a dummy SP\_CANOPY\_COVER\_TOTAL value was added in office (VEG\_VISIT.VEG\_MANUAL = 1.7 only) where a quadrat species record existed without a matching subplot species record. When DUMMY\_SUBP\_COVER\_PRE2004 = 1, SP\_CANOPY\_COVER\_TOTAL is set to 1 and MAX\_COVER\_LAYER\_NBR\_PRE2004 is blank (null). This variable is not available for VEG\_VISIT.VEG\_MANUAL = 2.0 and later.

**Codes: DUMMY\_SUBP\_COVER\_PRE2004**

Code	Description
0	Subplot species cover data are field recorded.
1	Dummy subplot cover data added where a quadrat species record existed without a matching subplot species record (VEG_VISIT.VEG_MANUAL = 1.7).

**5.5.22 MAX\_COVER\_LAYER\_NBR\_PRE2004**

**Maximum cover layer for data collected prior to 2004.** A code indicating the layer number with maximum cover for the species on the subplot. This code was field recorded when VEG\_VISIT.VEG\_MANUAL = 1.7 and DUMMY\_SUBP\_COVER\_PRE2004 = 0; otherwise it is null. This variable was not collected for VEG\_VISIT.VEG\_MANUAL = 2.0 and later.

**Codes: MAX\_COVER\_LAYER\_NBR\_PRE2004**

Code	Description
1	0 - 2 feet above ground.
2	>2 - 6 feet above ground.

Code	Description
3	>6-16 feet above ground.
4	>16 above ground.

**5.5.23 CREATED\_BY**

**Created by.** See VEG\_VISIT.CREATED\_BY description for definition.

**5.5.24 CREATED\_DATE**

**Created date.** See VEG\_VISIT.CREATED\_DATE description for definition.

**5.5.25 CREATED\_IN\_INSTANCE**

**Created in instance.** See VEG\_VISIT.CREATED\_IN\_INSTANCE description for definition.

**5.5.26 MODIFIED\_BY**

**Modified by.** See VEG\_VISIT.MODIFIED\_BY description for definition.

**5.5.27 MODIFIED\_DATE**

**Modified date.** See VEG\_VISIT.MODIFIED\_DATE description for definition.

**5.5.28 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** See VEG\_VISIT.MODIFIED\_IN\_INSTANCE description for definition.

# Chapter 6: Database Tables - Reference

## Chapter Contents:

Section	Database table
6.1	<a href="#">Reference Plant Dictionary</a>

## Definitions for database tables:

For further detail and examples, refer to the Overview (chapter 1).

### Keys Presented with the Tables

Key type	Definition
Primary	A single column in a table whose values uniquely identify each row in an Oracle table.
Unique	Multiple columns in a table whose values uniquely identify each row in an Oracle table. There can be one and only one row for each unique key value.
Natural	A type of unique key made from existing attributes in the table. It is stored as an index in this database.
Foreign	A column in a table that is used as a link to a matching column in another Oracle table.

### Oracle Data Types

Oracle data type	Definition
DATE	A data type that stores the date in the format of DD-MON-YYYY.
NUMBER	A data type that contains only numbers, positive or negative, with a floating decimal point.
NUMBER(SIZE, D)	A data type that contains only numbers up to a specified maximum size. The maximum size ( <i>and optional fixed decimal point</i> ) is specified by the value(s) listed in the parentheses.
VARCHAR2(SIZE)	A data type that contains alphanumeric data (numbers and/or characters) up to a specified maximum size.

## 6.1 Reference Plant Dictionary

(Oracle table name: REF\_PLANT\_DICTIONARY)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
6.2.1	CN	Sequence number	VARCHAR2(34)
6.2.2	SYMBOL_TYPE	Symbol type	VARCHAR2(20)
6.2.3	SYMBOL	Symbol	VARCHAR2(16)
6.2.4	SCIENTIFIC_NAME	Scientific name	VARCHAR2(100)
6.2.5	NEW_SYMBOL	New symbol	VARCHAR2(16)
6.2.6	NEW_SCIENTIFIC_NAME	New scientific name	VARCHAR2(100)
6.2.7	COMMON_NAME	Common name	VARCHAR2(100)
6.2.8	CATEGORY	Category	VARCHAR2(15)
6.2.9	FAMILY	Family	VARCHAR2(25)
6.2.10	GROWTH_HABIT	Growth habit	VARCHAR2(50)
6.2.11	DURATION	Duration	VARCHAR2(50)
6.2.12	US_NATIVITY	United States nativity	VARCHAR2(100)
6.2.13	STATE_DISTRIBUTION	State distribution	VARCHAR2(300)
6.2.14	STATE_AND_PROVINCE	State and province	VARCHAR2(500)
6.2.15	SCIENTIFIC_NAME_W_AUTHOR	Scientific name with author	VARCHAR2(500)
6.2.16	GENERA_BINOMIAL_AUTHOR	Genera binomial author	VARCHAR2(100)
6.2.17	TRINOMIAL_AUTHOR	Trinomial author	VARCHAR2(100)
6.2.18	QUADRINOMIAL_AUTHOR	Quadrinomial author	VARCHAR2(100)
6.2.19	XGENUS	Cross genus	VARCHAR2(1)
6.2.20	GENUS	Genus	VARCHAR2(40)
6.2.21	XSPECIES	Cross species	VARCHAR2(1)
6.2.22	SPECIES	Species	VARCHAR2(50)
6.2.23	SSP	Subspecies indicator "ssp"	VARCHAR2(4)
6.2.24	XSUBSPECIES	Cross-subspecies	VARCHAR2(1)
6.2.25	SUBSPECIES	Subspecies	VARCHAR2(30)
6.2.26	VAR	Variety indicator "var"	VARCHAR2(4)
6.2.27	XVARIETY	Cross variety	VARCHAR2(1)
6.2.28	VARIETY	Variety	VARCHAR2(30)
6.2.29	SUBVAR	Subspecies indicator "subvar"	VARCHAR2(7)
6.2.30	SUBVARIETY	Subvariety	VARCHAR2(30)
6.2.31	F	Forma indicator "f"	VARCHAR2(2)
6.2.32	FORMA	Forma	VARCHAR2(30)
6.2.33	NOTES	Notes	VARCHAR2(2000)
6.2.34	CREATED_BY	Created by	VARCHAR2(30)

Subsection	Column name (attribute)	Descriptive name	Oracle data type
6.2.35	CREATED_DATE	Created date	DATE
6.2.36	CREATED_IN_INSTANCE	Created in instance	VARCHAR2(6)
6.2.37	MODIFIED_BY	Modified by	VARCHAR2(30)
6.2.38	MODIFIED_DATE	Modified date	DATE
6.2.39	MODIFIED_IN_INSTANCE	Modified in instance	VARCHAR2(6)

Key Type	Column(s) order	Tables to link	Abbreviated notation
Primary	CN	N/A	RPD_PK
Unique	SYMBOL_TYPE, SYMBOL, NEW_SYMBOL	N/A	RPD_UK

### 6.1.1 CN

**Sequence number.** A unique sequence number used to identify a reference plant dictionary table record.

### 6.1.2 SYMBOL\_TYPE

**Symbol type.** This attribute describes the type of NRCS PLANTS symbol (from the January 1, 2010 download of the database).

**Codes: SYMBOL\_TYPE**

Code	Symbol type
Species	Accepted symbol identified to species, subspecies, or variety.
Genus	Accepted symbol identified to genus.
Old	Synonym symbol for an old scientific name.
Unknown	Symbol used to identify generic categories of unknown plants.

### 6.1.3 SYMBOL

**Symbol.** The NRCS PLANTS database code (from the January 1, 2010 download) used to represent a plant species and populate VEG\_SPCD.

### 6.1.4 SCIENTIFIC\_NAME

**Scientific name.** The NRCS PLANTS database scientific name for SYMBOL.

### 6.1.5 NEW\_SYMBOL

**New symbol.** Populated only when SYMBOL\_TYPE = old. Represents the new NRCS PLANTS database accepted code that has been reclassified from the old synonym symbol.

### 6.1.6 NEW\_SCIENTIFIC\_NAME

**New scientific name.** Populated only when SYMBOL\_TYPE = old. Represents the new NRCS PLANTS database accepted code that has been reclassified from the old synonym scientific name.



**6.1.7 COMMON\_NAME**

**Common name.** The NRCS PLANTS database common name associated with the species SYMBOL.

**6.1.8 CATEGORY**

**Category.** Indicates the broad taxonomic category for the symbol. Attribute is null (blank) when SYMBOL = unknown.

**Codes: CATEGORY**

Code	Category
Dicot	Division Magnoliophyta; Class Magnoliopsida.
Fern	Division Pteridophyta.
Gymnosperm	Division Coniferophyta (conifers).
Horsetail	Division Equisetophyta.
Lycopod	Division Lycopodiophyta; Class Lycopodiopsida; Order Lycopodiales (clubmoss).
Monocot	Division Magnoliophyta; Class Liliopsida.
Psilophyte	Division Psilophyta (whisk-ferns).
Quillwort	Division Lycopodiophyta; Class Lycopodiopsida; Order Isoetales.

**6.1.9 FAMILY**

**Family.** The NRCS PLANTS database family name associated with the species SYMBOL.

**6.1.10 GROWTH\_HABIT**

**Growth habit.** The growth habit of the symbol according to the NRCS PLANTS database (2010 download). Some plants have different growth habits depending on environment or location, so a plant can have more than one value. Code descriptions are from the NRCS PLANTS documentation.

**Codes: GROWTH\_HABIT**

Code	Growth habit
Forb / herb	Vascular plant without significant woody tissue above or at the ground. Forbs and herbs may be annual, biennial, or perennial but always lack significant thickening by secondary woody growth and have perennating buds borne at or below the ground surface. In PLANTS, graminoids are excluded, but ferns, horsetails, lycopods, and whisk-ferns are included.
Graminoid	Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes).
Liana	Climbing plant found in tropical forests with long, woody rope-like stems of anomalous anatomical structure.
Shrub	Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes).
Subshrub	Climbing plant found in tropical forests with long, woody rope-like stems of anomalous anatomical structure.

Code	Growth habit
Tree	Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters (13 to 16 feet) in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).
Vine	Twining/climbing plant with relatively long stems, can be woody or herbaceous.

### 6.1.11 DURATION

**Duration.** The duration of a plant according to the NRCS PLANTS database (2010 download). Some plants have different growth habits depending on environment or location, so a plant can have more than one value.

**Codes: DURATION**

Code	Duration
Annual	Individual completes life cycle in a single year.
Biennial	Individual completes life cycle over two growing seasons.
Perennial	Individuals live for many years, including herbaceous plants that resprout from roots.
Unknown	Life cycle and duration unknown.

### 6.1.12 US\_NATIVITY

**The United States nativity of the species represented by the symbol.** A plant that is native to any part of the US is considered Native, even if some populations within the United States are introduced. However, a plant like dandelion (*Taraxacum officinale*) with some populations that are native to the US and some that are native to another country is considered Native and Introduced.

**Codes: US\_NATIVITY (Native)**

Code	United States nativity
N	Native.
N?	Probably Native.
NI	Native and Introduced - some infra-taxa are native and others are introduced.
NI?	Native and Probably Introduced - some infra-taxa are native and others are probably introduced.

**Codes: US\_NATIVITY (Introduced)**

Code	United States nativity
GP	Garden persistent - persists around gardens and old habitations, not naturalized.
GP?	Probably Garden persistent - persists around gardens and old habitations, not naturalized.
I	Introduced.
I?	Probably Introduced.
N?I	Probably Native and Introduced - some infra-taxa are probably native and others are introduced.

Code	United States nativity
W	Waif - an ephemeral introduction, not persistently naturalized.
W?	Probably a Waif - an ephemeral introduction, not persistently naturalized.

**6.1.13 STATE\_DISTRIBUTION**

**State distribution.** State distribution of the plant according to NRCS PLANTS database download of January 1, 2010.

**6.1.14 STATE\_AND\_PROVINCE**

**State and province.** State and province distribution of the of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.

**6.1.15 SCIENTIFIC\_NAME\_W\_AUTHOR**

**Scientific name with author.** Scientific name with author of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.

**6.1.16 GENERA\_BINOMIAL\_AUTHOR**

**Genera binomial author.** Genera binomial author of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.

**6.1.17 TRINOMIAL\_AUTHOR**

**Trinomial author.** Trinomial author of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.

**6.1.18 QUADRINOMIAL\_AUTHOR**

**Quadrinomial author.** Quadrinomial author of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.

**6.1.19 XGENUS**

**Cross genus.** The cross-genus hybridization indicator.

**6.1.20 GENUS**

**Genus.** The NRCS PLANTS database genus name associated with the species symbol.

**6.1.21 XSPECIES**

**Cross species.** The cross-species hybridization indicator.

**6.1.22 SPECIES**

**Species, individual.** The NRCS PLANTS database species name associated with the species symbol.

**6.1.23 SSP**

**Subspecies indicator "ssp."**

**6.1.24 XSUBSPECIES**

**Cross-subspecies.** Cross-subspecies hybridization indicator.

**6.1.25 SUBSPECIES**

**Subspecies.**

- 6.1.26 VAR**  
**Variety indicator "var."**
- 6.1.27 XVARIETY**  
**Cross-variety.** Cross-variety hybridization indicator.
- 6.1.28 VARIETY**  
**Variety.** The NRCS PLANTS database variety name associated with the species symbol.
- 6.1.29 SUBVAR**  
**Subspecies indicator "subvar."** Subspecies indicator "subvar" of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.
- 6.1.30 SUBVARIETY**  
**Subvariety.** Subvariety of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.
- 6.1.31 F**  
**Forma indicator "f."** Forma indicator "f" of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.
- 6.1.32 FORMA**  
**Forma.** Forma of the plant according to the NRCS PLANTS 2010 database download of January 1, 2010.
- 6.1.33 NOTES**  
**Notes.**
- 6.1.34 CREATED\_BY**  
**Created by.** The employee who created the record. This attribute is intentionally left blank in download files.
- 6.1.35 CREATED\_DATE**  
**Created date.** The date on which the record was created. Date will be in the form DD-MON-YYYY.
- 6.1.36 CREATED\_IN\_INSTANCE**  
**Created in instance.** The database instance in which the record was created. Each computer system has a unique database instance code, and this attribute stores that information to determine on which computer the record was created.
- 6.1.37 MODIFIED\_BY**  
**Modified by.** The employee who modified the record. This field will be null if the data have not been modified since initial creation. This attribute is intentionally left blank in download files.
- 6.1.38 MODIFIED\_DATE**  
**Modified date.** The date on which the record was last modified. This field will be null if the data have not been modified since initial creation. Date will be in the form DD-MON-YYYY.

**6.1.39 MODIFIED\_IN\_INSTANCE**

**Modified in instance.** The database instance in which the record was modified. This field will be null if the data have not been modified since initial creation.



# Chapter 7: Views

## Chapter Contents:

Section	Database table
7.1	<a href="#">Summarization of Veg Data</a>

## 7.1 Summarization of Veg Data

The first step in putting the data in a format that can be easily used for estimating species quadrat frequency and quadrat-level species richness is the creation of a QUADRAT\_SPP table. The data presented in this table originates from the Vegetation Subplot Species Table (VEG\_SUBPLOT\_SPP). In VEG\_SUBPLOT\_SPP, each subplot species record contains presence/absence information on each quadrat.

Species quadrat frequency is determined by dividing the number of quadrats where a species was recorded by the total number of quadrats sampled. The Quadrat Species table is used to determine the number of quadrats where a species was recorded. The total number of quadrats sampled is determined from the Vegetation Quadrat Table (QUADRAT\_STATUS = 1 or 3).

Quadrat species richness is the number of species found on a quadrat (on a standard area of 1 m<sup>2</sup>). This view is used to determine the number of species on each quadrat where QUADRAT\_STATUS = 1. Population estimates of quadrat species richness must also include quadrats where QUADRAT\_STATUS = 3 (quadrat sampled, but no vascular plants were rooted in or overhanging within 6 feet).

```
CREATE OR REPLACE TABLE VEG_QUADRAT_SPP
(PLT_CN, VVT_CN, VSB_CN, VQT_CN, VPS_CN,
 STATECD, INVYR, COUNTYCD, PLOT, SUBP,
 QUADRAT, VEG_FLDSPCD, UNIQUE_SP_NBR, VEG_SPCD)
AS
Select
"PLT_CN","VVT_CN","VSB_CN","VQT_CN","VPS_CN","STATECD","INVYR","COUNTYCD","PLOT","SU
BP","QUADRAT","VEG_FLDSPCD","UNIQUE_SP_NBR","VEG_SPCD"
from
(SELECT vss.plt_cn, vss.vvt_cn, vsb.cn as vsb_cn, vqt.cn as vqt_cn, vss.vps_cn,
 plt.statecd, plt.invyr, plt.countycd, plt.plot,
 vss.subp, 1 AS quadrat,
 vps.veg fldspcd, vps.unique_sp_nbr, vps.veg_spcd
FROM veg_visit vvt,
 plot plt,
 veg_plot_species vps,
 veg_subplot vsb,
 veg_subplot_spp vss,
```

```

    veg_quadrat vqt
WHERE plt.cn = vvt.plt_cn
  AND vvt.cn = vps.vvt_cn
  AND vps.cn = vss.vps_cn
  AND vvt.cn = vsb.vvt_cn
  AND vsb.vvt_cn = vps.vvt_cn
  AND vsb.subp = vss.subp
  AND vqt.vsb_cn = vsb.cn
  AND vqt.quadrat = 1
  AND vss.quad_1_presence = 1
UNION
SELECT vss.plt_cn, vss.vvt_cn, vsb.cn as vsb_cn, vqt.cn as vqt_cn, vss.vps_cn,
  plt.statecd, plt.invyr, plt.countycd, plt.plot,
  vss.subp, 2 AS quadrat,
  vps.veg_fldspcd, vps.unique_sp_nbr, vps.veg_spcd
FROM veg_visit vvt,
  plot plt,
  veg_plot_species vps,
  veg_subplot vsb,
  veg_subplot_spp vss,
  veg_quadrat vqt
WHERE plt.cn = vvt.plt_cn
  AND vvt.cn = vps.vvt_cn
  AND vps.cn = vss.vps_cn
  AND vvt.cn = vsb.vvt_cn
  AND vsb.vvt_cn = vps.vvt_cn
  AND vsb.subp = vss.subp
  AND vqt.vsb_cn = vsb.cn
  AND vqt.quadrat = 2
  AND vss.quad_2_presence = 1
UNION
SELECT vss.plt_cn, vss.vvt_cn, vsb.cn as vsb_cn, vqt.cn as vqt_cn, vss.vps_cn,
  plt.statecd, plt.invyr, plt.countycd, plt.plot,
  vss.subp, 3 AS quadrat,
  vps.veg_fldspcd, vps.unique_sp_nbr, vps.veg_spcd
FROM veg_visit vvt,
  plot plt,
  veg_plot_species vps,
  veg_subplot vsb,
  veg_subplot_spp vss,
  veg_quadrat vqt
WHERE plt.cn = vvt.plt_cn
  AND vvt.cn = vps.vvt_cn
  AND vps.cn = vss.vps_cn
  AND vvt.cn = vsb.vvt_cn
  AND vsb.vvt_cn = vps.vvt_cn
  AND vsb.subp = vss.subp
  AND vqt.vsb_cn = vsb.cn
  AND vqt.quadrat = 3
  AND vss.quad_3_presence = 1
) a
order by a.statecd, a.invyr, a.countycd, a.plot, a.subp, a.quadrat;
```



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# Index of Column Names

The following table contains an alphabetized list of all of the column names (attributes) in the database tables included within this user guide. The Oracle table name and descriptive name associated with each attribute are also listed. The "Subsection" number indicates the location of the attribute within this user guide. The "Field Guide section" number indicates the location of the attribute within the FIA National Core Field Guide.

**Note:** The section/subsection numbering used in this document is specific to this guide; within the FIADB, attributes should be referenced by their actual "column name" and not by the subsection number used in this guide.

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
3.2.9	21.3.12	ABUNDANCE_CLASS	LICHEN_LAB	Abundance class
4.4.16	-	AIR_DRY_SOIL_WEIGHT	SOILS_LAB	Air-dry soil weight
2.6.11	-	AMNT_MAX	OZONE_SPECIES_SUMMARY	Amount maximum
2.6.13	-	AMNT_MEAN	OZONE_SPECIES_SUMMARY	Amount mean
2.6.12	-	AMNT_MIN	OZONE_SPECIES_SUMMARY	Amount minimum
2.5.13	20.4.10	ASPECT	OZONE_PLOT_SUMMARY	Aspect
2.6.24	20.4.10	ASPECT	OZONE_SPECIES_SUMMARY	Aspect
2.2.14	20.4.10	ASPECT	OZONE_VISIT	Aspect
2.4.14	-	BIOSITE_INDEX	OZONE_BIOSITE_SUMMARY	Biosite index
2.5.10	-	BIOSITE_INDEX	OZONE_PLOT_SUMMARY	Biosite index
2.4.15	-	BIOSITE_INDEX_MULTIPLIER	OZONE_BIOSITE_SUMMARY	Biosite index multiplier
2.5.19	-	BIOSITE_INDEX_MULTIPLIER	OZONE_PLOT_SUMMARY	Biosite index multiplier
2.6.10	20.6.1	BIOSPCD	OZONE_SPECIES_SUMMARY	Bioindicator species code
2.3.9	20.6.1	BIOSPCD	OZONE_VALIDATION	Bioindicator species code
2.6.21	-	BIOSPCD_INDEX	OZONE_SPECIES_SUMMARY	Bioindicator species index
2.6.20	-	BIOSPCD_SUM	OZONE_SPECIES_SUMMARY	Bioindicator species sum
4.4.43	-	BRAY1_P	SOILS_LAB	Bray 1 phosphorus
4.4.21	-	BULK_DENSITY	SOILS_LAB	Bulk density
4.4.24	-	C_INORG_PCT	SOILS_LAB	Carbon inorganic percent
4.4.23	-	C_ORG_PCT	SOILS_LAB	Carbon organic percent
4.4.25	-	C_TOTAL_PCT	SOILS_LAB	Carbon total percent
6.1.8	-	CATEGORY	REF_PLANT_DICTIONARY	Category
3.2.1	-	CN	LICHEN_LAB	Sequence number
3.3.1	-	CN	LICHEN_PLOT_SUMMARY	Sequence number
3.4.1	-	CN	LICHEN_SPECIES_SUMMARY	Sequence number
3.1.1	-	CN	LICHEN_VISIT	Sequence number
2.4.1	-	CN	OZONE_BIOSITE_SUMMARY	Sequence number

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.1.1	-	CN	OZONE_PLOT	Sequence number
2.5.1	-	CN	OZONE_PLOT_SUMMARY	Sequence number
2.6.1	-	CN	OZONE_SPECIES_SUMMARY	Sequence number
2.3.1	-	CN	OZONE_VALIDATION	Sequence number
2.2.1	-	CN	OZONE_VISIT	Sequence number
3.5.7	-	CN	REF_LICHEN_SPECIES	Sequence number
3.6.6	-	CN	REF_LICHEN_SPP_COMMENTS	Sequence number
6.1.1	-	CN	REF_PLANT_DICTIONARY	Sequence number
4.2.1	-	CN	SOILS_EROSION	Sequence number
4.4.1	-	CN	SOILS_LAB	Sequence number
4.3.1	-	CN	SOILS_SAMPLE_LOC	Sequence number
4.1.1	-	CN	SOILS_VISIT	Sequence number
5.2.1	-	CN	VEG_PLOT_SPECIES	Sequence number
5.4.1	-	CN	VEG_QUADRAT	Sequence number
5.3.1	-	CN	VEG_SUBPLOT	Sequence number
5.5.1	-	CN	VEG_SUBPLOT_SPP	Sequence number
5.1.1	-	CN	VEG_VISIT	Sequence number
4.4.22	-	COARSE_FRACTION_PCT	SOILS_LAB	Coarse fraction percent
6.1.7	-	COMMON_NAME	REF_PLANT_DICTIONARY	Common name
4.2.10	22.7.2	COMPCPCT	SOILS_EROSION	Compact percent (percent compacted area)
4.3.19	22.8.11	CONDID	SOILS_SAMPLE_LOC	Forest condition class number
5.4.11	24.7.3	CONDID	VEG_QUADRAT	Condition class number
3.2.5	21.3.5	COUNTYCD	LICHEN_LAB	County code
3.3.5	21.3.5	COUNTYCD	LICHEN_PLOT_SUMMARY	County code
3.1.5	21.3.5	COUNTYCD	LICHEN_VISIT	County code
2.4.4	20.4.2	COUNTYCD	OZONE_BIOSITE_SUMMARY	County code
2.1.7	20.4.2	COUNTYCD	OZONE_PLOT	County code
2.5.4	20.4.2	COUNTYCD	OZONE_PLOT_SUMMARY	County code
2.6.4	20.4.2	COUNTYCD	OZONE_SPECIES_SUMMARY	County code
2.3.5	20.4.2	COUNTYCD	OZONE_VALIDATION	County code
2.2.5	20.4.2	COUNTYCD	OZONE_VISIT	County code
4.2.5	-	COUNTYCD	SOILS_EROSION	County code
4.4.5	-	COUNTYCD	SOILS_LAB	County code
4.3.5	-	COUNTYCD	SOILS_SAMPLE_LOC	County code
4.1.5	-	COUNTYCD	SOILS_VISIT	County code
5.2.6	24.3.2	COUNTYCD	VEG_PLOT_SPECIES	County code

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
5.4.7	24.3.2	COUNTYCD	VEG_QUADRAT	County code
5.3.6	24.3.2	COUNTYCD	VEG_SUBPLOT	County code
5.5.8	24.3.2	COUNTYCD	VEG_SUBPLOT_SPP	County code
5.1.5	24.3.2	COUNTYCD	VEG_VISIT	County code
3.2.12	-	CREATED_BY	LICHEN_LAB	Created by
3.3.12	-	CREATED_BY	LICHEN_PLOT_SUMMARY	Created by
3.4.13	-	CREATED_BY	LICHEN_SPECIES_SUMMARY	Created by
3.1.32	-	CREATED_BY	LICHEN_VISIT	Created by
2.4.22	-	CREATED_BY	OZONE_BIOSITE_SUMMARY	Created by
2.1.19	-	CREATED_BY	OZONE_PLOT	Created by
2.5.22	-	CREATED_BY	OZONE_PLOT_SUMMARY	Created by
2.6.30	-	CREATED_BY	OZONE_SPECIES_SUMMARY	Created by
2.3.16	-	CREATED_BY	OZONE_VALIDATION	Created by
2.2.23	-	CREATED_BY	OZONE_VISIT	Created by
3.5.8	-	CREATED_BY	REF_LICHEN_SPECIES	Created by
3.6.7	-	CREATED_BY	REF_LICHEN_SPP_COMMENT S	Created by
6.1.34	-	CREATED_BY	REF_PLANT_DICTIONARY	Created by
4.2.15	-	CREATED_BY	SOILS_EROSION	Created by
4.4.49	-	CREATED_BY	SOILS_LAB	Created by
4.3.25	-	CREATED_BY	SOILS_SAMPLE_LOC	Created by
4.1.10	-	CREATED_BY	SOILS_VISIT	Created by
5.2.15	-	CREATED_BY	VEG_PLOT_SPECIES	Created by
5.4.15	-	CREATED_BY	VEG_QUADRAT	Created by
5.3.30	-	CREATED_BY	VEG_SUBPLOT	Created by
5.5.23	-	CREATED_BY	VEG_SUBPLOT_SPP	Created by
5.1.15	-	CREATED_BY	VEG_VISIT	Created by
3.2.13	-	CREATED_DATE	LICHEN_LAB	Created date
3.3.13	-	CREATED_DATE	LICHEN_PLOT_SUMMARY	Created date
3.4.14	-	CREATED_DATE	LICHEN_SPECIES_SUMMARY	Created date
3.1.33	-	CREATED_DATE	LICHEN_VISIT	Created date
2.4.23	-	CREATED_DATE	OZONE_BIOSITE_SUMMARY	Created date
2.1.20	-	CREATED_DATE	OZONE_PLOT	Created date
2.5.23	-	CREATED_DATE	OZONE_PLOT_SUMMARY	Created date
2.6.31	-	CREATED_DATE	OZONE_SPECIES_SUMMARY	Created date
2.3.17	-	CREATED_DATE	OZONE_VALIDATION	Created date
2.2.24	-	CREATED_DATE	OZONE_VISIT	Created date
3.5.9	-	CREATED_DATE	REF_LICHEN_SPECIES	Created date

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
3.6.8	-	CREATED_DATE	REF_LICHEN_SPP_COMMENT S	Created date
6.1.35	-	CREATED_DATE	REF_PLANT_DICTIONARY	Created date
4.2.16	-	CREATED_DATE	SOILS_EROSION	Created date
4.4.50	-	CREATED_DATE	SOILS_LAB	Created date
4.3.26	-	CREATED_DATE	SOILS_SAMPLE_LOC	Created date
4.1.11	-	CREATED_DATE	SOILS_VISIT	Created date
5.2.16	-	CREATED_DATE	VEG_PLOT_SPECIES	Created date
5.4.16	-	CREATED_DATE	VEG_QUADRAT	Created date
5.3.31	-	CREATED_DATE	VEG_SUBPLOT	Created date
5.5.24	-	CREATED_DATE	VEG_SUBPLOT_SPP	Created date
5.1.16	-	CREATED_DATE	VEG_VISIT	Created date
3.2.14	-	CREATED_IN_INSTANCE	LICHEN_LAB	Created in instance
3.3.14	-	CREATED_IN_INSTANCE	LICHEN_PLOT_SUMMARY	Created in instance
3.4.15	-	CREATED_IN_INSTANCE	LICHEN_SPECIES_SUMMARY	Created in instance
3.1.34	-	CREATED_IN_INSTANCE	LICHEN_VISIT	Created in instance
2.4.24	-	CREATED_IN_INSTANCE	OZONE_BIOSITE_SUMMARY	Created in instance
2.1.21	-	CREATED_IN_INSTANCE	OZONE_PLOT	Created in instance
2.5.24	-	CREATED_IN_INSTANCE	OZONE_PLOT_SUMMARY	Created in instance
2.6.32	-	CREATED_IN_INSTANCE	OZONE_SPECIES_SUMMARY	Created in instance
2.3.18	-	CREATED_IN_INSTANCE	OZONE_VALIDATION	Created in instance
2.2.25	-	CREATED_IN_INSTANCE	OZONE_VISIT	Created in instance
3.5.10	-	CREATED_IN_INSTANCE	REF_LICHEN_SPECIES	Created in instance
3.6.9	-	CREATED_IN_INSTANCE	REF_LICHEN_SPP_COMMENT S	Created in instance
6.1.36	-	CREATED_IN_INSTANCE	REF_PLANT_DICTIONARY	Created in instance
4.2.17	-	CREATED_IN_INSTANCE	SOILS_EROSION	Created in instance
4.4.51	-	CREATED_IN_INSTANCE	SOILS_LAB	Created in instance
4.3.27	-	CREATED_IN_INSTANCE	SOILS_SAMPLE_LOC	Created in instance
4.1.12	-	CREATED_IN_INSTANCE	SOILS_VISIT	Created in instance
5.2.17	-	CREATED_IN_INSTANCE	VEG_PLOT_SPECIES	Created in instance
5.4.17	-	CREATED_IN_INSTANCE	VEG_QUADRAT	Created in instance
5.3.32	-	CREATED_IN_INSTANCE	VEG_SUBPLOT	Created in instance
5.5.25	-	CREATED_IN_INSTANCE	VEG_SUBPLOT_SPP	Created in instance
5.1.17	-	CREATED_IN_INSTANCE	VEG_VISIT	Created in instance
2.3.11	20.4.6	CRWTYP	OZONE_VALIDATION	Crew type code
2.2.19	20.4.6	CRWTYP	OZONE_VISIT	Crew type code
5.3.17	24.6.1	CRYPTO_CRUST_COVER_PCT	VEG_SUBPLOT	Cryptobiotic crust cover percent

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.1.3	-	CTY_CN	OZONE_PLOT	County sequence number
2.1.25	-	CYCLE	OZONE_PLOT	Inventory cycle number
5.3.12	24.4.5	DETAILED_NONFOREST_LAND_USE	VEG_SUBPLOT	Detailed nonforest land use
3.3.11	-	DIVERSITY	LICHEN_PLOT_SUMMARY	Diversity
4.3.23	22.8.20	DPTHSBSL	SOILS_SAMPLE_LOC	Depth to restricted layer
5.5.21	-	DUMMY_SUBP_COVER_PRE2004	VEG_SUBPLOT_SPP	Dummy subplot cover for data prior to 2004
6.1.11	-	DURATION	REF_PLANT_DICTIONARY	Duration
4.4.34	-	ECEC	SOILS_LAB	Effective cation exchange capacity
2.5.11	-	ELEV	OZONE_PLOT_SUMMARY	Elevation
2.6.22	-	ELEV	OZONE_SPECIES_SUMMARY	Elevation
2.1.16	20.4.16	ELEVATION	OZONE_PLOT	Elevation
3.3.10	-	EVENNESS	LICHEN_PLOT_SUMMARY	Evenness
4.4.33	-	EXCHNG_AL	SOILS_LAB	Exchangeable aluminum
4.4.32	-	EXCHNG_CA	SOILS_LAB	Exchangeable calcium
4.4.40	-	EXCHNG_CD	SOILS_LAB	Exchangeable cadmium
4.4.38	-	EXCHNG_CU	SOILS_LAB	Exchangeable copper
4.4.36	-	EXCHNG_FE	SOILS_LAB	Exchangeable iron
4.4.30	-	EXCHNG_K	SOILS_LAB	Exchangeable potassium
4.4.31	-	EXCHNG_MG	SOILS_LAB	Exchangeable magnesium
4.4.35	-	EXCHNG_MN	SOILS_LAB	Exchangeable manganese
4.4.29	-	EXCHNG_NA	SOILS_LAB	Exchangeable sodium
4.4.37	-	EXCHNG_NI	SOILS_LAB	Exchangeable nickel
4.4.41	-	EXCHNG_PB	SOILS_LAB	Exchangeable lead
4.4.42	-	EXCHNG_S	SOILS_LAB	Exchangeable sulfur
4.4.39	-	EXCHNG_ZN	SOILS_LAB	Exchangeable zinc
6.1.31	-	F	REF_PLANT_DICTIONARY	
6.1.9	-	FAMILY	REF_PLANT_DICTIONARY	Family
2.4.6	-	FIELD_ID	OZONE_BIOSITE_SUMMARY	Field identification number
2.1.9	-	FIELD_ID	OZONE_PLOT	Field identification number
2.5.6	-	FIELD_ID	OZONE_PLOT_SUMMARY	Field identification number
2.6.6	-	FIELD_ID	OZONE_SPECIES_SUMMARY	Field identification number
2.3.7	-	FIELD_ID	OZONE_VALIDATION	Field identification number
2.2.7	-	FIELD_ID	OZONE_VISIT	Field identification number
4.4.15	-	FIELD_MOIST_SOIL_WT	SOILS_LAB	Field moist soil weight
4.4.18	-	FIELD_MOIST_WATER_CONTENT_PCT	SOILS_LAB	Field moist water content percent

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
4.3.9	-	FORFLTHK	SOILS_SAMPLE_LOC	Average forest floor thickness for the subplot
4.3.15	22.8.13	FORFLTHKE	SOILS_SAMPLE_LOC	Forest floor thickness at the east edge of the sampling
4.3.11	22.8.12	FORFLTHKN	SOILS_SAMPLE_LOC	Forest floor thickness at the north edge of the sampling
4.3.13	22.8.14	FORFLTHKS	SOILS_SAMPLE_LOC	Forest floor thickness at the south edge of the sampling
4.3.17	22.8.15	FORFLTHKW	SOILS_SAMPLE_LOC	Forest floor thickness at the west edge of the sampling
6.1.32	-	FORMA	REF_PLANT_DICTIONARY	Forma
3.4.10	-	FREQUENCY_PCT	LICHEN_SPECIES_SUMMARY	Frequency percent
3.1.21	21.3.25	FTRCD1	LICHEN_VISIT	Features code 1
3.1.22	21.3.25	FTRCD2	LICHEN_VISIT	Features code 2
3.1.23	21.3.25	FTRCD3	LICHEN_VISIT	Features code 3
3.1.24	21.3.25	FTRCD4	LICHEN_VISIT	Features code 4
3.1.18	21.3.23 .1	GAPPCT	LICHEN_VISIT	Gap percent
3.1.19	21.3.23 .2	GAPRCNT	LICHEN_VISIT	Gap recent percent
6.1.16	-	GENERA_BINOMIAL_AUTHOR	REF_PLANT_DICTIONARY	Genera binomial author
3.4.8	-	GENUS	LICHEN_SPECIES_SUMMARY	Genus
3.5.5	-	GENUS	REF_LICHEN_SPECIES	Genus
6.1.20	-	GENUS	REF_PLANT_DICTIONARY	Genus
2.2.22	-	GRIDDEN	OZONE_VISIT	Grid density
6.1.10	-	GROWTH_HABIT	REF_PLANT_DICTIONARY	Growth habit
2.4.8	-	GROUND_LOC_CD	OZONE_BIOSITE_SUMMARY	Ground location code
2.6.8	-	GROUND_LOC_CD	OZONE_SPECIES_SUMMARY	Ground location code
3.1.16	21.3.19	HRDWDPCT	LICHEN_VISIT	Percent hardwood
2.2.21	20.4.15	INJCHECK	OZONE_VISIT	Injury check
2.3.13	-	INJVALID	OZONE_VALIDATION	Injury validation
3.2.3	-	INVYR	LICHEN_LAB	Inventory year
3.3.3	-	INVYR	LICHEN_PLOT_SUMMARY	Inventory year
3.4.2	-	INVYR	LICHEN_SPECIES_SUMMARY	Inventory year
3.1.3	-	INVYR	LICHEN_VISIT	Inventory year
2.4.2	-	INVYR	OZONE_BIOSITE_SUMMARY	Inventory year
2.1.4	-	INVYR	OZONE_PLOT	Inventory year
2.5.2	-	INVYR	OZONE_PLOT_SUMMARY	Inventory year



Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.6.2	-	INVYR	OZONE_SPECIES_SUMMARY	Inventory year
2.3.3	-	INVYR	OZONE_VALIDATION	Inventory year
2.2.3	-	INVYR	OZONE_VISIT	Inventory year
4.2.3	-	INVYR	SOILS_EROSION	Inventory year
4.4.3	-	INVYR	SOILS_LAB	Inventory year
4.3.3	-	INVYR	SOILS_SAMPLE_LOC	Inventory year
4.1.3	-	INVYR	SOILS_VISIT	Inventory year
5.2.4	-	INVYR	VEG_PLOT_SPECIES	Inventory year
5.4.5	-	INVYR	VEG_QUADRAT	Inventory year
5.3.4	-	INVYR	VEG_SUBPLOT	Inventory year
5.5.6	--	INVYR	VEG_SUBPLOT_SPP	Inventory year
5.1.3	-	INVYR	VEG_VISIT	Inventory year
3.1.25	21.3.26	ISSUECD1	LICHEN_VISIT	Issues code 1
3.1.26	21.3.26	ISSUECD2	LICHEN_VISIT	Issues code 2
3.1.27	21.3.26	ISSUECD3	LICHEN_VISIT	Issues code 3
3.1.28	21.3.26	ISSUECD4	LICHEN_VISIT	Issues code 4
4.4.13	-	LAB_ID	SOILS_LAB	Laboratory identification
2.1.14	-	LAT	OZONE_PLOT	Fuzzed coordinates
2.5.20	-	LAT	OZONE_PLOT_SUMMARY	Fuzzed coordinates
4.4.9	-	LAYER_TYPE	SOILS_LAB	Layer type
2.3.12	-	LEAFVCHR	OZONE_VALIDATION	Leaf voucher
3.2.7	-	LICH_SPPCD	LICHEN_LAB	Lichen species code
3.4.4	-	LICH_SPPCD	LICHEN_SPECIES_SUMMARY	Lichen species code
3.5.1	-	LICH_SPPCD	REF_LICHEN_SPECIES	Lichen species code
3.6.1	-	LICH_SPPCD	REF_LICHEN_SPP_COMMENT S	Lichen species code
5.3.18	24.6.2	LICHEN_COVER_PCT	VEG_SUBPLOT	Lichen ground cover percent
3.4.3	-	LICHEN_REGION	LICHEN_SPECIES_SUMMARY	Lichen region
3.4.6	-	LICHEN_REGION_DESCR	LICHEN_SPECIES_SUMMARY	Lichen region description
3.1.10	21.3.15	LICHEN_STATCD	LICHEN_VISIT	Lichens collected
3.1.11	21.3.10	LIPROJCD	LICHEN_VISIT	Lichen project code
5.3.19	24.6.3	LITTER_DUFF_COVER_PCT	VEG_SUBPLOT	Litter/duff ground cover percent
2.4.7	-	LOCATION_CNT	OZONE_BIOSITE_SUMMARY	Location count
2.1.15	-	LON	OZONE_PLOT	Fuzzed coordinates
2.5.21	-	LON	OZONE_PLOT_SUMMARY	Fuzzed coordinates
4.3.10	-	LTRLRTHK	SOILS_SAMPLE_LOC	Average litter layer thickness for the subplot

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
4.3.16	22.8.17	LTRLRTHKE	SOILS_SAMPLE_LOC	Litter layer thickness at the east edge of the sampling frame
4.3.12	22.8.16	LTRLRTHKN	SOILS_SAMPLE_LOC	Litter layer thickness at the north edge of the sampling frame
4.3.14	22.8.18	FORFLTHKS	SOILS_SAMPLE_LOC	Litter layer thickness at the south edge of the sampling frame
4.3.18	22.8.19	LTRLRTHKW	SOILS_SAMPLE_LOC	Litter layer thickness at the west edge of the sampling frame
2.1.17	-	MANUAL	OZONE_PLOT	Field guide (manual) version number
5.5.22	-	MAX_COVER_LAYER_NBR_PRE2004	VEG_SUBPLOT_SPP	Maximum cover layer number for data collected prior to 2004
3.1.7	21.3.9	MEASDAY	LICHEN_VISIT	Measurement day
2.1.13	20.4.8.3	MEASDAY	OZONE_PLOT	Measurement day
2.2.10	20.4.8.3	MEASDAY	OZONE_VISIT	Measurement day
4.1.7	22.6.1.3	MEASDAY	SOILS_VISIT	Measurement day
3.1.8	21.3.8	MEASMON	LICHEN_VISIT	Measurement month
2.1.12	20.4.8.2	MEASMON	OZONE_PLOT	Measurement month
2.2.11	20.4.8.2	MEASMON	OZONE_VISIT	Measurement month
4.1.8	22.6.1.2	MEASMON	SOILS_VISIT	Measurement month
3.2.8	21.3.7	MEASYEAR	LICHEN_LAB	Measurement year
3.3.8	21.3.7	MEASYEAR	LICHEN_PLOT_SUMMARY	Measurement year
3.4.5	21.3.7	MEASYEAR	LICHEN_SPECIES_SUMMARY	Measurement year
3.1.9	21.3.7	MEASYEAR	LICHEN_VISIT	Measurement year
2.4.9	20.4.8.1	MEASYEAR	OZONE_BIOSITE_SUMMARY	Measurement year
2.1.11	20.4.8.1	MEASYEAR	OZONE_PLOT	Measurement year
2.5.8	20.4.8.1	MEASYEAR	OZONE_PLOT_SUMMARY	Measurement year
2.6.9	20.4.8.1	MEASYEAR	OZONE_SPECIES_SUMMARY	Measurement year
2.3.15	20.4.8.1	MEASYEAR	OZONE_VALIDATION	Measurement year

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.2.12	20.4.8.1	MEASYEAR	OZONE_VISIT	Measurement year
4.2.8	22.6.1.1	MEASYEAR	SOILS_EROSION	Measurement year
4.4.45	22.6.1.1	MEASYEAR	SOILS_LAB	Measurement year
4.3.8	22.6.1.1	MEASYEAR	SOILS_SAMPLE_LOC	Measurement year
4.1.9	22.6.1.1	MEASYEAR	SOILS_VISIT	Measurement year
5.3.20	24.6.4	MINERAL_SOIL_COVER_PCT	VEG_SUBPLOT	Mineral soil ground cover percent
3.2.15	-	MODIFIED_BY	LICHEN_LAB	Modified by
3.3.15	-	MODIFIED_BY	LICHEN_PLOT_SUMMARY	Modified by
3.4.16	-	MODIFIED_BY	LICHEN_SPECIES_SUMMARY	Modified by
3.1.35	-	MODIFIED_BY	LICHEN_VISIT	Modified by
2.4.25	-	MODIFIED_BY	OZONE_BIOSITE_SUMMARY	Modified by
2.1.22	-	MODIFIED_BY	OZONE_PLOT	Modified by
2.5.25	-	MODIFIED_BY	OZONE_PLOT_SUMMARY	Modified by
2.6.33	-	MODIFIED_BY	OZONE_SPECIES_SUMMARY	Modified by
2.3.19	-	MODIFIED_BY	OZONE_VALIDATION	Modified by
2.2.26	-	MODIFIED_BY	OZONE_VISIT	Modified by
3.5.11	-	MODIFIED_BY	REF_LICHEN_SPECIES	Modified by
3.6.10	-	MODIFIED_BY	REF_LICHEN_SPP_COMMENTS	Modified by
6.1.37	-	MODIFIED_BY	REF_PLANT_DICTIONARY	Modified by
4.2.18	-	MODIFIED_BY	SOILS_EROSION	Modified by
4.4.46	-	MODIFIED_BY	SOILS_LAB	Modified by
4.3.28	-	MODIFIED_BY	SOILS_SAMPLE_LOC	Modified by
4.1.13	-	MODIFIED_BY	SOILS_VISIT	Modified by
5.2.18	-	MODIFIED_BY	VEG_PLOT_SPECIES	Modified by
5.4.18	-	MODIFIED_BY	VEG_QUADRAT	Modified by
5.3.33	-	MODIFIED_BY	VEG_SUBPLOT	Modified by
5.5.26	-	MODIFIED_BY	VEG_SUBPLOT_SPP	Modified by
5.1.18	-	MODIFIED_BY	VEG_VISIT	Modified by
3.2.16	-	MODIFIED_DATE	LICHEN_LAB	Modified date
3.3.16	-	MODIFIED_DATE	LICHEN_PLOT_SUMMARY	Modified date
3.4.17	-	MODIFIED_DATE	LICHEN_SPECIES_SUMMARY	Modified date
3.1.36	-	MODIFIED_DATE	LICHEN_VISIT	Modified date
2.4.26	-	MODIFIED_DATE	OZONE_BIOSITE_SUMMARY	Modified date
2.1.27	-	MODIFIED_DATE	OZONE_PLOT	Modified date

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.5.26	-	MODIFIED_DATE	OZONE_PLOT_SUMMARY	Modified date
2.6.34	-	MODIFIED_DATE	OZONE_SPECIES_SUMMARY	Modified date
2.3.20	-	MODIFIED_DATE	OZONE_VALIDATION	Modified date
2.2.27	-	MODIFIED_DATE	OZONE_VISIT	Modified date
3.5.12	-	MODIFIED_DATE	REF_LICHEN_SPECIES	Modified date
3.6.11	-	MODIFIED_DATE	REF_LICHEN_SPP_COMMENT S	Modified date
6.1.38	-	MODIFIED_DATE	REF_PLANT_DICTIONARY	Modified date
4.2.19	-	MODIFIED_DATE	SOILS_EROSION	Modified date
4.4.47	-	MODIFIED_DATE	SOILS_LAB	Modified date
4.3.29	-	MODIFIED_DATE	SOILS_SAMPLE_LOC	Modified date
4.1.14	-	MODIFIED_DATE	SOILS_VISIT	Modified date
5.2.19	-	MODIFIED_DATE	VEG_PLOT_SPECIES	Modified date
5.4.19	-	MODIFIED_DATE	VEG_QUADRAT	Modified date
5.3.34	-	MODIFIED_DATE	VEG_SUBPLOT	Modified date
5.5.27	-	MODIFIED_DATE	VEG_SUBPLOT_SPP	Modified date
5.1.19	-	MODIFIED_DATE	VEG_VISIT	Modified date
3.2.17	-	MODIFIED_IN_INSTANCE	LICHEN_LAB	Modified in instance
3.3.17	-	MODIFIED_IN_INSTANCE	LICHEN_PLOT_SUMMARY	Modified in instance
3.4.18	-	MODIFIED_IN_INSTANCE	LICHEN_SPECIES_SUMMARY	Modified in instance
3.1.37	-	MODIFIED_IN_INSTANCE	LICHEN_VISIT	Modified in instance
2.4.27	-	MODIFIED_IN_INSTANCE	OZONE_BIOSITE_SUMMARY	Modified in instance
2.1.24	-	MODIFIED_IN_INSTANCE	OZONE_PLOT	Modified in instance
2.5.27	-	MODIFIED_IN_INSTANCE	OZONE_PLOT_SUMMARY	Modified in instance
2.6.35	-	MODIFIED_IN_INSTANCE	OZONE_SPECIES_SUMMARY	Modified in instance
2.3.21	-	MODIFIED_IN_INSTANCE	OZONE_VALIDATION	Modified in instance
2.2.28	-	MODIFIED_IN_INSTANCE	OZONE_VISIT	Modified in instance
3.5.13	-	MODIFIED_IN_INSTANCE	REF_LICHEN_SPECIES	Modified in instance
6.1.39	-	MODIFIED_IN_INSTANCE	REF_PLANT_DICTIONARY	Modified in instance
3.6.12	-	MODIFIED_IN_INSTANCE	REF_LICHEN_SPP_COMMENT S	Modified in instance
4.2.20	-	MODIFIED_IN_INSTANCE	SOILS_EROSION	Modified in instance
4.4.48	-	MODIFIED_IN_INSTANCE	SOILS_LAB	Modified in instance
4.3.30	-	MODIFIED_IN_INSTANCE	SOILS_SAMPLE_LOC	Modified in instance
4.1.15	-	MODIFIED_IN_INSTANCE	SOILS_VISIT	Modified in instance
5.2.20	-	MODIFIED_IN_INSTANCE	VEG_PLOT_SPECIES	Modified in instance
5.4.20	-	MODIFIED_IN_INSTANCE	VEG_QUADRAT	Modified in instance
5.3.35	-	MODIFIED_IN_INSTANCE	VEG_SUBPLOT	Modified in instance
5.5.28	-	MODIFIED_IN_INSTANCE	VEG_SUBPLOT_SPP	Modified in instance

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
5.1.20	-	MODIFIED_IN_INSTANCE	VEG_VISIT	Modified in instance
5.3.21	24.6.5	MOSS_COVER_PCT	VEG_SUBPLOT	Moss ground cover percent
4.4.26	-	N_TOTAL_PCT	SOILS_LAB	Nitrogen total percent
6.1.6	-	NEW_SCIENTIFIC_NAME	REF_PLANT_DICTIONARY	New scientific name
6.1.5	-	NEW_SYMBOL	REF_PLANT_DICTIONARY	New symbol
6.1.33	-	NOTES	REF_PLANT_DICTIONARY	Notes
2.3.14	-	O3_STATCD	OZONE_VALIDATION	Ozone status code
2.4.5	20.4.4	O3PLOT	OZONE_BIOSITE_SUMMARY	Ozone plot
2.1.8	20.4.4	O3PLOT	OZONE_PLOT	Ozone plot
2.5.5	20.4.4	O3PLOT	OZONE_PLOT_SUMMARY	Ozone plot
2.6.5	20.4.4	O3PLOT	OZONE_SPECIES_SUMMARY	Ozone plot
2.3.6	20.4.4	O3PLOT	OZONE_VALIDATION	Ozone plot
2.2.6	20.4.4	O3PLOT	OZONE_VISIT	Ozone plot
4.4.44	-	OLSEN_P	SOILS_LAB	Olsen phosphorus
3.2.10	-	ORIGIN_FLAG	LICHEN_LAB	Origin flag
4.4.17	-	OVEN_DRY SOIL_WT	SOILS_LAB	Oven dry soil weight
4.4.28	-	PH_CACL2	SOILS_LAB	pH measured in calcium chloride
4.4.27	-	PH_H2O	SOILS_LAB	pH measured in water
2.4.11	-	PLANT_EVAL CNT	OZONE_BIOSITE_SUMMARY	Plant evaluation count
2.6.18	-	PLANT_EVAL CNT	OZONE_SPECIES_SUMMARY	Plant evaluation count
2.4.10	-	PLANT_INJ_CNT	OZONE_BIOSITE_SUMMARY	Plant injury count
2.6.17	-	PLANT_INJ_CNT	OZONE_SPECIES_SUMMARY	Plant injury count
2.4.12	-	PLANT_RATIO	OZONE_BIOSITE_SUMMARY	Plant ratio
2.6.19	-	PPLANT_RATIO	OZONE_SPECIES_SUMMARY	Plant ratio
3.2.6	21.3.3	PLOT	LICHEN_LAB	Phase 2 plot number
3.3.6	21.3.3	PLOT	LICHEN_PLOT_SUMMARY	Phase 2 plot number
3.1.6	21.3.3	PLOT	LICHEN_VISIT	Phase 2 plot number
4.2.6	-	PLOT	SOILS_EROSION	Phase 2 plot number
4.4.6	-	PLOT	SOILS_LAB	Phase 2 plot number
4.3.6	-	PLOT	SOILS_SAMPLE_LOC	Phase 2 plot number
4.1.6	-	PLOT	SOILS_VISIT	Phase 2 plot number
5.2.7	24.3.3	PLOT	VEG_PLOT_SPECIES	Phase 2 plot number
5.4.8	24.3.3	PLOT	VEG_QUADRAT	Phase 2 plot number
5.3.7	24.3.3	PLOT	VEG_SUBPLOT	Phase 2 plot number
5.5.9	24.3.3	PLOT	VEG_SUBPLOT_SPP	Phase 2 plot number
5.1.6	24.3.3	PLOT	VEG_VISIT	Phase 2 plot number
3.4.12	-	PLOTS_IN_REGION	LICHEN_SPECIES_SUMMARY	Plots in region (number)
2.5.17	20.4.13	PLOTWET	OZONE_PLOT_SUMMARY	Plot wetness

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.6.28	20.4.13	PLOTWET	OZONE_SPECIES_SUMMARY	Plot wetness
2.2.20	20.4.13	PLOTWET	OZONE_VISIT	Plot wetness
3.2.2	-	PLT_CN	LICHEN_LAB	Plot sequence number
3.3.2	-	PLT_CN	LICHEN_PLOT_SUMMARY	Plot sequence number
3.1.2	-	PLT_CN	LICHEN_VISIT	Plot sequence number
2.3.2	-	PLT_CN	OZONE_VALIDATION	Plot sequence number
2.2.2	-	PLT_CN	OZONE_VISIT	Plot sequence number
4.2.2	-	PLT_CN	SOILS_EROSION	Plot sequence number
4.4.2	-	PLT_CN	SOILS_LAB	Plot sequence number
4.3.2	-	PLT_CN	SOILS_SAMPLE_LOC	Plot sequence number
4.1.2	-	PLT_CN	SOILS_VISIT	Plot sequence number
5.2.2	-	PLT_CN	VEG_PLOT_SPECIES	Plot sequence number
5.4.2	-	PLT_CN	VEG_QUADRAT	Plot sequence number
5.3.2	-	PLT_CN	VEG_SUBPLOT	Plot sequence number
5.5.2	-	PLT_CN	VEG_SUBPLOT_SPP	Plot sequence number
5.1.2	-	PLT_CN	VEG_VISIT	Plot sequence number
2.5.18	20.4.14	PLTDSTRB	OZONE_PLOT_SUMMARY	Plot disturbance
2.6.29	20.4.14	PLTDSTRB	OZONE_SPECIES_SUMMARY	Plot disturbance
2.2.18	20.4.14	PLTDSTRB	OZONE_VISIT	Plot disturbance
2.5.12	20.4.9	PLTSIZE	OZONE_PLOT_SUMMARY	Plot size
2.6.23	20.4.9	PLTSIZE	OZONE_SPECIES_SUMMARY	Plot size
2.2.13	20.4.9	PLTSIZE	OZONE_VISIT	Plot size
2.1.18	20.4.5	QA_STATUS	OZONE_PLOT	Quality assurance status
2.3.10	-	QASTATCD	OZONE_VALIDATION	Quality assurance status code
4.4.11	-	QASTATCD	SOILS_LAB	Quality assurance status code
5.5.18	-	QUAD_1_PRESENCE	VEG_SUBPLOT_SPP	Presence of species on quadrat 1 of current subplot
5.5.19	-	QUAD_2_PRESENCE	VEG_SUBPLOT_SPP	Presence of species on quadrat 2 of current subplot
5.5.20	-	QUAD_3_PRESENCE	VEG_SUBPLOT_SPP	Presence of species on quadrat 3 of current subplot
5.4.10	24.7.2	QUADRAT	VEG_QUADRAT	Quadrat number
5.4.12	24.7.4	QUADRAT_STATUS	VEG_QUADRAT	Quadrat status code
5.4.13	-	QUADRAT_STATUS_PRE2004	VEG_QUADRAT	Quadrat status of quadrats sampled before 2004
6.1.18	-	QUADRINOMIAL_AUTHOR	REF_PLANT_DICTIONARY	Quadrinomial author

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
4.4.19	-	RESIDUAL_WATER_CONTENT_PC T	SOILS_LAB	Residual water content percent
3.3.9	-	RICHNESS	LICHEN_PLOT_SUMMARY	Richness
5.3.22	24.6.6	ROAD_TRAIL_COVER_PCT	VEG_SUBPLOT	Road/trail ground cover percent
5.3.23	24.6.7	ROCK_COVER_PCT	VEG_SUBPLOT	Rock ground cover percent
4.4.12	-	SAMPLE_DATE	SOILS_LAB	Sample date
4.4.14	-	SAMPLE_ID	SOILS_LAB	Sample identification
4.4.10	-	SAMPLER_TYPE	SOILS_LAB	Sampler type
6.1.4	-	SCIENTIFIC_NAME	REF_PLANT_DICTIONARY	Scientific name
6.1.15	-	SCIENTIFIC_NAME_W_AUTHOR	REF_PLANT_DICTIONARY	Scientific name with author
3.1.15	21.3.18	SFTWDPCT	LICHEN_VISIT	Softwood percent (percent conifers)
3.1.17	21.3.20	SHRUBPCT	LICHEN_VISIT	Percent shrub
2.2.9	20.4.7	SMPKND CD	OZONE_VISIT	Ozone sample kind code
4.4.7	-	SMPLNNBR	SOILS_LAB	Sample line number
4.3.7	-	SMPLNNBR	SOILS_SAMPLE_LOC	Sample line number
3.1.13	21.3.17	SMPLSTP	LICHEN_VISIT	Sample stop time
3.1.12	21.3.16	SMPLSTRT	LICHEN_VISIT	Sample start time
3.1.14	-	SMPLTIME	LICHEN_VISIT	Total sample time
2.5.15	20.4.12	SOILDPTH	OZONE_PLOT_SUMMARY	Soil depth
2.6.26	20.4.12	SOILDPTH	OZONE_SPECIES_SUMMARY	Soil depth
2.2.16	20.4.12	SOILDPTH	OZONE_VISIT	Soil depth
2.5.16	20.4.13	SOILDRN	OZONE_PLOT_SUMMARY	Soil drainage
2.6.27	20.4.13	SOILDRN	OZONE_SPECIES_SUMMARY	Soil drainage
2.2.17	20.4.13	SOILDRN	OZONE_VISIT	Soil drainage
4.3.24	22.8.10	SOILS_STATCD	SOILS_SAMPLE_LOC	Soil sampling status code
4.2.9	22.7.1	SOILSPCT	SOILS_EROSION	Soils percent (percent bare soil)
5.5.15	-	SP_CANOPY_COVER_LAYER_1_2	VEG_SUBPLOT_SPP	Species canopy cover layer 1 and 2
5.5.16	-	SP_CANOPY_COVER_LAYER_3	VEG_SUBPLOT_SPP	Species canopy cover layer 3
5.5.17	-	SP_CANOPY_COVER_LAYER_4	VEG_SUBPLOT_SPP	Species canopy cover layer 4
5.5.14	-	SP_CANOPY_COVER_TOTAL	VEG_SUBPLOT_SPP	Total species canopy cover percent
3.4.11	-	SPECIES	LICHEN_SPECIES_SUMMARY	Species
3.5.6	-	SPECIES	REF_LICHEN_SPECIES	Species
6.1.22	-	SPECIES	REF_PLANT_DICTIONARY	Species

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
2.4.13	-	<a href="#">SPECIES_EVAL_CNT</a>	OZONE_BIOSITE_SUMMARY	Species evaluation count
2.5.9	-	<a href="#">SPECIES_EVAL_CNT</a>	OZONE_PLOT_SUMMARY	Species evaluation count
5.2.11	24.8.1.3	<a href="#">SPECIMEN_COLLECTED</a>	VEG_PLOT_SPECIES	Specimen officially collected
5.2.12	24.8.1.4	<a href="#">SPECIMEN_LABEL_NBR</a>	VEG_PLOT_SPECIES	Specimen label number for unknown specimen collected
5.2.13	24.8.1.5	<a href="#">SPECIMEN_NOT_COLLECTED_REASON</a>	VEG_PLOT_SPECIES	Specimen not collected reason
5.2.14	-	<a href="#">SPECIMEN_RESOLVED</a>	VEG_PLOT_SPECIES	Specimen resolved
2.1.10	-	<a href="#">SPLIT_PLOTID</a>	OZONE_PLOT	Split plot identification
2.5.7	-	<a href="#">SPLIT_PLOTID</a>	OZONE_PLOT SUMMARY	Split plot identification
2.6.7	-	<a href="#">SPLIT_PLOTID</a>	OZONE_SPECIES_SUMMARY	Split plot identification
2.3.8	-	<a href="#">SPLIT_PLOTID</a>	OZONE_VALIDATION	Split plot identification
2.2.8	-	<a href="#">SPLIT_PLOTID</a>	OZONE_VISIT	Split plot identification
3.4.7	-	<a href="#">SPP_ACRONYM</a>	LICHEN_SPECIES_SUMMARY	Species acronym
3.5.4	-	<a href="#">SPP_ACRONYM</a>	REF_LICHEN_SPECIES	Species acronym
3.2.11	-	<a href="#">SPP_COMMENTS</a>	LICHEN_LAB	Species comments
3.6.5	-	<a href="#">SPP_COMMENTS</a>	REF_LICHEN_SPP_COMMENTS	Species comments
3.6.2	-	<a href="#">SPP_NAME</a>	REF_LICHEN_SPP_COMMENTS	Species name
2.1.2	-	<a href="#">SRV_CN</a>	OZONE_PLOT	Survey sequence number
6.1.23	-	<a href="#">SSP</a>	REF_PLANT_DICTIONARY	
5.3.24	24.6.8	<a href="#">STANDING_WATER_COVER_PCT</a>	VEG_SUBPLOT	Standing water/flooded ground cover percent
6.1.14	-	<a href="#">STATE_AND_PROVINCE</a>	REF_PLANT_DICTIONARY	State and province
6.1.13	-	<a href="#">STATE_DISTRIBUTION</a>	REF_PLANT_DICTIONARY	State distribution
3.2.4	21.3.4	<a href="#">STATECD</a>	LICHEN_LAB	State code
3.3.4	21.3.4	<a href="#">STATECD</a>	LICHEN_PLOT_SUMMARY	State code
3.1.4	21.3.4	<a href="#">STATECD</a>	LICHEN_VISIT	State code
2.4.3	20.4.1	<a href="#">STATECD</a>	OZONE_BIOSITE_SUMMARY	State code
2.1.5	20.4.1	<a href="#">STATECD</a>	OZONE_PLOT	State code
2.5.3	20.4.1	<a href="#">STATECD</a>	OZONE_PLOT_SUMMARY	State code
2.6.3	20.4.1	<a href="#">STATECD</a>	OZONE_SPECIES_SUMMARY	State code
2.3.4	20.4.1	<a href="#">STATECD</a>	OZONE_VALIDATION	State code
2.2.4	20.4.1	<a href="#">STATECD</a>	OZONE_VISIT	State code
4.2.4	-	<a href="#">STATECD</a>	SOILS_EROSION	State code
4.4.4	-	<a href="#">STATECD</a>	SOILS_LAB	State code
4.3.4	-	<a href="#">STATECD</a>	SOILS_SAMPLE_LOC	State code
4.1.4	-	<a href="#">STATECD</a>	SOILS_VISIT	State code



Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
5.2.5	24.3.1	STATECD	VEG_PLOT_SPECIES	State code
5.4.6	24.3.1	STATECD	VEG_QUADRAT	State code
5.3.5	24.3.1	STATECD	VEG_SUBPLOT	State code
5.5.7	24.3.1	STATECD	VEG_SUBPLOT_SPP	State code
5.1.4	24.3.1	STATECD	VEG__VISIT	State code
5.3.25	24.6.9	STREAM_LAKE_COVER_PCT	VEG_SUBPLOT	Stream and lake ground cover percent
2.1.26	-	SUBCYCLE	OZONE_PLOT	Subcycle number
5.4.9	24.7.1	SUBP	VEG_QUADRAT	Subplot number
4.2.7	-	SUBP	SOILS_EROSION	Subplot number
5.3.8	24.4.1	SUBP	VEG_SUBPLOT	Subplot number
5.5.10	-	SUBP	VEG_SUBPLOT_SPP	Subplot number
5.3.11	24.4.4	SUBP_ACCESSIBLE_FOREST_PCT	VEG_SUBPLOT	Subplot accessible forest percent
6.1.25	-	SUBSPECIES	REF_PLANT_DICTIONARY	Subspecies
3.4.9	-	SUM_ABUNDANCE	LICHEN_SPECIES_SUMMARY	Sum of abundance
6.1.29	-	SUBVAR	REF_PLANT_DICTIONARY	
6.1.30	-	SUBVARIETY	REF_PLANT_DICTIONARY	Subvariety
3.3.8	-	SUMMATION	LICHEN_PLOT_SUMMARY	Summation
2.4.21	-	SVRTY_CLASS_FIVE	OZONE_BIOSITE_SUMMARY	Severity class five
2.4.20	-	SVRTY_CLASS_FOUR	OZONE_BIOSITE_SUMMARY	Severity class four
2.4.17	-	SVRTY_CLASS_ONE	OZONE_BIOSITE_SUMMARY	Severity class one
2.4.19	-	SVRTY_CLASS_THREE	OZONE_BIOSITE_SUMMARY	Severity class three
2.4.18	-	SVRTY_CLASS_TWO	OZONE_BIOSITE_SUMMARY	Severity class two
2.4.16	-	SVRTY_CLASS_ZERO	OZONE_BIOSITE_SUMMARY	Severity class zero
2.6.14	-	SVRTY_MAX	OZONE_SPECIES_SUMMARY	Severity maximum
2.6.16	-	SVRTY_MEAN	OZONE_SPECIES_SUMMARY	Severity mean
2.6.15	-	SVRTY_MIN	OZONE_SPECIES_SUMMARY	Severity minimum
6.1.3	-	SYMBOL	REF_PLANT_DICTIONARY	Symbol
6.1.2	-	SYMBOL_TYPE	REF_PLANT_DICTIONARY	Symbol type
3.1.29	21.3.24	SZCLSCD1	LICHEN_VISIT	Size class code
3.1.30	21.3.24	SZCLSCD2	LICHEN_VISIT	Size class code
3.1.31	21.3.24	SZCLSCD3	LICHEN_VISIT	Size class code
3.1.20	21.3.23 .3	TALLSHRB	LICHEN_VISIT	Tall shrubs
2.5.14	20.4.11	TERRPOS	OZONE_PLOT_SUMMARY	Terrain position
2.6.25	20.4.11	TERRPOS	OZONE_SPECIES_SUMMARY	Terrain position
2.2.15	20.4.11	TERRPOS	OZONE_VISIT	Terrain position
6.1.17	-	TRINOMIAL_AUTHOR	REF_PLANT_DICTIONARY	Trinomial author

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
5.3.13	24.5.1	TOTAL_CANOPY_COVER_LAYER_1	VEG_SUBPLOT	Total canopy cover layer 1
5.3.14	24.5.2	TOTAL_CANOPY_COVER_LAYER_2	VEG_SUBPLOT	Total canopy cover layer 2
5.3.15	24.5.3	TOTAL_CANOPY_COVER_LAYER_3	VEG_SUBPLOT	Total canopy cover layer 3
5.3.16	24.5.4	TOTAL_CANOPY_COVER_LAYER_4	VEG_SUBPLOT	Total canopy cover layer 4
4.4.20	-	TOTAL_WATER_CONTENT_PCT	SOILS_LAB	Total water content percent
5.1.10	-	TRACE_COVER_ALLOWED	VEG_VISIT	Trace cover allowed
5.4.14	-	TRAMPLING	VEG_QUADRAT	Trampling code
5.3.26	24.6.10	TRASH_JUNK_COVER_PCT	VEG_SUBPLOT	Trash/junk/other ground cover percent
4.3.21	22.8.21	TTXRLYR1	SOILS_SAMPLE_LOC	Soil texture layer 1
4.3.22	22.6.22	TXRLYR2	SOILS_SAMPLE_LOC	Soil texture layer 2
4.2.13	22.7.5	TYPAREACD	SOILS_EROSION	Type compacted area code
4.2.12	22.7.4	TYPCMPCD	SOILS_EROSION	Type compacted trail code
4.2.14	22.7.6	TYPOTHRCD	SOILS_EROSION	Type other type of compaction code
4.2.11	22.7.3	TYPRTDCD	SOILS_EROSION	Type rutted trail code
5.2.9	24.8.1.2	UNIQUE_SP_NBR	VEG_PLOT_SPECIES	Unique species number
5.5.12	24.8.1.2	UNIQUE_SP_NBR	VEG_SUBPLOT_SPP	Unique species number
2.1.6	-	UNITCD	OZONE_PLOT	Unit code
6.1.12	-	US_NATIVITY	REF_PLANT_DICTIONARY	United States nativity
6.1.26	-	VAR	REF_PLANT_DICTIONARY	
6.1.28	-	VARIETY	REF_PLANT_DICTIONARY	Variety
5.2.8	24.8.1.1	VEG_FLDSPCD	VEG_PLOT_SPECIES	Vegetation field species code
5.5.11	24.8.1.1	VEG_FLDSPCD	VEG_SUBPLOT_SPP	Vegetation field species code
5.1.8	-	VEG_KINDCD	VEG_VISIT	Vegetation sample kind code
5.1.9	-	VEG_MANUAL	VEG_VISIT	Vegetation manual (field guide version number)
5.1.13	-	VEG_MEASDAY	VEG_VISIT	Vegetation measurement day
5.1.12	-	VEG_MEASMON	VEG_VISIT	Vegetation measurement month
5.1.11	-	VEG_MEASYEAR	VEG_VISIT	Vegetation measurement year
5.1.7	24.3.4	VEG_QA_STATUS	VEG_VISIT	Vegetation quality assurance status code
5.1.14	-	VEG_SAMPLE_BASIS	VEG_VISIT	Vegetation sample basis

Subsection	Field Guide section	Column name (attribute)	Oracle table name	Descriptive name
5.2.10	-	VEG_SPCD	VEG_PLOT_SPECIES	Vegetation species code
5.5.13	-	VEG_SPCD	VEG_SUBPLOT_SPP	Vegetation species code
5.3.10	24.4.3	VEG_SUBP_NONSAMPLE_REASON_CD	VEG_SUBPLOT	Vegetation subplot nonsampled reason code
5.3.29	-	VEG_SUBP_NONSMP_RSN_CD_PRE2004	VEG_SUBPLOT	Vegetation subplot nonsampled reason code, prior to 2004
5.3.9	24.4.2	VEG_SUBP_STATUS_CD	VEG_SUBPLOT	Vegetation subplot status code
5.3.28	-	VEG_SUBP_STATUS_CD_PRE2004	VEG_SUBPLOT	Vegetation subplot status code, prior to 2004
5.5.5	-	VPS_CN	VEG_SUBPLOT_SPP	Vegetation plot species sequence number
5.4.4	-	VSB_CN	VEG_QUADRAT	Vegetation subplot sequence number
5.5.4	-	VPS_CN	VEG_SUBPLOT_SPP	Vegetation subplot sequence number
4.4.8	22.8.9	VSTNBR	SOILS_LAB	Visit number
4.320	22.8.9	VSTNBR	SOILS_SAMPLE_LOC	Visit number
5.5.3	-	VVT_CN	VEG_SUBPLOT_SPP	Vegetation visit sequence number
5.4.3	-	VVT_CN	VEG_QUADRAT	Vegetation visit sequence number
5.3.3	-	VVT_CN	VEG_SUBPLOT	Vegetation visit sequence number
5.5.3	-	VVT_CN	VEG_SUBPLOT_SPP	Vegetation visit sequence number
5.3.27	-	WOOD_COVER_PCT	VEG_SUBPLOT	Wood ground cover percent
6.1.19	-	XGENUS	REF_PLANT_DICTIONARY	Cross genus
6.1.21	-	XSPECIES	REF_PLANT_DICTIONARY	Cross species
6.1.24	-	XSUBSPECIES	REF_PLANT_DICTIONARY	Cross-subspecies
6.1.27	-	XVARIETY	REF_PLANT_DICTIONARY	Cross variety
3.5.3	-	YEAREND	REF_LICHEN_SPECIES	Year end
3.6.3	-	YEAREND	REF_LICHEN_SPP_COMMENTS	Year end
3.5.2	-	YEARSTART	REF_LICHEN_SPECIES	Year start
3.6.4	-	YEARSTART	REF_LICHEN_SPP_COMMENTS	Year start

