Aerial Survey Geographic Information System Handbook

Sketchmaps to Digital Geographic Information

November 2005

Forest Health Monitoring Program

State and Private Forestry
Forest Health Protection

Revision History

October 1999 — First publication

January 2001

Figure 2 – ArcInfo PAT File Format – Flown/Not Flown Area Coverages

- Corrected data type in fields BEGIN_DATE1, BEGIN_DATE2, BEGIN_DATE2, END_DATE1, END_DATE2, and END_DATE3 to read D (date) rather than I (integer).

Appendix D – Cooperating Agency Codes

- Changed MODNR – Missouri Department of Natural Resources to MODC – Missouri Department of Conservation

Appendix E – Damage Causal Agent Codes

- Add 21028, sudden oak death, *Phytophthora spp.*
- Add 22074, cedar brown pocket rot, *Poria sericeomollis*
- Add 22075, Lachnellula canker, *Lachnellula flavovirons*
- Add 25074, Delphinella shoot blight, *Delphinella abietis*
- Add 80003, five-needle pine decline

June 2003

Figure 1 – ArcInfo PAT File Format – Damage Coverages and Appendix A - Definitions of Items in Damage Coverages

- Add RPT_YR attribute item with a definition of 4, 4, I
- Changed item definition of SURVEY_ID1, SURVEY_ID2 and SURVEY_ID3 to 6, 6, C from 2, 2, I

Figure 2 – ArcInfo PAT File Format – Flown/Not Flown Area Coverages and Appendix B - Definitions of Items in Flown/Not Flown Coverages

- Add RPT_YR attribute item with a definition of 4, 4, I

Changed item definition of SURVEY_ID1, SURVEY_ID2 and SURVEY_ID3 to 6, 6, C from 2, 2, I

Changed item name for begin flight date to BEGIN1, BEGIN2, BEGIN3 from BEGIN_DATE1, BEGIN_DATE2, BEGIN_DATE3

Changed item name for ending date of flight to END1, END2, END3 from END_DATE1, END_DATE2, END_DATE3

Changed item name for number of flight days to FL_DAYS1, FL_DAYS2 and FL_DAYS3 from FLIGHT_DAYS1, FLIGHT_DAYS2, FLIGHT_DAYS3.

Changed item name for comments to FL_NOTES from FLIGHT_NOTES.

Appendix D – Cooperating Agency Codes

Add AZFH, Arizona Forest Health Program, University of Arizona

Add NDCNR, Nevada Department of Conservation

Appendix E – Damage Causal Agent Codes

Add 11055, spruce ips, *Ips pilifrons*

Add 11056, Mexican pine beetle, *Dendroctonus mexicanus*

Add 11999, western bark beetle complex

Change 12154, **unknown**, *Thyridopteryx ephemeraeformis* to 12154, **bagworm**, *Thyridopteryx ephemeraeformis*

Change 12171, **unknown**, *Neodiprion edulicolus* to **pinon sawfly**, *Neodiprion edulicolus*

Add 12188, elm sawfly, *Cimbrex americana*

Add 12189, june beetle, *Phyllophaga* spp.

Add 12190, hickory tussock moth, *Halisidota caryae*

Add 12191, pin oak sawfly, *Caliroa lineata*

Add 12192, palmerworm, *Dichomeris ligulella*

Add 12193, pitch pine looper, *Lambdina athasaria pellucidaria*

Add 12194, red pine sawfly, *Neodiprion nanulus nanulus*

Add 12195, pine tip moth, *Argyrotaenia pinatubana*

Add 12196, baldcypress leafroller, *Archips goyerana*

Add 13030, adana tip moth, *Rhyacionia adana*

Add 14068, European elm scale, *Gossyparia spuria*

Add 14069, elm scurfy scale, *Chionaspis americana*

Change 15058, **unknown**, *Prionoxystus robiniae* to **carpenterworm**, *Prionoxystus robiniae*

Add 15083, cottonwood twig borer, *Gypsonoma haimbachiana*

Add 15084, southern pine sawyer, *Monochamus titillator*

Add 15085, banded ash borer, *Neoclytus capraea*

Add 15086, emerald ash borer, *Agrilus planipennis*

Add 16049, prairie tent caterpillar, *Malacosoma lutescens*

Add 16050, jack pine tip beetle, *Conophthorus banksianae*

Add 17021, jumping oak gall wasp, *Neuroterus saltatorius*

Change 21028, sudden oak death, *Phytophthora* **spp.** to *Phytophthora* ***ramorum***

Add 22076, strumella canker, *Strumella coryneoidea*

Add 22077, phomopsis blight, *Phomopsis juniperovora*

Add 22078, fusarium canker of yellow poplar, *Fusarium solani*

Add 22079, sterile conk of maple and beech, *Inonotus glomeratus*

Add 22080, canker of spruce, *Aleurodiscus* spp.

Add 22081, birch conk, *Piptoporus betulinus*

Add 22082, canker, *Discocainia treleasei*

Add 24030, elm phloem necrosis, *Mycoplasma*

Add 26013, southern cone rust, *Cronartium strobilinum*

Add 80004, pinion pine mortality

November 2005 Database Requirements

Add section on Traditional v. Digital Aerial Sketchmapping

Add in the “Output” section information on acres summaries and general disclaimers

Add Requirements for submitting shapefiles

Map Projection Requirements: Projection and parameters information now shown using ArcGIS 9 terminology.

Change projection requirement to Datum NAD83

Add Figure 3: Table properties from the conversion of a properly formatted coverage to a shapefile using ArcGIS v.9 tools

Add Figure 4: Table properties formatted using D-ASM SketchTools v.2.6

Appendix A – Definitions of Items (Attributes) in Damage Coverages

Change dmg_type domain value 2 Mortality to 2 Mortality (Current)

Add dmg_type domain value 11 Previously Undocumented (Old) Mortality

Appendix D – Cooperating Agency Codes

Change MADEM, Massachusetts Department of Environmental Management to MADCR, Massachusetts Department of Conservation and Recreation

Appendix E – Damage Causal Agent Codes

Add 12197, winter moth, *Operophtera brumata*

Add 12198, basswood thrips, *Neohydatothrips tiliae*

Add 12199, noctuid moth, *Xylomyges simplex* (Walker)

Add 14070, magnolia scale, *Neolecanium cornuparvum*

Add 14071, beech blight aphid, *Grylloprociphilus imbricator*

Add 14072, beech woolly aphid, *Phyllaphis fagi*

Change 15086, **emerald ash borer** to **sitka spruce weevil,** *Pissodes sitchensis*

Add 15087, emerald ash borer, *Agrilus planipennis*

Add 15088, hemlock borer, *Melanophila fulvoguttata*

Add 25075, tar spot, *Rhytisma acerinum*

Add 30003, crown fire damage

Add 30004, ground fire damage

Add 41012, elk

Add 41013, deer

Add 41014, feral pigs

Add 41015, mountain beaver

Add 41016, deer or elk

Add 41017, earthworm, *Lumbricidae*

Change **50012**, wild fire to **30001**, wild fire

Add 50018, other geologic event

Add 50019, mechanical (non-human caused)

Change **70002**, human caused fire to **30002**, human caused fire

November 2007 (*following appendices only*)

Appendix D – Cooperating Agency Codes

Add IADNR, Iowa Department of Natural Resources

Add INDNR, Indiana Department of Natural Resources

Add NDF, Nevada Division of Forestry

Add NJAG, New Jersey Department of Agriculture

Add PADCNR, Pennsylvania Department of Conservation and Natual Resources

Appendix E – Damage Causal Agent Codes

Add 12200, pyralid moth, *Palpita magniferalis*

Add 12201 pacific silver fir budmoth, *Zeiraphera sp. Destitutana* (Walker)

Add 12202, red pine needle midge, *Thecodiplosis piniresinosae*

Add 25076, birch leaf fungus, *Septoria betulae*

Table of Contents

Introduction

The purpose of this handbook is to guide the process of incorporating geographic information systems (GIS) into insect and disease aerial survey data storage, reporting, and analysis. The handbook discusses compiling and entering aerial survey sketchmaps into GIS, quality assurance/quality control (QA/QC) issues, and presents the GIS database standards, format, and coding schemes required for entering data into the national Forest Health Monitoring database.

It should be emphasized that a successful aerial survey program is a team effort involving, not only the sketchmappers, pilots, and ground support personnel, but also the people involved in compiling, digitizing, and moving the data into a digital database. Prior to the start of the aerial survey season, GIS personnel should meet with the aerial survey specialists and assist in the development of the aerial survey plan. GIS requirements for map types, coding schemes, definitions, and other data requirements should be identified before the survey is flown. It is hoped this document provides the link between the aerial survey, the Forest Health Monitoring Aerial Survey Standards and the national database, and identifies key GIS considerations that should be incorporated into the aerial survey. The use of GIS should streamline the process of getting the aerial survey sketchmap information into the hands of those who need and use it. These people range from program managers at the national level to land managers and field personnel.

The development of the handbook will be an ongoing process. As technology, policies, fieldwork procedures, aerial survey methods, and Forest Health Monitoring Standards change, the handbook will be revised. The Aerial Survey Standards Working Group hopes this handbook will be a useful reference for the people working with aerial survey data in GIS.

Traditional vs. Digital Aerial Sketchmapping

Traditional aerial sketchmapping is performed using paper maps. Advances in computer and touch-screen display technology have now made it possible to capture aerial observations directly into a format compatible with a GIS database, thereby streamlining the data collection, conversion and processing procedures. The guidelines on the following pages are written with the traditional method in mind. However, many concepts also apply to the digital approach. Detailed information on the operation and use of the Digital Aerial Sketchmapping (D-ASM) system is available online at the following locations:

http://www.fs.fed.us/foresthealth/publications/id/id_tech.html
ftp://ftp2.fs.fed.us/incoming/rsac/D-ASM/

Getting Sketchmaps Ready for GIS

The goal is to use a map for aerial sketchmapping that is suitable for use both in the airplane and for digitizing. Choosing the map should be a coordinated effort between the aerial survey and GIS personnel. Compromises may have to be made, but the use of one map for both purposes will result in greater efficiency and eliminate errors that may arise in transferring data between maps of different scales or projections.

The schedule for mapping activities should be coordinated between the sketchmappers and the people doing the GIS work. Prior to the flying season, the aerial survey and GIS personnel should prepare a proposed schedule detailing when sketchmaps will be available for digitizing. The schedule should be realistic and reflect potential problems, such as bad weather that may delay the aerial survey.

Requirements for Sketchmaps

Information on and recommendations for base maps for aerial survey are presented in A Guide to Conducting Aerial Sketchmapping Surveys. The characteristics of the map as they pertain to entering data into GIS are as follows:

- Maps should be at a scale of 1:100,000 or larger (e.g., 1:24,000) for the continental United States. Maps for Alaska may be at a scale of 1:250,000.
- Maps should display a standard projection and coordinate system (e.g., UTM).
- Maps should have a minimum of four points suitable for using as registration points when converting the map to digital form. These points should be tied to the coordinate system on the map.
- The maps should be in good condition. They should be clean and as free from wrinkles and tears as possible. If original survey maps are damaged, the data should be transferred onto a new map suitable for digitizing, though the transfer of data to a new map should be avoided if possible.
- The map should be neat. Features should be drawn using a thin discrete line or point that is clearly visible against the background of the map. Areas should be represented as closed polygons.
- The coding on the map should be clear and complete. Coding should be legible and clearly associated with the correct feature. All features shown should be assigned attributes.
- Adjacent maps should be edge-matched. All lines crossing the edge of the map should match up with the corresponding line on the adjacent map.

- Areas covered by the aerial survey (see the discussion on Flown/Not Flown Areas, later in the guide) should be delineated on the sketchmap(s) or on another map(s) of similar scale. If a separate map is used, it should meet all of the above requirements.

Data Coding

Prior to the beginning of the aerial survey, there should be agreement between the sketchmapping and GIS personnel on the coding scheme to be used on the aerial survey maps. Requirements for coding may be different for different projects or aerial survey missions. Due to the difficulty of recording information on maps during flight, different coding schemes may be needed for recording the data on the sketchmaps from what is used in the GIS database. Coding schemes should take into account the national reporting efforts, and Region or local reporting requirements. There are, at this time, national standards in place for reporting mortality and defoliation that include standard attributes and coding schemes. These coding schemes are presented in the appendices to this guide.

A data dictionary should be developed for use both by the sketchmappers and the GIS personnel. The data dictionary should show each data element required and the characteristics of each element.

The characteristics of a data element are as follows:

- Name of data element
- Description of data element
- Type of data - Integer, decimal number, or alphanumeric character
- Size of field - Number of allowable characters
- Number of decimal places for numeric data
- Allowable codes or entries for alphanumeric data - Allowable values or range for numeric data
- Definitions of codes
- Source or reference for codes
- Crosswalk between codes used on sketchmaps and data entered into GIS. There can be a one to one relationship between map codes and GIS codes or map data may be aggregated into broader categories in GIS.

The data dictionary information will also be used in the metadata for the digital geographic information.

Building Digital Geographic Information

The process of converting hardcopy sketchmaps to digital geographic information involves two steps. The first step is converting the sketchmap data recorded on paper or mylar maps into digital form. The second step is processing the digital data into usable data.

The Forest Services is moving toward the use of geodatabases in an ArcGIS environment. However, ArcInfo coverages are still being used and remain the standard for submitting data into the national database. Shapefiles may also be submitted and requirements for both coverages and shapefiles are detailed on the following pages. Where information relates to both a coverage and a shapefile, the term “dataset” will be used.

Converting Data

The raw aerial survey data is recorded on paper sketchmaps. The data can be converted into digital form either by scanning maps electronically or by digitizing the the maps manually. GIS personnel should determine the better method to use based on the individual situation.

Scanning the sketchmaps involves feeding a map into a scanner, which creates a digital file containing all features visible on the map. Scanning may require editing and cleaning of the data before and after scanning. In some cases, sketchmapped data may have to be transferred to another medium (such as a mylar sheet) prior to scanning. After scanning, the electronic file may require "cleanup" to resolve unclear lines.

Digitizing sketchmaps involves transferring sketchmapped data to a digital file selectively. The sketchmap is taped to a digitizing table and a digitizing mouse is used to trace sketchmapped polygons. Digitizing is more labor-intensive than scanning, but requires less "cleanup" of the digital file. Both methods should yield the same result: a clean and accurate digital representation of the sketchmap.

The important factors to keep in mind when either scanning or digitizing are as follows:

- The registration points on the sketchmaps should be used when entering the data into a GIS to ensure that the data is geographically accurate.
- Map projections of the sketchmaps and of the resulting dataset should be considered to ensure accurate data transformations.
- The accuracy of the data on the sketchmap should be maintained in the conversion process.
- The conversion should be both efficient and cost-effective.
- The final dataset should accurately reflect the information on the sketchmaps, with points and polygons on the two matching up.

- The final dataset should be clean (e.g., polygons should be closed, with no gaps or dangling line segments).
- A separate dataset of Flown/Not Flown areas should be created that covers the region of the sketchmaps (may be created by digitizing, scanning, buffering GPS data of flightlines, or other methods).

Data Processing

The dataset created by the conversion process is merely a set of points and polygons. Further processing is necessary to make it usable. The attributes for each point and polygon must be entered and attached to the appropriate feature. Two or more dataset may have to be combined to create a single one for a given project. Datasets may have to be projected into appropriate map projections. The end result of the processing should be a clean dataset that meets the units requirements for use of the aerial survey data. The dataset should also be able to be processed for incorporation into the national GIS aerial survey database. The final section of this document contains information on requirements for the national database.

There are numerous methods of entering attributes into GIS and associating them with the appropriate features. The method used should be based on the individual situation. The attributes are stored in the appropriate feature table in ArcInfo or a table in an Oracle database system. The attributes should be checked back against the sketchmaps to ensure accuracy. This can be accomplished by producing a 'check' map from the GIS showing features with attributes that can be directly compared to the sketchmaps.

If one aerial survey project produces several sketchmaps, the datasets for each map may be combined into one. The datasets to be combined must be in the same map projection. Adjacent maps should have been edgematched prior to converting the maps into digital form. However, additional editing may be necessary. Entering attributes into GIS can be performed either before or after maps have been combined into a single dataset.

Calculations, such as converting areas (usually expressed in meters) to acres, should be performed at the appropriate time, taking into account the processing steps to be performed. For example, calculating trees-per-acre should be performed with accurate acreage figures for the polygon to which the tree count applies. If a poylgon spans two or more map sheets, then the polygon segments should be joined before the trees-per-acre figure is calculated. This would also apply to situations in which the damage polygon may be divided during an overlay process such as overlaying damage polygons with county boundaries. Trees per acre should be calculated for the polygon before it is used in an overlay process. Standard conversion factors should be used throughout a project.

Each unit may have different requirements for using the aerial survey data. In producing maps and reports to meet these requirements, datasets may need to be projected into different map projections. ArcInfo provides the tools to achieve this.

The current requirements for delivering aerial survey data to the national GIS database are described in the final section of this document. Map projection parameters, coverages, shapefiles, conversion factors, attributes, and other information are discussed. The information about the attributes includes references to standard coding to be used, and the sources of these coding schemes. All data processing should consider the national reporting effort to ensure that aerial survey data can be submitted to the national database with the appropriate attributes and formats.

Processing Additional Datasets

Individual Forest Service units will have different requirements for additional datasets to accompany the aerial survey data. The only additional dataset required by the national reporting effort is the Flown/Not Flown Areas dataset.

Flight lines are a good example of an additional dataset a unit may require. Flight lines can be used to accurately assess the coverage of an area by the aerial survey. The flight lines may even be used to develop the Flown/Not Flown Areas dataset.

Forest Inventory and Analysis (FIA) and Forest Health Monitoring (FHM) plot locations may be required to produce maps showing the relationship of the aerial survey data to plot locations. In the future, procedures may be developed to use the aerial survey data to assess data collected on these plots, and vice versa. The plot location data should be used with caution due to the sensitive nature of some locations. Due consideration should be given to the level of accuracy of the aerial survey and plot location before using the data together.

Other reference data will probably already exist in a GIS. These datasets are needed to allow further analysis and produce maps showing the aerial survey data in relationship to traditional map features, such as roads, national forest boundaries, etc.

Documentation and Metadata

Documentation of the data-generation process, from starting with sketchmaps through GIS maps and reports, is important. Documentation allows involved parties to track what was done, how it was done, when it was done, and who did it. The documentation also ensures that anyone using the data knows the limitations of the data and will be able to determine appropriate uses of the data.

Documentation really starts in the planning process for an aerial survey project. Ideally, everyone involved in the project should sit down and design the project from data collection to final information. The documentation should be designed into the project and assigned to the responsible parties to ensure completion.

The main tool for documentation is metadata attached to each coverage. Metadata, or data about data, has all the information needed by someone to allow them to use the data correctly. As of this writing, the Forest Service has not adopted an application for handling metadata. However, several are being reviewed that are compliant with the Federal Geographic Data Committee (FGDC) standards. Numerous applications exist that are compliant with FGDC. The application used should be determined by the GIS personnel, but it must be FGDC-compliant.

Most of the documentation for aerial survey data will be handled by the metadata effort. However, additional documentation may be required. The documentation should cover the following main items:

- Where the data comes from, including where and when the data was collected.
- The format of the data at the start of the GIS process including a data dictionary.
- The process used to convert the data to digital format and turn it into geographic information.
- The data parameters needed by anyone using the dataset for analysis.
- The information needed by anyone using the geographic information to make decisions.

Documentation should be readily available. Metadata should be associated with the appropriate dataset and accompany it when it is shared with, or delivered to, another user.

Quality Assurance/Quality Control

The quality assurance/quality control (QA/QC) process should ensure that the conversion of sketchmap data into digital geographic information maintains the accuracy of the original data.

The conversion of the data into digital form and any other GIS processes performed on the data should be checked to ensure that the process maintains data accuracy. The production of a 'check' map to use as an overlay to the sketchmaps for checking the GIS dataset is one method of doing this. The 'check' map also can be used to compare coding on the sketchmap to the GIS coverage.

The coding of all attributes should be checked against the data dictionary to see that all the data are valid. Macros in GIS can be used to check data validity, as can the use of the 'check' map. Any calculations made in GIS should also be checked against the data dictionary, in addition to confirming that the calculation itself is correct.

Production of maps and reports should be based on the accuracy of the data. Maps should not be produced at a significantly larger scale than that at which the data was collected and compiled. Doing this implies an accuracy of the data that is not supported. Information in reports should be reported in the same accuracy as the original data.

The metadata should accompany the GIS dataset. The accuracy of the data is recorded in the metadata, and should serve as a reminder to anyone using the data as to the accuracy of the data.

Output

The only standard outputs from the aerial survey data are the requirements for FHM reporting and the national reporting efforts. Each year various maps and summaries are provided to the FHM Director and other cooperators. Each unit may have its own specific output requirements to state cooperators, national forest personnel and other private parties.

The inherent spatial and attribute inaccuracies in aerial survey data make it imperative that care be taken when producing summaries or maps of any kind. Language such as "acres *with* damage" rather than "acres *of* damage" better explains the qualities of the data.

Summarizing acres by any category can introduce multiple counting issues if care is not taken to avoid it. At the national level, additional attributes are used to identify polygons with multiple attribute sets. Queries to the database are structured so that within a category such as "dmg_type = mortality", a polygon will only get counted once, even if it had two mortality pests present. If however, a single polygon reports a damage type from two different categories (i.e. mortality and defoliation), the same acres will be counted for each category and a "footprint" total will be provided that summarizes the area of all polygons with no multiple counting. National maps contain a note briefly explaining these concepts. It states:

> *Acres are summarized from the current year's observations only and are not cumulative. Multiple counting of acres may occur between categories if an area is observed to have simultaneous multiple damage types. However, multiple counting of acres does not occur within a category. The "footprint" total represents the affected area on the ground with no multiple counting.*

National GIS Database Requirements

A national GIS database for all aerial survey data has been established at the Forest Health Technology Enterprise Team (FHTET) in Fort Collins, Colorado. The purpose of this database is to provide a single source for all aerially detected insect, disease, and abiotic forest damage data to facilitate national and multi-regional level reporting of damage for both Forest Health Monitoring and Forest Health Protection. At this time, the National Aerial Survey Data Standards require only mortality and defoliation data be collected and reported. Many cooperators are collecting data on other damage types; for this reason, the national database has been configured to include those other damage types. The database will contain both current data and, as available, historic data. It is anticipated that, in the future, this database will be expanded to include insect and disease data collected by other means.

The database is built from polygon datasets developed by the Regions/Area and made available each year to the staff at FHTET. Data can be submitted as ArcInfo coverages or shapefiles. The following sections describe formatting requirements.

Datasets

- **Overview Survey** An overview survey is one during which all types of damage are mapped. This, the most common type of survey, normally takes weeks or months to complete, and covers an extensive area. All overview surveys will be delivered as a single polygon coverage or shapefile for each Region/Area, containing all damage data for that calendar year.

- **Special Surveys** Special surveys are flown to capture data on a single insect, disease or abiotic event, and are usually done at a time when the signature for that event is most apparent. These surveys frequently cover a smaller geographic area than an overview survey, and may infact overlap in area with the overview survey in the same year. Each special survey, or combinationof several special surveys for the same insect or pathogen, will be delivered as a separate coveage or shapefile in the same format as the overview survey.

- **Flown/Not Flown Area** Each overview and special survey dataset will be accompanied by a dataset delineating the area or areas surveyed. This dataset is needed to distinguish areas of no damage from areas for which there is no data.

Standard Conversion Factors

When converting area in meters to acres in the GIS, the following formula should be used:

Acres = Area (in square meters)/4046.8726

Map Projection Parameters

All data should be projected into the Albers Conic Equal Area projection using the following parameters:

<u>For Conterminous 48 States</u>	
Projected Coordinate System	USA_Contiguous_Albers_Equal_Area_Conic
Geographic Coordinate System	GCS_North_American_1983
Datum	D_North_American_1983
Spheroid (GRS_1980)	6378137.0, 298.257222101
Prime Meridian (Greenwich)	0.0
Unit (Degree)	0.0174532925199433
Projection	Albers
False Easting	0.0
False Northing	0.0
Central Meridian	96.0
Standard Parallel 1	29.5
Standard Parallel 2	45.5
Latitude of Origin	23.0
Unit (Meter)	1.0

<u>For Alaska</u>	
Projected Coordinate System	Alaska_Albers_Equal_Area_Conic
Geographic Coordinate System	GCS_North_American_1983
Datum	D_North_American_1983
Spheroid (GRS_1980)	6378137.0, 298.257222101
Prime Meridian (Greenwich)	0.0
Unit (Degree)	0.0174532925199433
Projection	Albers
False Easting	0.0
False Northing	0.0
Central Meridian	-154.0
Standard Parallel 1	55.0
Standard Parallel 2	65.0
Latitude of Origin	50.0
Unit (Meter)	1.0

Polygon Attribute Table For Damage Coverages

Figure 1 contains the polygon attribute table (PAT) format for aerial survey damage data collected during either overview or special surveys. Appendix A contains descriptions of each data item in the PAT. Example data and an example PAT for damage coverages is contained in Appendix C. The following should be noted about the PAT:

- The standard coding scheme allows for entering up to three aerial survey observations for any one polygon. Each observation is a unique combination of attributes (survey_id1, dmg_type1, severity1, etc.) and is assigned to one of three attribute groups (survey_id1, dmg_typ1... survey_id2, dmg_typ2... survey_id3, dmg_type3...). Data should not be entered into one attribute in a group unless data is entered in all attributes in the group. (See example PAT file in Appendix C.)

  Note: If special circumstances call for more than three attribute groups for any one polygon, these may be added to the PAT based on the standard scheme. (Example: SURVEY_ID4, DMG_TYPE4, SEVERITY4….SURVEY_ID6, DMG_TYPE6, SEVERITY6)

- The coding scheme does not require real data in each field of the PAT. Fields with "No Data" may result from the way data was collected or differences between data required by mortality versus defoliation. (See example PAT file in Appendix C.)

- The coding scheme allows for more than one damage type to be entered for any one polygon. Therefore, an acreage summary for all damages may double- or triple-count the area of some polygons. Users should be aware of this, and structure queries so as to avoid it, if desired.

- Acres will be calculated from area using the standard conversion factor shown above.

- The measure of mortality is dead trees per acre (TPA). TPA is entered directly or calculated from the number of trees (the NO_TREES field) divided by acres (the ACRES field). In those cases where trees per acre (TPA) is recorded and entered directly, the number of trees (NO_TREES) field is calculated from TPA multiplied by ACRES.

- Additional items, may be added at the national level during the combining of data from all the Regions/Area.

Figure 1: ArcInfo PAT File Format - Damage Coverages (Overview and Special Surveys)

Item Name	Input Width	Output Width	Type	No. Dec	Description
AREA	4	12	F	3	Item generated by ArcInfo
PERIMETER	4	12	F	3	Item generated by ArcInfo
COVERAGE#	4	5	B		Item generated by ArcInfo
COVERAGE-ID	4	5	B		Item generated by ArcInfo
RPT_YR	4	4	I		Year of survey
SURVEY_ID1	6	6	C		Unique Survey Identifier
SURVEY_ID2	6	6	C		Unique Survey Identifier
SURVEY_ID3	6	6	C		Unique Survey Identifier
DMG_TYPE1	2	2	I		Damage Type Code
DMG_TYPE2	2	2	I		Damage Type Code
DMG_TYPE3	2	2	I		Damage Type Code
SEVERITY1	2	2	I		Defoliation Severity Code
SEVERITY2	2	2	I		Defoliation Severity Code
SEVERITY3	2	2	I		Defoliation Severity Code
PATTERN1	2	2	I		Defoliation Pattern Code
PATTERN2	2	2	I		Defoliation Pattern Code
PATTERN3	2	2	I		Defoliation Pattern Code
TPA1	7	7	N	2	Dead Trees Per Acre
TPA2	7	7	N	2	Dead Trees Per Acre
TPA3	7	7	N	2	Dead Trees Per Acre
NO_TREES1	7	7	I		Number of Dead Trees
NO_TREES2	7	7	I		Number of Dead Trees
NO_TREES3	7	7	I		Number of Dead Trees
DCA1	5	5	I		Damage Causal Agent Code
DCA2	5	5	I		Damage Causal Agent Code
DCA3	5	5	I		Damage Causal Agent Code
HOST1	4	4	I		Host Tree Species Code
HOST2	4	4	I		Host Tree Species Code
HOST3	4	4	I		Host Tree Species Code
FOR_TYPE1	4	4	I		Forest Type Code
FOR_TYPE2	4	4	I		Forest Type Code
FOR_TYPE3	4	4	I		Forest Type Code
ACRES	4	12	F	1	Calculated Acres Based on AREA
NOTES	60	60	C		Comments

Polygon Attribute Table For Flown/Not Flown Coverages

Figure 2 contains the polygon attribute table (PAT) for the flown/not flown coverage. The purpose of the coverage is to enable users to differentiate between areas that were surveyed and contained no damage and those areas for which no survey was flown. Each damage coverage should be accompanied by a flown/not flown coverage. As with the PAT for damage coverages, this attribute coding scheme provides for up to three attribute groups per polygon to allow for overlaps, multiple agencies, multiple surveyors, etc. As with the damage coverages, data should not be entered into one attribute in a group unless it is entered into all attributes in a group. The coding scheme does not require real data in each field. Appendix B contains descriptions of each Flown/Not Flown Area data item in the PAT.

Figure 2: ArcInfo PAT File Format - Flown/Not Flown Area Coverages

Item Name	Input Width	Output Width	Type	No. Dec	Description
AREA	4	12	F	3	Item generated by ArcInfo
PERIMETER	4	12	F	3	Item generated by ArcInfo
COVERAGE#	4	5	B		Item generated by ArcInfo
COVERAGE-ID	4	5	B		Item generated by ArcInfo
RPT_YR	4	4	I		Year of survey
SURVEY_ID1	6	6	C		Unique Survey Identifier
SURVEY_ID2	6	6	C		Unique Survey Identifier
SURVEY_ID3	6	6	C		Unique Survey Identifier
FLOWN1	2	2	I		Flown/Not Flown Code
FLOWN2	2	2	I		Flown/Not Flown Code
FLOWN3	2	2	I		Flown/Not Flown Code
AGENCY1	10	10	C		Responsible Agency
AGENCY2	10	10	C		Responsible Agency
AGENCY3	10	10	C		Responsible Agency
SURVEYOR1	30	30	C		List of Aerial Surveyors
SURVEYOR2	30	30	C		List of Aerial Surveyors
SURVEYOR3	30	30	C		List of Aerial Surveyors
BEGIN1	8	8	D		Beginning Date of Flight
BEGIN2	8	8	D		Beginning Date of Flight
BEGIN3	8	8	D		Beginning Date of Flight
END1	8	8	D		Ending Date of Flight
END2	8	8	D		Ending Date of Flight
END3	8	8	D		Ending Date of Flight
FL_DAYS1	3	3	I		Number of Days for the Survey
FL_DAYS2	3	3	I		Number of Days for the Survey
FL_DAYS3	3	3	I		Number of Days for the Survey
PURPOSE1	30	30	C		Purpose of the Flight
PURPOSE2	30	30	C		Purpose of the Flight
PURPOSE3	30	30	C		Purpose of the Flight
FL_NOTES	60	60	C		Comments

Polygon Shapefiles

Data may also be submitted as shapefiles. Attribute naming conventions and coding schemes follow those described in the coverage section. In addition, any submitted shapefile must meet the following criteria:

- It must be a polygon shapefile.
- Each polygon must have a unique ID number.
- Polygons must be clean (e.g., closed with no gaps or dangling line segments) with no overlapping of adjacent polygons.
- The shapefile must have an accompanying projection file (.prj) with the appropriate Albers projection information.
- Standard attribute field properties must be compatible with the following tables.

Figure 3: Table properties from the conversion of a properly formatted coverage to a shapefile using ArcGIS v.9 tools

Field Name	Type	Length	Precision	Scale
RPT_YR	Short Integer	4	4	0
SURVEY ID1,2,3	Text/String	6	0	0
DMG_TYPE1,2,3	Short Integer	2	2	0
SEVERITY1,2,3	Short Integer	2	2	0
PATTERN1,2,3	Short Integer	2	2	0
TPA1,2,3	Float	7	6	2
NO_TREES1,2,3	Long Integer	7	7	0
DCA1,2,3	Long Integer	5	5	0
HOST1,2,3	Short Integer	4	4	0
FOR_TYPE1,2,3	Short Integer	4	4	0
ACRES	Float	13	12	11
NOTES	Text/String	60	0	0

Field Name	Type	Length	Precision	Scale
RPT_YR	Short Integer	4	4	0
SURVEY ID1,2,3	Text/String	6	0	0
FLOWN1,2,3	Short Integer	2	2	0
AGENCY1,2,3	Text/String	10	0	0
SURVEYOR1,2,3	Text/String	30	0	0
BEGIN1,2,3	Date	8	0	0
END,2,3	Date	8	0	0
FL_DAYS1,2,3	Short Integer	3	3	0
PURPOSE	Text/String	30	0	0
FL_NOTES	Text/String	60	0	0

Figure 4: Table properties formatted using D-ASM SketchTools v.2.6[1]

Field Name	Type	Length	Precision	Scale
RPT_YR	Short Integer	4	4	0
SURVEY ID1,2,3	Text/String	6	0	0
DMG_TYPE1,2,3	Short Integer	4	4	0
SEVERITY1,2,3	Short Integer	4	4	0
PATTERN1,2,3	Short Integer	4	4	0
TPA1,2,3	Float	7	6	2
NO_TREES1,2,3	Long Integer	7	7	0
DCA1,2,3	Long Integer	5	5	0
HOST1,2,3	Short Integer	4	4	0
FOR_TYPE1,2,3	Short Integer	4	4	0
ACRES	Double	12	11	1
NOTES	Text/String	60	0	0

Field Name	Type	Length	Precision	Scale
RPT_YR	Short Integer	4	4	0
SURVEY ID1,2,3	Text/String	6	0	0
FLOWN1,2,3	Short Integer	4	4	0
AGENCY1,2,3	Text/String	10	0	0
SURVEYOR1,2,3	Text/String	30	0	0
BEGIN1,2,3	Date	8	0	0
END1,2,3	Date	8	0	0
FL_DAYS1,2,3	Short Integer	4	4	0
PURPOSE	Text/String	30	0	0
FL_NOTES	Text/String	60	0	0

1 Digital Aerial SketchMapping SketchTools v2.6, Schrader-Patton, C., April 2005, USDA Forest Service, RSAC. Online at: http://www.fs.fed.us/foresthealth/publications/id/id_tech.html and ftp://ftp2.fs.fed.us/incoming/rsac/D-ASM/.

Appendix A Definitions of Items (Attributes) in Damage Coverages

Attribute label: area perimeter coverage# coverage-id
Definition (description): Items generated by ArcInfo

Attribute label: survey_id1 survey_id2 survey_id3
Definition (description): Unique identifier for survey project
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No data
User-defined numeric/alphanumeric code
Format Type: Character
Format Length: 6

Attribute label: rpt_yr
Definition (description): Year the survey was flown
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: YYYY four digit year
Format Type: Integer
Format Length: 4

Attribute label: dmg_type1 dmg_type2 dmg_typ3
Definition (description): Damage type identification code
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
1 Defoliation
2 Mortality (Current Year)
3 Discoloration
4 Dieback
5 Topkill
6 Branch Breakage
7 Main Stem Broken/Uprooted
8 Branch Flagging
9 No Damage
10 Other Damage
11 Previously Undocumented (Old) Mortality
Format Type: Integer
Format Length: 2

Attribute label: severity1 severity2 severity3
Definition (description): Defoliation severity code
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
1 Low (Equal to or Less than 50 % defoliation)
2 High (More then 50 % defoliation)
Format Type: Integer
Format Length: 2

Attribute label: pattern1 pattern2 pattern3
Definition (description): Defoliation pattern code
Source USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
1 Host type or species is > 50 % and the damage is contiguous (relatively continuous)
2 Host type or species is > 50 % and damage is patchy (concentrated in discrete pockets or individual trees)
3 Host type or species < 50 % and damage is continuous
4 Host type or species < 50 % and damage is scattered
Format Type: Integer
Format Length: 2

Attribute label: tpa1 tpa2 tpa3
Definition (description): Dead trees per acre - measure of mortality
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
0 to 9999.99 User-defined
Format Type: Numeric
Format Length: 7
Decimal Places: 2

Attribute label: no_trees1 no_trees2 no_trees3
Definition (description): Number of dead trees detected - measure of mortality
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
0 to 9999999 User-defined
Format Type: Integer
Format Length: 7

Attribute label: dca1 dca2 dca3
Definition (description): Damage-causing agent code
Source: USDA Forest Service, FMSC, "FSVeg - Field Sample Vegetation Data Dictionary" version 1.3
Domain Value: 99999 No Data
0 to 99999 User-defined
Format Type: Integer
Format Length: 5

Attribute label: host1 host2 host3
Definition (description): Host tree species code
Source: USDA Forest Service, Environmental Monitoring and Assessment Program (EMAP) FHM Manual (Eastern and Western), Appendix A
Domain Value -1 No Data
0 to 9999 User-defined
Format Type: Integer
Format Length: 4

Attribute label: for_type1 for_type2 for_type3
Definition (description): Forest Type Code
Source: USDA Forest Service, EMAP FHM Manual (Eastern and Western) Appendix C
Domain Value: -1 No Data
0 to 9999 User-defined
Format Type: Integer
Format Length: 4

Attribute label: acres
Definition (description): Area in Acres of the Polygon
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
0 to 999999.9 User-defined
Format Type: Floating Point
Format Length: 12
Decimal Places: 1

Attribute label: notes
Definition (description): Notes (comments)
Format Type: Character
Format Length: 60

Appendix B *Definitions of Items (Attributes) in Flown/Not Flown Coverages*

Attribute label: area perimeter coverage# coverage-id
Definition (description): Items generated by ArcInfo

Attribute label: survey_id1 survey_id2 survey_id3
Definition (description): Unique identifier for survey project
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
User-defined numeric or alphanumeric code
Format Type: Character
Format Length 6

Attribute label: rpt_yr
Definition (description): Year the survey was flown
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: YYYY four digit year
Format Type: Integer
Format Length: 4

Attribute label: flown1 flown2 flown3
Definition (description): Code identifier for areas flown or not flown
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
0 Not Flown
1 Flown
Format Type: Integer
Format Length: 2

Attribute label: agency1 agency2 agency3
Definition (description): Acronym identifier for agency responsible for flight
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook (see List below)
Format Type: Character
Format Length: 10

Attribute label: surveyor1 surveyor2 surveyor3
Definition (description): List of aerial surveyors
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Format Type: Character
Format Length: 30

Attribute label: begin1 begin2 begin3
Definition (description): Beginning date for survey flown
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data

YYYYMMDD Date format
Format Type: Date
Format Length: 8

Attribute label: end1 end2 end3
Definition (description): Ending date for survey flown
Source USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
YYYYMMDD Date format
Format Type: Date
Format Length: 8

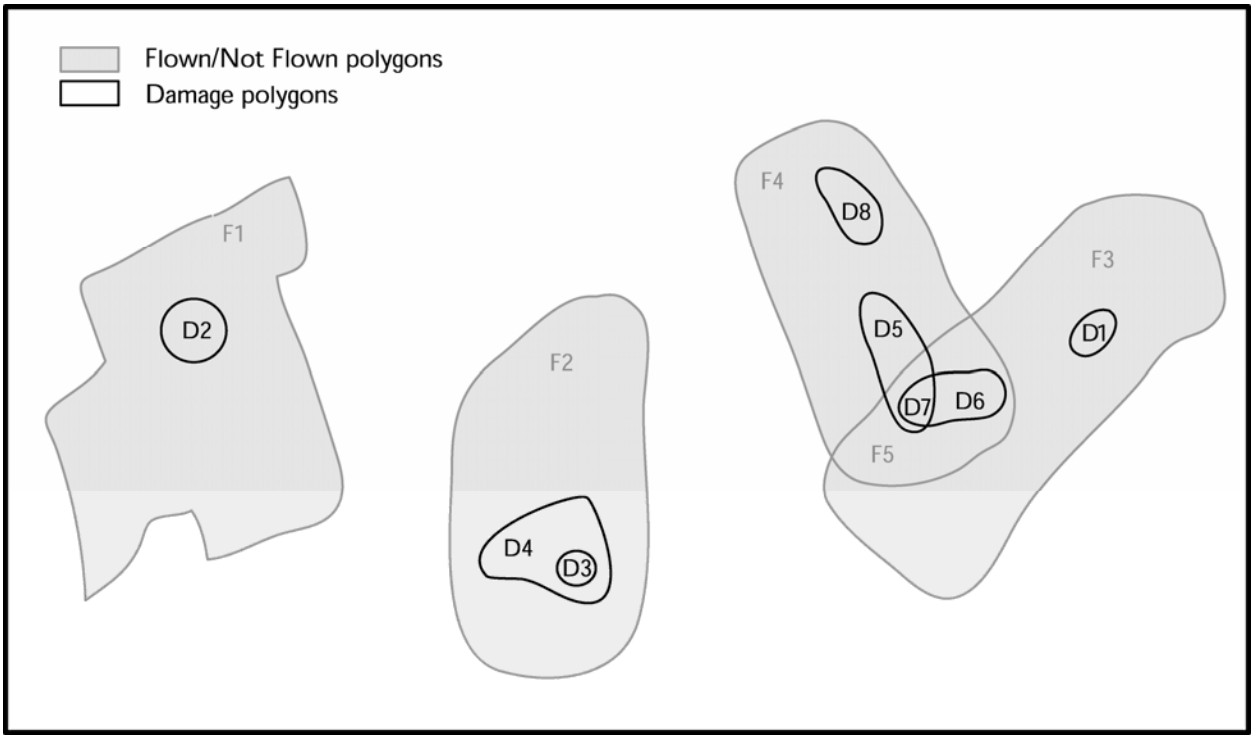
Attribute label: fl_days1 fl_days2 fl_days3
Definition (description): Number of days from beginning of survey to end of survey
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Domain Value: -1 No Data
1 to 999 User-defined
Format Type: Integer
Format Length: 3

Attribute label: purpose1 purpose2 purpose3
Definition (description): Purpose of aerial survey
Source: USDA Forest Service, FHM Aerial Survey codes, GIS Handbook
Format Type: Character
Format Length: 30

Attribute label: fl_notes
Definition (description): Notes (comments)
Format Type: Character
Format Length: 60

Appendix C *Damage and Flown/Not Flown Polygon Examples*

The following illustration and polygon attribute table (PAT) examples are provided to clarify various situations that occur both during a survey and while building attribute tables. Information is given for four hypothetical aerial surveys, which resulted in five flown/not flown polygons and seven damage polygons.



Damage Polygons

Polygon D1

Observation 1: Survey 2 - high severity (2) of continuous (1) defoliation (1) by western spruce budworm (12040) in Douglas-fir (202)

Observation 2: No Data

Observation 3: No Data

Polygon D2

Observation 1: Survey 7 - mortality (2) of 150 trees per acre by southern pine beetle (11003) in loblolly/shortleaf pine group (300). Number of trees is calculated from trees per acre (150) multiplied by total acres (0.6).

Observation 2: No Data

Observation 3: No Data

Polygon D3

Observation 1: Survey 7 - No damage (9) in polygon surrounded by polygon with damage

Observation 2: No Data

Observation 3: No Data

Polygon D4

Observation 1: Survey 23 - high severity(2) of continuous (1) defoliation (1) by gypsy moth (12089) in red oak (833)

Observation 2: Survey 23 - high severity(2) of continuous (1) defoliation (1) by gypsy moth (12089) in white oak (802)

Observation 3: Survey 23 - low severity(1) of patchy (2) defoliation (1) by gypsy moth (12089) in white pine (129)

The following three examples describe a situation where the combining of all surveys into one final coverage reveals an area of overlap. As a result, not all final PAT values are a direct reflection of observed attributes. The trees per acre values for polygons D5 and D6 are calculated from observed tree counts divided by acres of the original "parent" polygon. In this example, the total acres for "parent" D5 is D5acres (22.4) plus D7acres (4.4) and the total acres for "parent" D6 is D6acres (58.2) plus D7acres (4.4).

Once coverages are combined and overlap appears, trees per acre values and all attributes EXCEPT number of trees are carried over to the new polygons. Number of trees is then calculated based on acres of the newly created polygons. Therefore, number of trees observed for the parent polygon are now split between what remains of the parent polygon and the new overlap area.

Polygon D5 (parent)

Observation 1: Survey 10 - low severity (1) of continuous (1) defoliation (1) by western spruce budworm (12040) in Douglas-fir (202)

Observation 2: Survey 10 - mortality (2) of 5 trees by Ips engraver beetle (11030) in Douglas-fir (202)

Observation 3: No Data

Polygon D6 (parent)

Observation 1: Survey 2 - mortality (2) of 10 trees by Douglas-fir beetle (11007) in Douglas-fir (202)

Observation 2: No Data

Observation 3: No Data

Polygon D7

This was not observed as a distinct polygon from the air, but once the damage polygons were digitized, it appeared as a product of two overlapping polygons. It will inherit the attributes of its parent polygons EXCEPT for the number of trees, which will be calculated based on the acreage of the overlap polygon.

Observation 1 (from polygon D5): Survey 10 - low severity (1) of continuous (1) defoliation (1) by western spruce budworm (12040) in Douglas-fir (202)

Observation 2 (from polygon D5): Survey 10 - mortality (2) of 5 trees by Ips engraver beetle (11030) in Douglas-fir (202)

Observation 3 (from polygon D6): Survey 2 - mortality (2) of 10 trees by Douglas-fir beetle (11007) in Douglas-fir (202).

Polygon D8

This polygon illustrates the coding scheme for mortality on multiple hosts within a single polygon.

Observation 1: Survey 10 – mortality(2) of .5 trees per acre by pine engraver(11029) on jack pine(105). Number of trees (13) is calculated from trees per acre (.5) multiplied by total acres (26.3).

Observation 2: Survey 10 – mortality(2) of 2.5 trees per acre by pine engraver(11029) on ponderosa pine(122). Number of trees (66) is calculated from trees per acre(2.5) multiplied by total acres(26.3).

Flown/Not Flown Polygons

Polygon F1

Survey 7 : Smith flew this southern pine beetle survey in one day, beginning and ending on September 13,1999 for the USDA Forest Sevice (USFS) and the South Carolina Commission of Forestry (SCCF).

Polygon F2

Survey 23 : Brown and Jefferson flew this overview survey in four days, beginning October 1 and ending October 4, 1999 for the USDA Forest Service, Durham field office (DFO).

Polygon F3

Survey 2 : Thompson flew this overview survey in three days, beginning July 6 and ending July8, 1999 for the USDA Forest Service (USFS).

Polygon F4

Survey 10 : Ogilvy flew this overview survey in one day, beginning and ending August 10, 1999 for the Colorado State Forest Service (CSFS).

Polygon F5

This was not a distinct survey, but once the flown/not flown polygons were digitized, it appeared as a product of two overlapping survey polygons. It will inherit the attributes of its parent polygons.

Item 1 attributes (from survey 2): Thompson flew this overview survey in three days, beginning July 8 and ending July12, 1999 for the USDA Forest Service (USFS).

Item 2 attributes (from survey 10): Ogilvy flew this overview survey in one day, beginning and ending August 10, 1999 for Colorado State Forest Service (CSFS).

PAT for Damage Polygons

Item Name	D1	D2	D3	D4	D5	D6	D7	D8
AREA	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
PERIMETER	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
COVERAGE#	x	x	x	x	x	x	x	x
COVERAGE-ID	x	x	x	x	x	x	x	x
RPT_YR	2003	2003	2003	2003	2003	2003	2003	2003
SURVEY_ID1	2	7	7	23	10	2	10	10
SURVEY_ID2	-1	-1	-1	23	10	-1	10	10
SURVEY_ID3	-1	-1	-1	23	-1	-1	2	-1
DMG_TYPE1	1	2	9	1	1	2	1	2
DMG_TYPE2	-1	-1	-1	1	2	-1	2	2
DMG_TYPE3	-1	-1	-1	1	-1	-1	2	-1
SEVERITY1	2	-1	-1	2	1	-1	1	-1
SEVERITY2	-1	-1	-1	2	-1	-1	-1	-1
SEVERITY3	-1	-1	-1	1	-1	-1	-1	-1
PATTERN1	1	-1	-1	1	2	-1	2	-1
PATTERN2	-1	-1	-1	1	-1	-1	-1	-1

PATTERN3	-1	-1	-1	2	-1	-1	-1	-1
TPA1	-1	150	-1	-1	-1	0.37	-1	0.5
TPA2	-1	-1	-1	-1	0.08	-1	0.08	2.5
TPA3	-1	-1	-1	-1	-1	-1	0.37	-1
NO_TREES1	-1	90	-1	-1	-1	8	-1	13
NO_TREES2	-1	-1	-1	-1	5	-1	0	66
NO_TREES3	-1	-1	-1	-1	-1	-1	2	-1
DCA1	12040	11003	99999	12089	12040	11007	12040	11029
DCA2	99999	99999	99999	12089	11030	99999	11030	11029
DCA3	99999	99999	99999	12089	99999	99999	11007	99999
HOST1	202	-1	-1	833	202	202	202	105
HOST2	-1	-1	-1	802	202	-1	202	122
HOST3	-1	-1	-1	129	-1	-1	202	-1
FOR_TYPE1	-1	300	-1	-1	-1	-1	-1	-1
FOR_TYPE2	-1	-1	-1	-1	-1	-1	-1	-1
FOR_TYPE3	-1	-1	-1	-1	-1	-1	-1	-1
ACRES	35.2	0.6	20.9	132.7	58.2	22.3	4.4	26.3
NOTES							overlap	

PAT for Flown/Not Flown Polygons

Item Name	Polygon F1	Polygon F2	Polygon F3	Polygon F4	Polygon F5
AREA	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
PERIMETER	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
COVERAGE#	x	x	x	x	x
COVERAGE-ID	x	x	x	x	x
RPT_YR	2003	2003	2003	2003	2003
SURVEY_ID1	7	23	2	10	2
SURVEY_ID2	7	23	-1	-1	10
SURVEY_ID3	-1	-1	-1	-1	-1
FLOWN1	1	1	1	1	1
FLOWN2	1	1	-1	-1	1
FLOWN3	-1	-1	-1	-1	-1
AGENCY1	SCCF	DFO	USFS	CSFS	USFS
AGENCY2	USFS	DFO	-1	-1	CSFS
AGENCY3	-1	-1	-1	-1	-1
SURVEYOR1	Smith	Brown	Thompson	Ogilvy	Thompson
SURVEYOR2	Smith	Jefferson	-1	-1	Ogilvy
SURVEYOR3	-1	-1	-1	-1	-1
BEGIN1	19990913	19991001	19990706	19990810	19990706
BEGIN2	19990913	19991001	-1	-1	19990810
BEGIN3	-1	-1	-1	-1	-1
END1	19990913	19991004	19990708	19990810	19990708
END2	19990913	19991004	-1	-1	19990810
END3	-1	-1	-1	-1	-1
FL_DAYS1	1	4	3	1	3
FL_DAYS2	1	4	-1	-1	1
FL_DAYS3	-1	-1	-1	-1	-1
PURPOSE1	SPB detection	Overview	Overview	Overview	Overview

PURPOSE2	SPB detection	Overview	-1	-1	Overview
PURPOSE3	-1	-1	-1	-1	-1
FL_NOTES					

Appendix D *Cooperating Agency Codes*

The following table lists the aerial survey cooperating agencies and codes to be used in the *agency1, agency2, agency3* fields of the flown/not flown coverages. The contents of this list is available in digital form (.dbf) at the following website: http://www.fs.fed.us/foresthealth/publications/id/id_guidelines.html

Code	Agency Name
AFC	Alabama Forestry Commission
ADNR	Alaska Department of Natural Resources
AZFH	Arizona Forest Health Program, University of Arizona
AZS	Arizona State Land Department
ARFC	Arkansas Forestry Commission
CDF	California Department of Forestry
CSFS	Colorado State Forest Service
CTAES	Connecticut Agricultural Experiment Station
DEDA	Delaware Department of Agriculture
FDOF	Florida Division of Forestry
FTA	Fort Apache Indian Reservation
GFC	Georgia Forestry Commission
HOA	Hopi Indian Reservation
IDL	Idaho Department of Lands
INDNR	Indiana Department of Natural Resources
IADNR	Iowa Department of Natural Resources
KDF	Kentucky Division of Forestry
LDAF	Louisiana Department of Agriculture and Forestry
MEFS	Maine Forest Service
MDDA	Maryland Department of Agriculture
MADCR	Massachusetts Department of Conservation and Recreation
MIDNR	Michigan Department of Natural Resources
MNDNR	Minnesota Department of Natural Resources
MFC	Mississippi Forestry Commission
MODC	Missouri Department of Conservation
NAO	Navajo Area Indian Reservation
NDCNR	Nevada Department of Conservation
NDF	Nevada Division of Forestry
NHDRED	New Hampshire Department of Resources and Economic Development
NJAG	New Jersey Department of Agriculture
NJFS	New Jersey Forest Service
NMCES	New Mexico Cooperative Extension Service
NYDEC	New York Department of Environmental Conservation
NCDFR	North Carolina Division of Forest Resources
OHDA	Ohio Department of Agriculture
OHDF	Ohio Division of Forestry
OFS	Oklahoma Forestry Services
ODF	Oregon Department of Forestry
PABOF	Pennsylvania Bureau of Forestry
PADCNR	Pennsylvania Department of Conservation and Natural Resources
RIDEM	Rhode Island Department of Environmental Management
SCA	San Carlos Indian Reservation
SCCF	South Carolina Commission of Forestry

Code	Agency Name
TDF	Tennessee Division of Forestry
TFS	Texas Forest Service
USFS	USDA Forest Service
ASF	USDA Forest Service, Apache/Sitgreaves National Forest
COF	USDA Forest Service, Coconino National Forest
CNF	USDA Forest Service, Coronado National Forest
DFO	USDA Forest Service, Durham Field Office
KNF	USDA Forest Service, Kaibab National Forest
MFO	USDA Forest Service, Morgantown Field Office
PNF	USDA Forest Service, Prescott National Forest
SPFO	USDA Forest Service, Saint Paul Field Office
TNF	USDA Forest Service, Tonto National Forest
BIA	USDI Bureau of Indian Affairs
PAO	USDI Bureau of Indian Affairs, Phoenix Area Office
TCA	USDI Bureau of Indian Affairs, Truxton Canon Agency
BLM	USDI Bureau of Land Management
ASD	USDI Bureau of Land Management, Arizona Strip District
PHD	USDI Bureau of Land Management, Phoenix Field Office
SAD	USDI Bureau of Land Management, Safford Field Office
CAP	USDI National Park Service, Canyon De Chelly National Monument
GCP	USDI National Park Service, Grand Canyon National Park
HUP	USDI National Park Service, Hubbell Trading Post
NAP	USDI National Park Service, Navajo National Monument
SAP	USDI National Park Service, Saguaro National Monument
PPA	USDI National Park Service, Wupatki/Sunset Crater National Monument
VTDFPR	Vermont Department of Forests, Parks and Recreation

Appendix E *Damage Causal Agent Codes*

The table in this appendix contains the list of damage causal agents and the associated codes for use in the dca1, dca2, and dca3 fields of the damage coverages.

- Genus or more aggregated levels are indicated by <…>, such as <Apidae>. Where no scientific name exists (such as fire), the common name is listed under scientific name as "<fire>".
- Similarly, where no common names exist, the scientific name is enclosed in <…> and listed under the common name. This convention eliminates blank fields which can cause problems when using the list with a database.
- Agent grouping, denoted by the first two digits in the original list, was determined to be inappropriate for some agents. The "Category" field more appropriately groups some agents without altering their codes.

Similar codes are used in the NRV_DISTURBANCE_AGENTS table of the FSVeg Field Sampled Vegetation Data Dictionary. Effort is made to coordinate any changes that may need to take place in future releases of FSVEG as a result of changes to this list.

The contents of this list is available in digital form (as .pdf and .dbf files) at the following website:
http://www.fs.fed.us/foresthealth/technology/ads_standards.shtml

Code	Common Name	Scientific Name	Category
10000	general insects	*<Insecta>*	General Insects
10001	thrips	*<Thysanoptera>*	General Insects
10002	pine tip moths	<pine tip moths>	General Insects
10003	wasp	<wasp>	General Insects
10004	Chinese rose beetle	*Adoretus sinicus*	General Insects
10005	rose beetle	*Adoretus versutus*	General Insects
10006	coconut hispid beetle	*Brontispa longissima*	General Insects
10007	clerid beetle	*<Cleridae>*	Insect Predators
10008	weevil	*<Curculionidae>*	Chewing Insects
10009	green rose chafer	*Dichelonyx backi*	Defoliators
10010	Allegheny mound ant	*Formica exsectoides*	General Insects
10011	ant	*<Formicidae>*	General Insects
10012	stick insect	*Graeffea crovanii*	General Insects
10013	*<Hulodes caranea>*	*Hulodes caranea*	General Insects
10014	conifer swift moth	*Korsheltellus gracilis*	General Insects
10015	Caroline shortnosed weevil	*Lophothetes spp.*	Chewing Insects
10016	coconut rhinoceros beetle	*Oryctes rhinoceros*	General Insects
10017	bagworm moth	*<Psychidae>*	Defoliators
10019	scarab	*<Scarabaeidae>*	General Insects
10020	ash whitefly	*Siphoninus phillyreae*	General Insects
10021	*<Steremnius carinatus>*	*Steremnius carinatus*	General Insects
10022	pyralid moth	*Thliptoceras octoquttale*	General Insects
10023	horntails	*<Siricidae>*	Boring Insects
11000	bark beetles	*<Scolytinae>*	Bark Beetles

Code	Common Name	Scientific Name	Category
11001	roundheaded pine beetle	*Dendroctonus adjunctus*	Bark Beetles
11002	western pine beetle	*Dendroctonus brevicomis*	Bark Beetles
11003	southern pine beetle	*Dendroctonus frontalis*	Bark Beetles
11004	Jeffrey pine beetle	*Dendroctonus jeffreyi*	Bark Beetles
11005	lodgepole pine beetle	*Dendroctonus murrayanae*	Bark Beetles
11006	mountain pine beetle	*Dendroctonus ponderosae*	Bark Beetles
11007	Douglas-fir beetle	*Dendroctonus pseudotsugae*	Bark Beetles
11008	boreal spruce beetle	*Dendroctonus punctatus*	Bark Beetles
11009	spruce beetle	*Dendroctonus rufipennis*	Bark Beetles
11010	eastern larch beetle	*Dendroctonus simplex*	Bark Beetles
11011	black turpentine beetle	*Dendroctonus terebrans*	Bark Beetles
11012	red turpentine beetle	*Dendroctonus valens*	Bark Beetles
11013	*<Dryocoetes affaber>*	*Dryocoetes affaber*	Bark Beetles
11014	*<Dryocoetes autographus>*	*Dryocoetes autographus*	Bark Beetles
11015	western balsam bark beetle	*Dryocoetes confusus*	Bark Beetles
11016	*<Dryocoetes sechelti>*	*Dryocoetes sechelti*	Bark Beetles
11017	ash bark beetles	*Hylesinus spp.*	Bark Beetles
11018	native elm bark beetle	*Hylurgopinus rufipes*	Bark Beetles
11019	pinyon ips	*Ips confusus*	Bark Beetles
11020	small southern pine engraver	*Ips avulsus*	Bark Beetles
11021	sixspined ips	*Ips calligraphus*	Bark Beetles
11022	emarginate ips	*Ips emarginatus*	Bark Beetles
11023	eastern fivespined ips	*Ips grandicollis*	Bark Beetles
11024	*<Orthotomicus latidens>*	*Orthotomicus latidens*	Bark Beetles
11025	Arizona fivespined ips	*Ips lecontei*	Bark Beetles
11026	Monterey pine ips	*Pseudips mexicanus*	Bark Beetles

Code	Common Name	Scientific Name	Category
11027	California fivespined ips	*Ips paraconfusus*	Bark Beetles
11028	northern spruce engraver	*Ips perturbatus*	Bark Beetles
11029	pine engraver	*Ips pini*	Bark Beetles
11030	ips	*Ips spp.*	Bark Beetles
11031	*<Ips tridens>*	*Ips tridens*	Bark Beetles
11032	western ash bark beetle	*Hylesinus californicus*	Bark Beetles
11033	Oregon ash bark beetle	*Hylesinus oregonus*	Bark Beetles
11034	*<Orthotomicus caelatus>*	*Orthotomicus caelatus*	Bark Beetles
11035	*<Phloeosinus spp.>*	*Phloeosinus spp.*	Bark Beetles
11036	western cedar bark beetle	*Phloeosinus punctatus*	Bark Beetles
11037	tip beetles	*Pityogenes spp.*	Bark Beetles
11038	*<Pityophthorus pseudotsugae>*	*Pityophthorus pseudotsugae*	Bark Beetles
11039	*<Pityophthorus spp.>*	*Pityophthorus spp.*	Bark Beetles
11040	foureyed spruce bark beetle	*Polygraphus rufipennis*	Bark Beetles
11041	fir root bark beetle	*Pseudohylesinus granulatus*	Bark Beetles
11042	*<Pseudohylesinus dispar>*	*Pseudohylesinus dispar*	Bark Beetles
11043	Douglas-fir pole beetle	*Pseudohylesinus nebulosus*	Bark Beetles
11044	silver fir beetle	*Pseudohylesinus sericeus*	Bark Beetles
11045	smaller European elm bark beetle	*Scolytus multistriatus*	Bark Beetles
11046	spruce scolytus	*Scolytus piceae*	Bark Beetles
11047	hickory bark beetle	*Scolytus quadrispinosus*	Bark Beetles
11048	true fir bark beetles	*Scolytus spp.*	Bark Beetles
11049	Douglas-fir engraver	*Scolytus unispinosus*	Bark Beetles
11050	fir engraver	*Scolytus ventralis*	Bark Beetles
11051	striped ambrosia beetle	*Trypodendron lineatum*	Bark Beetles
11052	Sitka spruce ips	*Pseudips concinnus*	Bark Beetles

Code	Common Name	Scientific Name	Category
11053	four-eyed bark beetle	*Polygraphus spp.*	Bark Beetles
11054	*<Pseudohylesinus tsugae>*	*Pseudohylesinus tsugae*	Bark Beetles
11055	*<Ips pilifrons>*	*Ips pilifrons*	Bark Beetles
11056	(smaller) Mexican pine beetle	*Dendroctonus mexicanus*	Bark Beetles
11057	banded elm bark beetle	*Scolytus schevyrewi*	Bark Beetles
11058	redbay ambrosia beetle	*Xyleborus glabratus*	Bark Beetles
11059	southern cypress beetle	*Phloeosinus taxodii*	Bark Beetles
11060	Mediterranean pine engraver	*Orthotomicus erosus*	Bark Beetles
11800	other bark beetle (known)	<other bark beetle (known)>	Bark Beetles
11900	unknown bark beetle	<unknown bark beetle>	Bark Beetles
11999	western bark beetle complex	<western bark beetle complex>	Bark Beetles
12000	defoliators	<defoliators>	Defoliators
12001	casebearer	<casebearer>	Defoliators
12002	leaftier	<leaftier>	Defoliators
12003	loopers	<loopers>	Defoliators
12004	needleminers	<needleminers>	Defoliators
12005	sawflies	<Symphyta>	Defoliators
12006	skeletonizer	<skeletonizer>	Defoliators
12007	larger elm leaf beetle	*Monocesta coryli*	Defoliators
12008	spanworm	<spanworm>	Defoliators
12009	webworm	<webworm>	Defoliators
12010	pine false webworm	*Acantholyda erythrocephala*	Defoliators
12011	western blackheaded budworm	*Acleris gloverana*	Defoliators
12012	eastern blackheaded budworm	*Acleris variana*	Defoliators
12013	whitefly	*<Aleyrodidae>*	Sucking Insects

Code	Common Name	Scientific Name	Category
12014	fall cankerworm	*Alsophila pometaria*	Defoliators
12015	alder flea beetle	*Macrohaltica ambiens*	Defoliators
12016	mountain mahogany looper	*Anacamptodes clivinaria profanata*	Defoliators
12017	birch leaffolder	*Ancylis discigerana*	Defoliators
12018	oak worms	*Anisota spp.*	Defoliators
12019	orangestriped oakworm	*Anisota senatoria*	Defoliators
12020	western larch sawfly	*Anoplonyx occidens*	Defoliators
12021	fruittree leafroller	*Archips argyrospila*	Defoliators
12022	uglynest caterpillar	*Archips cerasivorana*	Defoliators
12023	*<Archips negundanus>*	*Archips negundanus*	Defoliators
12024	oak leafroller	*Archips semiferana*	Defoliators
12025	birch sawfly	*Arge pectoralis*	Defoliators
12026	arborvitae leafminer	*Argyresthia thuiella*	Defoliators
12027	coconut scale	*Aspidiotus destructor*	Defoliators
12028	Texas leafcutting ant	*Atta texana*	Defoliators
12029	oak skeletonizer	*Bucculatrix ainsliella*	Defoliators
12030	pear sawfly	*Caliroa cerasi*	Defoliators
12031	scarlet oak sawfly	*Caliroa quercuscoccineae*	Defoliators
12032	elm calligrapha	*Calligrapha scalaris*	Defoliators
12033	boxelder leafroller	*Caloptilia negundella*	Defoliators
12034	maple petiole borer	*Caulocampus acericaulis*	Defoliators
12035	*<Cephalcia fascipennis>*	*Cephalcia fascipennis*	Defoliators
12036	Two-year budworm	*Choristoneura biennis*	Defoliators
12037	large aspen tortrix	*Choristoneura conflictana*	Defoliators
12038	spruce budworm	*Choristoneura fumiferana*	Defoliators
12039	western pine budworm	*Choristoneura lambertiana*	Defoliators

Code	Common Name	Scientific Name	Category
12040	western spruce budworm	*Choristoneura occidentalis*	Defoliators
12041	jack pine budworm	*Choristoneura pinus*	Defoliators
12042	Modoc budworm	*Choristoneura retiniana*	Defoliators
12043	aspen leaf beetle	*Chrysomela crotchi*	Defoliators
12044	cottonwood leaf beetle	*Chrysomela scripta*	Defoliators
12045	leafhopper	*<Cicadellidae>*	Defoliators
12046	poplar tentmaker	*Clostera inclusa*	Defoliators
12047	larch casebearer	*Coleophora laricella*	Defoliators
12048	birch casebearer	*Coleophora serratella*	Defoliators
12049	lodgepole needleminer	*Coleotechnites milleri*	Defoliators
12050	*<Coleotechnites spp.>*	*Coleotechnites spp.*	Defoliators
12051	Black Hills pandora moth	*Coloradia doris*	Defoliators
12052	pandora moth	*Coloradia pandora*	Defoliators
12053	sycamore lace bug	*Corythucha ciliata*	Defoliators
12054	lace bugs	*Corythucha spp.*	Defoliators
12055	oak leaftier	*Croesia semipurpurana*	Defoliators
12056	dusky birch sawfly	*Croesus latitarsus*	Defoliators
12057	walnut caterpillar	*Datana integerrima*	Defoliators
12058	yellownecked caterpillar	*Datana ministra*	Defoliators
12059	walkingstick	*Diapheromera femorata*	Defoliators
12060	spruce coneworm	*Dioryctria reniculelloides*	Defoliators
12061	introduced pine sawfly	*Diprion similis*	Defoliators
12062	greenstriped mapleworm	*Dryocampa rubicunda*	Defoliators
12063	spruce needleminer	*Endothenia albolineana*	Defoliators
12064	elm spanworm	*Ennomos subsignaria*	Defoliators
12065	maple trumpet skeletonizer	*Epinotia aceriella*	Defoliators

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12066	white fir needleminer	*Epinotia meritana*	Defoliators
12067	linden looper	*Erannis tiliaria*	Defoliators
12068	browntail moth	*Euproctis chrysorrhoea*	Defoliators
12069	pine needleminer	*Exoteleia pinifoliella*	Defoliators
12070	birch leafminer	*Fenusa pusilla*	Defoliators
12071	elm leafminer	*Kaliofenusa ulmi*	Defoliators
12072	geometrid moth	*<Geometridae>*	Defoliators
12073	leafblotch miner	*<Gracillariidae>*	Defoliators
12074	spotted tussock moth	*Lophocampa maculata*	Defoliators
12075	pale tussock moth	*Lophocampa tessellaris*	Defoliators
12076	hesperiid moth	*Hasora chromus*	Defoliators
12077	brown day moth	*Hemileuca eglanterina*	Defoliators
12078	buck moth	*Hemileuca maia*	Defoliators
12079	saddled prominent	*Heterocampa guttivitta*	Defoliators
12080	variable oakleaf caterpillar	*Lochmaeus manteo*	Defoliators
12081	cherry scallop shell moth	*Hydria prunivorata*	Defoliators
12082	fall webworm	*Hyphantria cunea*	Defoliators
12083	*<Lambdina fiscellaria>*	*Lambdina fiscellaria*	Defoliators
12084	*<Lambdina punctata>*	*Lambdina punctata*	Defoliators
12085	tent caterpillar moth	*<Lasiocampidae>*	Defoliators
12086	satin moth	*Leucoma salicis*	Defoliators
12087	willow leafblotch miner	*Lithocolletis spp.*	Defoliators
12088	aspen blotchminer	*Phyllonorycter tremuloidiella*	Defoliators
12089	gypsy moth	*Lymantria dispar*	Defoliators
12090	*<Lyonetia spp.>*	*Lyonetia spp.*	Defoliators
12091	dogwood sawfly	*Macremphytus tarsatus*	Defoliators

Code	Common Name	Scientific Name	Category
12092	rose chafer	*Macrodactylus subspinosus*	Defoliators
12093	eastern tent caterpillar	*Malacosoma americanum*	Defoliators
12094	western tent caterpillar	*Malacosoma californicum*	Defoliators
12095	Pacific tent caterpillar	*Malacosoma constrictum*	Defoliators
12096	forest tent caterpillar	*Malacosoma disstria*	Defoliators
12097	Southwestern tent caterpillar	*Malacosoma incurvum*	Defoliators
12098	leafcutting bees	*<Megachilidae>*	Defoliators
12099	blister beetle	*<Meloidae>*	Defoliators
12100	early birch leaf edgeminer	*Messa nana*	Defoliators
12101	*<Monoctenus fulvus>*	*Monoctenus fulvus*	Defoliators
12102	*<Nematus spp.>*	*Nematus spp.*	Defoliators
12103	balsam fir sawfly	*Neodiprion abietis*	Defoliators
12104	lodgepole sawfly	*Neodiprion burkei*	Defoliators
12105	blackheaded pine sawfly	*Neodiprion excitans*	Defoliators
12106	*<Neodiprion fulviceps>*	*Neodiprion fulviceps*	Defoliators
12107	redheaded pine sawfly	*Neodiprion lecontei*	Defoliators
12109	*<Neodiprion mundus>*	*Neodiprion mundus*	Defoliators
12110	white pine sawfly	*Neodiprion pinetum*	Defoliators
12111	jack pine sawfly	*Neodiprion pratti banksianae*	Defoliators
12112	Virginia pine sawfly	*Neodiprion pratti pratti*	Defoliators
12113	European pine sawfly	*Neodiprion sertifer*	Defoliators
12114	loblolly pine sawfly	*Neodiprion taedae linearis*	Defoliators
12115	hemlock sawfly	*Neodiprion tsugae*	Defoliators
12116	pine butterfly	*Neophasia menapia*	Defoliators
12117	false hemlock looper	*Nepytia canosaria*	Defoliators
12118	California tortoiseshell	*Nymphalis californica*	Defoliators

Code	Common Name	Scientific Name	Category
12119	locust leafminer	*Odontota dorsalis*	Defoliators
12120	Bruce spanworm	*Operophtera bruceata*	Defoliators
12121	rusty tussock moth	*Orgyia antiqua*	Defoliators
12122	whitemarked tussock moth	*Orgyia leucostigma*	Defoliators
12123	Douglas-fir tussock moth	*Orgyia pseudotsugata*	Defoliators
12124	western tussock moth	*Orgyia vetusta*	Defoliators
12125	spring cankerworm	*Paleacrita vernata*	Defoliators
12126	black citrus swallowtail butterfly	*Papilio polytes*	Defoliators
12127	maple leafcutter	*Paraclemensia acerifoliella*	Defoliators
12128	pine tussock moth	*Dasychira pinicola*	Defoliators
12129	poinciana looper	*Pericyma cruegeri*	Defoliators
12130	*<Phigalia titea>*	*Phigalia titea*	Defoliators
12131	Phoberia moth	*Phoberia atomaris*	Defoliators
12132	California oakworm	*Phryganidia californica*	Defoliators
12133	European snout beetle	*Phyllobius oblongus*	Defoliators
12134	citrus leafminer	*Phyllocnistis citrella*	Defoliators
12135	aspen leafminer	*Phyllocnistis populiella*	Defoliators
12136	yellowheaded spruce sawfly	*Pikonema alaskensis*	Defoliators
12137	tenlined June beetle	*Polyphylla decemlineata*	Defoliators
12138	Japanese beetle	*Popillia japonica*	Defoliators
12139	larch sawfly	*Pristiphora erichsonii*	Defoliators
12140	mountain-ash sawfly	*Pristiphora geniculata*	Defoliators
12141	elm leaf beetle	*Pyrrhalta luteola*	Defoliators
12142	spear-marked black moth	*Rheumaptera hastata*	Defoliators
12143	giant silkworm moth	*<Saturniidae>*	Defoliators
12144	redhumped caterpillar	*Schizura concinna*	Defoliators

Code	Common Name	Scientific Name	Category
12145	redbanded thrips	*Selenothrips rubrocinctus*	Defoliators
12146	green larch looper	*Semiothisa sexmaculata*	Defoliators
12147	*<Sparganothis acerivorana>*	*Sparganothis acerivorana*	Defoliators
12148	redhumped oakworm	*Symmerista canicosta*	Defoliators
12149	orangehumped mapleworm	*Symmerista leucitys*	Defoliators
12150	spruce needleminer	*Taniva albolineana*	Defoliators
12151	maple webworm	*Tetralopha asperatella*	Defoliators
12152	pine webworm	*Pococera robustella*	Defoliators
12153	introduced basswood thrips	*Thrips calcaratus*	Defoliators
12154	bagworm	*Thyridopteryx ephemeraeformis*	Defoliators
12155	leafroller/seed moth	*<Tortricidae>* [leafroller / seed moth]	Defoliators
12156	willow defoliation	*<Tortricidae>* [willow defoliation]	Defoliators
12157	euonymus caterpillar	*Yponomeuta spp.*	Defoliators
12158	spruce bud moth	*Zeiraphera canadensis*	Defoliators
12159	larch bud moth	*Zeiraphera improbana*	Defoliators
12160	pine needle sheathminer	*Zelleria haimbachi*	Defoliators
12161	*<Anacamptodes pergracilis>*	*Anacamptodes pergracilis*	Defoliators
12162	Chrysomela leaf beetle	*Chrysomela spp.*	Defoliators
12163	pine colaspis	*Colaspis pini*	Defoliators
12164	saddleback looper	*Ectropis crepuscularia*	Defoliators
12165	*<Epinotia solandriana>*	*Epinotia solandriana*	Defoliators
12166	New Mexico fir looper	*Galenara consimilis*	Defoliators
12167	striped alder sawfly	*Hemichroa crocea*	Defoliators
12168	greenstriped looper	*Melanolophia imitata*	Defoliators
12169	willow leaf blotchminer	*Micrurapteryx salicifoliella*	Defoliators

Code	Common Name	Scientific Name	Category
12170	*<Neodiprion autmnalis>*	*Neodiprion autmnalis*	Defoliators
12171	pinyon sawfly	*Neodiprion edulicolus*	Defoliators
12172	*<Neodiprion gillettei>*	*Neodiprion gillettei*	Defoliators
12173	*<Neodiprion ventralis>*	*Neodiprion ventralis*	Defoliators
12174	*<Phaeoura mexicanaria>*	*Phaeoura mexicanaria*	Defoliators
12175	*<Zadiprion rohweri>*	*Zadiprion rohweri*	Defoliators
12176	*<Zadiprion townsendi>*	*Zadiprion townsendi*	Defoliators
12177	*<Zeiraphera hesperiana>*	*Zeiraphera hesperiana*	Defoliators
12178	western oak looper	*Lambdina fiscellaria somniaria*	Defoliators
12179	phantom hemlock looper	*Nepytia phantasmaria*	Defoliators
12180	*<Malacosoma spp.>*	*Malacosoma spp.*	Defoliators
12181	*<Neodiprion abbotii>*	*Neodiprion abbotii*	Defoliators
12182	slash pine sawfly	*Neodiprion merkeli*	Defoliators
12183	sand pine sawfly	*Neodiprion pratti*	Defoliators
12184	melalueca leaf weevil	*Oxyops vitiosa*	Defoliators
12185	cypress leaf beetle	*Systena marginalis*	Defoliators
12186	*<Nepytia janetae>*	*Nepytia janetae*	Defoliators
12187	agromyzid fly	*Agromyza viridula*	Defoliators
12188	elm sawfly	*Cimbex americana*	Defoliators
12189	june beetle	*Phyllophaga spp.*	Defoliators
12190	hickory tussock moth	*Lophocampa caryae*	Defoliators
12191	pin oak sawfly	*Caliroa lineata*	Defoliators
12192	palmerworm	*Dichomeris ligulella*	Defoliators
12193	pitch pine looper	*Lambdina athasaria pellucidaria*	Defoliators
12194	red pine sawfly	*Neodiprion nanulus nanulus*	Defoliators
12195	pine tube moth	*Argyrotaenia pinatubana*	Defoliators

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12196	baldcypress leafroller	*Archips goyerana*	Defoliators
12197	winter moth	*Operophtera brumata*	Defoliators
12198	basswood thrips	*Sericothrips tiliae*	Defoliators
12199	noctuid moth	*Xylomyges simplex*	Defoliators
12200	pyralid moth	*Palpita magniferalis*	Defoliators
12201	pacific silver fir budmoth	*Zeiraphera spp.*	Defoliators
12202	red pine needle midge	*Thecodiplosis piniresinosae*	Defoliators
12203	western hemlock looper	*Lambdina fiscellaria lugubrosa*	Defoliators
12204	lodgepole pine sawfly	*Neodiprion nanulus contortae*	Defoliators
12205	silverspotted tiger moth	*Lophocampa argentata*	Defoliators
12207	conifer sawflies	<conifer sawflies>	Defoliators
12800	other defoliator (known)	<other defoliator (known)>	Defoliators
12900	unknown defoliator	<unknown defoliator>	Defoliators
13000	chewing insects	<chewing insects>	Chewing Insects
13001	grasshopper	<grasshopper>	Chewing Insects
13002	shorthorn grasshoppers	*<Acrididae>*	Chewing Insects
13003	black cutworm	*Agrotis ipsilon*	Chewing Insects
13004	Palau coconut beetle	*Brontispa palauenis*	Chewing Insects
13005	clearwinged grasshopper	*Camnula pellucida*	Chewing Insects
13006	cicadas	*<Cicadidae>*	Sucking Insects
13007	*<Eurytoma spp.>*	*Eurytoma spp.*	Chewing Insects
13008	*<Euxoa excellens>*	*Euxoa excellens*	Chewing Insects
13009	whitefringed beetles	*Graphognathus spp.*	Chewing Insects
13010	pales weevil	*Hylobius pales*	Chewing Insects
13011	vegetable weevil	*Listroderes difficilis*	Chewing Insects

Code	Common Name	Scientific Name	Category
13012	periodical cicada	*Magicicada septendecim*	Sucking Insects
13013	migratory grasshopper	*Melanoplus sanguinipes*	Chewing Insects
13014	valley grasshopper	*Oedaleonotus enigma*	Chewing Insects
13015	strawberry root weevil	*Otiorhynchus ovatus*	Chewing Insects
13016	black vine weevil	*Otiorhynchus sulcatus*	Chewing Insects
13017	pandanus beetle	*Oxycephala pandani*	Chewing Insects
13018	spaeth pandanus	*Oxycephala spaethi*	Chewing Insects
13019	agamemnon butterfly	*Papilio agememnon*	Chewing Insects
13020	northern pitch twig moth	*Petrova albicapitana*	Chewing Insects
13021	ponderosa pine tip moth	*Rhyacionia zozana*	Chewing Insects
13022	pine needle weevil	*Scythropus spp.*	Chewing Insects
13023	coconut longhorned grasshopper	*Segestes unicolor*	Chewing Insects
13024	clover root curculio	*Sitona hispidulus*	Chewing Insects
13025	*<Thrips madronii>*	*Thrips madronii*	Chewing Insects
13026	ash plant bug	*Tropidosteptes amoenus*	Chewing Insects
13027	shorthorned grasshopper	*Valanga nigricornis*	Chewing Insects
13028	pitch-eating weevil	*Pachylobius picivorus*	Chewing Insects
13029	eastern pine weevil	*Pissodes nemorensis*	Chewing Insects
13030	adana tip moth	*Rhyacionia adana*	Chewing Insects
13800	other chewing insect (known)	<other chewing insect (known)>	Chewing Insects
13900	unknown chewing insect	<unknown chewing insect>	Chewing Insects
14000	sucking insects	<sucking insects>	Sucking Insects
14001	scale insects	*<Coccodidea>*	Sucking Insects
14002	western larch woolly aphid	*Adelges oregonensis*	Sucking Insects
14003	balsam woolly adelgid	*Adelges piceae*	Sucking Insects

Code	Common Name	Scientific Name	Category
14004	hemlock woolly adelgid	*Adelges tsugae*	Sucking Insects
14005	spiraling whitefly	*Aleurodicus dispersus*	Sucking Insects
14006	aphid	*<Aphididae>*	Sucking Insects
14007	pine spittlebug	*Aphrophora cribrata*	Sucking Insects
14008	western pine spittlebug	*Aphrophora permutata*	Sucking Insects
14009	Saratoga spittlebug	*Aphrophora saratogensis*	Sucking Insects
14010	spittlebug	*<Cercopidae>*	Sucking Insects
14011	wax scale	*Ceroplastes spp.*	Sucking Insects
14012	pine needle scale	*Chionaspis pinifoliae*	Sucking Insects
14014	giant conifer aphids	*Cinara spp.*	Sucking Insects
14015	white pine aphid	*Cinara strobi*	Sucking Insects
14016	beech scale	*Cryptococcus fagisuga*	Sucking Insects
14017	spruce aphid	*Elatobium abietinum*	Sucking Insects
14018	woolly apple aphid	*Eriosoma lanigerum*	Sucking Insects
14019	striped mealybug	*Ferrisia virgata*	Sucking Insects
14020	elongate hemlock scale	*Fiorinia externa*	Sucking Insects
14021	coconut red scale	*Furcaspis oceanica*	Sucking Insects
14022	pine thrips	*Gnophothrips spp.*	Sucking Insects
14023	leucaena psyllid	*Heteropsylla cubana*	Sucking Insects
14024	honeysuckle aphids	*Hyadaphis tataricae*	Sucking Insects
14025	Egyptian fluted scale	*Icerya aegyptiaca*	Sucking Insects
14026	Lecanium scale	*Lecanium spp.*	Sucking Insects
14027	common falsepit scale	*Lecanodiaspis prosopidis*	Sucking Insects
14028	oystershell scale	*Lepidosaphes ulmi*	Sucking Insects
14029	pinyon needle scale	*Matsucoccus acalyptus*	Sucking Insects
14030	ponderosa pine twig scale	*Matsucoccus bisetosus*	Sucking Insects

Code	Common Name	Scientific Name	Category
14031	*<Matsucoccus californicus>*	*Matsucoccus californicus*	Sucking Insects
14032	*<Matsucoccus degeneratus>*	*Matsucoccus degeneratus*	Sucking Insects
14033	red pine scale	*Matsucoccus resinosae*	Sucking Insects
14034	Prescott scale	*Matsucoccus vexillorum*	Sucking Insects
14035	treehoopers	*<Membracidae>*	Sucking Insects
14036	hibiscus psyllid	*Mesohomotoma hibisci*	Sucking Insects
14037	balsam twig aphid	*Mindarus abietinus*	Sucking Insects
14038	hibiscus mealybug	*Nipaecoccus viridis*	Sucking Insects
14039	black pineleaf scale	*Nuculaspis californica*	Sucking Insects
14040	spruce spider mite	*Oligonychus ununguis*	Sucking Insects
14041	twig girdler	*Oncideres cingulata*	Sucking Insects
14042	woolly alder aphid	*Paraprociphilus tessellatus*	Sucking Insects
14043	maple aphids	*Periphyllus spp.*	Sucking Insects
14044	spruce bud scale	*Physokermes piceae*	Sucking Insects
14045	*<Pineus borneri>*	*Pineus borneri*	Sucking Insects
14046	pine leaf adelgid	*Pineus pinifoliae*	Sucking Insects
14047	white pine adelgid	*Pineus spp.*	Sucking Insects
14048	pine bark adelgid	*Pineus strobi*	Sucking Insects
14049	*<Prociphilus americanus>*	*Prociphilus americanus*	Sucking Insects
14050	mealybug	*<Pseudococcidae>*	Sucking Insects
14051	cottony maple scale	*Pulvinaria innumerabilis*	Sucking Insects
14052	fir mealybug	*Puto cupressi*	Sucking Insects
14053	Douglas-fir mealybug	*Puto profusus*	Sucking Insects
14054	spruce mealybug	*Puto sandini*	Sucking Insects
14055	hemispherical scale	*Saissetia coffeae*	Sucking Insects
14056	woolly pine needle aphid	*Schizolachnus piniradiatae*	Sucking Insects

Code	Common Name	Scientific Name	Category
14057	steatococcus scale	*Steatococcus samaraius*	Sucking Insects
14058	pear thrips	*Taeniothrips inconsequens*	Sucking Insects
14059	mulberry whitefly	*Tetraleurodes mori*	Sucking Insects
14060	tuliptree scale	*Toumeyella liriodendri*	Sucking Insects
14061	pine tortoise scale	*Toumeyella parvicornis*	Sucking Insects
14062	citrus snow scale	*Unaspis citri*	Sucking Insects
14063	birch aphid	*Euceraphis betulae*	Sucking Insects
14064	Kermes scale	*Allokermes spp.*	Sucking Insects
14065	*<Clastoptera undulata>*	*Clastoptera undulata*	Sucking Insects
14066	giant bark aphid	*Longistigma caryae*	Sucking Insects
14067	woolly pine scale	*Pseudophilippia quaintancii*	Sucking Insects
14068	European elm scale	*Gossyparia spuria*	Sucking Insects
14069	elm scurfy scale	*Chionaspis americana*	Sucking Insects
14070	magnolia scale	*Neolecanium cornuparvum*	Sucking Insects
14071	beech blight aphid	*Fagiphagus imbricator*	Sucking Insects
14072	beech woolly aphid	*Phyllaphis fagi*	Sucking Insects
14800	other sucking insect (known)	<other sucking insect (known)>	Sucking Insects
14900	unknown sucking insect	<unknown sucking insect>	Sucking Insects
15000	boring insects	<boring insects>	Boring Insects
15001	shoot borers	<shoot borers>	Boring Insects
15002	termites	*<Isoptera>*	Boring Insects
15003	ponderosa pine bark beetle	*Acanthocinus princeps*	Boring Insects
15004	bronze birch borer	*Agrilus anxius*	Boring Insects
15005	twolined chestnut borer	*Agrilus bilineatus*	Boring Insects
15006	bronze poplar borer	*Agrilus liragus*	Boring Insects

Code	Common Name	Scientific Name	Category
15007	carpenter bees	*<Apidae>*	Boring Insects
15008	flatheaded borer	*<Buprestidae>*	Boring Insects
15009	golden buprestid	*Buprestis aurulenta*	Boring Insects
15010	*<Camponotus spp.>*	*Camponotus spp.*	Boring Insects
15012	shootboring sawflies	*<Cephidae>*	Boring Insects
15013	roundheaded borer	*<Cerambycidae>*	Boring Insects
15014	flatheaded appletree borer	*Chrysobothris femorata*	Boring Insects
15015	cranberry girdler	*Chrysoteuchia topiaria*	Boring Insects
15016	Columbian timber beetle	*Corthylus columbianus*	Boring Insects
15017	pitted ambrosia beetle	*Corthylus punctatissimus*	Boring Insects
15018	carpenterworm moths	*<Cossidae>*	Boring Insects
15019	poplar-and-willow borer	*Cryptorhynchus lapathi*	Boring Insects
15020	pine reproduction weevil	*Cylindrocopturus eatoni*	Boring Insects
15021	Douglas-fir twig weevil	*Cylindrocopturus furnissi*	Boring Insects
15022	Zimmerman pine moth	*Dioryctria zimmermani*	Boring Insects
15023	oak twig borers	*Anelaphus spp.*	Boring Insects
15024	twig pruner	*Anelaphus villosus*	Boring Insects
15025	lesser cornstalk borer	*Elasmopalpus lignosellus*	Boring Insects
15026	red oak borer	*Enaphalodes rufulus*	Boring Insects
15027	ponderous borer	*Ergates spiculatus*	Boring Insects
15028	eastern pine shoot borer	*Eucosma gloriola*	Boring Insects
15029	western pine shoot borer	*Eucosma sonomana*	Boring Insects
15030	Eucosma species	*Eucosma spp.*	Boring Insects
15031	sugar maple borer	*Glycobius speciosus*	Boring Insects
15032	*<Goes spp.>*	*Goes spp.*	Boring Insects
15033	pine root collar weevil	*Hylobius radicis*	Boring Insects

Code	Common Name	Scientific Name	Category
15034	Warren root collar weevil	*Hylobius warreni*	Boring Insects
15035	powderpost beetles	*<Lyctidae>*	Boring Insects
15036	tarnished plant bug	*Lygus lineolaris*	Boring Insects
15037	*<Magdalis spp.>*	*Magdalis spp.*	Boring Insects
15038	*<Marmara fasciella>*	*Marmara fasciella*	Boring Insects
15039	locust borer	*Megacyllene robiniae*	Boring Insects
15040	California flatheaded borer	*Phaenops californica*	Boring Insects
15041	flatheaded fir borer	*Phaenops drummondi*	Boring Insects
15042	whitespotted sawyer	*Monochamus scutellatus*	Boring Insects
15043	redheaded ash borer	*Neoclytus acuminatus*	Boring Insects
15044	western ash borer	*Neoclytus conjunctus*	Boring Insects
15045	oberea shoot borers	*Oberea spp.*	Boring Insects
15046	eucalyptus longhorned borer	*Phoracantha semipunctata*	Boring Insects
15048	balsam bark weevil	*Pissodes dubius*	Boring Insects
15049	Monterey pine weevil	*Pissodes radiatae*	Boring Insects
15050	Engelmann spruce weevil	*Pissodes strobi*	Boring Insects
15051	lodgepole terminal weevil	*Pissodes terminalis*	Boring Insects
15052	ambrosia beetles	*Platypus spp.*	Boring Insects
15053	cottonwood borer	*Plectrodera scalator*	Boring Insects
15054	balsam shootboring sawfly	*Pleroneura brunneicornis*	Boring Insects
15055	pine gall weevil	*Podapion gallicola*	Boring Insects
15056	ash borer	*Podosesia syringae fraxini*	Boring Insects
15057	ash borer / lilac borer	*Podosesia syringae*	Boring Insects
15058	carpenterworm	*Prionoxystus robiniae*	Boring Insects
15059	maple shoot borers	*Proteoteras spp.*	Boring Insects
15060	western subterranean termite	*Reticulitermes hesperus*	Boring Insects

Code	Common Name	Scientific Name	Category
15061	coconut trunk weevil	*Rhabdoscelus asperipennis*	Boring Insects
15062	New Guinea sugarcane weevil	*Rhabdoscelus obscurus*	Boring Insects
15063	European pine shoot moth	*Rhyacionia buoliana*	Boring Insects
15064	western pine tip moth	*Rhyacionia bushnelli*	Boring Insects
15065	Nantucket pine tip moth	*Rhyacionia frustrana*	Boring Insects
15066	*<Rhyacionia montana>*	*Rhyacionia montana*	Boring Insects
15067	southwestern pine tip moth	*Rhyacionia neomexicana*	Boring Insects
15068	poplar borer	*Saperda calcarata*	Boring Insects
15069	roundheaded appletree borer	*Saperda candida*	Boring Insects
15070	Saperda shoot borer	*Saperda spp.*	Boring Insects
15071	clearwing moths	<Sesiidae>	Boring Insects
15072	dogwood borer	*Synanthedon scitula*	Boring Insects
15073	roundheaded fir borer	*Tetropium abietis*	Boring Insects
15074	western larch borer	*Tetropium velutinum*	Boring Insects
15075	western cedar borer	*Trachykele blondeli*	Boring Insects
15076	Douglas-fir pitch moth	*Synanthedon novaroensis*	Boring Insects
15077	sequoia pitch moth	*Synanthedon sequoiae*	Boring Insects
15078	black twig borer	*Xylosandrus compactus*	Boring Insects
15079	Pacific dampwood termite	*Zootermopsis angusticollis*	Boring Insects
15080	subtropical pine tip moth	*Rhyacionia subtropica*	Boring Insects
15081	granulate ambrosia beetle	*Xylosandrus crassiusculus*	Boring Insects
15082	Asian longhorned beetle	*Anoplophora glabripennis*	Boring Insects
15083	cottonwood twig borer	*Gypsonoma haimbachiana*	Boring Insects
15084	southern pine sawyer	*Monochamus titillator*	Boring Insects
15085	banded ash borer	*Neoclytus caprea*	Boring Insects
15087	emerald ash borer	*Agrilus planipennis*	Boring Insects

Code	Common Name	Scientific Name	Category
15088	hemlock borer	*Melanophila fulvoguttata*	Boring Insects
15089	Formosan subterranean termite	*Coptotermes formosanus*	Boring Insects
15090	<*Sirex noctilio*>	*Sirex noctilio*	Boring Insects
15091	Oregon fir sawyer	*Monochamus scutellatus oregonensis*	Boring Insects
15092	cypress weevil	*Eudociminus mannerheimii*	Boring Insects
15093	camphor shot borer	*Xylosandrus mutilatus*	Boring Insects
15094	goldspotted oak borer	*Agrilus coxalis*	Boring Insects
15095	European oak borer	*Agrilus sulcicollis*	Boring Insects
15800	other boring insect (known)	<other boring insect (known)>	Boring Insects
15900	unknown boring insect	<unknown boring insect>	Boring Insects
16000	seed/cone/flower/fruit insects	<seed/cone/flower/fruit insects>	Seed/Cone/Flower/Fruit Insects
16001	Douglas-fir cone moth	*Barbara colfaxiana*	Seed/Cone/Flower/Fruit Insects
16002	lodgepole cone beetle	*Conophthorus contortae*	Seed/Cone/Flower/Fruit Insects
16003	limber pine cone beetle	*Conophthorus flexilis*	Seed/Cone/Flower/Fruit Insects
16004	mountain pine cone beetle	*Conophthorus monticolae*	Seed/Cone/Flower/Fruit Insects
16005	ponderosa pine cone beetle	*Conophthorus ponderosae*	Seed/Cone/Flower/Fruit Insects
16006	Monterey pine cone beetle	*Conophthorus radiatae*	Seed/Cone/Flower/Fruit Insects
16007	red pine cone beetle	*Conophthorus resinosae*	Seed/Cone/Flower/Fruit Insects
16008	white pine cone beetle	*Conophthorus coniperda*	Seed/Cone/Flower/Fruit Insects
16009	black walnut curculio	*Conotrachelus retentus*	Seed/Cone/Flower/Fruit Insects
16010	Douglas-fir cone gall midge	*Contarinia oregonensis*	Seed/Cone/Flower/Fruit Insects
16011	Douglas-fir cone scale midge	*Contarinia washingtonensis*	Seed/Cone/Flower/Fruit Insects
16012	<*Curculio spp.*>	*Curculio spp.*	Seed/Cone/Flower/Fruit Insects
16013	Caroline fruitfly	*Dacus frauenfeldi*	Seed/Cone/Flower/Fruit Insects

Code	Common Name	Scientific Name	Category
16014	spruce bud midge	*Dasineura swainei*	Seed/Cone/Flower/Fruit Insects
16015	fir coneworm	*Dioryctria abietivorella*	Seed/Cone/Flower/Fruit Insects
16016	southern pine coneworm	*Dioryctria amatella*	Seed/Cone/Flower/Fruit Insects
16017	ponderosa pine coneworm	*Dioryctria auranticella*	Seed/Cone/Flower/Fruit Insects
16018	loblolly pine coneworm	*Dioryctria merkeli*	Seed/Cone/Flower/Fruit Insects
16019	ponderosa twig moth	*Dioryctria ponderosae*	Seed/Cone/Flower/Fruit Insects
16020	*<Dioryctria pseudotsugella>*	*Dioryctria pseudotsugella*	Seed/Cone/Flower/Fruit Insects
16021	*<Dioryctria spp.>*	*Dioryctria spp.*	Seed/Cone/Flower/Fruit Insects
16022	lodgepole cone moth	*Eucosma rescissoriana*	Seed/Cone/Flower/Fruit Insects
16023	seed chalcid	*<Eurytomidae>*	Seed/Cone/Flower/Fruit Insects
16024	slash pine flower thrips	*Gnophothrips fuscus*	Seed/Cone/Flower/Fruit Insects
16025	*<Hylemya anthracina>*	*Hylemya anthracina*	Seed/Cone/Flower/Fruit Insects
16026	longleaf pine seed worm or moth	*Laspeyresia ingens*	Seed/Cone/Flower/Fruit Insects
16027	ponderosa pine seed moth	*Laspeyresia piperana*	Seed/Cone/Flower/Fruit Insects
16028	spruce seed moth	*Cydia strobilella*	Seed/Cone/Flower/Fruit Insects
16029	boxelder bug	*Boisea trivittata*	Seed/Cone/Flower/Fruit Insects
16030	leaffooted pine seed bug	*Leptoglossus corculus*	Seed/Cone/Flower/Fruit Insects
16031	western conifer-seed bug	*Leptoglossus occidentalis*	Seed/Cone/Flower/Fruit Insects
16032	hollyhock thrips	*Liothrips varicornis*	Seed/Cone/Flower/Fruit Insects
16033	*<Megastigmus lasiocarpae>*	*Megastigmus lasiocarpae*	Seed/Cone/Flower/Fruit Insects
16034	spruce seed chalcid	*Megastigmus piceae*	Seed/Cone/Flower/Fruit Insects
16035	pine seed chalcid	*Megastigmus albifrons*	Seed/Cone/Flower/Fruit Insects
16036	fir seed chalcid	*Megastigmus pinus*	Seed/Cone/Flower/Fruit Insects
16037	Douglas-fir seed chalcid	*Megastigmus spermotrophus*	Seed/Cone/Flower/Fruit Insects
16038	*<Odontopus calceatus>*	*Odontopus calceatus*	Seed/Cone/Flower/Fruit Insects
16039	fruitpiercing moth	*Othreis fullonia*	Seed/Cone/Flower/Fruit Insects

Code	Common Name	Scientific Name	Category
16040	roundheaded cone borer	*Paratimia conicola*	Seed/Cone/Flower/Fruit Insects
16041	mango shoot caterpillar	*Penicillaria jocosatrix*	Seed/Cone/Flower/Fruit Insects
16042	coneworm	*<Phycitinae>*	Seed/Cone/Flower/Fruit Insects
16043	harvester ants	*Pogonomyrmex spp.*	Seed/Cone/Flower/Fruit Insects
16044	citrus flower moth	*Prays citri*	Seed/Cone/Flower/Fruit Insects
16045	fir cone maggot	*Strobilomyia abietis*	Seed/Cone/Flower/Fruit Insects
16046	spruce cone maggot	*Strobilomyia anthracina*	Seed/Cone/Flower/Fruit Insects
16047	shieldbacked pine seed bug	*Tetyra bipunctata*	Seed/Cone/Flower/Fruit Insects
16048	coneworm	*Hylemia spp.*	Seed/Cone/Flower/Fruit Insects
16049	prairie tent caterpillar	*Malacosoma lutescens*	Seed/Cone/Flower/Fruit Insects
16050	jack pine tip beetle	*Conophthorus banksianae*	Seed/Cone/Flower/Fruit Insects
16051	webbing coneworm	*Dioryctria disclusa*	Seed/Cone/Flower/Fruit Insects
16052	blister coneworm	*Dioryctria clarioralis*	Seed/Cone/Flower/Fruit Insects
16053	southern cone gall midge	*Cecidomyia bisetosa*	Seed/Cone/Flower/Fruit Insects
16054	seed bugs	*<Lygaeidae>*	Seed/Cone/Flower/Fruit Insects
16800	other seed/cone/flower insect (known)	<other seed/cone/flower insect (known)>	Seed/Cone/Flower/Fruit Insects
16900	unknown seed/cone/flower insect	<unknown seed/cone/flower insect>	Seed/Cone/Flower/Fruit Insects
17000	gallmaker insects	<gallmaker insects>	Gallmaker Insects
17001	birch budgall mite	*Aceria rudis*	Gallmaker Insects
17002	eastern spruce gall adelgid	*Adelges abietis*	Gallmaker Insects
17003	Cooley spruce gall adelgid	*Adelges cooleyi*	Gallmaker Insects
17004	horned oak gall	*Callirhytis cornigera*	Gallmaker Insects
17005	*<Callirhytis quercusfutilis>*	*Callirhytis quercusfutilis*	Gallmaker Insects
17006	gall midge	*<Cecidomyiidae>*	Gallmaker Insects

Code	Common Name	Scientific Name	Category
17007	*<Contarinia pseudotsugae>*	*Contarinia pseudotsugae*	Gallmaker Insects
17008	gall mite	*<Eriophyidae>*	Gallmaker Insects
17009	spruce gall midge	*Mayetiola piceae*	Gallmaker Insects
17010	hackberry nipplegall maker	*Pachypsylla celtidismamma*	Gallmaker Insects
17011	balsam gall midge	*Paradiplosis tumifex*	Gallmaker Insects
17012	hickory gall phylloxera	*Phylloxera caryaecaulis*	Gallmaker Insects
17013	gall aphid	*<Phylloxeridae>*	Gallmaker Insects
17014	alder gall mite	*Phytoptus laevis*	Gallmaker Insects
17015	psyllid	*<Psyllidae>*	Gallmaker Insects
17016	sugarberry psyllid	*Tetragonocephela flava*	Gallmaker Insects
17017	mountain apple psyllid	*Trioza vitiensis*	Gallmaker Insects
17018	gouty pitch midge	*Cecidomyia piniinopis*	Gallmaker Insects
17019	spider mites	*Oligonychus spp.*	Gallmaker Insects
17020	cypress gall midges	*Taxodiomyia spp.*	Gallmaker Insects
17021	jumping oak gall wasp	*Neuroterus saltatorius*	Gallmaker Insects
17800	other gallmaking insect (known)	<other gallmaking insect (known)>	Gallmaker Insects
17900	unknown gallmaking insect	<unknown gallmaking insect>	Gallmaker Insects
18000	predatory insects	*<Chrysopidae>*	Insect Predators
18001	lacewings	<lacewings>	Insect Predators
18002	blackbellied clerid	*Enoclerus lecontei*	Insect Predators
18003	redbellied clerid	*Enoclerus sphegeus*	Insect Predators
18004	*<Formica rufa>*	*Formica rufa*	Insect Predators
18005	western yellowjacket	*Vespula pennsylvanica*	Insect Predators
19000	general diseases	<general diseases>	General Diseases

Code	Common Name	Scientific Name	Category
20000	biotic damage	<biotic damage>	Biotic Damage
20001	damping-off	<damping-off>	Biotic Damage
20002	gray mold	*Botrytis cinerea*	Biotic Damage
20003	Cassytha	*Cassytha filiformis*	Biotic Damage
20004	hemlock fluting	<hemlock fluting>	Biotic Damage
21000	root/butt diseases	<root/butt diseases>	Root/Butt Diseases
21001	Armillaria root disease	*Armillaria spp.*	Root/Butt Diseases
21002	yellow stringy rot	*Scytinostroma galactinum*	Root/Butt Diseases
21003	Cylindrocladium root disease	*Cylindrocladium spp.*	Root/Butt Diseases
21005	black root rot of pine	*Fusarium oxysporum*	Root/Butt Diseases
21006	Fusarium root rot	*Fusarium spp.*	Root/Butt Diseases
21007	Ganoderma trunk rot	*Ganoderma applanatum*	Root/Butt Diseases
21008	Ganoderma rot of hardwood	*Ganoderma lucidum*	Root/Butt Diseases
21009	Ganoderma rot of conifers	*Ganoderma tsugae*	Root/Butt Diseases
21010	annosus root disease	*Heterobasidion annosum*	Root/Butt Diseases
21011	circinatus root rot	*Onnia circinata*	Root/Butt Diseases
21012	tomentosus root rot/false velvet top fungus	*Onnia tomentosa*	Root/Butt Diseases
21013	*<Macrophomina phaseolina>*	*Macrophomina phaseolina*	Root/Butt Diseases
21014	black stain root disease	*Leptographium wageneri*	Root/Butt Diseases
21015	Schweinitzii root and butt rot	*Phaeolus schweinitzii*	Root/Butt Diseases
21016	flame tree root disease	*Phellinus noxius*	Root/Butt Diseases
21017	laminated root rot	*Phellinus weirii*	Root/Butt Diseases
21019	littleleaf disease / Phytophthora root	*Phytophthora cinnamomi*	Root/Butt Diseases

Code	Common Name	Scientific Name	Category
	rot		
21020	Port-Orford-cedar root disease	*Phytophthora lateralis*	Root/Butt Diseases
21022	Pythium root rot	*Pythium spp.*	Root/Butt Diseases
21023	procera root disease of conifers	*Leptographium procerum*	Root/Butt Diseases
21024	crown gall	*Agrobacterium tumefaciens*	Root/Butt Diseases
21025	borealis conk	*Climacocystis borealis*	Root/Butt Diseases
21026	yellow pitted rot	*Hericium abietis*	Root/Butt Diseases
21027	brown cubical rot	*Laetiporus sulphureus*	Root/Butt Diseases
21028	sudden oak death	*Phytophthora ramorum*	Stem Decays/Cankers
21029	Rhizina root disease	*Rhizina undulata*	Root/Butt Diseases
21030	yellow root rot	*Perenniporia subacida*	Root/Butt Diseases
21031	brown top rot	*Fomitopsis cajanderi*	Root/Butt Diseases
21033	pocket dry rot	*Tyromyces amarus*	Root/Butt Diseases
21700	root or butt decay (indicators present)	<root or butt decay (indicators present)>	Root/Butt Diseases
21800	other root or butt disease (known)	<other root or butt disease (known)>	Root/Butt Diseases
21900	unknown root or butt disease	<unknown root or butt disease>	Root/Butt Diseases
22000	stem decays/cankers	<stem decays/cankers>	Stem Decays/Cankers
22001	heart rot	<heart rot>	Stem Decays/Cankers
22002	stem rot	<stem rot>	Stem Decays/Cankers
22003	sap rot	<sap rot>	Stem Decays/Cankers
22004	slime flux	<slime flux>	Stem Decays/Cankers
22005	viruses	<virus>	Stem Decays/Cankers
22006	black knot of cherry	*Apiosporina morbosa*	Stem Decays/Cankers
22007	atropellis canker	*Atropellis piniphila*	Stem Decays/Cankers

Code	Common Name	Scientific Name	Category
22008	Siberian elm canker	*Botryodiplodia hypodermia*	Stem Decays/Cankers
22009	Botryosphaeria canker	*Botryosphaeria ribis*	Stem Decays/Cankers
22010	black rot fungus	*Botryosphaeria stevensii*	Stem Decays/Cankers
22011	Caliciopsis canker	*Caliciopsis pinea*	Stem Decays/Cankers
22012	black canker of aspen	*Ceratocystis fimbriata*	Stem Decays/Cankers
22013	sycamore canker aspen	*Ceratocystis fimbriata f sp platani*	Stem Decays/Cankers
22023	chestnut blight	*Cryphonectria parasitica*	Stem Decays/Cankers
22024	gray brown sap rot	*Cryptoporus volvatus*	Stem Decays/Cankers
22025	Cryptosphaeria canker of aspen	*Cryptosphaeria ligniota*	Stem Decays/Cankers
22026	Cytospora canker of fir	*Cytospora abietis*	Stem Decays/Cankers
22027	red rot	*Dichomitus squalens*	Stem Decays/Cankers
22028	Indian paint fungus	*Echinodontium tinctorium*	Stem Decays/Cankers
22029	sooty bark canker	*Encoelia pruinosa*	Stem Decays/Cankers
22030	Eutypella canker	*Eutypella parasitica*	Stem Decays/Cankers
22031	Fusarium cortical stem rot	*Gibberella avenacea*	Stem Decays/Cankers
22032	pitch canker of pines	*Fusarium circinatum*	Stem Decays/Cankers
22033	Fusiococcum canker	<Fusiococcum canker>	Stem Decays/Cankers
22034	Scleroderris canker	*Gremmeniella abietina*	Stem Decays/Cankers
22035	amelanchier rust	*Gymnosporangium harknessianum*	Stem Decays/Cankers
22036	cedar apple rust	*Gymnosporangium juniperi-virginianae*	Stem Decays/Cankers
22037	Hypoxylon canker of oak	*Biscogniauxia atropunctata var. atropunctata*	Stem Decays/Cankers
22038	Hypoxylon canker of aspen	*Entoleuca mammata*	Stem Decays/Cankers
22039	canker rot of oak	*Inonotus hispidus*	Stem Decays/Cankers
22040	sterile conk trunk rot of birch	*Inonotus obliquus*	Stem Decays/Cankers

Code	Common Name	Scientific Name	Category
22041	European larch canker	*Lachnellula willkommii*	Stem Decays/Cankers
22042	beech bark disease	*Nectria coccinea*	Stem Decays/Cankers
22043	Nectria canker	*Nectria galligena*	Stem Decays/Cankers
22044	ash heart rot	*Perenniporia fraxinophila*	Stem Decays/Cankers
22047	red heart rot	*Phellinus pini*	Stem Decays/Cankers
22048	aspen trunk rot	*Phellinus tremulae*	Stem Decays/Cankers
22049	stem decay of black walnut	*Phellinus weirianus*	Stem Decays/Cankers
22050	Phomopsis canker	*Phomopsis occulta*	Stem Decays/Cankers
22051	Phomopsis canker	*Phomopsis spp.*	Stem Decays/Cankers
22052	cypress canker	*Seiridium cardinale*	Stem Decays/Cankers
22053	butternut canker	*Sirococcus clavigignenti juglandacearum*	Stem Decays/Cankers
22054	maple canker	*Steganosporium spp.*	Stem Decays/Cankers
22055	Thyronectria canker	*Thyronectria austroamericana*	Stem Decays/Cankers
22056	*<Xanthomonas citri>*	*Xanthomonas citri*	Stem Decays/Cankers
22057	Cytospora canker of aspen	*Valsa sordida*	Stem Decays/Cankers
22058	Dothichiza canker	*Chondroplea populea*	Stem Decays/Cankers
22059	red belt fungus / brown crumbly rot	*Fomitopsis pinicola*	Stem Decays/Cankers
22060	Leucocytospora canker of spruce	*Valsa kunzei*	Stem Decays/Cankers
22062	quinine fungus / brown trunk rot	*Laricifomes officinalis*	Stem Decays/Cankers
22063	*<Coniophora puteana>*	*Coniophora puteana*	Stem Decays/Cankers
22064	tinder fungus	*Fomes fomentarius*	Stem Decays/Cankers
22065	purple conk	*Trichaptum abietinum*	Stem Decays/Cankers
22067	*<Phellinus hartigii>*	*Phellinus hartigii*	Stem Decays/Cankers
22068	false tinder fungus	*Phellinus igniarius*	Stem Decays/Cankers
22069	robustus conk	*Phellinus robustus*	Stem Decays/Cankers

Code	Common Name	Scientific Name	Category
22070	mottled rot	*Pholiota spp.*	Stem Decays/Cankers
22071	oyster mushroom	*Pleurotus ostreatus*	Stem Decays/Cankers
22072	white ring rot	*Ceriporiopsis rivulosa*	Stem Decays/Cankers
22073	hemlock canker	*Xenomeris abietis*	Stem Decays/Cankers
22074	pencil rot of western redcedar	*Postia sericeomollis*	Stem Decays/Cankers
22075	Lachnellula canker	*Lachnellula flavovirens*	Stem Decays/Cankers
22076	Strumella canker	*Strumella coryneoidea*	Stem Decays/Cankers
22077	Phomopsis blight	*Phomopsis juniperivora*	Stem Decays/Cankers
22078	Fusarium canker of yellow poplar	*Nectria haematococca*	Stem Decays/Cankers
22079	sterile conk of maple and beech	*Inonotus glomeratus*	Stem Decays/Cankers
22080	canker of spruce	*Aleurodiscus spp.*	Stem Decays/Cankers
22081	birch conk	*Piptoporus betulinus*	Stem Decays/Cankers
22082	canker	*Discocainia treleasei*	Stem Decays/Cankers
22083	red ring rot canker	*Phellinus pini var. cancriformans*	Stem Decays/Cankers
22084	Douglas-fir cankers	<Douglas-fir cankers>	Stem Decays/Cankers
22085	Grovesiella canker	*Grovesiella abieticola*	Stem Decays/Cankers
22086	thousand canker disease (of walnut)	Geosmithia sp. nov.	Stem Decays/Cankers
22700	canker (general)	<canker (general)>	Stem Decays/Cankers
22800	other stem decay / canker disease (known)	<other stem decay / canker disease (known)>	Stem Decays/Cankers
22900	unknown stem decay / canker disease	<unknown stem decay / canker disease>	Stem Decays/Cankers
23000	parasitic/epiphytic plants	<parasitic/epiphytic plants>	Parasitic/Epiphytic Plants
23001	mistletoe	<mistletoe>	Parasitic/Epiphytic Plants
23002	parasitic plants	<parasitic plants>	Parasitic/Epiphytic Plants

Code	Common Name	Scientific Name	Category
23003	vine damage	<vine damage>	Parasitic/Epiphytic Plants
23005	white fir dwarf mistletoe	*Arceuthobium abietinum f. sp concoloris*	Parasitic/Epiphytic Plants
23006	American dwarf mistletoe	*Arceuthobium americanum*	Parasitic/Epiphytic Plants
23007	Apache dwarf mistletoe	*Arceuthobium apachecum*	Parasitic/Epiphytic Plants
23008	western dwarf mistletoe	*Arceuthobium campylopodum*	Parasitic/Epiphytic Plants
23009	limber pine dwarf mistletoe	*Arceuthobium cyanocarpum*	Parasitic/Epiphytic Plants
23010	pinyon dwarf mistletoe	*Arceuthobium divaricatum*	Parasitic/Epiphytic Plants
23011	Douglas-fir dwarf mistletoe	*Arceuthobium douglasii*	Parasitic/Epiphytic Plants
23012	Huachuca Mountain dwarf mistletoe	*Arceuthobium gillii*	Parasitic/Epiphytic Plants
23013	larch dwarf mistletoe	*Arceuthobium laricis*	Parasitic/Epiphytic Plants
23014	western spruce dwarf mistletoe	*Arceuthobium microcarpum*	Parasitic/Epiphytic Plants
23015	eastern dwarf mistletoe	*Arceuthobium pusillum*	Parasitic/Epiphytic Plants
23016	hemlock dwarf mistletoe	*Arceuthobium tsugense*	Parasitic/Epiphytic Plants
23017	pineland dwarf mistletoe	*Arceuthobium vaginatum*	Parasitic/Epiphytic Plants
23018	dodder	*Cuscuta spp.*	Parasitic/Epiphytic Plants
23019	fir mistletoe	*Phoradendron pauciflorum*	Parasitic/Epiphytic Plants
23020	mistletoe	*Phoradendron spp.*	Parasitic/Epiphytic Plants
23021	red fir dwarf mistletoe	*Arceuthobium abietinum f. sp magnificae*	Parasitic/Epiphytic Plants
23022	juniper mistletoe	*Phoradendron juniperinum*	Parasitic/Epiphytic Plants
23023	dwarf mistletoe	*Arceuthobium spp.*	Parasitic/Epiphytic Plants
24000	decline complexes/dieback	<decline complexes/dieback>	Decline Complexes/Dieback/Wilts
24001	yellow-cedar decline	<yellow-cedar decline>	Decline Complexes/Dieback/Wilts
24002	Norfolk Island pine decline	<Norfolk Island pine decline>	Decline Complexes/Dieback/Wilts

Code	Common Name	Scientific Name	Category
24003	Stillwells syndrome	<Stillwells syndrome>	Decline Complexes/Dieback/Wilts
24004	ash decline/yellows	<ash decline/yellows>	Decline Complexes/Dieback/Wilts
24005	birch dieback	<birch dieback>	Decline Complexes/Dieback/Wilts
24006	coconut cadang-cadang viroid	*Cocadviroid coconut cadang-cadang viroid*	Decline Complexes/Dieback/Wilts
24007	complex	<complex>	Decline Complexes/Dieback/Wilts
24008	decline	<decline>	Decline Complexes/Dieback/Wilts
24009	fall hardwood defoliator complex	<fall hardwood defoliator complex>	Decline Complexes/Dieback/Wilts
24010	joga decline	<joga decline>	Decline Complexes/Dieback/Wilts
24011	larch decline	<larch decline>	Decline Complexes/Dieback/Wilts
24012	looper abiotic complex	<looper abiotic complex>	Decline Complexes/Dieback/Wilts
24013	maple decline	<maple decline>	Decline Complexes/Dieback/Wilts
24014	oak decline	*Hypoxylon spp.*	Decline Complexes/Dieback/Wilts
24015	pingelap disease	<pingelap disease>	Decline Complexes/Dieback/Wilts
24016	sprout dieback	<sprout dieback>	Decline Complexes/Dieback/Wilts
24017	true fir pest complex	<true fir pest complex>	Decline Complexes/Dieback/Wilts
24018	western X disease	<western X disease>	Decline Complexes/Dieback/Wilts
24019	pinewood nematode	*Bursaphelenchus xylophilus*	Decline Complexes/Dieback/Wilts
24020	sapstreak disease of sugar maple	*Ceratocystis coerulescens*	Decline Complexes/Dieback/Wilts
24021	oak wilt	*Ceratocystis fagacearum*	Decline Complexes/Dieback/Wilts
24022	Dutch elm disease	*Ophiostoma novo-ulmi*	Decline Complexes/Dieback/Wilts
24023	bacterial wetwood	*Enterobacter nimipressuralis*	Decline Complexes/Dieback/Wilts
24024	mimosa wilt	*Fusarium oxysporum perniciosum*	Decline Complexes/Dieback/Wilts
24025	Verticillium wilt	*Verticillium albo-atrum*	Decline Complexes/Dieback/Wilts
24026	bacterial leaf scorch	*Xylella fastidiosa*	Decline Complexes/Dieback/Wilts
24027	wetwood	<wetwood>	Decline Complexes/Dieback/Wilts

Code	Common Name	Scientific Name	Category
24028	hemlock decline	<hemlock decline>	Decline Complexes/Dieback/Wilts
24029	Pacific madrone decline	<Pacific madrone decline>	Decline Complexes/Dieback/Wilts
24030	elm phloem necrosis	*Mycoplasma spp.*	Decline Complexes/Dieback/Wilts
24031	laurel wilt	*Raffaelea spp.*	Decline Complexes/Dieback/Wilts
24032	sudden aspen decline	<sudden aspen decline>	Decline Complexes/Dieback/Wilts
24800	other decline/complex/wilt (known)	<other decline/complex/wilt (known)>	Decline Complexes/Dieback/Wilts
24900	unknown decline/complex/wilt	<unknown decline/complex/wilt>	Decline Complexes/Dieback/Wilts
25000	foliage and shoot diseases	<foliage diseases>	Foliage Diseases
25001	blight	<blight>	Foliage Diseases
25003	juniper blights	<juniper blights>	Foliage Diseases
25004	leaf spots	<leaf spots>	Foliage Diseases
25005	needlecast	<needlecast>	Foliage Diseases
25006	powdery mildew	<powdery mildew>	Foliage Diseases
25007	tobacco mosaic virus	<tobacco mosaic virus>	Foliage Diseases
25008	tobacco ringspot virus	*Nepovirus TRSV*	Foliage Diseases
25009	true fir needle cast	<true fir needle cast>	Foliage Diseases
25010	sycamore anthracnose	*Apiognomonia veneta*	Foliage Diseases
25011	Cercospora blight of juniper	*Asperisporium sequoiae*	Foliage Diseases
25013	large-spored spruce-laborador tea rust	*Chrysomyxa ledicola*	Foliage Diseases
25014	ink spot of aspen	*Ciborinia whetzelii*	Foliage Diseases
25015	pine needle rust	*Coleosporium spp.*	Foliage Diseases
25016	anthracnose on Russian olive	*Colletotrichum spp.*	Foliage Diseases
25017	Coronado limb rust	*Cronartium arizonicum*	Foliage Diseases

Code	Common Name	Scientific Name	Category
25018	leaf shothole	*Cylindrosporium spp.*	Foliage Diseases
25019	cedar leaf blight	*Didymascella thujina*	Foliage Diseases
25020	dogwood anthracnose	*Discula destructiva*	Foliage Diseases
25021	mango scab	*Elsinoë mangiferae*	Foliage Diseases
25022	Elytroderma needle blight	*Elytroderma deformans*	Foliage Diseases
25023	fire blight	*Erwinia amylovora*	Foliage Diseases
25024	walnut anthracnose	*Gnomonia leptostyla*	Foliage Diseases
25025	anthracnose	*Gnomonia spp.*	Foliage Diseases
25027	brown felt blight	*Herpotrichia juniperi*	Foliage Diseases
25028	larch needle blight	*Hypodermella laricis*	Foliage Diseases
25029	hardwood anthracnose	*Kabatiella apocrypta*	Foliage Diseases
25030	cone damage	*Lasiodiplodia spp.*	Foliage Diseases
25031	spruce needle cast	*Lirula macrospora*	Foliage Diseases
25032	fir needle cast	*Lirula spp.*	Foliage Diseases
25033	*<Lophodermella arcuata>*	*Lophodermella arcuata*	Foliage Diseases
25034	Lophodermella needle cast of pines	*Lophodermella spp.*	Foliage Diseases
25035	Lophodermium needle cast of pines	*Lophodermium spp.*	Foliage Diseases
25036	Marssonina blight	*Drepanopeziza punctiformis*	Foliage Diseases
25037	Douglas-fir rust	*Melampsora medusae*	Foliage Diseases
25039	larch needle cast	*Meria laricis*	Foliage Diseases
25040	Dothistroma needle blight	*Mycosphaerella pini*	Foliage Diseases
25041	brown felt blight of pines	*Neopeckia coulteri*	Foliage Diseases
25042	snow blight	*Phacidium infestans*	Foliage Diseases
25043	Swiss needle cast	*Phaeocryptopus gaeumannii*	Foliage Diseases
25044	Phoma blight	*Phoma spp.*	Foliage Diseases
25045	Phyllosticta leaf spot	*Phyllosticta spp.*	Foliage Diseases

Code	Common Name	Scientific Name	Category
25046	bud rot	*Phytophthora palmivora*	Foliage Diseases
25047	Ploioderma needle cast	*Ploioderma spp.*	Foliage Diseases
25048	ash rust	*Puccinia sparganioides*	Foliage Diseases
25049	fir and hemlock needle rusts	*Pucciniastrum spp.*	Foliage Diseases
25050	Rhabdocline neele cast	*Rhabdocline spp.*	Foliage Diseases
25051	Rhizoctonia needle blight	*Rhizoctonia spp.*	Foliage Diseases
25052	Rhizosphaera needle cast	*Rhizosphaera spp.*	Foliage Diseases
25053	Rhizopus rot	*Rhizopus stolonifer var. stolonifer*	Foliage Diseases
25054	brown spot needle blight	*Mycosphaerella dearnessii*	Foliage Diseases
25055	Septoria leaf spot	*Septoria alnifolia*	Foliage Diseases
25056	Septoria leaf spot and canker	*Mycosphaerella populorum*	Foliage Diseases
25057	Sirococcus tip blight	*Sirococcus conigenus*	Foliage Diseases
25058	Diplodia canker	*Sphaeropsis sapinea*	Foliage Diseases
25059	leaf blister of oak	*Taphrina caerulescens*	Foliage Diseases
25060	Venturia leaf blight of maple	*Venturia aceris*	Foliage Diseases
25061	shepherds crook	*Venturia tremulae*	Foliage Diseases
25063	yellow-cedar shoot blight	*Apostrasseria spp.*	Foliage Diseases
25065	spruce needle rust	*Chrysomyxa weirii*	Foliage Diseases
25066	cedar leaf blight	*Gymnosporangium nootkatense*	Foliage Diseases
25067	spruce needle cast	*Lophodermium piceae*	Foliage Diseases
25068	hardwood leaf rusts	*Melampsora spp.*	Foliage Diseases
25070	hemlock needle rust	*Naohidemyces vaccinii*	Foliage Diseases
25071	spruce needle cast	*Rhizosphaera pini*	Foliage Diseases
25072	sirococcus shoot blight	*Sirococcus strobilinus*	Foliage Diseases
25073	shepherds crook	*Venturia populina*	Foliage Diseases
25074	Delphinella shoot blight	*Delphinella abietis*	Foliage Diseases

Code	Common Name	Scientific Name	Category
25075	tar spot	*Rhytisma acerinum*	Foliage Diseases
25076	birch leaf fungus	*Septoria betulae*	Foliage Diseases
25077	Septoria leaf spot of maple	*Septoria aceris*	Foliage Diseases
25800	other foliage / shoot disease (known)	<other foliage / shoot disease (known)>	Foliage Diseases
25900	unknown foliage / shoot disease	<unknown foliage / shoot disease>	Foliage Diseases
26000	stem rust	<stem rust>	Stem Rusts
26001	white pine blister rust	*Cronartium ribicola*	Stem Rusts
26002	western gall rust	*Endocronartium harknessii*	Stem Rusts
26003	stalactiform rust	*Cronartium coleosporioides*	Stem Rusts
26004	comandra blister rust	*Cronartium comandrae*	Stem Rusts
26005	pinyon rust	*Cronartium occidentale*	Stem Rusts
26006	fusiform rust	*Cronartium quercuum*	Stem Rusts
26007	gall rust of jack pine	*Cronartium quercuum f sp banksianae*	Stem Rusts
26008	gall rust of shortleaf pine	*Cronartium quercuum f sp echinatae*	Stem Rusts
26009	fusiform rust	*Cronartium quercuum f sp fusiforme*	Stem Rusts
26010	gall rust of Virginia pine	*Cronartium quercuum f sp virginianae*	Stem Rusts
26011	Bethuli rust	*Peridermium bethuli*	Stem Rusts
26012	filamentosum rust	*Peridermium filamentosum*	Stem Rusts
26013	southern cone rust	*Cronartium strobilinum*	Stem Rusts
26800	other stem rust (known)	<other stem rust (known)>	Stem Rusts
26900	unknown stem rust	<unknown stem rust>	Stem Rusts

Code	Common Name	Scientific Name	Category
27000	broom rusts	<broom rusts>	Broom Rusts
27001	spruce broom rust	*Chrysomyxa arctostaphyli*	Broom Rusts
27002	incense-cedar rust	*Gymnosporangium libocedri*	Broom Rusts
27003	juniper broom rust	*Gymnosporangium nidus-avis*	Broom Rusts
27004	yellow witches-broom of fir	*Melampsorella caryophyllacearum*	Broom Rusts
27800	other broom rust (known)	<other broom rust (known)>	Broom Rusts
27900	unknown broom rust	<unknown broom rust>	Broom Rusts
28000	boring insects - shoot and twig	<boring insects - shoot and twig>	Terminal, Shoot, and Twig Insects
28001	pine shoot beetle	*Tomicus piniperda*	Terminal, Shoot, and Twig Insects
28002	*<Rynchophorus cruentatus>*	*Rynchophorus cruentatus*	Terminal, Shoot, and Twig Insects
29000	root feeding insects	<root feeding insects>	Root Insects
30000	fire	<fire>	Fire
30001	wild fire	<wild fire>	Fire
30002	human caused fire	<human caused fire>	Fire
30003	crown fire damage	<crown fire damage>	Fire
30004	ground fire damage	<ground fire damage>	Fire
41000	wild animals	<wild animals>	Wild Animals
41001	bears	*Ursus spp.*	Wild Animals
41002	American beaver	*Castor canadensis*	Wild Animals
41003	big game	<big game>	Wild Animals
41004	mice or voles	<mice or voles>	Wild Animals

Code	Common Name	Scientific Name	Category
41005	pocket gophers	*<Geomyidae>*	Wild Animals
41006	common porcupine	*Erethizon dorsatum*	Wild Animals
41007	rabbits	*Sylvilagus spp.*	Wild Animals
41008	sapsuckers	*Sphyrapicus spp.*	Wild Animals
41009	squirrels	*<Sciuridae>*	Wild Animals
41010	woodpeckers	*<Piciformes>*	Wild Animals
41011	moose	*Alces alces*	Wild Animals
41012	elk	*Cervus elaphus*	Wild Animals
41013	deer	*Odocoileus spp.*	Wild Animals
41014	feral pigs	*Sus scrofa*	Wild Animals
41015	mountain beaver	*Aplodontia rufa*	Wild Animals
41016	deer or elk	*<Cervidae>*	Wild Animals
41017	earthworm	*<Lumbricidae>*	Wild Animals
41800	other wild animals (known)	<other wild animals (known)>	Wild Animals
41900	unknown wild animals	<unknown wild animals>	Wild Animals
42000	domestic animals	<domestic animals>	Domestic Animals
42001	domesticated cattle	*Bos taurus*	Domestic Animals
42002	goat	*Capra hircus*	Domestic Animals
42003	horse	*Equus caballus*	Domestic Animals
42004	sheep	*Ovis aries*	Domestic Animals
42800	other domestic animal (known)	<other domestic animal (known)>	Domestic Animals
42900	unknown domestic animal	<unknown domestic animal>	Domestic Animals
50000	abiotic damage	<abiotic damage>	Abiotic Damage
50001	air pollutants	<air pollutants>	Abiotic Damage

Code	Common Name	Scientific Name	Category
50002	chemical	<chemical>	Abiotic Damage
50003	drought	<drought>	Abiotic Damage
50004	flooding-high water	<flooding-high water>	Abiotic Damage
50005	frost	<frost>	Abiotic Damage
50006	hail	<hail>	Abiotic Damage
50007	heat	<heat>	Abiotic Damage
50008	lightning	<lightning>	Abiotic Damage
50009	nutrient imbalances	<nutrient imbalances>	Abiotic Damage
50010	radiation	<radiation>	Abiotic Damage
50011	snow-ice	<snow-ice>	Abiotic Damage
50013	wind-tornado/hurricane	<wind-tornado/hurricane>	Abiotic Damage
50014	winter injury	<winter injury>	Abiotic Damage
50015	avalanche	<avalanche>	Abiotic Damage
50016	mud-land slide	<mud-land slide>	Abiotic Damage
50017	volcano	<volcano>	Abiotic Damage
50018	other geologic event	<other geologic event>	Abiotic Damage
50019	mechanical (non-human caused)	<mechanical (non-human caused)>	Abiotic Damage
50020	saltwater injury - flooding / hurricane	<saltwater injury - flooding / hurricane>	Abiotic Damage
50800	other abiotic damage (known)	<other abiotic damage (known)>	Abiotic Damage
50900	unknown abiotic damage	<unknown abiotic damage>	Abiotic Damage
60000	competition	<competition>	Competition
70000	human activities	<human activities>	Human Activities
70001	herbicides	<herbicides>	Human Activities

Code	Common Name	Scientific Name	Category
70003	imbedded objects	<imbedded objects>	Human Activities
70004	improper planting technique	<improper planting technique>	Human Activities
70005	land clearing	<land clearing>	Human Activities
70006	land use conversion	<land use conversion>	Human Activities
70007	logging damage	<logging damage>	Human Activities
70008	mechanical	<mechanical>	Human Activities
70009	pesticides	<pesticides>	Human Activities
70010	roads	<roads>	Human Activities
70011	soil compaction	<soil compaction>	Human Activities
70012	suppression	<suppression>	Human Activities
70013	vehicle damage	<vehicle damage>	Human Activities
70014	road salt	<road salt>	Human Activities
71000	harvest	<harvest>	Human Activities
80000	multi-damage (insect/disease)	<multi-damage (insect/disease)>	Multi-Damage (Insect/Disease)
80001	aspen defoliation	<aspen defoliation>	Multi-Damage (Insect/Disease)
80002	subalpine fir mortality	<subalpine fir mortality>	Multi-Damage (Insect/Disease)
80003	five-needle pine decline	<five-needle pine decline>	Multi-Damage (Insect/Disease)
80004	pinyon pine mortality	<pinyon pine mortality>	Multi-Damage (Insect/Disease)
90000	unknown	<unknown>	Unknown
90001	broken top	<broken top>	Unknown
90002	dead top	<dead top>	Unknown
90003	limby-wolf tree	<limby-wolf tree>	Unknown
90004	forked top	<forked top>	Unknown
90005	forked below merch top	<forked below merch top>	Unknown

Code	Common Name	Scientific Name	Category
90006	crook or sweep	<crook or sweep>	Unknown
90007	checks, bole cracks	<checks, bole cracks>	Unknown
90008	foliage discoloration	<foliage discoloration>	Unknown
90009	mortality	<mortality>	Unknown
90010	dieback	<dieback>	Unknown
99999	no data	<no data>	No Damage

Appendix F *Host Tree Species Codes*

The table in this appendix contains the list of host tree species and the associated codes to be used in the *host1, host2, and host3* fields of the damage coverages. These codes are taken from the EMAP Forest Health Monitoring Manual, Appendix A, Rev. No. 0, April, 1995. There are east and west versions of this manual. This list combines the east and west versions into a single list. For Forest Health Monitoring aerial survey purposes, some codes have been added. These added codes are noted in the following list with an astrick (*) and may be added to the FHM manual in a future release. The contents of this list is available in digital form (.dbf) at the following website: http://www.fs.fed.us/foresthealth/publications/id/id_guidelines.html

Code	Common Name	Genus	Species
001	hardwoods *		
002	softwoods *		
003	hardwoods/softwoods *		
010	fir	Abies	spp.
011	Pacific silver fir	Abies	amabilis
012	balsam fir	Abies	balsamea
014	bristlecone fir	Abies	bracteata
015	white fir	Abies	concolor
016	Fraser fir	Abies	fraseri
017	grand fir	Abies	grandis
018	corkbark fir	Abies	lasiocarpa var. arizonica
019	subalpine fir	Abies	lasiocarpa
020	California red fir	Abies	magnifica var. magnifica
021	Shasta red fir	Abies	magnifica var. shastensis
022	noble fir	Abies	procera
041	Port-Orford-cedar	Chamaecyparis	lawsoniana
042	Alaska yellow-cedar	Chamaecyparis	nootkatensis
043	Atlantic white-cedar	Chamaecyparis	thyoides
050	cypress	Cupressus	spp.
051	Arizona cypress	Cupressus	arizonica
052	Baker cypress	Cupressus	bakeri
053	Tecate cypress	Cupressus	forbesii
054	Monterey cypress	Cupressus	macrocarpa
055	Sargent cypress	Cupressus	sargentii
057	redcedar; juniper	Juniperus	spp.
058	Pinchot juniper	Juniperis	pinchotii
059	redberry juniper	Juniperis	erythrocarpa
061	Ashe juniper	Juniperus	ashei
062	California juniper	Juniperis	californica
063	alligator juniper	Juniperis	deppeana
064	western juniper	Juniperis	occidentalis
065	Utah juniper	Juniperis	osteosperma
066	Rocky Mountain juniper	Juniperis	scopulorum
067	southern redcedar	Juniperus	silicicola
068	eastern redcedar	Juniperus	virginiana

Code	Common Name	Genus	Species
069	oneseed juniper	Juniperis	monosperma
070	larch (introduced)	Larix	spp.
071	tamarack	Larix	laricina
072	subalpine larch	Larix	lyallii
073	western larch	Larix	occidentalis
081	incense-cedar	Libocedrus	decurrens
090	spruce	Picea	spp.
091	Norway spruce	Picea	abies
092	Brewer spruce	Picea	brewerana
093	Engelmann spruce	Picea	engelmannii
094	white spruce	Picea	glauca
095	black spruce	Picea	mariana
096	blue spruce	Picea	pungens
097	red spruce	Picea	rubens
098	Sitka spruce	Picea	sitchensis
099	Lutz spruce	Picea	glauca var. sitchensis
100	pine	Pinus	spp.
101	whitebark pine	Pinus	albicaulis
102	bristlecone pine	Pinus	aristata
103	knobcone pine	Pinus	attenuata
104	foxtail pine	Pinus	balfouriana
105	jack pine	Pinus	banksiana
106	common pinyon	Pinus	edulis
107	sand pine	Pinus	clausa
108	lodgepole pine	Pinus	contorta
109	Coulter pine	Pinus	coulteri
110	shortleaf pine	Pinus	echinata
111	slash pine	Pinus	elliottii
112	Apache pine	Pinus	engelmannii
113	limber pine	Pinus	flexilis var. reflexa
114	southwestern white pine	Pinus	strobiformis
115	spruce pine	Pinus	glabra
116	Jeffrey pine	Pinus	jeffreyi
117	sugar pine	Pinus	lambertiana
118	Chihuahuan pine	Pinus	leiophylla
119	western white pine	Pinus	monticola

Code	Common Name	Genus	Species
120	bishop pine	Pinus	muricata
121	longleaf pine	Pinus	palustris
122	ponderosa pine	Pinus	ponderosa
123	Table Mountain pine	Pinus	pungens
124	Monterey pine	Pinus	radiata
125	red pine	Pinus	resinosa
126	pitch pine	Pinus	rigida
127	grey pine	Pinus	sabiniana
128	pond pine	Pinus	serotina
129	eastern white pine	Pinus	strobus
130	Scotch pine	Pinus	sylvestris
131	loblolly pine	Pinus	taeda
132	Virginia pine	Pinus	virginiana
133	singleleaf pinyon	Pinus	monophylla
134	border pinyon	Pinus	discolor
135	Arizona pine	Pinus	ponderosa var. arizonica
136	Austrian pine	Pinus	nigra
137	Washoe pine	Pinus	washoensis
138	four-needle pine	Pinus	quadrifolia
139	Torrey pine	Pinus	torreyana
140	Mexican pinyon pine	Pinus	cembroides
201	bigcone Douglas-fir	Pseudotsuga	macrocarpa
202	Douglas-fir	Pseudotsuga	menziesii
211	redwood	Sequoia	sempervirens
212	giant sequoia	Sequoiadendron	giganteum
221	baldcypress	Taxodium	distichum
222	pondcypress	Taxodium	distichum var. nutans
231	Pacific yew	Taxus	brevifolia
241	northern white-cedar	Thuja	occidentalis
242	western redcedar	Thuja	plicata
251	California torreya	Torreya	californica
260	hemlock	Tsuga	spp.
261	eastern hemlock	Tsuga	canadensis
262	Carolina hemlock	Tsuga	caroliniana
263	western hemlock	Tsuga	heterophylla
264	mountain hemlock	Tsuga	mertensiana

Code	Common Name	Genus	Species
310	maple	Acer	spp.
311	Florida maple	Acer	barbatum
312	bigleaf maple	Acer	macrophyllum
313	boxelder	Acer	negundo
314	black maple	Acer	nigrum
315	striped maple	Acer	pensylvanicum
316	red maple	Acer	rubrum
317	silver maple	Acer	saccharinum
318	sugar maple	Acer	saccharum
319	mountain maple	Acer	spicatum
321	Rocky Mountain maple	Acer	glabrum
322	bigtooth maple	Acer	grandidentatum
330	buckeye; horsechestnut	Aesculus	spp.
331	horsechestnut	Aesculus	glabra
332	yellow buckeye	Aesculus	octandra
333	California buckeye	Aesculus	californica
341	ailanthus	Ailanthus	altissima
351	red alder	Alnus	rubra
352	white alder	Alnus	rhombifolia
355	European alder	Alnus	glutinosa
356	serviceberry	Amelanchier	arborea
361	Pacific madrone	Arbutus	menziesii
367	pawpaw	Asimina	triloba
370	birch	Betula	spp.
371	yellow birch	Betula	alleghaniensis
372	sweet birch	Betula	lenta
373	river birch	Betula	nigra
375	paper birch	Betula	papyrifera
376	western paper birch	Betula	papyrifera var. commutata
377	Alaska paper birch	Betula	papyrifera var. neoalaskana
378	northwestern paper birch	Betula	papyrifera var. subcordata
379	gray birch	Betula	populifolia
381	chittamwood; gum bumelia	Bumelia	lanuginosa
391	American hornbeam; musclewood	Carpinus	caroliniana
400	hickory	Carya	spp.
401	water hickory	Carya	aquatica

Code	Common Name	Genus	Species
402	bitternut hickory	Carya	cordiformis
403	pignut hickory	Carya	glabra
404	pecan	Carya	illinoensis
405	shellbark hickory	Carya	laciniosa
407	shagbark hickory	Carya	ovata
408	black hickory	Carya	texana
409	mockernut hickory	Carya	tomentosa
421	American chestnut	Castanea	dentata
422	Allegheny chinkapin	Castanea	pumila
423	Ozark chinkapin	Castanea	ozarkensis
431	golden chinkapin	Castanopsis	chrysophylla
450	catalpa	Catalpa	spp.
451	southern catalpa	Catalpa	bignonioides
452	northern catalpa	Catalpa	speciosa
460	hackberry	Celtis	spp.
461	sugarberry	Celtis	laevigata
462	hackberry	Celtis	occidentalis
463	netleaf hackberry	Celtis	reticulata
471	eastern redbud	Cercis	canadensis
475	curlleaf mountain-mahogany	Cercocarpus	ledifolius
476	alderleaf mountain-mahogany	Cercocarpus	montanus
477	hairy mountain-mahogany	Cercocarpus	breviflorus
481	yellowwood cladrastis	Cladrastis	kentukea
491	flowering dogwood	Cornus	florida
492	Pacific dogwood	Cornus	nuttallii
500	hawthorn	Crataegus	spp.
501	hawthorn (crus-galli)	Crataegus	crus-galli
502	hawthorn (mollis)	Crataegus	mollis
510	eucalyptus	Eucalyptus	spp.
521	common persimmon	Diospyros	virginiana
531	American beech	Fagus	grandifolia
540	ash	Fraxinus	spp.
541	white ash	Fraxinus	americana
542	Oregon ash	Fraxinus	latifolia
543	black ash	Fraxinus	nigra
544	green ash	Fraxinus	pennsylvanica

Code	Common Name	Genus	Species
545	pumpkin ash	Fraxinus	profunda
546	blue ash	Fraxinus	quadrangulata
547	velvet ash	Fraxinus	velutina
551	waterlocust	Gleditsia	aquatica
552	honeylocust	Gleditsia	triacanthos
555	loblolly-bay	Gordonia	lasianthus
571	Kentucky coffeetree	Gymnocladus	dioicus
580	silverbell	Halesia	spp.
591	American holly	Ilex	opaca
600	walnut	Juglans	spp.
601	butternut	Juglans	cinerea
602	black walnut	Juglans	nigra
603	California black walnut	Juglans	hindsii
604	southern California black walnut	Juglans	californica
605	Texas walnut	Juglans	microcarpa
611	sweetgum	Liquidambar	styraciflua
621	yellow-poplar	Liriodendron	tulipifera
631	tanoak	Lithocarpus	densiflorus
641	Osage-orange	Maclura	pomifera
650	magnolia	Magnolia	spp.
651	cucumbertree	Magnolia	acuminata
652	southern magnolia	Magnolia	grandiflora
653	sweetbay	Magnolia	virginiana
654	bigleaf magnolia	Magnolia	macrophylla
660	apple	Malus	spp.
661	Oregon crab apple	Malus	fusca
680	mulberry	Morus	spp.
681	white mulberry	Morus	alba
682	red mulberry	Morus	rubra
691	water tupelo	Nyssa	aquatica
692	Ogeechee tupelo	Nyssa	ogeche
693	blackgum	Nyssa	sylvatica
694	swamp tupelo	Nyssa	sylvatica var. biflora
701	eastern hophornbeam, ironwood	Ostrya	virginiana
711	sourwood	Oxydendrum	arboreum
712	paulownia, empress-tree	Paulownia	tomentosa

Code	Common Name	Genus	Species
715	yellow paloverde	Parkinsonia	microphylla
716	blue paloverde	Parkinsonia	florida
717	Jerusalem thorn	Parkinsonia	aculeata
721	redbay	Persea	borbonia
722	water elm, planer tree	Planera	acquatica
730	California sycamore	Platanus	californica
731	sycamore	Platanus	occidentalis
740	cottonwood, poplar	Populus	spp.
741	balsam popular	Populus	balsamifera
742	eastern cottonwood	Populus	deltoides
743	bigtooth aspen	Populus	grandidentata
744	swamp cottonwood	Populus	heterophylla
745	plains cottonwood	Populus	sargentii
746	quaking aspen	Populus	tremuloides
747	black cottonwood	Populus	trichocarpa
748	Fremont poplar	Populus	fremontii
749	narrowleaf cottonwood	Populus	angustifolia
752	silver poplar	Populus	alba
755	mesquite	Prosopsis	sp.
756	western honey mesquite	Prosposis	glandulosa var. torreyana
757	velvet mesquite	Prosposis	velutina var. velutina
758	screwbean mesquite	Prosopsis	pubescens
760	cherry; plum	Prunus	spp.
761	pin cherry	Prunus	pensylvanica
762	black cherry	Prunus	serotina
763	chokecherry	Prunus	virginiana
765	Canada plum	Prunus	nigra
766	wild plum	Prunus	americana
768	bitter cherry	Prunus	emarginata
800	oak(deciduous)	Quercus	spp.
801	coast live oak	Quercus	agrifolia
802	white oak	Quercus	alba
803	Arizona white oak; gray oak	Quercus	arizonica
804	swamp white oak	Quercus	bicolor
805	canyon live oak	Quercus	chrysolepis
806	scarlet oak	Quercus	coccinea

Code	Common Name	Genus	Species
807	blue oak	Quercus	douglasii
808	Durand oak	Quercus	durandii
809	northern pin oak	Quercus	ellipsoidalis
810	Emery oak	Quercus	emoryi
811	Engelmann oak	Quercus	engelmannii
812	southern red oak	Quercus	falcata var. falcata
813	cherrybark oak; swamp red oak	Quercus	pagodaefolia
814	Gambel oak	Quercus	gambelii
815	Oregon white oak	Quercus	garryana
816	bear oak; scrub oak	Quercus	ilicifolia
817	shingle oak	Quercus	imbricaria
818	California black oak	Quercus	kelloggii
819	turkey oak	Quercus	laevis
820	laurel oak	Quercus	laurifolia
821	valley oak	Quercus	lobata
822	overcup oak	Quercus	lyrata
823	bur oak	Quercus	macrocarpa
824	blackjack oak	Quercus	marilandica
825	swamp chestnut oak	Quercus	michauxii
826	chinkapin oak	Quercus	muehlenbergii
827	water oak	Quercus	nigra
828	Nuttall oak	Quercus	nuttallii
829	Mexican blue oak	Quercus	oblongifolia
830	pin oak	Quercus	palustris
831	willow oak	Quercus	phellos
832	chestnut oak	Quercus	prinus
833	northern red oak	Quercus	rubra
834	Shumard oak	Quercus	shumardii
835	post oak	Quercus	stellata
836	Delta post oak	Quercus	stellata var. mississippiensis
837	black oak	Quercus	velutina
838	live oak	Quercus	virginiana
839	interior live oak	Quercus	wislizeni
840	dwarf post oak	Quercus	stellata var. stellata
841	dwarf live oak	Quercus	minima
842	bluejack oak	Quercus	incana

Code	Common Name	Genus	Species
843	silverleaf oak	Quercus	hypoleucoides
850	oak (evergreen)	Quercus	spp.
901	black locust	Robinia	pseudoacacia
902	New Mexico locust	Robinia	neomexicana
919	soapberry	Sapindus	drummondii
920	willow	Salix	spp.
921	peachleaf willow	Salix	amygdaloides
922	black willow	Salix	nigra
924	Scouler willow	Salix	scoulerana
927	white willow	Salix	alba
931	sassafras	Sassafras	albidum
935	American mountain-ash	Sorbus	americana
936	European mountain-ash	Sorbus	aucuparia
950	basswood	Tilia	spp.
951	American basswood	Tilia	americana
952	white basswood	Tilia	heterophylla
970	elm	Ulmus	spp.
971	winged elm	Ulmus	alata
972	American elm	Ulmus	americana
973	cedar elm	Ulmus	crassifolia
974	Siberian elm	Ulmus	pumila
975	slippery elm	Ulmus	rubra
976	September elm	Ulmus	serotina
977	rock elm	Ulmus	thomasii
981	California-laurel	Umellularia	californica
990	tesota	Olneya	tesota
991	saltcedar	Tamarix	spp.
993	chinaberry	Melia	azedarach
994	Chinese tallowtree	Sapium	sebiferum
995	tung-oil-tree	Aleurites	fordii
996	smoketree	Cotinus	obovatus
997	Russian-olive	Elaeagnus	angustifolia
998	not listed		
999	unknown		

Appendix G Forest Type Codes

The table in this appendix contains the list of forest types and the associated codes to be used in the *for_type1, for_type2, and for_type3* fields of the damage coverages. These codes are taken from the EMAP Forest Health Monitoring Manual, Appendix B, Rev. No. 0, April, 1995. There are east and west versions of this manual. This list combines the east and west versions into a single list. For Forest Health Monitoring aerial survey purposes, some codes have been added. These added codes are noted in the following list with an astrick (*) and may be added to the FHM manual in a future release. The contents of this list is available in digital form (.dbf) at the following website: http://www.fs.fed.us/foresthealth/publications/id/id_guidelines.html

Code	Host Forest Type
0000	WHITE/RED/JACK PINE GROUP
0010	Jack pine
0020	Red pine
0030	White pine
0040	White pine/hemlock
0050	Hemlock
0060	Scotch pine
0070	Ponderosa pine
0100	SPRUCE/FIR GROUP
0110	Balsam fir
0120	Black spruce
0130	Red spruce/balsam fir
0140	Northern white-cedar
0150	Tamarack (eastern larch)
0160	White spruce
0170	Norway spruce
0180	Larch (introduced)
0190	Red spruce
0200	LONGLEAF/SLASH PINE GROUP
0210	Longleaf pine
0220	Slash pine
0300	LOBLOLLY/SHORTLEAF PINE GROUP
0310	Loblolly pine
0320	Shortleaf pine
0330	Virginia pine
0340	Sand pine
0350	Eastern redcedar
0360	Pond pine
0370	Spruce pine
0380	Pitch pine
0390	Table-mountain pine
0400	OAK/PINE GROUP
0410	White pine/northern red oak/white ash
0420	Eastern redcedar/hardwood
0430	Longleaf pine/scrub oak

Code	Host Forest Type
0440	Shortleaf pine/oak
0450	Virginia pine/southern red oak
0460	Loblolly pine/hardwood
0470	Slash pine/hardwood
0480	Scarlet oak
0490	Other oak/pine
0500	OAK/HICKORY GROUP
0510	Post, black, or bear oak
0520	Chestnut oak
0530	White oak/red oak/hickory
0540	White oak
0550	Northern red oak
0560	Yellow-poplar/white oak/northern red oak
0562	Sweetgum/yellow-poplar
0564	Yellow-poplar
0570	Southern scrub oak
0580	Black locust
0590	Mixed central hardwoods
0592	Sassafras/persimmon
0594	Central hardwood reverting field
0600	OAK/GUM/CYPRESS GROUP
0610	Swamp chestnut oak/cherrybark oak
0620	Sweetgum/Nuttall oak/willow oak
0630	Sugarberry/American elm/green ash
0650	Overcup oak/water hickory
0660	Atlantic white-cedar
0670	Baldcypress/water tupelo
0680	Sweetbay/swamp tupelo/red maple
0690	Palm/mangrove/other tropical
0692	Mangrove
0694	Palm
0696	Other tropical
0700	ELM/ASH/RED MAPLE GROUP
0710	Black ash/American elm/red maple
0720	River birch/sycamore
0730	Cottonwood

Code	Host Forest Type
0740	Willow
0750	Sycamore/pecan/American elm
0800	MAPLE/BEECH/BIRCH GROUP
0810	Sugar maple/beech/yellow birch
0820	Black cherry
0830	Black walnut
0840	Red maple/northern hardwoods
0850	Red maple/central hardwoods
0880	Northern hardwood reverting field
0890	Mixed northern hardwoods
0900	ASPEN/BIRCH GROUP
0910	Aspen
0920	Paper birch
0930	Gray birch
0998	INDETERMINATE
0999	NONSTOCKED
1200	DOUGLAS-FIR TYPE GROUP
1201	Bigcone Douglas-fir
1202	Douglas-fir
2100	MAJOR PINE TYPE GROUP
2108	Lodgepole pine
2116	Jeffrey pine
2117	Sugar pine
2119	Western white pine
2122	Ponderosa pine
3000	WESTERN FIR-SPRUCE TYPE GROUP
3010	Fir
3011	Pacific silver fir
3014	Bristlecone fir
3015	White fir
3017	Grand fir
3018	Corkbark fir
3019	Subalpine fir
3020	California red fir
3021	Shasta red fir
3022	Noble fir

Code	Host Forest Type
3090	Spruce
3092	Brewer spruce
3093	Engelmann spruce
3094	White spruce
3095	Black spruce
3096	Blue spruce
3097	Spruce-Fir
3099	Lutz spruce
4000	HEMLOCK-SPRUCE TYPE GROUP
4098	Sitka spruce
4242	Western redcedar
4263	Western hemlock
4264	Mountain hemlock
5200	REDWOOD/SEQUOIA TYPE GROUP
5211	Redwood
5212	Giant sequoia
6300	WESTERN HARDWOODS
6310	Maple
6312	Bigleaf maple
6313	Boxelder
6321	Rocky Mountain maple
6322	Bigtooth maple
6333	Buckeye
6350	Alder
6351	Red alder
6352	White alder
6360	Madrone
6361	Pacific madrone
6370	Birch
6375	Paper birch
6376	Western paper birch
6430	Chinkapin
6431	Golden chinkapin
6463	Netleaf hackberry
6475	Curlleaf mountain-mahogany
6476	Alderleaf mountain-mahogany

Code	Host Forest Type
6477	Hairy mountain-mahogany
6492	Pacific dogwood
6510	Eucalyptus
6540	Ash
6542	Oregon ash
6547	Velvet ash
6600	Walnut
6602	Black walnut
6603	California black walnut
6604	Southern california black walnut
6631	Tanoak
6660	Apple
6715	Yellow paloverde
6716	Blue paloverde
6717	Jerusalem thorn
6730	Sycamore
6740	Cottonwood
6741	Balsam popular
6745	Plains cottonwood
6746	Quaking aspen
6747	Black cottonwood
6748	Fremont cottonwood
6749	Narrowleaf cottonwood
6755	Mesquite
6756	Western honey mesquite
6757	Velvet mesquite
6758	Screwbean mesquite
6760	Cherry; peach; plum
6768	Bitter cherry (emarginata)
6800	Oak (deciduous)
6801	California live oak
6803	Arizona white oak
6805	Canyon live oak
6807	Blue oak
6810	Emery oak
6811	Engelmann oak

Code	Host Forest Type
6814	Gambel oak
6815	Oregon white oak
6818	California black oak
6821	California white oak
6826	Chinkapin oak
6829	Mexican blue oak
6839	Interior live oak
6843	Silverleaf oak
6850	Oak (evergreen)
6902	New Mexico locust
6920	Willow
6924	Scouler willow
6981	California-willow
6990	Arizona ironwood; tesota
6997	Russian-olive
7000	MISCELLANEOUS WESTERN SOFTWOODS
7041	Port-Orford-cedar
7042	Alaska-cedar
7050	Cypress spp.
7052	Baker cypress
7053	Tecate cypress
7054	Montery cypress
7055	Sargent cypress
7057	Juniper spp.
7058	Pinchot juniper
7059	Redberry juniper
7062	California juniper
7064	Western juniper
7065	Utah juniper
7066	Rocky Mountain juniper
7069	Oneseed juniper
7071	Tamarack
7072	Subalpine larch
7073	Western larch
7081	Incense-cedar
7101	Whitebark pine

Code	Host Forest Type
7102	Bristlecone pine
7103	Knobcone pine
7104	Foxtail pine
7106	Common pinyon
7109	Coulter pine
7113	Limber pine
7120	Bishop pine
7124	Montery pine
7127	Grey pine
7133	Singleleaf pinyon
7134	Border pinyon
7137	Washoe pine
7138	Four-leaved pine
7139	Torrey pine
7140	Mexican pinyon pine
7141	Pinyon-Juniper
7231	Pacific yew
7251	California Torreya
7991	Saltcedar
9000	MIXED CONIFERS
9001	Mixed conifers, California
9999	Unknown *****