

Aerial Survey Geographic Information System Handbook

Sketchmaps to Digital Geographic Information

November 2005

Forest Health Monitoring
Program



State and Private Forestry
Forest Health Protection



- 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

Add 41017, earthworm, Lumbricidae

Change 50012 wild fire to 30001, wild fire

Add

Table of Contents

Introduction	1
Traditional vs. Digital Aerial Sketchmapping	2
Getting Sketchmaps Ready for GIS.....	3.....
Building Digital Geographic Information	5
National GIS Database Requirements	10
Appendix A Definitions of Items (Attributes) in Damage Coverages	17
Appendix B Definitions of Items (Attributes) in Flown/Not Flown Coverages	20
Appendix C Damage and Flown/Not Flown Polygon Examples.....	22
Appendix D Cooperating Agency Codes	Error! Bookmark not defined.
Appendix E Damage Causal Agent Codes	Error! Bookmark not defined.
Appendix F Host Tree Species Codes.....	Error!.Bookmark not defined.
Appendix G Forest Type Codes	Error!.Bookmark not defined.

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

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](#)

- x 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:

- x Name of data element
- x Description of data element
- x Type of data - Integer, decimal number, or alphanumeric character
- x Size of field - Number of allowable characters
- x Number of decimal places for numeric data
- x Allowable cogable 1 TgreRrifT2 ber of dexme to be use(8.8(e)-.2kgreRrifT2 vor.2kgrpg of)8.57cE5(m)Ar8ents fo.1(e)-5se

- x The final dataset should be clean (e.g., polygons should be closed, with no gaps or dangling line segments).
- x 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 polygon 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 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

14if0005 iyrlse(rv)-60-e accuraot

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

- x **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.
- x **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 in fact overlap in area with the overview survey in the same year. Each special survey, or combination of several special surveys for the same insect or pathogen, will be delivered as a separate coverage or shapefile in the same format as the overview survey.
- x **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.

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:

- x The standard coding scheme allows for entering up to three aerial survey observations for any one polygon. Each observation is a unique combination of attrib

Polygon Attribute Table For Flown/Not Flown Coverages

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:

- x It must be a polygon shapefile.
- x Each polygon must have a unique ID number.
- x

Figure 4: Table properties formatted using D-ASM SketchTools¹ v.2.6

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

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

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

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.

Polygon F2

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								

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
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, Grand Canyon 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

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	<i>Adoretus sinicus</i>	General Insects
10005	rose beetle	<i>Adoretus versutus</i>	General Insects
10006	coconut hispid beetle	<i>Brontispa longissima</i>	General Insects
10007	clerid beetle	<Cleridae>	Insect Predators
10008	weevil	<Curculionidae>	Chewing Insects
10009	green rose chafer	<i>Dichelonyx backi</i>	Defoliators
10010	Allegheny mound ant	<i>Formica exsectoides</i>	General Insects
10011	ant	<Formicidae>	General Insects
10012	stick insect	<i>Graeffea crovanii</i>	General Insects
10013	< <i>Hulodes caranea</i> >	<i>Hulodes caranea</i>	General Insects
10014	conifer swift moth	<i>Korsheltellus gracilis</i>	General Insects
10015	Caroline shortnosed weevil	<i>Lophothetes</i> spp.	Chewing Insects
10016	coconut rhinoceros beetle	<i>Oryctes rhinoceros</i>	General Insects
10017	bagworm moth	<Psychidae>	Defoliators
10019	scarab	<Scarabaeidae>	General Insects
10020	ash whitefly	<i>Siphoninus phillyreae</i>	General Insects

Code	Common Name	Scientific Name	Category
11001	roundheaded pine beetle	<i>Dendroctonus adjunctus</i>	Bark Beetles
11002	western pine beetle	<i>Dendroctonus brevicomis</i>	Bark Beetles
11003	southern pine beetle	<i>Dendroctonus frontalis</i>	Bark Beetles
11004	Jeffrey pine beetle	<i>Dendroctonus jeffreyi</i>	Bark Beetles
11005	lodgepole pine beetle	<i>Dendroctonus murrayanae</i>	Bark Beetles
11006	mountain pine beetle	<i>Dendroctonus ponderosae</i>	Bark Beetles
11007	Douglas-fir beetle	<i>Dendroctonus pseudotsugae</i>	Bark Beetles
11008	boreal spruce beetle	<i>Dendroctonus punctatus</i>	Bark Beetles
11009	spruce beetle	<i>Dendroctonus rufipennis</i>	Bark Beetles
11010	eastern larch beetle	<i>Dendroctonus simplex</i>	Bark Beetles
11011	black turpentine beetle	<i>Dendroctonus terebrans</i>	Bark Beetles
11012	red turpentine beetle	<i>Dendroctonus valens</i>	Bark Beetles
11013	< <i>Dryocoetes affaber</i> >	<i>Dryocoetes affaber</i>	Bark Beetles
11014	< <i>Dryocoetes autographus</i> >	<i>Dryocoetes autographus</i>	Bark Beetles
11015	western balsam bark beetle	<i>Dryocoetes confusus</i>	Bark Beetles
11016	< <i>Dryocoetes sechelti</i> >	<i>Dryocoetes sechelti</i>	Bark Beetles
11017	ash bark beetles	<i>Hylesinus</i> spp.	Bark Beetles
11018	native elm bark beetle	<i>Hylurgopinus rufipes</i>	Bark Beetles
11019	pinyon ips	<i>Ips confusus</i>	Bark Beetles

Code	Common Name	Scientific Name	Category
11027	California fivespined ips	<i>Ips paraconfusus</i>	Bark Beetles
11028	northern spruce engraver	<i>Ips perturbatus</i>	Bark Beetles
11029	pine engraver	<i>Ips pini</i>	Bark Beetles
11030	ips	<i>Ips</i> spp.	Bark Beetles
11031	< <i>Ips tridens</i> >	<i>Ips tridens</i>	Bark Beetles
11032	western ash bark beetle	<i>Hylesinus californicus</i>	Bark Beetles
11033	Oregon ash bark beetle	<i>Hylesinus oregonus</i>	Bark Beetles
11034	< <i>Orthotomicus caelatus</i> >	<i>Orthotomicus caelatus</i>	Bark Beetles
11035	< <i>Phloeosinus</i> spp.>	<i>Phloeosinus</i> spp.	Bark Beetles
11036	western cedar bark beetle	<i>Phloeosinus punctatus</i>	Bark Beetles
11037	tip beetles	<i>Pityogenes</i> spp.	Bark Beetles
11038	< <i>Pityophthorus pseudotsugae</i> >	<i>Pityophthorus pseudotsugae</i>	Bark Beetles
11039	< <i>Pityophthorus</i> spp.>	<i>Pityophthorus</i> spp.	Bark Beetles
11040	foureyed spruce bark beetle	<i>Polygraphus rufipennis</i>	Bark Beetles
11041	fir root bark beetle	<i>Pseudohylesinus granulatus</i>	Bark Beetles
11042	< <i>Pseudohylesinus dispar</i> >	<i>Pseudohylesinus dispar</i>	Bark Beetles
11043	Douglas-fir pole beetle	<i>Pseudohylesinus nebulosus</i>	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		

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

Code	Common Name	Scientific Name	Category
12145	redbanded thrips	<i>Selenothrips rubrocinctus</i>	Defoliators
12146	green larch looper	<i>Semiothisa sexmaculata</i>	Defoliators
12147	<Sparganothis acerivorana>	<i>Sparganothis acerivorana</i>	Defoliators
12148	redhumped oakworm	<i>Symmerista canicosta</i>	Defoliators
12149	orangehumped mapleworm	<i>Symmerista leucitys</i>	Defoliators
12150	spruce needleminer	<i>Taniva albolineana</i>	Defoliators
12151	maple webworm	<i>Tetralopha asperatella</i>	Defoliators
12152	pine webworm	<i>Pococera robustella</i>	Defoliators
12153	introduced basswood thrips	<i>Thrips calcaratus</i>	Defoliators
12154	bagworm	<i>Thyridopteryx ephemeraeformis</i>	Defoliators
12155	leafroller/seed moth	Tortricidae	

Code	Common Name	Scientific Name	Category
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

Code	Common Name	Scientific Name	Category
13012	periodical cicada	Magicalicada septendecim	Sucking Insects
13013	migratory grasshopper		

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

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

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		

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	<Cepidae>	Boring Insects
15013	roundheaded borer	<Cerambycidae>	Boring Insects
15014	flatheaded apple tree 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

Code	Common Name	Scientific Name	Category
15088	hemlock borer	<i>Melanophila fulvoguttata</i>	Boring Insects
15089	Formosan subterranean termite	<i>Coptotermes formosanus</i>	Boring 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

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	<i>Lachnellula willkommii</i>	Stem Decays/Cankers
22042	beech bark disease	<i>Nectria coccinea</i>	Stem Decays/Cankers
22043	Nectria canker	<i>Nectria galligena</i>	Stem Decays/Cankers
22044	ash heart rot	<i>Perenniporia fraxinophila</i>	Stem Decays/Cankers
22047	red heart rot	<i>Phellinus pini</i>	Stem Decays/Cankers
22048	aspen trunk rot	<i>Phellinus tremulae</i>	Stem Decays/Cankers
22049	stem decay of black walnut	<i>Phellinus weirianus</i>	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)	Ocrethia sp. nov.	Stem Decays/Cankers
22700	canker (general)	<canker (gen)>	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		

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-	

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

Code	Common Name	Scientific Name	Category
25018	leaf shothole	<i>Cylindrosporium</i> spp.	Foliage Diseases
25019	cedar leaf blight	<i>Didymascella thujina</i>	Foliage Diseases
25020	dogwood anthracnose	<i>Discula destructiva</i>	Foliage Diseases
25021	mango scab	<i>Elsinoë mangiferae</i>	Foliage Diseases
25022	Elytroderma needle blight	<i>Elytroderma deformans</i>	Foliage Diseases
25023	fire blight	<i>Erwinia amylovora</i>	Foliage Diseases
25024	walnut anthracnose	<i>Gnomonia leptostyla</i>	Foliage Diseases
25025	anthracnose	<i>Gnomonia</i> spp.	Foliage Diseases
25027	brown felt blight	<i>Herpotrichia juniperi</i>	Foliage Diseases
25028	larch needle blight	<i>Hypodermella laricis</i>	Foliage Diseases

Code	Common Name	Scientific Name	Category
25046	bud rot		

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			

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		

Code	Common Name	Scientific Name	Category
------	-------------	-----------------	----------

Code	Common Name	Scientific Name	Category
90006	crook or sweep	<crook or sweep>	Unknown
90007	checks, bole cracks	<check, 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	hardwood\$		
002	softwood\$		
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

Code Common Name Genus Species

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 torreyia	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
------	-------------	-------	---------

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

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

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 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/vd_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

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	Curleaf 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 poplar
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 (<i>emarginata</i>)
6800	Oak (deciduous)
6801	California live oak
6803	Arizona white oak
6805	Canyon live oak
6807	Blue oak
6810	Emery oak

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	Monterey 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

9000