

Susceptibility Surface Model for *Ips typographus*

Data format: Raster Dataset - ESRI GRID

File or table name: Susceptibility

Coordinate system: Albers Conical Equal Area

Theme keywords: Forest Pathogen, Forest Pest, Exotic, Invasive Species, *Ips typographus*, European spruce bark beetle, Susceptibility

Abstract: The Susceptibility Potential Surface for *Ips typographus* was produced for the Conterminous United States (CUS) in 1 square kilometer (km²) units by the U.S. Forest Service, Forest Health Technology Enterprise Team's (FHTET) Invasive Species Steering Committee

FGDC and ESRI Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Metadata elements shown with blue text are defined in the Federal Geographic Data Committee's (FGDC) [Content Standard for Digital Geospatial Metadata \(CSDGM\)](#). Elements shown with green text are defined in the [ESRI Profile of the CSDGM](#). Elements shown with a green asterisk (*) will be automatically updated by ArcCatalog. ArcCatalog adds hints indicating which FGDC elements are mandatory; these are shown with gray text.

Identification Information:

Citation:

Citation information:

Originators: Forest Health Technology Team (FHTET) USDA Forest Service

Title:

Susceptibility Potential Surface Model for *Ips typographus*

***File or table name:** suscept15_rca (GRID)

File or table name: susceptibility6.mdx

Tool name: Ips_models

Model Name: Susceptibility2

Publication date: 6/20/2006

***Geospatial data presentation form:** raster digital data

Series information:

Series name: Version 1.0

Issue identification: 6/20/2006

Publication information:

Publication place: Fort Collins, Colorado

Publisher: Marla C. Downing

Online linkage:

http://www.fs.fed.us/foresthealth/technology/invasives_ipstypographus_risk_maps.shtml

Larger work citation:

Citation information:

Originators: Forest Health Technology Enterprise Team (FHTET) USDA Forest Service

Title:

Susceptibility Potential for *Ips typographus*

Publication date: 6/20/2006

Edition: 1.0

Geospatial data presentation form: map

Online linkage:

<http://www.fs.fed.us/foresthealth/technology/products.shtml>

Description:

Abstract:

The Susceptibility Potential Surface for *Ips typographus* was produced for the Conterminous United States (CUS) in 1 square kilometer (km²) units by the USDA Forest Service, Forest Health Technology Enterprise Team's (FHTET) Invasive Species Steering Committee; a multidisciplinary team with participation from USFS and APHIS. Supporting information for this product was taken from Exotic Forest Pest (ExFor) website (<http://spfnic.fs.fed.us/exfor/>).

Purpose:

The product's intended use is to develop a detection strategy for *Ips typographus*.

Supplemental information:

The Susceptibility Potential Surface was produced by combining the *Ips typographus* Introduction and Establishment Potential Surfaces in a final equal weighted overlay.

***Language of dataset:** en

Time period of content:

Time period information:

Single date/time:

Calendar date: 6/20/2006

Currentness reference:

publication date: 6/20/2006

Status:

Progress: Planned

Maintenance and update frequency: As needed

Spatial domain:

Bounding coordinates:

***West bounding coordinate:** -131.718010

***East bounding coordinate:** -50.048796

***North bounding coordinate:** 54.232833

***South bounding coordinate:** 17.231111

Local bounding coordinates:

***Left bounding coordinate:** -2554594.365555

***Right bounding coordinate:** 3399405.634445

***Top bounding coordinate:** 3455151.329310

***Bottom bounding coordinate:** -56848.670690

Keywords:

Theme:

Theme keywords: Forest Pathogen, Forest Pest, Invasive Species, Exotic, *Ips typographus*, European spruce bark beetle, Susceptibility

Place:

Place keywords: Conterminous United States

Place keyword thesaurus: Lower 48 States

Access constraints: None

Use constraints:

None

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http://www.fs.fed.us/foresthealth/technology/invasives_ipstypographus_risk_maps.shtml
Browse graphic file description:
webpage
Browse graphic file type: JPEG

Data set credit:
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Bill D. Smith, USFS SRS
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Security information:
Security classification: Unclassified

***Native dataset format:** Raster Dataset
***Native data set environment:**
Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI
ArcCatalog 9.1.0.722

Cross reference:

Citation information:

Originators: Forest Health Technology Enterprise Team (FHTET) USDA
Forest Service

Title:

Susceptibility Potential for *Ips typographus*

Publication date: 6/20/2006

Edition: 1.0

Geospatial data presentation form: map

Online linkage:

<http://www.fs.fed.us/foresthealth/technology/products.shtml>

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Data Quality Information:

Attribute accuracy:

Attribute accuracy report:

One kilometer

Lineage:

Process step:

Process description:

The Susceptibility Potential Surface for *Ips typographus* was produced for the conterminous United States in 1 square kilometer (km²) units by the U.S. Forest Service, Forest Health Technology Enterprise Team's (FHTET) Invasive Species Steering Committee. The product's intended use is to develop a detection strategy for *Ips typographus*. The Susceptibility Potential Surface was produced by combining the *Ips typographus* Introduction and Establishment Potential Surfaces in a final equal weighted overlay. Supporting information for this product was taken from Exotic Forest Pest (ExFor) website <http://spfnic.fs.fed.us/exfor/>. The datasets used in the Introduction and Establishment can be seen below.

Website URL:

http://www.fs.fed.us/foresthealth/technology/invasives_ipstypographus_riskmaps.shtml

Introduction:

The Introduction Potential Surface for *Ips typographus* was produced for the Conterminous United States (CUS) in 1 square kilometer (km²) units by the U.S. Forest Service, Forest Health Technology Enterprise Team's (FHTET) Invasive Species Steering Committee. The product's intended use is to develop a detection strategy for *Ips typographus*. Supporting information for this product was taken from Exotic Forest Pest (ExFor) website (<http://spfnic.fs.fed.us/exfor/>). Three primary datasets with standardized values from 0 to 10 were used as variables in the analysis. Each data set was multiplied by its arithmetic weight (Table 1), and the resultant values were combined in a weighted overlay (Eastman 1999). The final Introduction Surface output values also range from 0 to 10, with 10 having the highest potential of introduction.

Each of the variables was used to depict potential locations where *Ips typographus* could be released into the CUS. To delineate its potential flight range, a curvilinear distance decay value was assigned with a risk rating of 10 at the location and decreasing to 0 at 6 kilometers away (Table 2)(Franklin 2000).

Reference

Eastman, J.R. 1999. IDRISI 32: Guide to GIS and Image Processing Volume 2. Software Manual. Worcester, MA: Clark Labs, Clark University.

Franklin. A. J., C. Debruyne, and J.-C Grégoire. 2000. *Recapture of Ips typographus* L. (Col., Scolytidae) with attractants of low release rates: localized dispersion and environmental influences. Agriculture and Forest Entomology Volume 2, Page 256.

Principal Ports. Source: Army Corps of Engineer, Waterborne Commerce, Foreign Cargo Statistics (1996 to 2003). A summary of imported tonnage of commodities that use Solid Wood Packing Material (SWPM), the packing material associated with Coleoptera or Scolytidae species interceptions, recorded in the APHIS Pest Interception Network (PIN) 309 database. Only commodities exported from countries where *Ips typographus* is present were included, countries of origin were not ranked. This point data was converted to 1 km² grid cells.

United States Ports that received Commodities from Countries (listed below) were used:

The Ports shapefiles are the result of querying a data set summarizing 8 years (1996-2003) of foreign marine cargo import information. These data have been compiled from Army Corps of Engineers waterborne commerce statistics, and then sorted by commodity type, foreign country of shipment origin, and U.S. port where the shipment arrived.

"COMM_NAME" = 'All Manufactured Equipment, Machinery and Products' OR
"COMM_NAME" = 'Building Cement & Concrete; Lime; Glass' OR
"COMM_NAME" = 'Forest Products, Lumber, Logs, Woodchips' OR
"COMM_NAME" = 'Primary Iron and Steel Products (Ingots, Bars, Rods, etc.)' OR
"COMM_NAME" = 'Primary Non-Ferrous Metal Products; Fabricated Metal Prods.' OR
"COMM_NAME" = 'Sand, Gravel, Stone, Rock, Limestone, Soil, Dredged Material' OR
"COMM_NAME" = 'Paper & Allied Products' OR
"COMM_NAME" = 'Primary Wood Products; Veneer; Plywood'

AND

"CTRY_NAME" =
Austria
Belarus
Belgium
Bosnia & Herzegovina
Bulgaria
Croatia
Czech Republic
Slovak Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Italy
Latvia
Lithuania
Luxembourg
Netherlands
Norway
Poland
Romania
Russian Federation
Serbia and Montenegro
Slovakia
Slovenia
Sweden
Switzerland
Ukraine
China
Georgia Republic
Japan
Korea, DPR
Korea Republic
Tajikistan
Turkey

In addition these United States Ports were added:

FORT LAUDERDALE, FL

DOVER, DE
ATLANTA, GA
ERLANGER, KY
ST PAUL, MN
ST LOUIS, MO
CHARLOTTE, NC
RALEIGH, NC
ELIZABETH, NJ
BROOKLYN, NY
TULSA, OK
MEMPHIS, TN
DALLAS, TX

Markets. Source: Federal Highway Administration, Freight Management and Operations, Freight Analysis Framework, Highway Truck Volume (HTV) and Capacity Data and Environmental Systems Research Institute's (ESRI) City polygon Data. Flow/capacity data was used to determine the number of truck trips occurring within the city polygons, which were then used to define potential markets.

Using a polygon data set from Environmental Systems Research Institute (ESRI) that depicts Cities in the United States an intersection was conducted. These City polygons were included as standard spatial data with the shipment of ArcGIS ver 9.1 in the year 2005. Next, the ESRI City Polygons were intersected with HTV. City polygons were selected that had any truck trips. Next a distance decay function illustrated in table 2 was applied to these data.

Distribution Centers. Sources: National Transportation Atlas Database (2003). Only distribution centers that handle commodities that likely use SWPM during transport were considered. Table 3 illustrates commodities that use SWPM; therefore Distribution Centers that handle these commodities contained in Table 3 were used in this analysis. Table 4 illustrates commodities that probably do not represent a significant risk for *S. noctilio* (i.e. not wood or packed/shipped with wood crates, pallets, etc); hence, the Distribution Centers that handle only commodities contained in Table 4 were removed from the analysis. The remaining records were summarized so that the table contains a single record for each unique facility, along with a count of how many relevant commodity types that facility distributes. This table has 1516 records, but 20 of these records have no corresponding facility; hence, these records were removed (1496 total number of distribution centers that received commodities that uses SWPM). The remaining 1496 distribution center records coupled with 1510 distribution center that had no particular commodity specification were used (totally to 3006 distribution centers). Next, a point shapefile was created using the 3006 distribution centers from the latitude and longitude coordinates for each distribution center. Then each distribution center point was converted to a 1 by 1 kilometer GRID cell. Finally, a distance decay function illustrated in

table 2 was applied to each GRID cell. Appendix A contains original metadata.

Table 1

Introduction Variables	Arithmetic Weights
Principal Ports	33.33%
Markets	33.33%
Distribution Centers	33.33%

Table 2

Distance Decay for Probable Flight Range of *Ips typographus*

Distance (kilometers)	Risk Value	GRID Value
GT or EQ 0 and LT or EQ to 2	100	10
GT 1 and LT or EQ to 2	70	7
GT 2 and LT or EQ to 4	40	4
GT 4 and LT or EQ to 5	20	2
GT 5 and LT or EQ to 6	10	1
GT 6	0	0

Table 3 (Commodities Retained)

Alcoholic Beverages
 Animal Feed, Pet Food, And Products Of Animal
 Articles Of Stone, Ceramic, Or Glass
 Breakbulk cargo
 Cargo needing specialized equipment
 Computers, Components, Peripherals, And Software
 Converted Paper And Converted Paper Products
 Electrical Machinery And Equipment
 Engines, Parts, And Accessories For Motor Vehicles
 Food and kindred products
 Forest Products
 Furniture And Furnishings
 General cargo "anything other than bulk"
 Iron And Steel In Primary Forms And Basic Shapes
 Lumber and logs in the rough
 Machinery
 Manufactured
 Mechanical Machinery
 Metal products -- primary and finished
 Milled Grain Products And Preparations And Bakery
 Miscellaneous Manufactured Products
 Mixed "neo" bulk
 Mixed freight

Monumental Or Building Stone
Motor Vehicles
Motorized and other vehicles, including parts
Other Metal, And Articles Of Metal
Other Prepared Food Stuffs
Package goods
Pharmaceutical Products
Plastics And Rubber
Precision Instruments And Apparatus
Printed Products
Pulp, Newsprint, Paper, And Paperboard
Semi-manufactured
Specialized cargo -- outsized, heavy, large cargo
Textiles, Leather, And Articles
Tobacco And Manufactured Tobacco Substitutes
Transportation Equipment N.E.C.
Wood Products
Wood chips and products

Table 4 (Commodities Removed)

Basic chemicals
Cereal grains
Chemical preparations N.E.C.
Coal
Crude petroleum
Fertilizers
Fuel Oils including aviation turbine
Gasoline
Gravel and crushed stone
Live animals and fish
Liquids and Dry Bulk
Liquids Edible
Meat, fish, and preparations
Metallic ores
Natural sands except metal-bearing
Non-metallic mineral products N.E.C.
Other crops
Other and Unknown
Other Dry Bulk
Refined petroleum products N.E.C.
Waste and Scrap

Establishment:

The Establishment Potential Surface for *Ips typographus* was produced for the conterminous United States in 1 square kilometer (km²) units by the U.S. Forest Service (USFS), Forest Health Technology Enterprise Team's (FHTET) Invasive Species Steering

Committee; a multidisciplinary team with participation from USFS and the USDA Animal and Plant Health Inspection Service (APHIS). Supporting information for this product was taken from Exotic Forest Pest (ExFor) website (<http://spfnic.fs.fed.us/exfor/>).

The product's intended use in conjunction with the Introduction Potential Surface is to develop a Susceptibility Potential Surface for *Ips typographus*. Eight primary datasets with standardized values from 0 to 10 were used in the analysis. The output values also range from 0 to 10 with 10 having the highest establishment potential. Establishment potential is related to disturbance (Gilbert 2005). These data sets were broken down into two primary data themes: 1) Host, and 2) Disturbance. The Disturbance consists of: Tornadoes, Maximum High Winds, Hurricanes, Fire, Lighting, and Avalanche Potential. Host data consists of: Urban Forests and the Forest Service Inventory and Analysis (FIA) host species data. Data were combined into a weighted overlay.

Host

Host Species: Source: US Forest Service Inventory and Analysis (FIA) spruce, larch and fir species data (Appendix B).

Urban Forest: Source: Four primary data sets were used: A) Environment Systems Research Institutes (ESRI) polygon data set that depicts Cities in the United States, B) National Land Cover Data (NLCD) Evergreen Forest Type, C) NLCD Mixed Forest Type, and E) USDA Plant Hardiness Zones. All data were combined to create the Urban Forest.

Finally the Urban Forest was combined with the FIA Host Species data using a maximum overlay process. The Urban Forest was considered to contain highly susceptible host species in Plant Hardiness Zones 2a - 7a, inclusive (<http://www.usna.usda.gov/Hardzone/ushzmap.html>).

Three primary data sets were used in the construction of the Establishment potential. These primary data sets are: Disturbance, Host species, and Urban Forests.

- 1) **Host Species.** Source: USDA Forest Service, Forest Inventory and Analysis (FIA) data (Appendix B). *Picea* species were classified as Very High Potential (GRID Value of 10). All other host species were give a Low Potential (GRID Value of 1). However, if any GRID cell was mixed with any *Picea* species (listed in Appendix B) then the Potential was Medium and the GRID value was 5.
- 2) **Urban Forest.** Source: Three primary data sets were used in the construction of the Urban forest: A) A polygon data set from Environmental Systems Research Institute (ESRI) that depicts Cities in the United States. These City polygons were included as standard spatial data with the

shipment of ArcGIS ver 9.1 in the year 2005 and B) National Land Cover Data (NLCD) from the USDA Natural Resources Conservation Service (NRCS), and C) USDA Plant Hardiness Zones. First the City polygons were converted to 1000 meter cells (CITY GRID). Next a subset forest type of the NLCD data (at 30 meter resolution) was extracted. This NLCD forest type was labeled Evergreen Forest (GRID Value 42). The NLCD Evergreen Forest type was resampled to 1000 meter cell resolution; however, the percent of cells of 30 meter NLCD Evergreen Forest that made up the entire 1000 meter cell was maintained as an attribute (NLCD Evergreen Forest GRID). The Plant Hardiness zone (zones 2a - 7a, inclusive) were extracted and converted to 1000 meter cells. Finally, the City GRID was overlain with the NLCD Evergreen Forest GRID (where the NLCD Evergreen Forest GRID and Mixed has 30 percent or more Evergreen forest and or Mixed). These data were combined with the Host Species data using a maximum overlay process. The Urban Forest was considered to be associated with highly susceptible host species (Piel 2005).

- 3) **Disturbance.** Consisted of: Tornadoes, Maximum High Winds, Hurricanes, Fire, Lighting, and Avalanche Potential (see below).

References:

Piel. F., M. Gilbert, A. Franklin, and J.-C Grégoire. 2005. *Occurrence of Ips typographus* (Col., Scolytidae) along an urbanization gradient in Brussels, Belgium. *Agricultural and Forest Entomology*. Volume 7, Page 161.

Disturbance

Tornadoes: Source: National Climate Atlas. Tornado line density from the year 1950 - 2004. These tornadoes events were calculated into tornado events per square kilometer; then, reclassified into 10 classes using Jenk's natural breaks.

The density function applied to these data is kernel in nature. A smooth curve is given over the entire search radius illustrating where the concentration of lines are located in the search radius. The kernel function is based on the quadratic kernel function described in Silverman 1986.

Therefore, the following parameters for calculating the density are applied: Using ESRI ArcView 9.1 Spatial Analysis extension, we applied the Density function with the following parameters:

Population Field:	Value
Density Type:	Kernel
Search Radius:	50,000 Meters
Area Units:	Square Kilometers
Cell Size:	1000 meters
Extent:	The Entire Lower 48 of the United

States

The Fujita Scale (F-SCALE) corresponds to the following wind and damage descriptions:

Fujita Scale 0 (F0): Winds of 40-72 mph, MINIMAL DAMAGE (Some damage to chimneys, TV antennas, roof shingles, trees, and windows).

Fujita Scale 1 (F1): Winds of 73-112 mph, MODERATE DAMAGE (Automobiles overturned, carports destroyed, trees uprooted).

Fujita Scale 2 (F2): Winds of 113-157 mph, MAJOR DAMAGE (Roofs blown off homes, sheds and outbuildings demolished, mobile homes overturned).

Fujita Scale 3 (F3): Winds of 158-206 mph, SEVERE DAMAGE (Exterior walls and roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests and farmland flattened).

Fujita Scale 4 (F4): Winds of 207-260 mph, DEVASTATING DAMAGE (Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances).

Fujita Scale 5 (F5): Winds of 261-318 mph, INCREDIBLE DAMAGE (Homes leveled with all debris removed. Schools, motels, and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished).

Fscale	Value
F0	1
F1	2
F2	3
F3	4
F4	5
F5	6

The Density Function with the above parameters works as follows:

Each GRID cells Values are calculated by using the number of times a Tornado passes through a particular GRID cell, times the Value of the Tornado (from the Population Field) and times the distance the Tornado covers in a particular cell. See example below:

Data Resolution: Is unknown since the data were collected from 1950 to 2004. Therefore we used 1 kilometer.

Data Source: The tornado track data set was provided by the U.S. Air Force Combat Climatology Center, Air Weather Service. Data originated from the Storm Prediction Center, NOAA. The information is based on tornado reports published in NCDC's *Storm Data*. Data is from the Climate Atlas Compact Disk and the shapefile is called torn47.

Hurricanes: Source: National Climate Atlas. Hurricane line density from the year 1851 - 2003. These hurricane events were

calculated into hurricane events per square kilometer; then, reclassified into 10 classes using natural breaks.

The Hurricane Line data sets were clipped to the Main land of the USA (Lower 48 States). Therefore all Hurricane data used in this analysis existed on land. This resulted in 1,990 hurricanes used in the analysis.

Hurricane data were edited. That is only Tropical Storms (TS), Category 1 (H1), Category 2 (H2), Category 3 (H3), Category 4 (H4), and Category 5 (H5) Hurricanes were used. All other data were deleted and not used in this analysis. This uses the same technique as was applied to the tornado data (see above).

A tropical storm (TS) is a tropical cyclone with maximum sustained surface (10 meter) winds of 34 knots/39 mph to 64 knots/73 mph, inclusive.

A Category 1 (H1) hurricane is a tropical cyclone with maximum sustained surface (10 meter) winds of 64 knots/74 mph to 82 knots/95 mph, inclusive.

A Category 2 (H2) hurricane is a tropical cyclone with maximum sustained surface (10 meter) winds of 83 knots/96 mph to 95 knots/110 mph, inclusive.

Category 3 (H3) hurricane is a tropical cyclone with maximum sustained surface (10 meter) winds of 96 knots/111 mph to 113 knots/130 mph, inclusive.

Category 4 (H4) hurricane is a tropical cyclone with maximum sustained surface (10 meter) winds of 114 knots/131 mph to 135 knots/155 mph, inclusive.

A Category 5 (H5) hurricane is a tropical cyclone with maximum sustained surface (10 meter) winds greater than 135 knots/155 mph.

Population Field:	Value
Density Type:	Kernel
Search Radius:	50,000 Meters
Area Units:	Square Kilometers
Cell Size:	1000 meters
Extent:	The Entire Lower 48 of the United States

Hurricane Data were classified and attributed as follows:

Category	Value
TS	1
H1	2
H2	3
H3	4
H4	5

H5

6

Data Source: The National Oceanic and Atmospheric Administration (NOAA), Tropical Prediction Center/National Hurricane Center. (<http://nationalatlas.gov/atlasftp.html>)

Fire: Source: Desert Research Institute (DRI) Program for Climate, Ecosystem and Fire Applications. Fire point events density on federal lands from 1970 - 2004. These fire events were calculated into fire events per square kilometer, then reclassified into 10 classes using Jenk's natural breaks.

Fire point events density on federal lands from 1970 - 2004. These fire events were calculated into fire events per square kilometer. These data were then reclassified into 10 classes using Jenk's natural breaks. The density function applied to these data is kernel in nature. Therefore the following parameters for calculating the density are applied: Using ESRI ArcView 9.1 Spatial Analysis we applied the Density function with the following parameters:

Population Field:	Value
Density Type:	Kernel
Search Radius:	50,000 Meters
Area Units:	Square Kilometers
Cell Size:	1000 meters
Extent:	The Entire Lower 48 of the United States

In essence all the fire points are counted up in the 50,000 meter search radius and then divided by the number of GRID cells in that search radius. A smooth curve is given over the entire search radius illustrating where the concentration of points are located in the search radius. The kernel function is based on the quadratic kernel function described in Silverman 1986.

Data Resolution: The metadata indicated that these data were collected using Township Range and Section (TRS) commonly referred to as the Public Land Survey (PLS). Therefore, it is likely that these data have a positional accuracy no better than 160 acres (1/4 of a section).

Data Source: Desert Research Institute (DRI), Program for Climate, Ecosystem and Fire Applications. *Coarse Assessment of Federal Wildland Fire Occurrences Data*. Report for the National Wildfire Coordinating Group. Authors: Timothy J. Brown, Beth L. Hall, Charlene R. Mohrle, and Hass J. Reinbold, December 2002. CEFA Report 02-04.

Maximum Winds: Source: National Climate Atlas The extreme 5% Wind Speed for a 30 year time period (1972 - 1992).

Mean Extreme 5% Wind Speed. The annual value was computed by taking the 30-year mean of the extreme 5% wind speed for each

calendar year. Annual mean extreme wind speeds for the identified percentile were computed by determining the percentile from all hourly averaged wind speed observations for the month year. These data were reclassified as follows: 1 = < 15 MPH, 2 = 15 to 16 MPH, 4 = 17 to 18 MPH, 5 = 19 to 20 MPH, 7 = 21 to 22 MPH, 8 = 23 to 24 MPH, 9 = 25 to 26 MPH, 10 = > 26 MPH.

Data Source: This element was computed using data from the National Climatic Data Center's Surface Airways Hourly (TD-3280) database (NOAA, 2000a). The original data is given in knots. This element is given in miles per hour. Data is from the Climate Atlas Compact Disk and the shapefile is called WIND64B.

Lightning: Source: NASA Lightning Imaging Sensor / Optical Transient Detector (LIS/OTD) Science Team The product is a 0.5° x 0.5° gridded composite of total (IC+CG) lightning bulk production, expressed as a flash rate density (fl/km²/yr). Climatologies from the 5-yr OTD (4/95-3/00) and 5-yr LIS (12/97-12/02) missions are included, as well as a combined OTD+LIS climatology and supporting base data (flash counts and viewing times).

Data were then resampled to 1000 meter by 1000 meter grid cells; then, reclassified into 10 classes using Jenk's Natural Breaks. Unclassified data range from a minimum value of 0 to a maximum value of 58.53.

Avalanche: Source: FHTET. Avalanche potential areas were calculated by the following parameters: 1) Areas greater than 5,000 feet above mean sea level, 2) Areas that are greater than 30° and less than 60° in slope, and 3) Areas that have 60 inches or more annual average snow accumulation. Data was created by FHTET via parameters (listed above) illustrated by Maggioni 2001.

Data Source:

Snow

The snow elements were obtained from the snow climatology (NOAA, 1997). The criteria for handling missing data for computing the mean monthly and annual normal snowfall differed for the coop stations and the first order (WBAN) stations. For the coop stations, the total snowfall had no tolerance for missing data. If even one day was missing in a month, the total snowfall was not to be computed for that year's month. Consequently, the number of years with non-missing data varied with month. For first order stations, the criteria were not as stringent as for coop stations. The WMO guidelines for computing normals were used. They defined a missing month as having (1) five or more consecutive daily values missing, or (2) a total of eleven or more missing daily values in the month. Data is from

the Climate Atlas Compact Disk and the shapefile is called SNOW29.

Elevation

Derived from USGS National Elevation Data (NED) Digital Elevation Models (DEMs) and resampled to 1000 meter by 1000 meter grid cells.

Slope

Derived from the USGS DEMs using ESRI ArcGIS ver 9.1 Spatial Analysis Slope generation algorithms.

Data from Tornadoes, Hurricanes and Fire were partitioned via the last three years of data then combined via a maximum overlay process and labeled as Current data. The remaining years of data from Tornadoes, Hurricanes, and Fire coupled with Maximum Winds, Lighting, and Avalanche were combined via a maximum overlay process and labeled as Historic data. The Current and Historic data were combined using an equal weighted overlay process to produce the Disturbance data.

Finally Host data and Disturbance data were combined in a weighted overlay (table 5) to produce the Establishment Potential.

Table 5
Establishment Variables and Arithmetic Weights.

Variable	Weight
Disturbance	40%
Host	60%

The Susceptibility Potential is the result of an equal weighted overlay of Establishment Potential and Introduction Potential.

References:

Gilbert, M., L.-M Nageleisen, A. Franklin, and J.-C Grégoire. 2005. *Post-storm surveys reveal large-scale spatial patterns and influences of site factors, forest structure and diversity in endemic bark-beetle populations.* Landscape Ecology Volume 20, Number 1, Page 35 - 49.

Maggioni. M., U. Gruber, and A. Stoffel, "Definition and characterization of potential avalanche release areas" Proceedings of the 2001 ESRI International User Conference July 9-13, 2001, San Diego. <http://gis.esri.com/library/userconf/proc02/pap1161/p1161.htm>

Silverman, B.W. *Density Estimation for Statistics and Data Analysis*.
New York: Chapman and Hall, 1986.

Process software and version: ArcGIS ver 9.1

Process date: 6/20/2006

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Contact electronic mail address: mdowning@fs.fed.us

Hours of service: 9:00 AM - 5:00 PM MT

Process step:

Process description:

Metadata imported.

Source used citation abbreviation:

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Spatial Data Organization Information:

***Direct spatial reference method:** Raster

Raster object information:

***Image format:** ESRI GRID
***Number of bands:** 1

***Row count:** 3512
***Column count:** 5954
***Vertical count:** 1

Cell size X direction: 1000
Cell size Y direction: 1000

***Bits per pixel:** 8
***Pyramid layers:** FALSE
***Image colormap:** FALSE
***Compression type:** Default

***Raster object type:** Grid Cell
***Raster display type:** matrix values
***Raster origin:** Upper Left

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Spatial Reference Information:

Horizontal coordinate system definition:

Coordinate system name:

***Projected coordinate system name:** NAD_1983_Albers
***Geographic coordinate system name:** GCS_North_American_1983

Planar:

Map projection:

***Map projection name:** Albers Conical Equal Area

Albers conical equal area:

***Standard parallel:** 29.500000
***Standard parallel:** 45.500000
***Longitude of central meridian:** -96.000000
***Latitude of projection origin:** 23.000000
***False easting:** 0.000000
***False northing:** 0.000000

Planar coordinate information:

***Planar coordinate encoding method:** row and column

Coordinate representation:

Abcissa resolution: 1000
Ordinate resolution: 1000
***Planar distance units:** meters

Geodetic model:

- ***Horizontal datum name:** North American Datum of 1983
- ***Ellipsoid name:** Geodetic Reference System 80
- ***Semi-major axis:** 6378137.000000
- ***Denominator of flattening ratio:** 298.257222

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Entity and Attribute Information:

Detailed description:

- ***Name:** Susceptibility

Entity type:

- ***Entity type label:** Susceptibility
- ***Entity type type:** Table
- ***Entity type count:** 4

Entity type definition:

Susceptibility Potential Surface for *Ips typographus*

Attribute:

- ***Attribute label:** ObjectID
- ***Attribute alias:** ObjectID
- ***Attribute definition:**
Internal feature number.
- ***Attribute definition source:**
ESRI

- ***Attribute type:** OID
- ***Attribute width:** 4
- ***Attribute precision:** 0
- ***Attribute scale:** 0

Attribute domain values:

- ***Unrepresentable domain:**
Sequential unique whole numbers that are automatically generated.

Attribute measurement frequency:

Unknown

Attribute:

- ***Attribute label:** Value
- ***Attribute alias:** Value
- ***Attribute definition:**
Integer Value from 1 - 4 where:
1 = Low Potential Susceptibility
2 = Medium Potential Susceptibility
3 = High Potential Susceptibility

4 = Very High Potential Susceptibility
No Data = Little or No Potential for Susceptibility

***Attribute type:** Integer
***Attribute width:** 0
***Attribute precision:** 0
***Attribute scale:** 0

Attribute value accuracy information:
Attribute value accuracy: As Reported

Attribute measurement frequency:
As needed

Attribute:
***Attribute label:** Count
***Attribute alias:** Count
Attribute definition:
The frequency of 1000 by 1000 meter GRID cells
Attribute definition source:
ESRI

***Attribute type:** Double
***Attribute width:** 0
***Attribute precision:** 0
***Attribute scale:** 0

Attribute measurement frequency:
As needed

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Distribution Information:

Resource description: Downloadable Data

Standard order process:
Digital form:
Digital transfer information:
***Transfer size:** 12.78 MB
***Dataset size:** 12.78 MB

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Metadata Reference Information:

***Metadata date:** 20060620
Metadata review date: 20060620

***Language of metadata:** en

Metadata contact:

Contact information:

Contact organization primary:

Contact person: Marla C. Downing

Contact organization: Forest Health Technology Enterprise Team (FHTET)
USDA Forest Service

Contact position: FHTET, Lead and Biological Scientist

Contact address:

Address type: mailing and physical address

Address:

2150 Centre Avenue, Bldg A, Suite 331

City: Fort Collins

State or province: Colorado

Postal code: 80526-1891

Country: USA

Contact voice telephone: 970-295-5843

Contact electronic mail address: mdowning@fs.fed.us

Hours of service: 9:00 AM - 5:00 PM MT

***Metadata standard name:** FGDC Content Standards for Digital Geospatial
Metadata

***Metadata standard version:** FGDC-STD-001-1998

***Metadata time convention:** local time

Metadata security information:

Metadata security classification: Unclassified

Metadata extensions:

***Online linkage:** <http://www.esri.com/metadata/esriprof80.html>

***Profile name:** ESRI Metadata Profile

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Appendix A

Used for the construction of the Distribution Centers data set.

Intermodal Terminal Facilities

Metadata also available as

Metadata:

- [Identification Information](#)
- [Data Quality Information](#)
- [Spatial Data Organization Information](#)
- [Spatial Reference Information](#)
- [Entity and Attribute Information](#)
- [Distribution Information](#)
- [Metadata Reference Information](#)

Identification_Information:

Citation:

Citation_Information:

Originator: USDOT/BTS

Publication_Date: 2003

Title: Intermodal Terminal Facilities

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Washington DC

Publisher: Bureau of Transportation Statistics (BTS)

Online_Linkage: <<http://www.bts.gov/ntda>>

Larger_Work_Citation:

Citation_Information:

Originator: Bureau of Transportation Statistics (BTS)

Publication_Date: 2003

Title: Intermodal Terminal Facilities

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Washington DC

Publisher: Bureau of Transportation Statistics (BTS)

Online_Linkage: <<http://www.bts.gov/gis/>>

Description:

Abstract:

This is a public dataset for the Department of Transportation, Bureau of Transportation Statistics. The public database consists of four tables. One of the tables is a spatial table: INTERMODAL_FACILITY. The three other tables consist of attribute data for the database: INTERMODAL_CARGO, INTERMODAL_COMMODITY and INTERMODAL_DIRECTIONALITY. This database was based on the requirements from the Commodity Flow Survey and with the different modes of DOT, supervised by BTS. The database will

extend its design to support all of the modes within the DOT and in reference to modes involved with Intermodal transfer.

Purpose:

This is a public dataset for the Department of Transportation, Bureau of Transportation Statistics for internal use in GIS efforts. The data can be utilized alone or in conjunction with various networks developed for the data.

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2002

Currentness_Reference: August 2002

Status:

Progress: In work

Maintenance_and_Update_Frequency: As needed

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -165.436110

East_Bounding_Coordinate: -66.002000

North_Bounding_Coordinate: 64.807090

South_Bounding_Coordinate: 18.439000

Keywords:

Theme:

Theme_Keyword_Thesaurus: Transport Amenities

Theme_Keyword: Intermodal Facility

Theme:

Theme_Keyword_Thesaurus: Transport

Theme_Keyword: Intermodal

Theme:

Theme_Keyword_Thesaurus: Transference

Theme_Keyword: Transportation

Theme:

Theme_Keyword_Thesaurus: Geographical Reference

Theme_Keyword: Point

Theme:

Theme_Keyword_Thesaurus: Transference Presence

Theme_Keyword: Transfer Locations

Place:

Place_Keyword: USA

Place_Keyword: United States

Place_Keyword: United States of America

Temporal:

Temporal_Keyword: 2003

Access_Constraints: The access of this data is not restricted.

Use_Constraints:

None. Acknowledgment of the Bureau of Transportation Statistics (BTS) National Transportation Atlas Databases (NTAD) 2003 would be appreciated in products derived from these data.

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: USDOT/BTS

Contact_Person: Mark Bradford

Contact_Position: Project Manager

Contact_Address:

Address_Type: mailing and physical address

Address: 400 7th Street, SW - Room 3140

City: Washington

State_or_Province: DC

Postal_Code: 20590

Country: USA

Contact_Voice_Telephone: (202) 366-6810

Native_Data_Set_Environment:

Microsoft Windows NT Version 4.0 (Build 1381) Service Pack 6; ESRI

ArcCatalog 8.3.0.800

Cross_Reference:

Citation_Information:

Originator: Bureau of Transportation Statistics (BTS)

Publication_Date: 2003

Title: Intermodal Terminal Facilities

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Washington DC

Publisher: Bureau of Transportation Statistics (BTS)

Online_Linkage: <<http://www.bts.gov/gis/>>

Larger_Work_Citation:

Citation_Information:

Originator: Bureau of Transportation Statistics (BTS)

Publication_Date: 2003

Geospatial_Data_Presentation_Form: vector digital data

Publication_Information:

Publication_Place: Washington DC

Publisher: Bureau of Transportation Statistics (BTS)

Online_Linkage: <<http://www.bts.gov/gis/>>

Data_Quality_Information:

Logical_Consistency_Report:

A single coordinate pair for GIS reference represents all points. A unique id number relates the records to other tables. A parent id is required, which may be used to aggregate to its facility, which is the granularity of the publicly released data.

Completeness_Report:

All records require geocoding, mode type, facility type, unique name combination, and unique id to be included in the final dataset.

Positional_Accuracy:

Horizontal_Positional_Accuracy:

Horizontal_Positional_Accuracy_Report:

Geocode source holds the source of the spatial coordinates, particular sources have varying spatial accuracy and is noted below.

Quantitative_Horizontal_Positional_Accuracy_Assessment:

Horizontal_Positional_Accuracy_Value: GDT98Streets

Horizontal_Positional_Accuracy_Explanation:

- The original digital source of line segment, such as a Census Bureau 1980 GBF/DIME File or a USGS 1:100,000 scale DLG-3. - Scale 1: 24,000

- For line segments that originated with the USGS DLG-3 files, the FCC is based on the USGS classification code in the DLG-3 file. For line segments that originated with the 1980 GBF / DIME Files, the FCC is based on the NS code and other feature identification content of the GBF/DIME -File.

- Latitude/longitude Data: except for DIME format (ASCII) boundary files, all latitude and longitude coordinates are signed and have six decimal places. Northern latitude is positive (0 degrees to 90 degrees), southern latitude is negative (0 degrees to -90 degrees). West longitude are negative (0 degrees to -180 degrees), and longitude are positive (0 degrees to 180 degrees)

- DIME format boundary file coordinates are expressed as all positive values with six implied decimal places. Any longitude west of 180 degrees is expressed in increasing, rather than decreasing values.

-Projection using latitude/longitude coordinate values with an implied 6 decimal places

-All coordinates are based on the 1983 North American Datum (NAD83).

- As new streets are reported, they are added daily by digital map technicians (DMTs) working in teams assigned to specific geographic areas covering the entire nation. As DMTs work through their particular regions, they concentrate on areas that contain the largest numbers of missing addresses, usually newly developed areas. They apply address ranges to unaddressed street segments, digitized new streets, correct inaccurate segment shapes, and add exits and turn or one-way restrictions. Each addition is verified with current maps and other data.

- ARC/INFO format products are available in double precision. Precision refers to the number of bits (single - 32bits, double - 64 bits) used to store coordinate data. Coverages in double precision are slightly more accurate, but larger than those in single precision.

For more detailed information please see Geographic Data Technology Inc.
1(800) 331.7881 or email to info@gdt1.com

Quantitative_Horizontal_Positional_Accuracy_Assessment:

Horizontal_Positional_Accuracy_Value: Army Corp of Engineers

Quantitative_Horizontal_Positional_Accuracy_Assessment:

Horizontal_Positional_Accuracy_Value: NTAD_Airports

Horizontal_Positional_Accuracy_Explanation:

Airport attributes were obtained from the Federal Aviation Administration's (FAA) National Airspace System Resource Aeronautical Data and the Office of Airline Information (OAI) Enplanement Data. The FAA Data was published by the Aeronautical Information Services (ATA-100) with an Effective Date of 21 February 2002. Horizontal positional accuracy is based on coordinate data provided in the FAA National Airspace System Resource Aeronautical Dataset (Effective 21 February 2002). These coordinate data identify the approximate location of the Airport Reference Point (ARP) as reported by the landing facility on the NFDC (National Flight Data Center) 5010 form. According to NFDC guidelines, the location of the ARP should be reported to a horizontal accuracy of one arc second of latitude and longitude. However, the accuracy of these reported coordinates are not verified by FAA. The records were loaded into a GIS and checked for any unusual or obviously erroneous locations.

Lineage:

Source_Information:

Source_Citation:

Citation_Information:

Originator: Primedia Information Inc. 2002

Publication_Date: 2002

Publication_Time: Bi-Monthly

Title: The Official Railway Guide. Freight Service Edition

Online_Linkage: www.primedia.com

Type_of_Source_Media: paper

Source_Contribution:

Facility information containing cargo, commodity, and directionality. This publication is biannual.

Source_Information:

Source_Citation:

Citation_Information:

Originator: American Authority Port Association

Publication_Date: Unknown

Publication_Time: Unknown

Title: American Authority Port Association

Online_Linkage: www.aapa-ports.org

Type_of_Source_Media: online

Source_Citation_Abbreviation: AAPA

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Publication_Date: Unknown

Title: Aberdeen and Rockfish

Online_Linkage: www.aberdeen-rockfish.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Publication_Date: Unknown

Title: AIR CANADA CARGO

Online_Linkage: www.aircanada.ca/cargo/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: AIR CARGO WORLD ONLINE/2001 AIR EXPRESS DIRECTORY

Online_Linkage: www.aircargoworld.com/

Type_of_Source_Media: paper

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Publication_Date: Unknown

Title: AIR CARGO WORLD ONLINE/2002 AIRPORT DIRECTORY

Online_Linkage: www.aircargoworld.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: AIR CARGO WORLD ONLINE/2002 FORWARDER DIRECTORY

Online_Linkage: www.aircargoworld.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: AIR JAMAICA

Online_Linkage: www.airjamaica.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: AMERICAN TRANS AIR

Online_Linkage: www.ata.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: ANACOSTIA AND PACIFIC COMPANY, INC.

Online_Linkage: www.anacostia.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: ARKANSAS - MISSOURI RAIL ROAD

Online_Linkage: www.arkansasmissouri-rr.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: Burlington Northern Santa Fe

Online_Linkage: www.bnsf.com/

Type_of_Source_Media: online

Source_Citation_Abbreviation: BNSF

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: CANADIAN NATIONAL

Online_Linkage: www.cn.ca/index.shtml

Type_of_Source_Media: online

Source_Citation_Abbreviation: CN

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: INTERMODAL CARTAGE COMPANY

Online_Linkage: www.imcg.com/

Type_of_Source_Media: online

Source_Citation_Abbreviation: IMCG

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Publication_Date: Unknown

Title: MARYLAND PORT AUTHORITY

Online_Linkage: www.mpa.state.md.us/

Type_of_Source_Media: online

Source_Citation_Abbreviation: MPA

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: Norfolk Southern

Online_Linkage: www.nscorp.com/nscorp/html/home.html

Type_of_Source_Media: online

Source_Citation_Abbreviation: NS

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: OMNITRAX

Online_Linkage: www.omnitrax.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: PACIFIC COAST CONTAINER

Online_Linkage: www.pacificcoastcontainer.net/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: PORT OF LOS ANGELES

Online_Linkage: www.portoflosangeles.org/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: U.S. Army Corp of Engineers

Publication_Time: 2001

Title: NDC Publications and U.S. Waterway Data (Port Report)

Edition: 7

Online_Linkage: www.hecsa.usace.army.mil/

Type_of_Source_Media: CD-ROM

Source_Citation_Abbreviation: USACE

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: THE RAIL-BRIDGE CORPORATION

Online_Linkage: www.railbridge.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Title: VIRGINIA PORT AUTHORITY

Online_Linkage: www.vaport.com/

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: MODALGISTICS

Publication_Date: Unknown

Publication_Time: Unknown

Title: MODALGISTICS

Online_Linkage: [<http://www.modalgistics.com/>](http://www.modalgistics.com/)

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: FEDERAL MOTOR CARRIER SAFTEY ADMINISTRATION

Publication_Date: Unknown

Publication_Time: Unknown

Title: FEDERAL MOTOR CARRIER SAFTEY ADMINISTRATION

Online_Linkage: <<http://www.dot.gov/>>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: PACIFIC HARBOR LINE, INC.

Publication_Date: Unknown

Publication_Time: Unknown

Title: PACIFIC HARBOR LINE, INC.

Online_Linkage: <<http://www.anacostia.com/phl/faciliti.html>>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: PORT OF INDIANA

Publication_Date: Unknown

Publication_Time: Unknown

Title: PORT OF INDIANA

Online_Linkage: <<http://www.portsofindiana.com/?pageRef=87>>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: PORT OF LONG BEACH

Publication_Date: Unknown

Publication_Time: Unknown

Title: PORT OF LONG BEACH

Online_Linkage: <<http://www.polb.com>>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: PORT OF OAKLAND

Publication_Date: Unknown

Publication_Time: Unknown

Title: PORT OF OAKLAND

Online_Linkage: <<http://www.portfoakland.com/>>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: PORT OF TAMPA

Publication_Date: Unknown

Publication_Time: Unknown

Title: PORT OF TAMPA

Online_Linkage:

<http://www.tampaport.com/display.asp?PAGE_NAME=Home+Page>

Type_of_Source_Media: online

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: United States Postal Service

Publication_Date: Unknown

Publication_Time: Unknown

Title: United States Postal Service

Online_Linkage:

Type_of_Source_Media: Direct Inquiry

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Source_Information:

Source_Citation:

Citation_Information:

Originator: Emery

Publication_Date: Unknown

Publication_Time: Unknown

Title: Emery

Online_Linkage:

Type_of_Source_Media: Direct Inquiry

Source_Contribution:

Facility information containing cargo, commodity, and directionality.

Process_Step:

Process_Description:

The use of this data for network or attribute related queries should note that supplementary data is stored in a separate dbf files. These tables hold pertinent information in a relational database format, ID fields being linked as the primary keys and foreign keys. PU_FAC table's primary key is ID and is the foreign key in PU_CAR, PU_COM, and PU_DIR, identified by FAC_ID. The shape files match the corresponding dbf files, no conversion is needed to utilize either format for analysis. Data is based on various public and private published sources, i.e. IANA Railway Guide, WWW, Army Corps of Engineers - Port Report. These sources are frequently updated and revised, any particular inquires should be directed to the data source of the record or records.

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Entity point

Point_and_Vector_Object_Count: 3279

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Latitude_Resolution: 0.000001

Longitude_Resolution: 0.000001

Geographic_Coordinate_Units: Decimal degrees

Geodetic_Model:

Horizontal_Datum_Name: D_WGS_1984

Ellipsoid_Name: WGS_1984

Semi-major_Axis: 6378137.000000

Denominator_of_Flattening_Ratio: 298.257224

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: Facility

Entity_Type_Definition:

An Intermodal facility is defined as generalized descriptors for collated customers and services. The PU_FAC table contains facilities that support two or more modes of transportation. These facilities can contain an address, but must contain a latitude and longitude.

Entity_Type_Definition_Source: USDOT/BTS

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain:

Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features.

Attribute:

Attribute_Label: ID

Attribute_Definition: Primary Key

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: NAME

Attribute_Definition: Unique name for the facility location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: TYPE

Attribute_Definition:

Name of the function of the primary function of the facility. Truck - Rail - Port - Air

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: MODE_TYPE

Attribute_Definition: Defines all the modes that are affiliated with this facility.

Attribute_Definition_Source: BTS

Attribute_Domain_Values:

Attribute:

Attribute_Label: CITY

Attribute_Definition: The city for the facilities location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: STATE

Attribute_Definition: The state abbreviation for the facilities location

Attribute_Definition_Source: BTS

Attribute_Domain_Values:

Attribute:

Attribute_Label: FIPS

Attribute_Definition: Federal Information Processing Standards for the states

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: ZIP

Attribute_Definition: The zip code for the facilities location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: ZIP2

Attribute_Definition: Zip Code Plus 4

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: PARCEL

Attribute_Definition: Indicates if a mail carrier is affiliated with this location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: LATITUDE

Attribute_Definition: Latitude for the location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: LONGITUDE

Attribute_Definition: Longitude for the location

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: GEOSOURCE

Attribute_Definition:

Source information of the latitude/longitude: either pre-determined or geocoded with Dynamap 2000

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: CREATEDATE

Attribute_Definition: The date the information was placed into the database

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: CREATOR

Attribute_Definition: The group of individuals responsible for populating that record

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: MODDATE

Attribute_Definition: Date of modifications to that facility's entry in the database

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: ASSOC

Attribute_Definition: List of other major business associated with this facility

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: BTSVERSION

Attribute_Definition: BTS tracking number

Attribute_Definition_Source: BTS

Attribute:

Attribute_Label: VERSION

Attribute_Definition:

The VERSION is a 2-digit number that will be incremented for all records in the database whenever a new release is distributed.

Attribute_Definition_Source: BTS

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum: 00

Range_Domain_Maximum: 99

Attribute:

Attribute_Label: REVISION

Attribute_Definition:

REVISION is a 2-digit number that will be incremented individually for each record whenever a change is made to one of its fields.

Attribute_Definition_Source: BTS

Attribute_Domain_Values:

Range_Domain:

Range_Domain_Minimum: 00

Range_Domain_Maximum: 99

Overview_Description:

Entity_and_Attribute_Overview:

Facilities a.Large scale operation that services various public and private customers in the transfer of various cargoes. b.Only successful geocoding is included in a dataset and reported in the attributes latitude, longitude, and geosource.

Entity_and_Attribute_Detail_Citation:

Directionality is directly related to the facility table, includes cargo or commodity records that have mode 1 to mode 2 restrictions or limitations requiring it to flow in only one direction.

Entity_and_Attribute_Detail_Citation:

Cargo is directly related to the facility table, used aggregated classifications of cargo types and commodity specific cargo types.

Entity_and_Attribute_Detail_Citation:

Commodity is directly related to the facility table, includes classifications based on the Commodity Flow Survey (USDOT/BTS) categorizations.

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Bureau of Transportation Statistics (BTS)

Contact_Address:

Address_Type: mailing and physical address

Address: Bureau of Transportation Statistics (BTS)

Address: 400 Seventh Street, S.W.

City: Washington

State_or_Province: District of Columbia

Postal_Code: 20590

Country: USA

Contact_Voice_Telephone: 202-366-DATA

Contact_Facsimile_Telephone: 202-366-3640

Contact_Electronic_Mail_Address: answers@bts.gov

Resource_Description: National Transportation Atlas Databases (NTAD) 2003

Distribution_Liability: None

Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Format_Name: ESRI Shapefile

Format_Version_Date: 2003

Transfer_Size: 5.438

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: <<http://www.bts.gov/gis/>>

Access_Instructions:

Anyone with access to the World Wide Web may connect to the BTS server. To access a specific database, go to the address listed above in the Network Resource Name. The visitor can create a package of the dataset for download in a .zip format (i.e. MS-DOS zip archive). This archived package is stored in a temporary file that can then be copied to the visitor's home directory.

Offline_Option:

Offline_Media: CD-ROM

Fees: None

Ordering_Instructions:

Call 202-366-DATA, fax 202-366-3640, or E-mail (answers@bts.gov) BTS to request the National Transportation Atlas Databases (NTAD) 2003 CD-ROM. This and other BTS products may be ordered from the BTS Internet website (<<http://www.bts.gov/gis/>>).

Technical_Prerequisites: Basic database skills to relate dependent tables.

Available_Time_Period:

Time_Period_Information:

Single_Date/Time:

Calendar_Date: 2003

Metadata_Reference_Information:

Metadata_Date: 20030422

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Bureau of Transportation Statistics (BTS)

Contact_Address:

Address_Type: mailing and physical address

Address: 400 Seventh Street, S.W.

Address: Bureau of Transportation Statistics (BTS)

City: Washington

State_or_Province: DC

Postal_Code: 20590
Country: USA
Contact_Voice_Telephone: 202-366-DATA
Contact_Facsimile_Telephone: 202-366-3640
Contact_Electronic_Mail_Address: answers@bts.gov
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata_Standard_Version: FGDC-STD-001-1998
Metadata_Time_Convention: local time
Metadata_Access_Constraints: The access of this data is not restricted.
Metadata_Use_Constraints: The use of this data is not restricted.
Metadata_Extensions:
Online_Linkage: <<http://www.esri.com/metadata/esriprof80.html>>
Profile_Name: ESRI Metadata Profile

Appendix B

FIA Measurement Year

State	Source	Measyear	FIA Cycle		
Notes					
Alabama	FIA Plots	1997	7		
Alabama	FIA Plots	1998	7		
Alabama	FIA Plots	1999	7		
Alabama	FIA Plots	2000	7		
Alabama	FIA Plots	2001	7		
Arizona	FIA Plots	1984	2		
Arizona	FIA Plots	1985	2		
Arizona	FIA Plots	1990	2		
Arizona	FIA Plots	1991	2		
Arizona	FIA Plots	1995	2		
Arizona	FIA Plots	1996	2		
Arizona	FIA Plots	1997	2		
Arizona	FIA Plots	1998	2		
Arizona	FIA Plots	1999	2		
Arizona	FIA Plots	2000	2		
Arizona	FIA Plots	2001	2		
Arkansas	FIA Plots	1900	1		
Arkansas	FIA Plots	1994	1		
Arkansas	FIA Plots	1995	1		
Arkansas	FIA Plots	1996	1		
California	FIA Plots	1991	3		
California	FIA Plots	1992	3		
California	FIA Plots	1993	3		
California	FIA Plots	1994	3		
California	FIA Plots	1997	3		
California	FIA Plots	1998	3		
California	Region 5, Pacific Southwest Region Plots	1980		1980	N/A
California	Region 5, Pacific Southwest Region Plots	1984		1984	N/A
California	Region 5, Pacific Southwest Region Plots	1993		1993	N/A
California	Region 5, Pacific Southwest Region Plots	1994		1994	N/A
California	Region 5, Pacific Southwest Region Plots	1995		1995	N/A

California	Region 5, Pacific Southwest Region Plots	1996	N/A
California	Region 5, Pacific Southwest Region Plots	1997	N/A
California	Region 5, Pacific Southwest Region Plots	1998	N/A
California	Region 5, Pacific Southwest Region Plots	1999	N/A
California	Region 5, Pacific Southwest Region Plots	2000	N/A
California	Region 5, Pacific Southwest Region Plots	1993	N/A
California	Region 5, Pacific Southwest Region Plots	1995	N/A
California	Region 5, Pacific Southwest Region Plots	1996	N/A
California	Region 5, Pacific Southwest Region Plots	1997	N/A
Colorado	FIA Plots	1979	1
Colorado	FIA Plots	1981	1
Colorado	FIA Plots	1982	1
Colorado	FIA Plots	1983	1
Colorado	FIA Plots	1984	1
Colorado	FIA Plots	1993	1
Colorado	FIA Plots	1997	1
Colorado	FIA Plots	2001	1
Colorado Only			
Colorado	FIA Plots	2002	2
Colorado Only			
Colorado	FIA Plots	2003	2
Colorado Only			
Connecticut	FIA Plots	1997	4
Connecticut	FIA Plots	1998	4
Delaware	FIA Plots	1999	4
Florida	FIA Plots	1900	2
Georgia	FIA Plots	1900	7
Idaho	FIA Plots	1981	1
Idaho	FIA Plots	1990	1
Idaho	FIA Plots	1991	1
Idaho	FIA Plots	1992	1
Idaho	FIA Plots	1993	1
Idaho	FIA Plots	1994	1
Idaho	FIA Plots	1995	1
Idaho	FIA Plots	1996	1
Idaho	FIA Plots	1997	1
Idaho	FIA Plots	1998	1
Idaho	FIA Plots	1999	1
Idaho	FIA Plots	2000	1
Idaho	FIA Plots	2001	1
Idaho	FIA Plots	2002	1
Idaho	FIA Plots	2004	1
Illinois	FIA Plots	No Year Listed	4
Illinois	FIA Plots	1987	4
Illinois	FIA Plots	1996	4
Illinois	FIA Plots	1997	4
Illinois	FIA Plots	1998	4
Indiana	FIA Plots	1998	5
Indiana	FIA Plots	1999	5
Indiana	FIA Plots	2000	5
Indiana	FIA Plots	2001	5
Indiana	FIA Plots	2002	5
Indiana	FIA Plots	2003	5
Iowa	FIA Plots	1999	4
Iowa	FIA Plots	2000	4
Iowa	FIA Plots	2001	4
Iowa	FIA Plots	2002	4

Iowa	FIA Plots	2003	4
Kansas	FIA Plots	1992	4
Kansas	FIA Plots	1993	4
Kansas	FIA Plots	1994	4
Kentucky	FIA Plots	1999	4
Kentucky	FIA Plots	2000	4
Kentucky	FIA Plots	2001	4
Kentucky	FIA Plots	2002	4
Kentucky	FIA Plots	2003	4
Louisiana	FIA Plots	2000	3
Louisiana	FIA Plots	2001	3
Louisiana	FIA Plots	2002	3
Louisiana	FIA Plots	2003	3
Louisiana	FIA Plots	2004	3
Maine	FIA Plots	1999	5
Maine	FIA Plots	2000	5
Maine	FIA Plots	2001	5
Maine	FIA Plots	2002	5
Maine	FIA Plots	2003	5
Maryland	FIA Plots	1999	5
Maryland	FIA Plots	2000	5
Massachusetts	FIA Plots	1997	4
Massachusetts	FIA Plots	1998	4
Michigan	FIA Plots	2000	6
Michigan	FIA Plots	2001	6
Michigan	FIA Plots	2002	6
Michigan	FIA Plots	2003	6
Minnesota	FIA Plots	1982	5
Minnesota	FIA Plots	1984	5
Minnesota	FIA Plots	1986	5
Minnesota	FIA Plots	1987	5
Minnesota	FIA Plots	1988	5
Minnesota	FIA Plots	1989	5
Minnesota	FIA Plots	1990	5
Minnesota	FIA Plots	1991	5
Mississippi	FIA Plots	1900	1
Mississippi	FIA Plots	1992	1
Mississippi	FIA Plots	1993	1
Mississippi	FIA Plots	1994	1
Missouri	FIA Plots	1998	5
Missouri	FIA Plots	1999	5
Missouri	FIA Plots	2000	5
Missouri	FIA Plots	2001	5
Missouri	FIA Plots	2002	5
Missouri	FIA Plots	2003	5
Montana	FIA Plots	1988	1
Montana	FIA Plots	1989	1
Montana	FIA Plots	1990	1
Montana	FIA Plots	1993	1
Montana	FIA Plots	1994	1
Montana	FIA Plots	1995	1
Montana	FIA Plots	1996	1
Montana	FIA Plots	1997	1
Montana	FIA Plots	1998	1
Montana	FIA Plots	1999	1
Montana	FIA Plots	2000	1
Montana	FIA Plots	2001	1

Nebraska	FIA Plots	2001	4
Nebraska	FIA Plots	2002	4
Nebraska	FIA Plots	2003	4
Nebraska	FIA Plots	2004	4
Nevada	FIA Plots	1978	1
Nevada	FIA Plots	1979	1
Nevada	FIA Plots	1980	1
Nevada	FIA Plots	1981	1
Nevada	FIA Plots	1982	1
Nevada	FIA Plots	1994	1
Nevada	FIA Plots	1995	1
Nevada	FIA Plots	1996	1
Nevada	FIA Plots	1997	1
New Hampshire	FIA Plots	1996	5
New Hampshire	FIA Plots	1997	5
New Jersey	FIA Plots	1998	4
New Jersey	FIA Plots	1999	4
New Mexico	FIA Plots	1986	2
New Mexico	FIA Plots	1987	2
New Mexico	FIA Plots	1993	2
New Mexico	FIA Plots	1994	2
New Mexico	FIA Plots	1996	2
New Mexico	FIA Plots	1997	2
New Mexico	FIA Plots	1998	2
New Mexico	FIA Plots	1999	2
New Mexico	FIA Plots	2000	2
New Mexico	FIA Plots	2001	2
New York	FIA Plots	1991	4
New York	FIA Plots	1992	4
New York	FIA Plots	1993	4
New York	FIA Plots	1994	4
North Carolina	FIA Plots	1998	3
North Carolina	FIA Plots	1999	3
North Carolina	FIA Plots	2000	3
North Carolina	FIA Plots	2001	3
North Carolina	FIA Plots	2002	3
North Dakota	FIA Plots	1992	3
North Dakota	FIA Plots	1994	3
Ohio	FIA Plots	1990	4
Ohio	FIA Plots	1991	4
Ohio	FIA Plots	1992	4
Oklahoma	FIA Plots	1900	1
Oklahoma	FIA Plots	1988	1
Oklahoma	FIA Plots	1989	1
Oklahoma	FIA Plots	1990	1
Oklahoma	FIA Plots	1992	1
Oregon	FIA Plots	No Year Listed	4
Oregon	FIA Plots	1995	4
Oregon	FIA Plots	1996	4
Oregon	FIA Plots	1997	4
Oregon	FIA Plots	1998	4
Oregon	FIA Plots	1999	4
Oregon	Bureau of Land Management Western Oregon Plots		
1997	N/A		
Oregon	Region 6, Pacific Northwest Region Plots	1993	N/A
Oregon	Region 6, Pacific Northwest Region Plots	1994	N/A
Oregon	Region 6, Pacific Northwest Region Plots	1995	N/A

Oregon	Region 6, Pacific Northwest	Region Plots	1996	N/A
Oregon	Region 6, Pacific Northwest	Region Plots	1997	N/A
Pennsylvania	FIA Plots	2000	5	
Pennsylvania	FIA Plots	2001	5	
Pennsylvania	FIA Plots	2002	5	
Pennsylvania	FIA Plots	2003	5	
Rhode Island	FIA Plots	1998	4	
South Carolina	FIA Plots	1998	3	
South Carolina	FIA Plots	1999	3	
South Carolina	FIA Plots	2000	3	
South Carolina	FIA Plots	2001	3	
South Carolina	FIA Plots	2002	3	
South Dakota	FIA Plots	No Year Listed	4	
South Dakota	FIA Plots	1900	4	
South Dakota	FIA Plots	1994	4	
South Dakota	FIA Plots	1995	4	
South Dakota	FIA Plots	1996	4	
South Dakota	FIA Plots	1999	4	
Tennessee	FIA Plots	1900	6	
Tennessee	FIA Plots	1996	6	
Tennessee	FIA Plots	1997	6	
Tennessee	FIA Plots	1998	6	
Tennessee	FIA Plots	1999	6	
Texas	FIA Plots	2001	3	
Texas	FIA Plots	2002	3	
Texas	FIA Plots	2003	3	
Utah	FIA Plots	1988	1	
Utah	FIA Plots	1991	1	
Utah	FIA Plots	1992	1	
Utah	FIA Plots	1993	1	
Utah	FIA Plots	1994	1	
Utah	FIA Plots	1995	1	
Utah	FIA Plots	1996	1	
Vermont	FIA Plots	1996	5	
Vermont	FIA Plots	1997	5	
Vermont	FIA Plots	1998	5	
Virginia	FIA Plots	1997	3	
Virginia	FIA Plots	1998	3	
Virginia	FIA Plots	1999	3	
Virginia	FIA Plots	2000	3	
Virginia	FIA Plots	2001	3	
Virginia	FIA Plots	2002	3	
Washington	FIA Plots	1988	3	
Washington	FIA Plots	1989	3	
Washington	FIA Plots	1990	3	
Washington	FIA Plots	1991	3	
Washington	FIA Plots	1998	3	
Washington	Region 6, Pacific Northwest	Region Plots		
1993	N/A			
Washington	Region 6, Pacific Northwest	Region Plots		
1994	N/A			
Washington	Region 6, Pacific Northwest	Region Plots		
1995	N/A			
Washington	Region 6, Pacific Northwest	Region Plots		
1996	N/A			
Washington	Region 6, Pacific Northwest	Region Plots		
1997	N/A			

West Virginia	FIA Plots	1999	5
West Virginia	FIA Plots	2000	5
West Virginia	FIA Plots	2001	5
West Virginia	FIA Plots	2002	5
Wisconsin	FIA Plots	1999	6
Wisconsin	FIA Plots	2000	6
Wisconsin	FIA Plots	2001	6
Wisconsin	FIA Plots	2002	6
Wisconsin	FIA Plots	2003	6
Wyoming	FIA Plots	1998	2
Wyoming	FIA Plots	1999	2
Wyoming	FIA Plots	2000	2
Wyoming	FIA Plots	2001	2
Wyoming	FIA Plots	2002	2
Wyoming	FIA Plots	2004	2

Appendix B: Host Species

FIA Code	Common Name	Genus	Species	Potential
93	Englemann spruce	<i>Picea</i>	<i>engelmannii</i>	Very High
98	Sitka spruce	<i>Picea</i>	<i>sitchensis</i>	Very High
95	Black spruce	<i>Picea</i>	<i>mariana</i>	Very High
94	White spruce	<i>Picea</i>	<i>glauca</i>	Very High
97	Red spruce	<i>Picea</i>	<i>rubens</i>	Very High
???	Brewer spruce	<i>Picea</i>	<i>breweriana</i>	Very High
???	Norway spruce	<i>Picea</i>	<i>abies</i>	Very High
???	Blue spruce	<i>Picea</i>	<i>pungens</i>	Very High
11	Pacific silver fir	<i>Abies</i>	<i>amabilis</i>	Low
12	balsam fir	<i>Abies</i>	<i>balsamea</i>	Low
15	white fir	<i>Abies</i>	<i>concolor</i>	Low
16	Fraser fir	<i>Abies</i>	<i>fraseri</i>	Low
17	grand fir	<i>Abies</i>	<i>grandis</i>	Low
???	Rocky Mountain fir	<i>Abies</i>	<i>lasiocarpa</i>	Low
20-21	red fir	<i>Abies</i>	<i>magnifica</i>	Low
22	noble fir	<i>Abies</i>	<i>procera</i>	Low
71	European larch	<i>Larix</i>	<i>decidua</i>	Low
71	eastern larch	<i>Larix</i>	<i>laricina</i>	Low
71	subalpine larch	<i>Larix</i>	<i>layallii</i>	Low
73	western larch	<i>Larix</i>	<i>occidentalis</i>	Low
???	Scots pine	<i>Pinus</i>	<i>sylvestris</i>	Low
119	Western white pine	<i>Pinus</i>	<i>strobus</i>	Low
202	Douglas-fir	<i>Pseudotsuga</i>	<i>menziesii</i>	Low
Low				