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Southern Wildfire Risk Assessment Project

Summary of Project Datasets

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1.0 SWRA GIS Database Development

This section of the document provides detailed information about the extensive GIS database that was developed during the project.

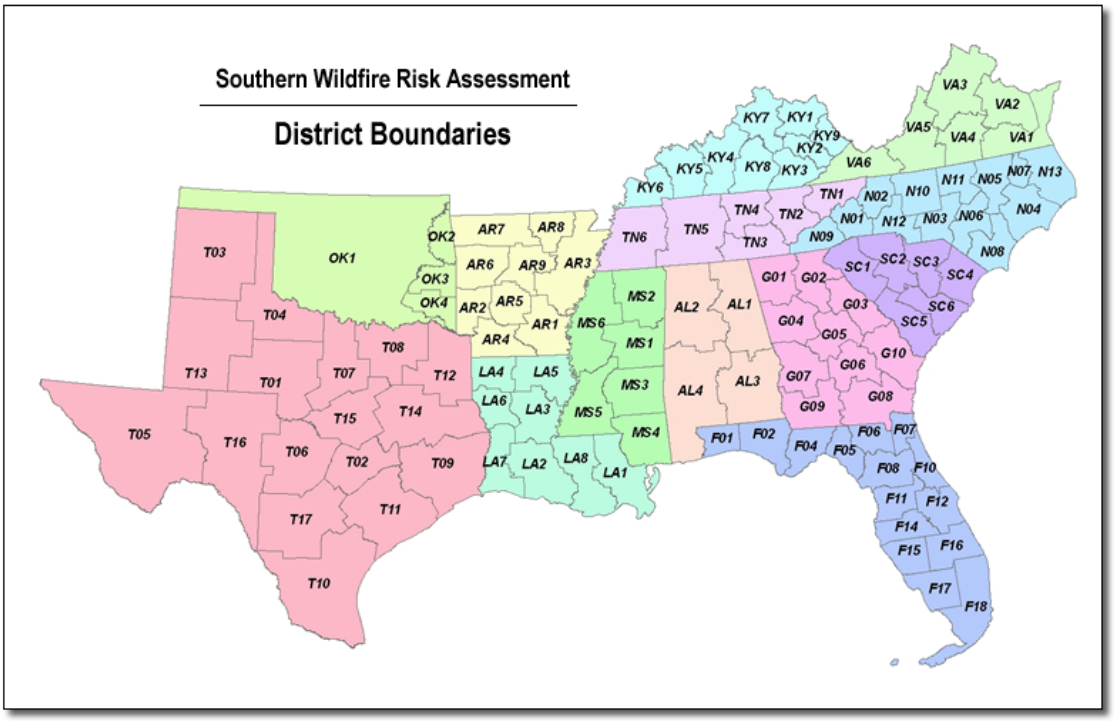
1.1 Data Formats and Delivery

All data developed during the SWRA project was delivered with the following format and specifications:

1. Data was created for the entire South and then partitioned by administrative Fire District. Districts stop at state boundaries. All data was delivered in ZIP format that included embedded ArcGIS raster data and a Personal Geodatabase containing all vector layers for the District. One ZIP file was delivered for each District. The following figure shows the Districts used for partitioning data in the SWRA project.

   The SGSF has recently embarked on making the data available on a per county or federal ownership basis. This data will be available in December 2008. In this regard a user can utilize the data tiled by either District, county or federal ownership boundaries.

Figure 1. SWRA District Boundaries



2. Raster data was delivered in ArcGIS grid coverage format. Vector data was provided in a Personal Geodatabase (one per District). All data is clipped to District boundaries.

3. All data is edgematched at District and State boundaries.

A description of data sources can be found in the following sections.

1.2 Government Supplied Data

Data sources provided by the state and federal government agencies included:

1. **Wildfire suppression resource locations (also referred to as initial dispatch locations)**
2. **Fire history data from fire reporting systems**
3. **District boundaries**
4. **County boundaries**

Significant effort was undertaken to compile this data including the cleaning and editing of the data into a standard format and specifications. State representatives were actively involved in the cleaning of the data. District boundaries were defined by state representatives and developed by Sanborn. A description of these datasets is provided below.

Initial Dispatch Locations

These are locations where firefighting resources are stored and are generally the first to respond to a wildfire within their jurisdiction. Data was compiled in 2003 and was obtained from designated representatives in each state. The data was imported into ESRI format and reviewed in order to identify any bad locations. State representatives supplied corrections for bad locations or, in some cases, bad locations were removed from the dataset.

Fire Ignition Data

This data represents point locations of historic wildfire ignitions. Data was compiled for the years 1997 - 2002 from state and federal agencies. Federal data was acquired from the US Federal Wildland Fire Management data. State occurrence data was obtained from individual state agencies responsible for fire reports. Once compiled and imported into GIS format, the data was reviewed in order to identify incorrect locations. State representatives supplied corrected locational data or, in some cases, the incorrect locational data was removed from the dataset. Additional cleaning of the data was also undertaken to ensure that the mandatory attributes for the ignitions existed. State staff played a key role in cleaning the data and providing revisions.

The fire ignition data was the key input in the creation of the Fire Occurrence Areas (FOA) data used in the WFSI model. An example map showing fire ignitions and resultant FOA data is provided in the description of the Fire Occurrence Areas. More information about FOAs and their compilation is found in Section 3.4.

District Boundaries

The Districts are administrative boundaries that are largely based on fire unit boundaries. Boundary definitions were provided by representatives from each state. Most all of the District boundaries follow county boundaries. In order to make the district boundaries align with the county boundaries, the line work was taken directly from the county boundaries data layer. In areas where the district boundary did not follow the county boundary, linework was digitized by hand.

County Boundaries

Polygon features representing county boundaries. Source scale is 1:24,000 and original data source is US Census Bureau.

1.3 Contractor Supplied Data

Data sources compiled, acquired and created by Sanborn included (in alphabetical order):

- Communities
- Infrastructure (airports, hospitals, schools)
- Land Ownership
- Median Housing Unit Dollar Value
- Plantations
- Roads
- Smoke Impacted Areas
- Soils
- Surface fuels
- Topography (aspect, elevation, slope)
- Vegetation
- Weather observation data
- Weather Influence Zones
- Wildland Urban Interface

Numerous different data sources were used to create this database. Metadata was delivered with all dataset deliverables that describe sources. Please refer to the metadata deliverable for complete information in this regard. A description of each dataset is provided below. Example maps are shown where appropriate.

Communities

Community Polygons represent cities and other populated areas such as suburbs and rural housing communities. The data is a compilation of two 2000 US Census datasets: Urban Areas (places) and Census Blocks. The primary source of named places is derived from the Urban Areas source. The census block data was used to incorporate additional populated areas which are not included in the Urban Areas.

The Census Blocks were rated by Housing Density (high, medium, and low). The Housing Density rankings for each census block were based on the number of housing units/km2 in each census block. The class breaks of high, medium and low were taken from the Wildland-Urban Interface layer. In the final datasets census blocks with low housing density were deleted.

Historical Weather Observations

Daily weather data was gathered from 1994 - 2003 from land management agency maintained weather stations and from National Oceanographic and Atmospheric Administration (NOAA) maintained weather stations. Section 3.4 describes the integration of the weather observations data with the Weather Influence Zones (WIZ) data for use in the WFSI component of the SWRA model.

Infrastructure (schools, airports, hospitals)

Airports: Polygon features representing airports. Original data source is NAVTECH NAVSTREETS Street Data by Navigation Technologies.

Hospitals: The hospital data layer is a subset of the ESRI ArcGIS 9.0 dataset. It was clipped to the district boundaries for the Southern Fire Risk Assessment System (SFRAS). U.S. Hospitals represents the locations and selected attributes for hospitals included in the FY2001 edition of the American Hospital Association (AHA) Annual Survey Database.

Schools: The schools data layer is a subset of the ESRI ArcGIS 9.0 dataset. It was clipped to the district boundaries for the Southern Fire Risk Assessment System (SFRAS). U.S. Geographic Names Information System School represents an automated inventory of the proper names and locations of physical and cultural geographic features located throughout the United States and its Territories.

Land Ownership

Polygon features that represent state and federal land ownership boundaries. Source data for federal land boundaries are from the ESRI ARCGIS 9.0 datasets. ESRI compiled these data from the National Atlas of the United States and the U.S. Geological Survey. Military and state lands were supplemented with data from NAVTECH NAVTREETS Streets Data by Navigation Technologies. Data was acquired from both sources and merged into one dataset.

Plantations

The primary source for the plantation dataset for most states was the vegetation data layer developed by the National GAP program. Texas and Virginia both utilized the land cover data from the National Land Cover Database (NLCD). Each GAP (or NLCD) vegetation class was labeled as to whether or not it would be mapped as a plantation. State foresters from each state determined which vegetation classes would be labeled as a plantation.

In Texas, the NLCD class 'evergreen' was labeled as a plantation if it was located east of I-45 and north of Hwy 90.

In Virginia, the NLCD was used to supplement existing plantation data that was derived from a remote sensing analysis of Virginia's 'Pine Basket'.

The FL plantation data was taken from the Florida Risk Assessment System (FRAS). The original source data was the 1995 Division Of Forestry - Water Management Districts LULC.

The GAP vegetation datasets, and the NLCD, were derived from Landsat Thematic Mapper (TM) satellite imagery collected in the early 1990's.

Roads

Four distinct level of roads were compiled for the project. Roads are not only used for reference data but also to define Transportation and Infrastructure Impacted Areas (for Values Impacted Rating), and for modeling the Fire Response Accessibility Index (FRAI).

Roads1: Level 1 Roads are interstate highways. The data is a subset of the ESRI U.S. Streets data, ArcGIS v9.1.

In Florida, Level 1 Roads are a subset of the roads data from the 2002 Florida Risk Assessment System (FRAS) . Level 1 Roads are the Primary or Major Highways (codes A1 - A19). The original source for the roads data was Dynamap/1000, a product of GDT.

Roads2: Level 2 Roads are U.S. highways. The data is a subset of the ESRI U.S. Streets data, ArcGIS v9.1.

In Florida, Level 2 Roads are a subset of the roads data from the 2002 Florida Risk Assessment System (FRAS) . Level 2 Roads are the Secondary or Minor Highways (codes A2 - A29). The original source for the roads data was Dynamap/1000, a product of GDT.

Roads3: Level 3 Roads are State highways. The data is a subset of the ESRI U.S. Streets data, ArcGIS v9.1.

In Florida, Level 3 Roads are a subset of the roads data from the 2002 Florida Risk Assessment System (FRAS) . Level 3 Roads are the Limited Access Highways (codes A3 - A39). The original source for the roads data was Dynamap/1000, a product of GDT.

Roads4: Level 4 Roads are all streets other than interstates, U.S. highways, or State highways. The data is a subset of the ESRI U.S. Streets data, ArcGIS v9.1.

In Florida, Level 4 Roads are a subset of the roads data from the 2002 Florida Risk Assessment System (FRAS) . Level 4 Roads are Local Roads and any other vehicular trails (4WD) or roads with special characteristics (codes A4 - A73). The original source for the roads data was Dynamap/1000, a product of GDT.

Soils

The soils dataset was compiled from both the STATSGO and SSURGO soils database and only includes soil types that make it difficult for firefighters to access wildfires. These soil types include histols (organic) soils as well as severely eroded soils. Only areas that contained 50% or more of these soil types were included. The SSURGO database contains more detail and has a larger source scale than the STATSGO database. However, SSURGO is not complete for all southern states. SSURGO was used where available and STATSGO was supplemented in areas where SSURGO was not available. In southern Georgia, vegetation classes were cross-walked to supplement areas where no soils data were available.

In Florida, the soils dataset is the same soils dataset that was compiled for the 2002 Florida Fire Risk Assessment System (FRAS). It was derived from the SSURGO soils database and only includes organic soils, histosols (muck, peat), that make it difficult for firefighters to access wildfires. The original dataset was compiled by the Florida Division of Forestry in conjunction with local expert soil scientists. District 2 (Chipola River) in Florida was updated for SFRAS.

Surface Fuels

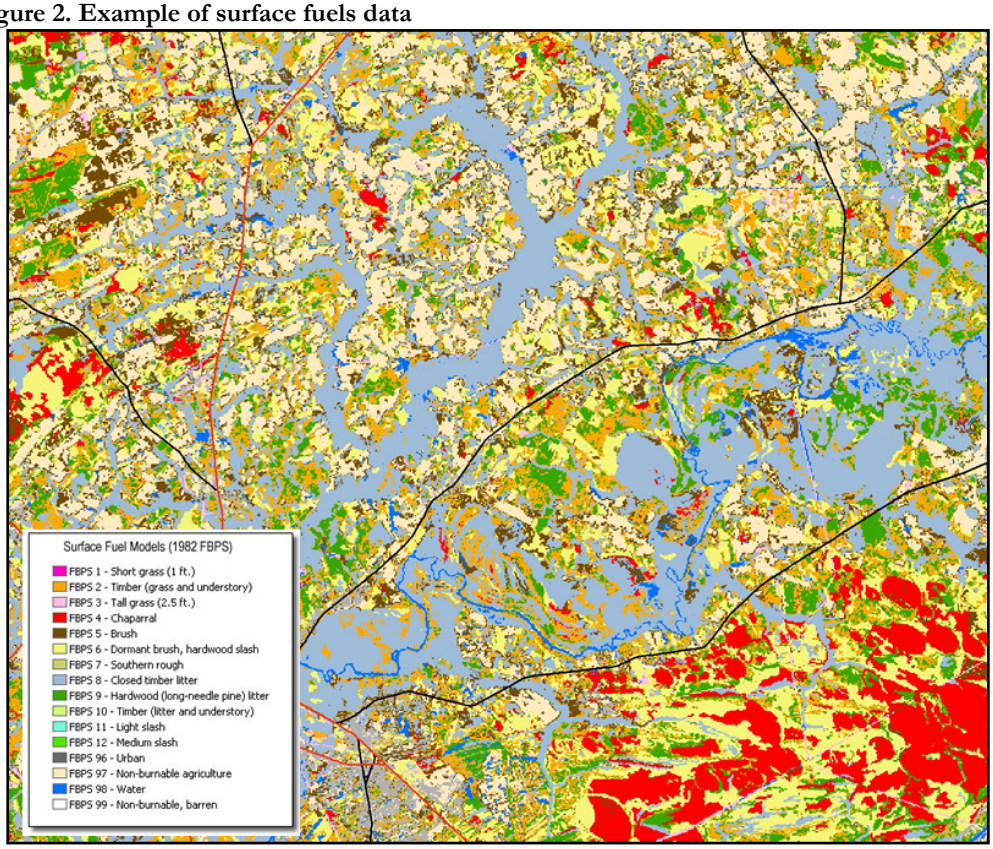
The surface fuel model dataset was derived using a "cross-walk" from existing vegetation data in conjunction with expert knowledge from local fire behavior and ecosystem specialists. For most states the vegetation data layer developed by the National GAP Program was used. However, in Alabama, where no GAP vegetation data existed, the 1993 National Landcover Database (NLCD) was used. The NLCD was also used to supplement the GAP data in both Tennessee and Virginia.

The fuel model dataset for FL was not derived from GAP vegetation. The fuel model dataset developed for the Florida Risk Assessment (FRAS) was used. This data was derived based on spectral classification of Landsat Thematic Mapper (TM) satellite imagery.

Both the Tennessee and Virginia GAP data had areas that were mapped as either "unknown" or "unclassified". In Tennessee these were areas of spectral confusion, most often mixed forest and grass classes. In Virginia, these were areas of clouds or cloud shadows. In both cases, a crosswalk was developed with the help of the state representatives to recode the NLCD to fuel model and canopy cover classes only for these unknown/unclassified areas.

There are 13 surface fuel model classes based on the 13 FBPS fuel models. In addition, there are four custom non-burnable fuel model classes (water, urban, agriculture, and barren). Numerous additional custom fuel models were also developed to support the fuel profiles and the Fuel Treatment Analysis tool. Appendix D provides a description of the fuels classification methods used in the project. The following figure shows an example of surface fuels data for South Carolina.

Figure 2. Example of surface fuels data



Topography

Using a source Digital Elevation Model (DEM), topography data was derived as three specific layers: elevation, slope and aspect.

Elevation: Digital Elevation Models (DEMs) were acquired from GeoEye (formerly Space Imaging). The DEMs are a mosaic of edited USGS 30m (1:24,000) and 90m (1:250,000) DEMs. Elevation is measured in meters. The DEMs provide the basis for a number of

assessment input layers, namely slope and aspect. A classification by height provides the elevation dataset.

Slope: Slope raster datasets were created from Digital Elevation Models (DEMs) acquired from GeoEye (formerly Space Imaging). The DEMs are a mosaic of edited USGS 30m (1:24,000) and 90m (1:250,000) DEMs. Grid values are integers and represent percent slope.

Aspect: The aspect raster datasets were created from Digital Elevation Models (DEMs) acquired from GeoEye (formerly Space Imaging). The DEMs are a mosaic of edited USGS 30m (1:24,000) and 90m (1:250,000) DEMs. Aspect was calculated in degrees and aggregated into four classes representing the four cardinal directions. Values of -1 (flat areas) were classified as 180 degrees (south).

Transportation and Infrastructure Effects Areas

The Transportation Infrastructure Effects grids (smoke impacts) were created from calculating a 300 meter buffer around road levels 1, 2, and 3; and a 500 meter buffer around elementary and secondary schools, airports, and hospitals. After the buffer was created for each of these six data layers (roads 1, roads 2, roads 3, schools, airports, and hospitals) they were converted to grids and then merged into one grid with values of 1 and 0. A value of 1 being inside a buffer and 0 being outside.

Road data for Transportation Infrastructure Effects is from NAVTECH NAVSTREETS STREETS data; locations of schools is from ESRI ArcGIS data; and hospitals and airports are from NAVTECH NAVSTREETS STREETS data.

Vegetation

The primary source for the vegetation dataset for most states was the vegetation data layer developed by the National GAP program. In some cases, local forestry experts made minor adjustments to the GAP vegetation dataset to improve accuracy. In Alabama, a GAP vegetation dataset did not exists and the National Landcover Database (NLCD) was used instead. A few modifications based on expert knowledge from local forestry experts were incorporated into the AL NLCD. These modification provided more detail in the forested cover types.

The GAP vegetation datasets were derived from Landsat Thematic Mapper (TM) satellite imagery with acquisition dates in the early 1990's. Each state (except for AL) developed their own map classes.

Water

Water data is derived from the surface fuels dataset by extracting the water custom fuel model class (FM 98). The surface fuels dataset was derived from the GAP analysis vegetation data layer, except in Alabama where the National Landcover Database 1993 (NLCD) was used, and Florida where the fuel model dataset developed for the Florida Risk Assessment (FRAS) was used. For more information refer to the surface fuels dataset description.

Wildland Urban Interface

The Wildland-Urban Interface (WUI) data layer was acquired from and developed by the SILVIS lab at the University of Wisconsin-Madison. The data is used for the Values Impacted Rating modeling. The WUI is the area where houses meet or intermingle with

undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires, habitat fragmentation, invasive species, and biodiversity decline. Using GIS techniques the U.S. Census and USGS National Land Cover Data were integrated to map the Federal Register definition of WUI (Federal Register 66:751, 2001). These data are useful within a GIS for mapping and analysis at national, state, and local levels.

1.4 Intermediate Derived Data Outputs

Several datasets were derived by data processing and analysis using source input data layers. These are described in this section.

Canopy Cover Percent

The percent tree canopy cover dataset was derived using a "cross-walk" from existing vegetation data in conjunction with expert knowledge from local fire behavior and ecosystem specialists. For most states the vegetation data layer developed by the National GAP Program was used. However, in Alabama, where no GAP vegetation data existed, the 1993 National Landcover Database (NLCD) was used. The NLCD was also used to supplement the GAP data in both Tennessee and Virginia.

In Florida, the tree canopy cover dataset was not developed based on GAP vegetation data. The canopy cover dataset developed for the Florida Risk Assessment (FRAS) was used. This data was derived from spectral classification of Landsat Thematic Mapper (TM) satellite imagery.

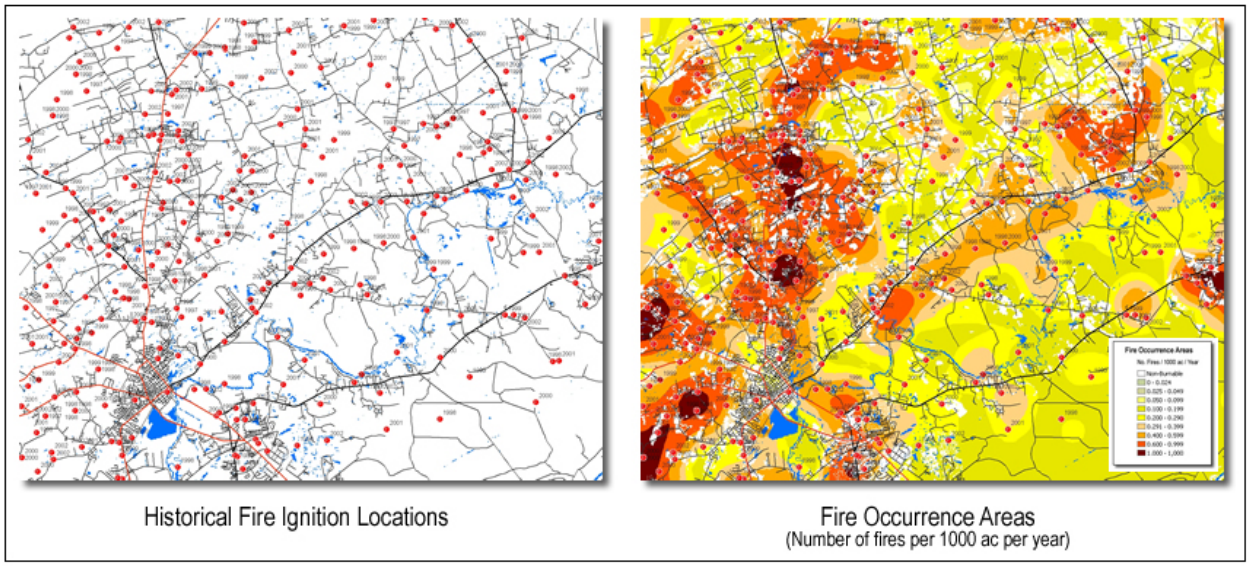
There are five tree canopy cover classes – (1) 1 – 20 %, (2) 21 – 50%, (3) 51 – 80%, (4) 81 – 100%. Except for "0", all tree canopy cover class values represent a range of canopy cover. Non-burnable fuel model classes and burnable classes with no tree canopy have a percent canopy cover value of "0".0%. Note that all non-burnable classes are the same as listed in the fuel model classes (96, 97, 98, 99). Canopy cover percent is a required input for the fire behavior analysis and the WFSI model.

Fire Occurrence Areas

A Fire Occurrence Area (FOA) is an area where the probability of each acre igniting is the same. The FOA data layer was developed based on historic wildfire ignition data. A FOA is defined as a fire ignition rate measured in Number of Fires/1000 acres/year. Wildfire ignition data was collected for the years 1997 - 2002 and geo-referenced using fire report information. The data was collected from both state and federal agencies, imported into a GIS, and any "incorrect" data locations were corrected or removed. State staff played a key role in the provision and correction of the fire ignition locations.

A custom GIS model was developed to create the FOA data layer using ArcGIS Raster modeling techniques. The following figure presents an example of fire ignition data points and the resultant FOA data layer. Note in many situations fires often occur at the same location (particularly for man caused fires), and the frequency of fires per year is modeled to create the FOA data. Areas with darker colors in the FOA map below show areas of greater frequency and higher mean ignition rates.

Figure 3. Example fire ignitions and resultant FOA layer



Fuel Profiles

Fuel profiles represent a definition of custom fuel models that occur over a 10 year period when a given fuel treatment is applied on a standard fuel model. Fuel profiles define the change in fuel models over time. Fuel profiles were defined for each fuel model in a GAP class for each treatment type in a state. State fuel specialists developed the fuel profiles during a project workshop. The following table presents an example fuel profile in Georgia for Prescribed Burning. Fuel profiles are defined for each treatment type.

Table 1. Example fuel profile for prescribed burning treatment type in GA.

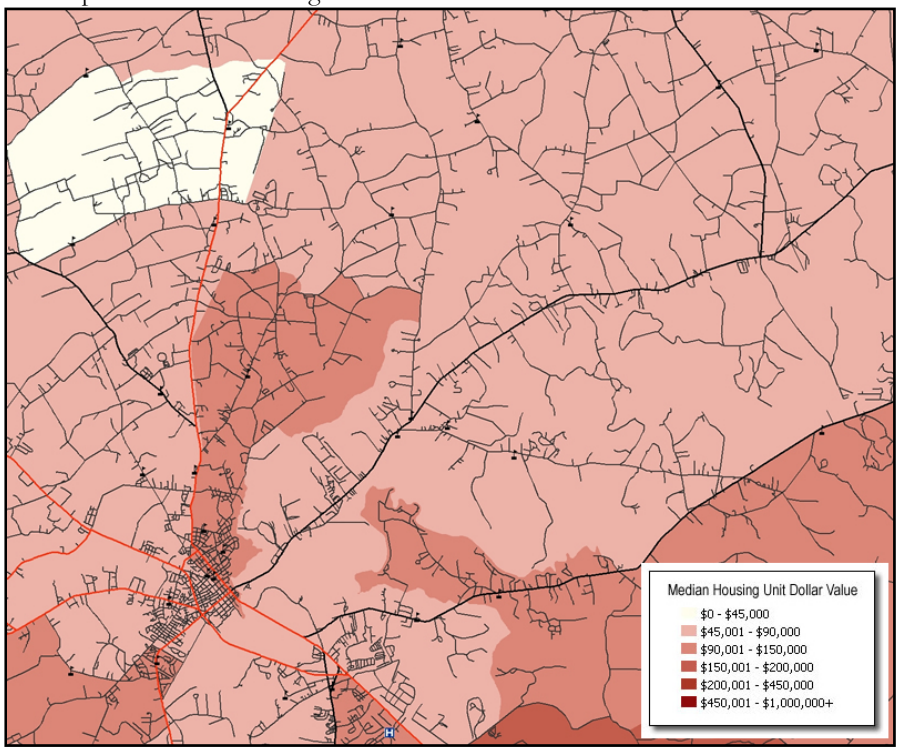
Georgia GAP class	FM	Post-Treat	Years Since Treatment									
			1	2	3	4	5	6	7	8	9	10
Longleaf Pine	**2**	2N	2A	2A	2M	2M	2Z	9M	9M	9M	9Z	9Z
Pasture/ Hay	**2**	2N	2A	2M	2Z	2Z	2Z	2Z	2Z	2Z	2Z	6M
Xeric Pine	**5**	8N	8A	8A	8A	8M	8M	5A	5A	5A	5A	5M
Open Loblolly-Shortleaf Pine	**9**	9N	9A	9A	9A	9M	9M	9M	9M	9Z	9Z	9Z
Montane Mixed Pine-Hardwd	**8**	8N	8A	8A	8A	8M	8M	8M	8M	9A	9A	9A
Loblolly-Shortleaf Pine	**9**	9N	8A	8M	9A	9A	9A	9A	9M	9M	9M	9Z
Loblolly-Slash Pine	**9**	9N	8M	8M	8Z	9A	9M	9M	9M	9M	9Z	9Z
Mixed Pine-Hardwood	**9**	8N	8A	8M	8Z	9A	9A	9M	9M	9M	9M	9Z
Sandhill	**9**	8N	8A	8A	8M	8M	8M	8Z	9A	9A	9M	9Z

Fuel profiles are used to support the Fuel Treatments tool within SFRAS. This tool helps users evaluate fuel treatment mitigation options and helps them determine the result on fuels and WFSI when treatments are applied. Refer to the SFRAS User Guide for more information on fuel profiles and the SFRAS Fuel Treatments tool.[1] Custom fuel models used for the fuel profiles are described in Appendix E.

Median Housing Unit Dollar Value

Polygon features represent median housing values. Source data is from US Census Bureau, 2000 Census. The US Census Bureau summarized housing values by Census Block Group. There are between 600 and 3,000 people per block group. Housing unit values are reported in US dollars and are classified into eight dollar ranges. Once compiled, adjacent block groups with the same dollar range were merged together (i.e., they were dissolved based on median housing value).

Figure 4. Example of Median Housing Unit Dollar Value data

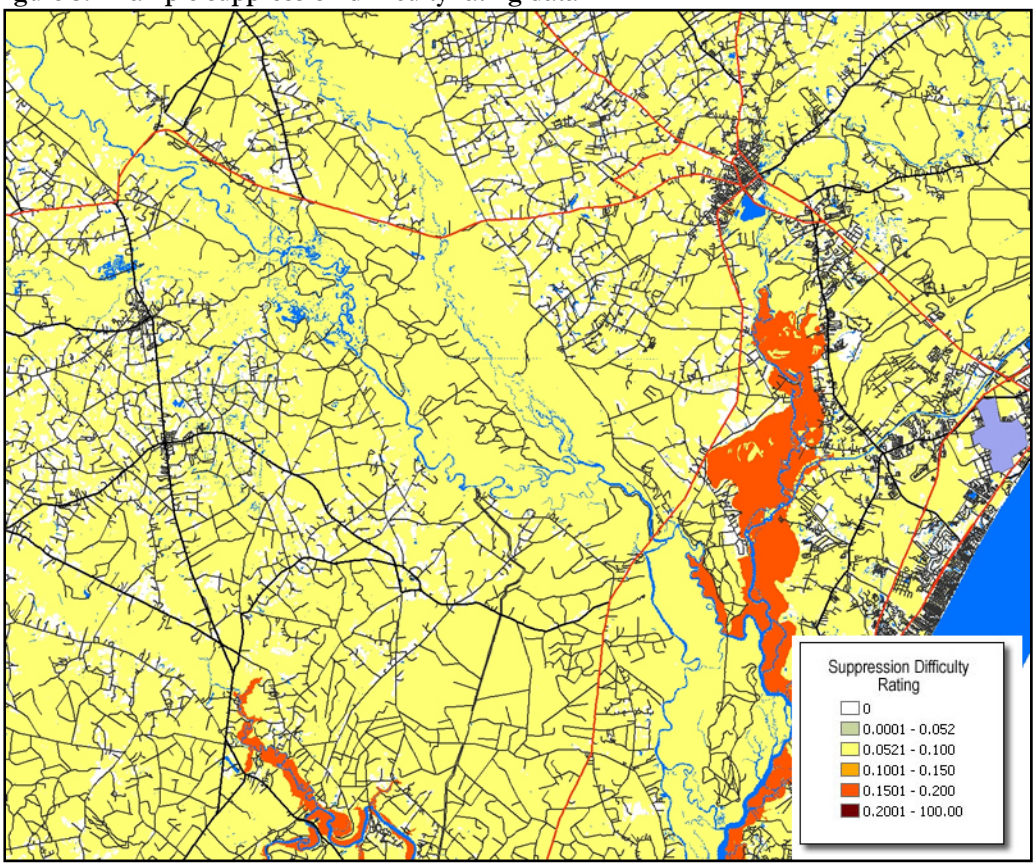


[1] SFRAS User Guide, Sanborn Map Company, November 2006.

Suppression Difficulty Rating

Each burnable cell is assigned a Suppression Difficulty Rating (suppco). This suppression rating is based on three elements: fuel type, topography, and the presence or absence of organic (peat/muck) soils. The higher the rating, the increased difficulty of suppression and corresponding increase in suppression costs. The following figure shows an example of suppression difficulty rating for an area in South Carolina.

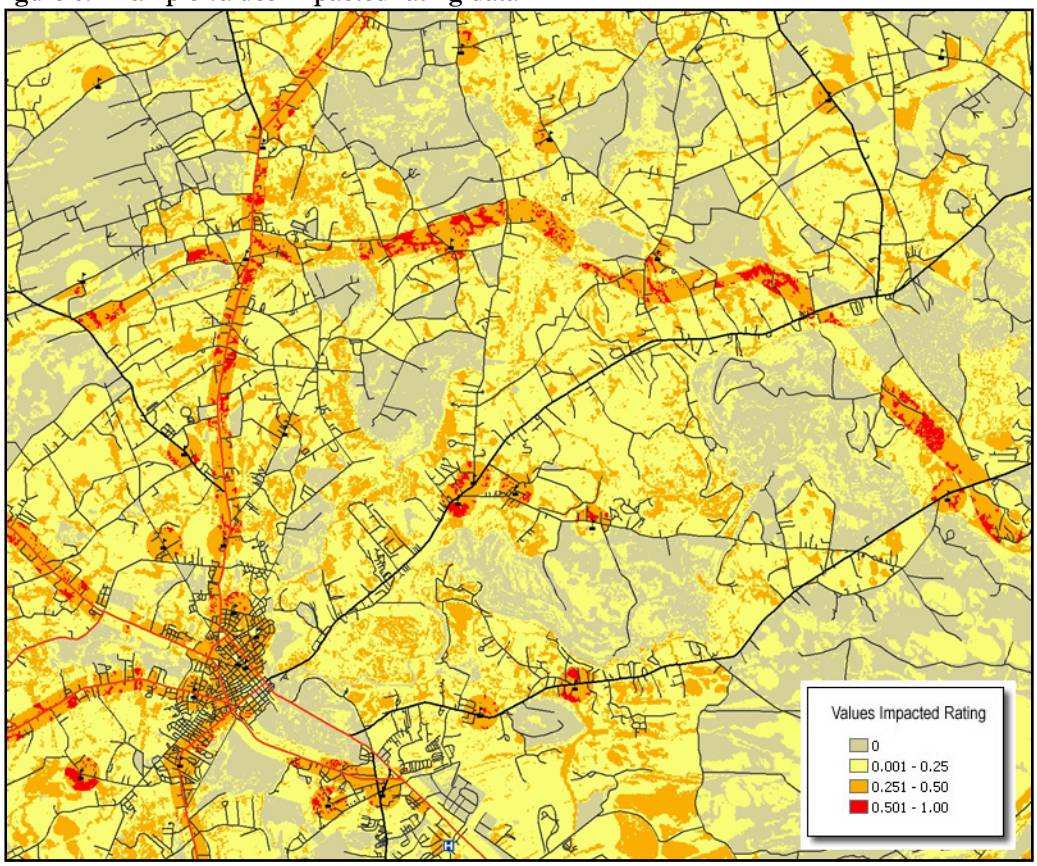
Figure 5. Example suppression difficulty rating data



Values Impacted Rating

The Values Impacted Rating reflects those areas that have important values at risk to wildland fire. This rating is based on three elements: transportation and infrastructure areas, urban interface, and plantations. Ratings are assigned by state fire managers using a matrix process to combine individual ratings for each element into one overall rating for each burnable cell. The following figure shows an example of values impacting rating for an area in South Carolina.

Figure 6. Example values impacted rating data

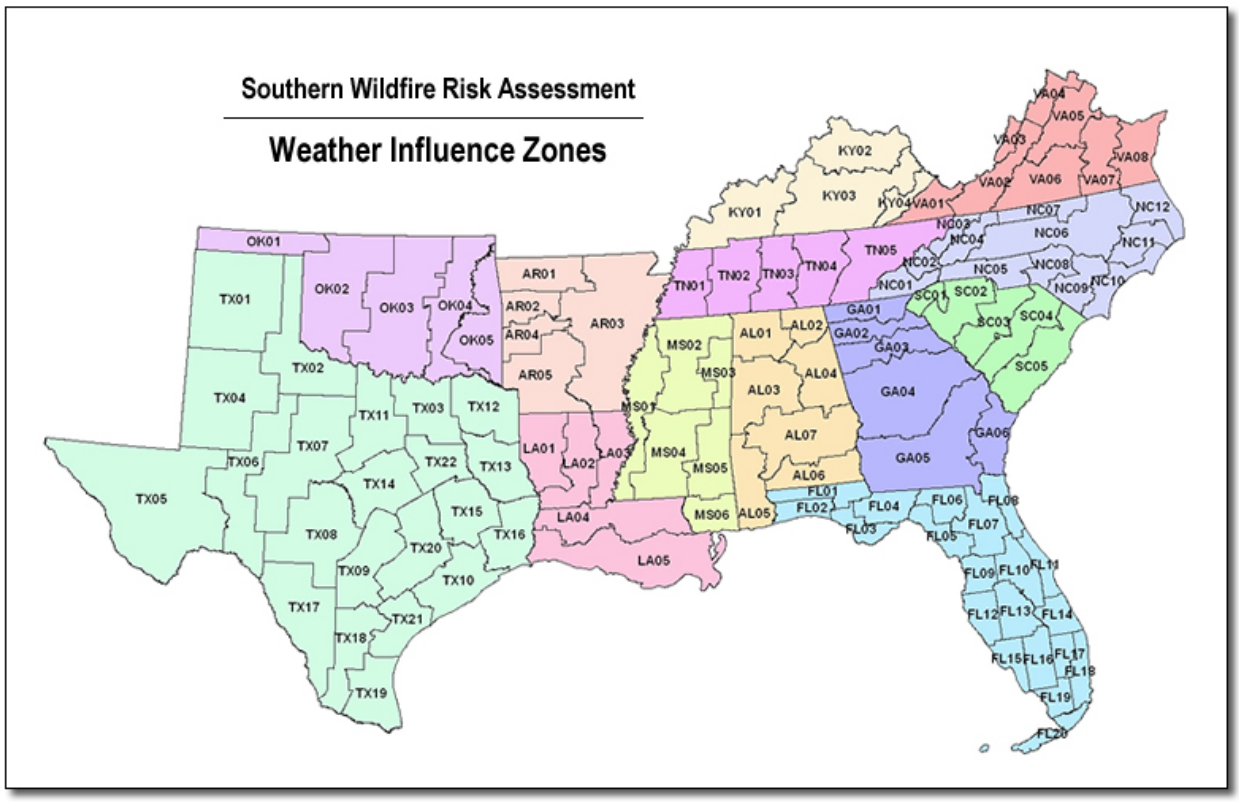


Weather Influence Zones

Weather in the South varies geographically. A Weather Influence Zone (WIZ) is an area where for analysis purposes the weather on any given day is considered to be uniform. WIZ polygons were developed by the Project Fire Weather Meteorologist. One hundred ten (110) Weather Influence Zones were developed for the South.

Within each WIZ, daily weather observations data is gathered and through analysis of the data percentile weather is developed for each WIZ. The compilation, integration and analysis of percentile weather is undertaken as part of the wildfire risk analysis task. Refer to Section 3.4 for more information about this process. The following figure presents the WIZ boundaries defined for the SWRA project. Note WIZs terminate at state boundaries to accommodate data partitioning requirements. However, percentile weather may be the same for adjoining WIZs.

Figure 7. SWRA Weather Influence Zone boundaries



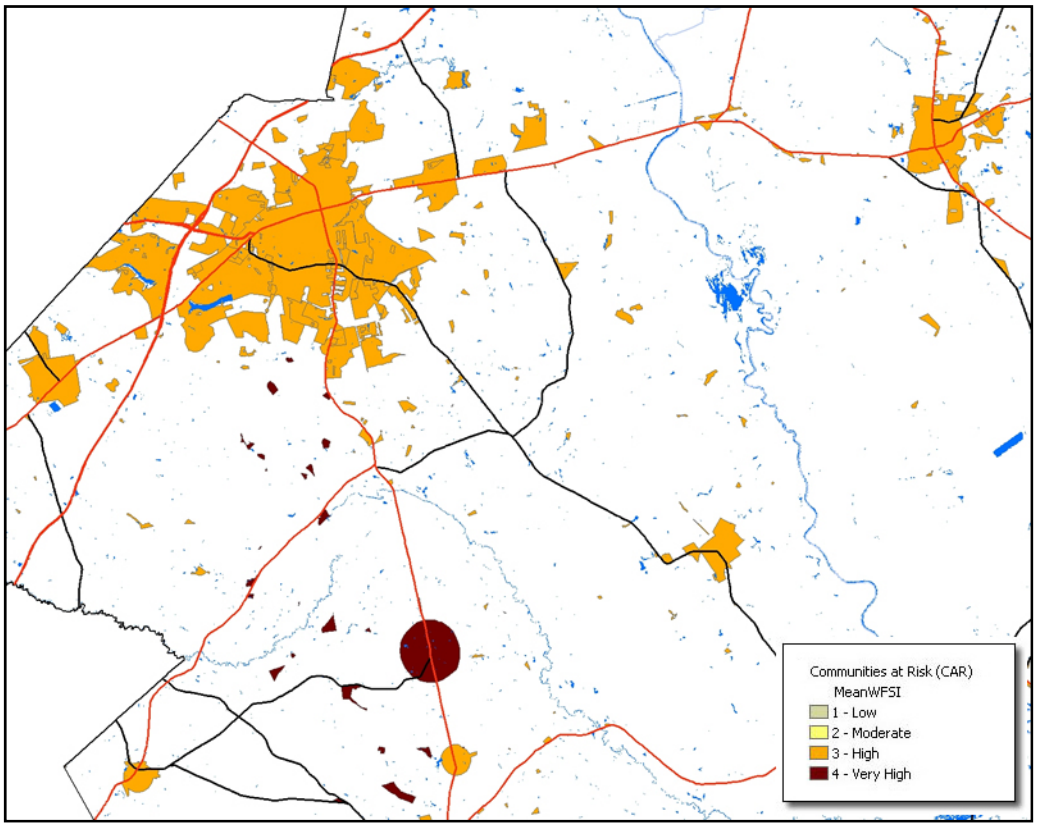
1.5 Modeled Data Outputs

This section describes the primary data outputs created from the SWRA risk models.

Community Risk Rating

A risk rating was generated for each community identified in the project. These risk scores are derived by averaging the WFSI value for each community, including a buffer zone around the community. This tool is useful in two ways. First, communities can be categorized based on their level of risk, which can aid in identifying the location where more detailed fire planning may be needed. Second, users are able to identify, categorize and prioritize those areas (not communities necessarily) where tactical analyses, mitigation activities, and community interaction may be necessary to reduce risk from wildfire. The Communities at Risk (CAR) layer was created by generating a 3-mile buffer around each community polygon within a district and calculating the average WFSI rating within the buffered area. The analysis was designed to comply with NASF guidelines for identifying and categorizing communities-at-risk while providing the flexibility to evaluate all 'community areas', not just those listed on the Federal Register.[2] Refer to Section 3.6 for a more detailed description of this data and the CAR analysis approach. The following figure presents an example of community risk ratings for a District.

Figure 8. Example Communities at Risk rating output data.

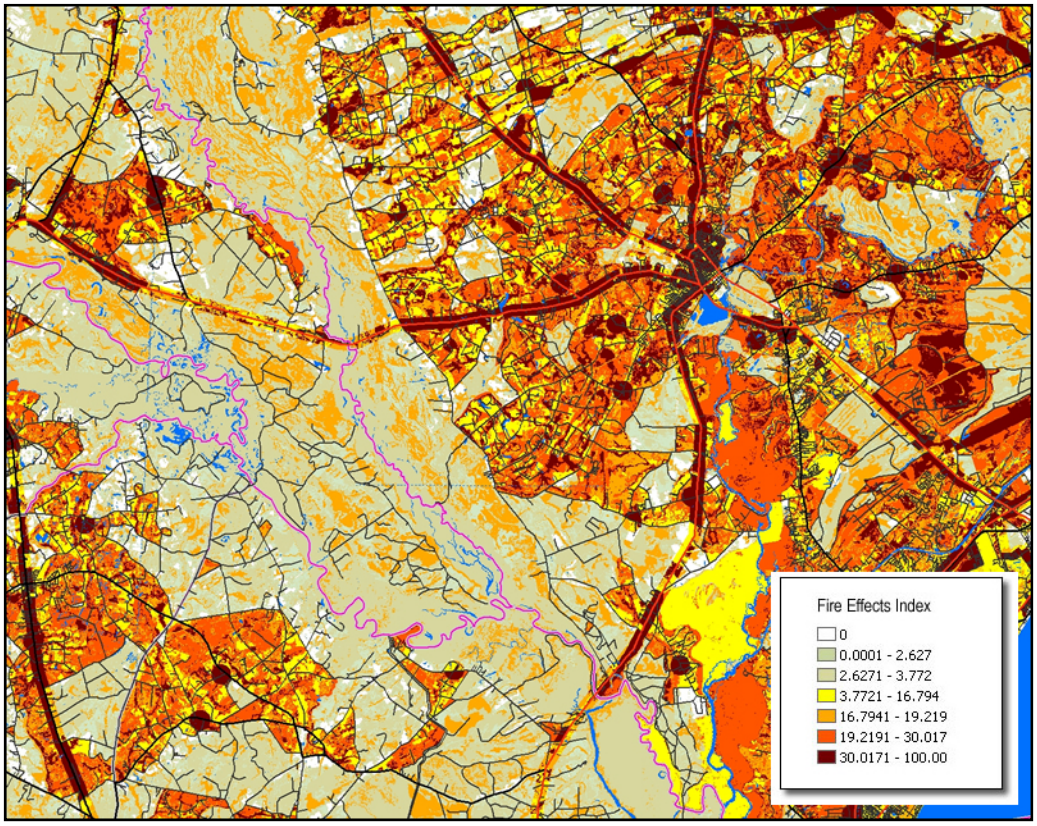


[2] Federal Register of Communities at Risk, Dept. of Agriculture, Dept. of Interior, Part III, August 17, 2001.

Fire Effects Index

The Fire Effects Index (FEI) is combined with the WFSI to calculate the Level of Concern. The FEI is comprised of two inputs: Value Impacted Rating and Suppression Difficulty Rating. The purpose of the index is to identify those areas that have important values at risk to wildland fire and/or are costly to suppress.

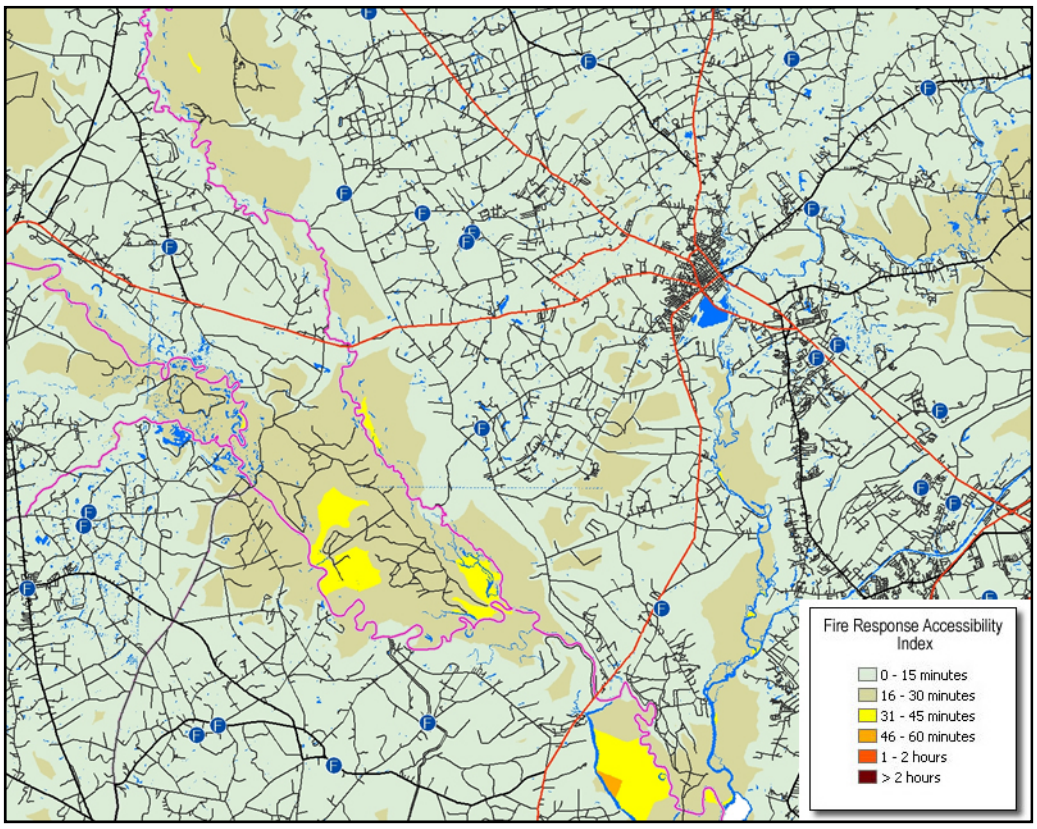
Figure 9. Example Fire Effects Index output data.



Fire Response Accessibility Index

The Fire Response Accessibility Index (FRAI) is a relative measure of how long it would take initial attack resources to drive from their resource location to each point on the map. The FRAI is calculated based on the distance from resource locations. The speed traveled on roads was estimated based on the class of road. Travel off of roads was assumed to be at 5 mph. Water was coded as "No Data", meaning that travel across water could not be done unless there was a road crossing. A cost distance analysis was run to assign an approximate time to reach each cell (i.e. any location on the map) from an existing Initial Dispatch Location.

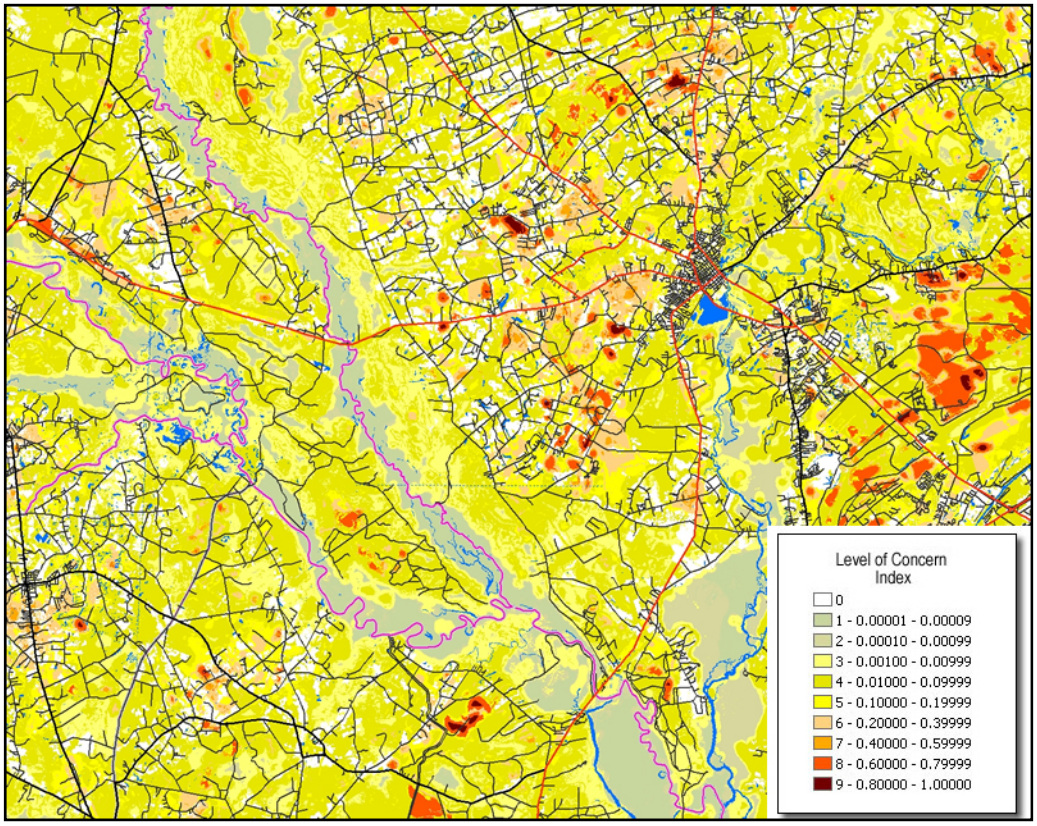
Figure 10. Example Fire Response Accessibility Index output data.



Level of Concern Index

The Level of Concern (LOC) is a value between 0 and 100. It is calculated as the Wildland Fire Susceptibility Index (WFSI) times the Fire Effects Index (FEI). It is one of the two primary outputs of the Southern Fire Risk Assessment System and is a measure of wildfire risk. The LOC can be used to: identify areas where mitigation options may be of value; allow agencies to work together and better define priorities; develop a refined analysis of a complex landscape and fire situations using GIS; and increase communication with local residents to address community priorities and needs.

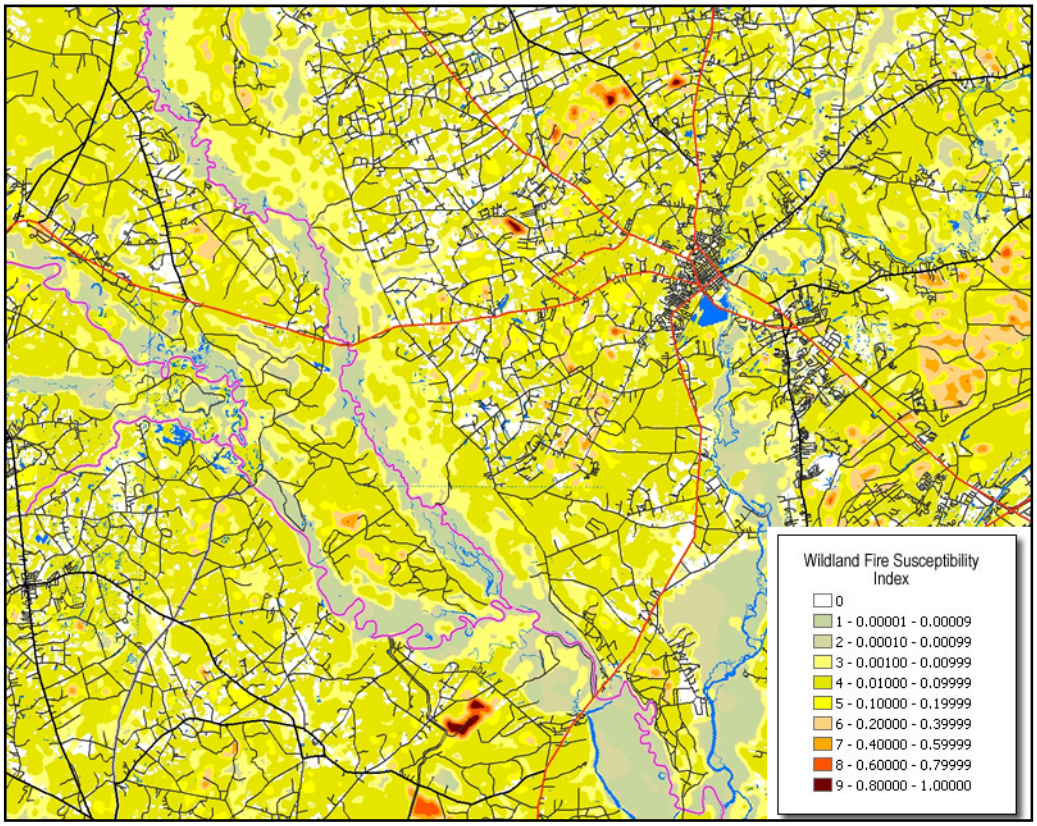
Figure 11. Example Level of Concern Index output data.



Wildland Fire Susceptibility Index

The Wildland Fire Susceptibility Index (WFSI) is a value between 0 and 1. It was developed consistent with the mathematical calculation process for determining the probability of an acre burning. The WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility. Due to some necessary assumptions, mainly fuel homogeneity, it is not the true probability. But since all areas of the State have this value determined consistently, it allows for comparison and ordination of areas of the state as to the likelihood of an acre burning.

Figure 12. Example Wildland Fire Susceptibility Index output data.



1.6 Map Projection

All data was provided in the same map projection for the entire South. Specifications for the map projection are:

Map Projection Name: 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 Distance Units: meters
Coordinate Encoding Method: coordinate pair

Coordinate Representation
Abscissa Resolution: 0.001388
Ordinate Resolution: 0.001388

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

1.7 More Information

To obtain more information about the GIS datasets and related lookup tables derived during the SWRA project contact Tom Spencer, SWRA Project Manager at the Texas Forest Service at tspencer@tfs.tamu.edu. All project data was compiled by the Sanborn Map Company (Portland, OR). However, data is only available directly from the state and federal agency representatives. Data is not distributed by Sanborn as the project data is owned by the project participants.