

SpotFires, Custom Tools for Fire Protection

Oregon Department of Forestry

ABSTRACT:

SpotFires is a collection of tools designed to assist the Oregon Department of Forestry (ODF) in the management of information needed to support wild-land fire fighting efforts at ODF. The application is based on ODF Geographic Information Systems (GIS) data. The primary function of SpotFires is to locate areas, return appropriate geographic information for dispatch, display a map at an appropriate scale, and then allow the user to digitize an incident location and attribute the point with appropriate information. The shape files are then used in SpotFires or other GIS packages to view incident locations or used by the fire management staff for strategic or tactical operations.

The Oregon Department of Forestry is responsible for fire protection on 15.7 million acres of private, state, and federal forestland in Oregon. In the last several years Geographic Information Systems (GIS) has played an ever-increasing role in the support of fire protection activities. In 1998 an application known as Lightning Tracker was developed to place near real time lightning information received from a vendor on to an ODF GIS base. This application addressed a specific set of needs for lightning detection. Based on Lightning Tracker user feedback, the application was modified to give dispatchers GIS tools to navigate to a location, extract spatial information, and track incidents.

SpotFires was the name given the application, and was developed to help ODF dispatchers collect and provide information in an easy, efficient manner. Using Spotfires dispatchers can easily:

1. pass the information to individuals who are the best suited to take action to suppress the fire.
2. add additional information to a call.
3. speed the information flow.
4. provide a documentation record of action taken on an incident.

SpotFires was developed to help dispatchers do all of these tasks in a more efficient manner.

Once the need for emergency response has been established the most important information has to do with 'where'. The answer to the 'where' question is something that GIS tools are best suited to answer. In order to answer the where questions SpotFires was developed based on statewide ODF standard base layers, in the standard projection for state data. The application is map-centric and may be described with three functionality groups.

Location: The locator functionality allows the user to navigate to a specific location in the following manners.

☞☞Statewide locator map

?? Zoom in/out

?? Pan

?? Sliders

☞☞Magnifier map, zoom/pan

☞☞Latitude/Longitude locate (3 formats)

☞☞Public Land Survey (PLS) locate, township, section quarter section, quarter-quarter section

☞☞Geographic

?? Place

?? Landmark

?? Streams

?? Water bodies

?? USGS Quad

☞☞ODF District

☞☞Oregon Counties

☞☞Bearing & distance intersections from lookouts

☞☞Bearing & distance intersections from airport VOR

Information Extraction: Once the user has navigated to a location the power of GIS queries and information extraction shows its value. The application provides information continually with the following focus.

Latitude & Longitude continually updated when the mouse moves. Scale dependent 'map-tips' of user specified layers, usually about 5-10 layers.

The following are locational information that the application gives for any location in the state.

☞☞Latitude & Longitude in 3 formats

☞☞Public land survey, quarter-quarter section, section, township & range

☞☞Distance and cardinal direction to the nearest two towns

☞☞County

☞☞USGS quad name & number

☞☞Nearest GNIS water body

- ☞☞ Nearest GNIS landmark
- ☞☞ Watershed basin
- ☞☞ ODF Fire Protection District
- ☞☞ General ownership
- ☞☞ ODF Fire weather zone
- ☞☞ ODF Regulated use areas
- ☞☞ Military operations area (if any)
- ☞☞ The nearest RAWS weather station
- ☞☞ Bearing & distance in nautical miles to the nearest two aircraft VOR antenna
- ☞☞ Highest elevation point in a Temporary Flight Restriction (TFR) area.

Incident tracking: As an incident develops SpotFires allows dispatchers to locate incidents on the screen, modify their status, or move the location. The following layers are tracked.

- ☞☞ Burn permits
- ☞☞ Incidents
- ☞☞ Fires
- ☞☞ Non Fire Crew Actions
- ☞☞ Miscellaneous dispatches
- ☞☞ Temporary Flight Restrictions

Future plans for SpotFires call for integration of Automatic Vehicle Locating, shared dispatch and incident locations across the ODF wide area network, address point and road intersection locating, and an internet deployment.

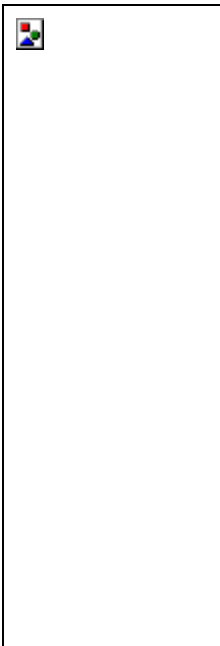
SpotFires Version 2.2.1

Application Description:



The base map for SpotFires is from the ODF GIS library, typically 1:100,000 scale. The themes drawing is scale dependent, so even though a theme may be checked on in the theme box it might not show on the map.

Themes:



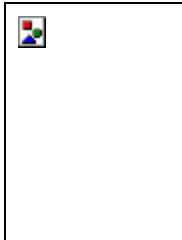
The themes that are checked will draw if the scale is appropriate. The names are generally self describing.

Menus:



The menu bar allows modifications of the display, and launches tools.

File Menu:



The Files menu has three options.

1. Defaults displays the following form:

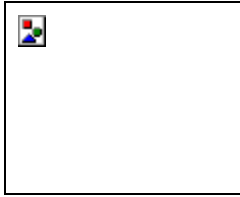


The Defaults menu is used to define the user's home District or Unit. All point data entered by the user for fires, miscellaneous, and burn permits will be stored in shapefiles organized by home unit for the year chosen. For example the Medford Units shapefiles will be named as follows(the files are located in the shapes drive identified in myapp.ini in the directory "\shapes\fires\");

- sf2000711 - Stores fires and NFCAs for the year 2000 for the Medford Unit of the SWO District.
- mi2000711 - Stores Miscellaneous and Assists for the year 2000 for the Medford Unit of the SWO District.
- bu2000711 - Stores Burn Permits for the year 2000 for the Medford Unit of the SWO District.

2. Print - Prints what you see on your computer screen to the default printer.
3. Exit - Exit SpotFires.

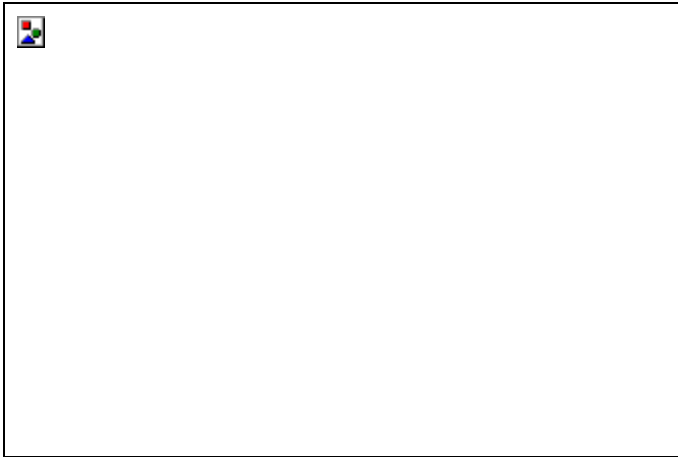
Edit Menu:



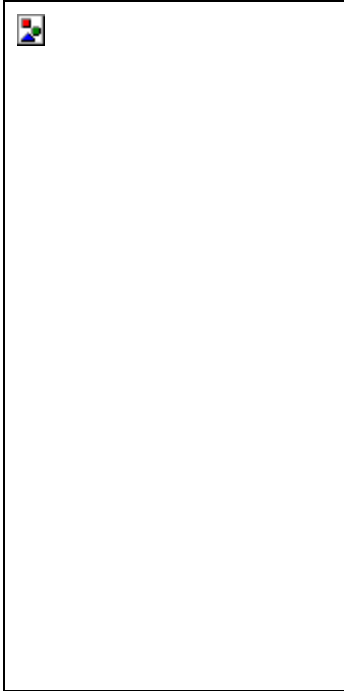
The Edit menu has Five options.

1. Copy to clipboard - Copies what you see on your computer screen to the clipboard.
2. Copy Map to BMP file - Copies what you see on your computer screen to a BMP file.

Select an output file directory and name:



3. Create New Location - The pencil tool is selected for a new point to be digitized.
4. Edit Location Date - The following form pops up to allow the user to select a point to edit:

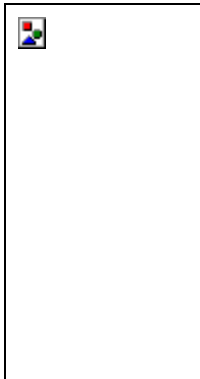


Select an ID for the Point and OK to continue.
Go to the appropriate input form.

Burn Permit Form

1. Delete a Location - A point can be deleted by selecting a point ID(See form under Edit location data).

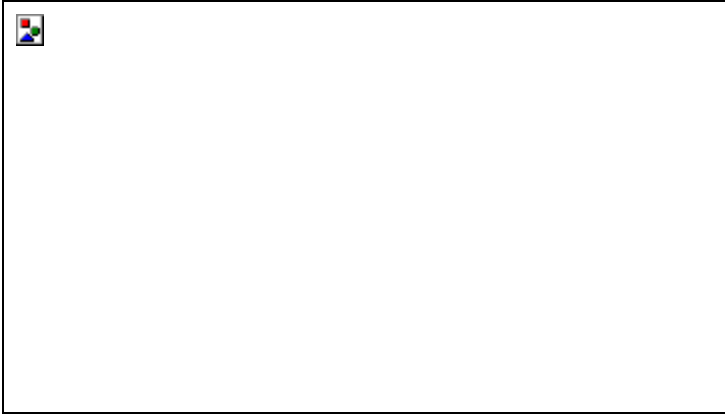
View Menu:



The View menu has 12 options for zooming and panning as well as for adding features to the display.

1. Locate - Locate by Lat/Long, Sections, or Oregon Locations.

The Locate tabs are used to change the map to a given location. The Zoom to Location button changes the current map extent to the one specified on the locate tab. The Add Location to Map Button will add a point at that location to the active theme.



Often a place will need to be located by latitude and longitude. The numbers may be entered as decimal degrees, degrees and decimal minutes, or degrees minutes and decimal seconds or a combination.



If a Public Land Survey (PLS) location is known it may be entered. If a quarter township or section is known then the map will zoom to that portion of the township or section.



The Oregon Locations tab makes use of several shape files to locate the map. The first four location types are derived from the Geographic Names Information System (GNIS) database. The categories are Places (such as towns), Landmarks, Waters (such as lakes & ponds), and Streams. The USGS quad extents are searchable by quad name. A hint for

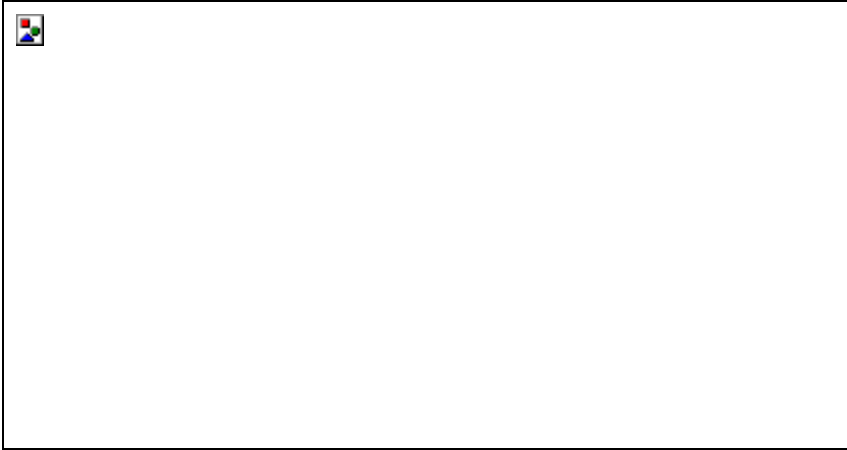
use is to use the asterix (*) after the first few letters of the name desired. The report generated by the search shows the name and the USGS quad where that location is found. Having the quad name reduces the problems of having multiple locations for the same name such as Rock Creek (150+ locations in the state). The bottom two pick lists can be used to zoom to a county or ODF Protection district in Oregon.

When local addresses become available address locating will be used.

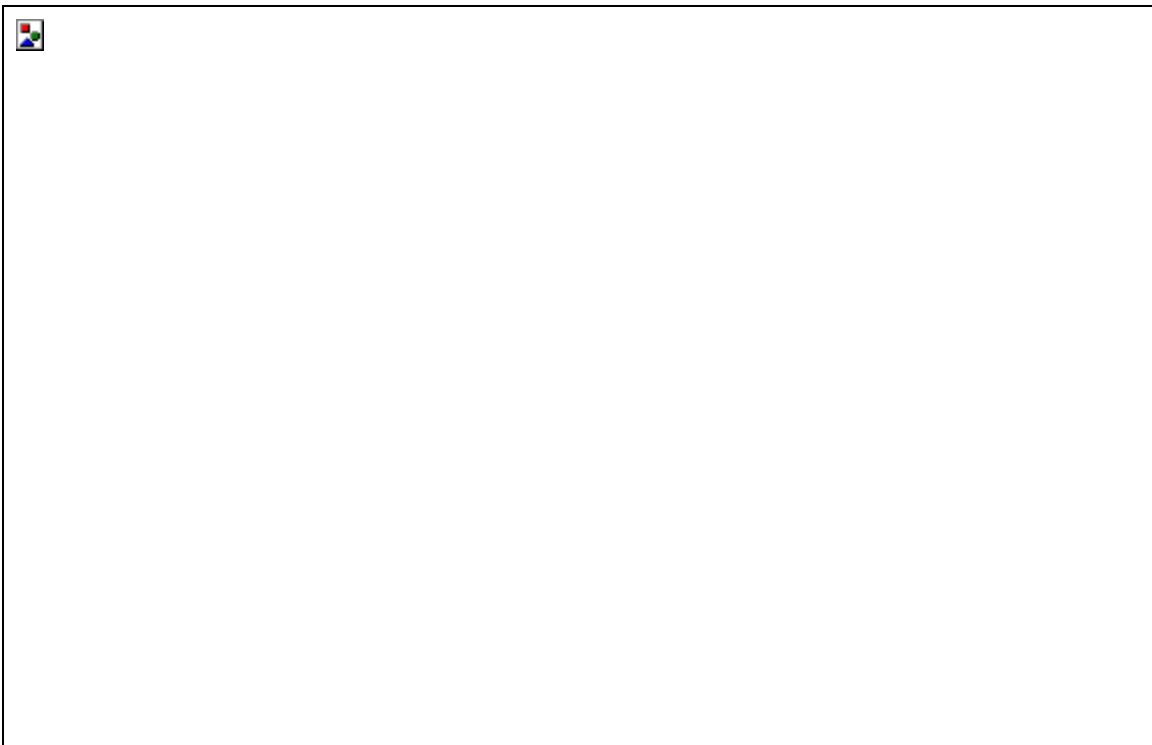
2. Zoom In - Zoom in to the center of the map by a factor of 2.
3. Zoom Out - Zoom Out to the center of the map by a factor of 2.
4. Zoom to State - Zoom Out to the Boundaries of the state.
5. Zoom to Home - Zoom Out to the Boundaries of the default home unit.
6. Zoom to Location - Zoom the point location identified by an ID.
7. Pan - The screen will pan 1/2 screen in the direction selected from the dropdown secondary menu.
8. MapTips - Turns on map tips shown adjacent to the cursor. The Lat/Long is also displayed in decimal degrees.



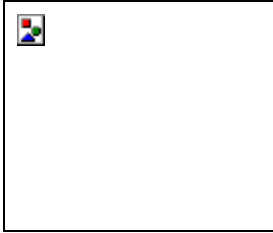
The maptips that are displayed are defined in layers97.mdb and are displayed with the following priority:



9. Map Title - The user is prompted to enter a map title. The title is added to the map with the township and range located in the center of the map. Tics are added to the map to provide a sense of scale. The width of the tics is determined from the scale of the map. The distance between tic is shown in the lower left corner of the map. The date the map was produced is shown in the lower right corner.

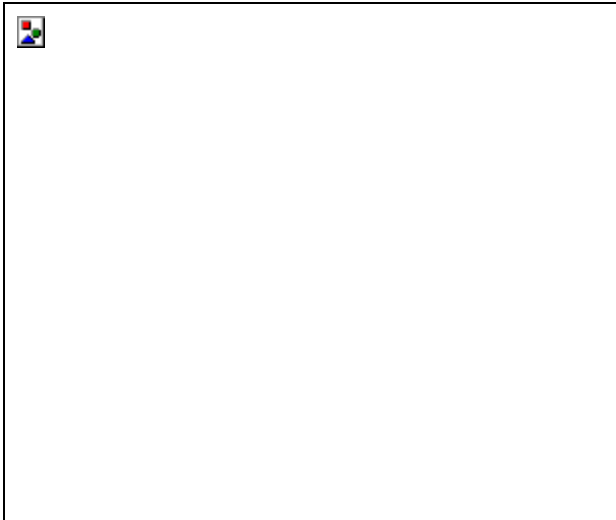


10. Vicinity Map - Displays a Vicinity Map.



The vicinity map serves as an indicator of the location shown on the main map. Navigation on the main map can be done on the vicinity map with the left mouse button to set a zoom box, or with the right mouse button to pan at the same scale.

11. Magnifier Map - Displays a map at 1:60,000 of the area under a magnifier graphics. The magnifier can be moved by clicking in it and dragging. The map at the current scale becomes visible when the magnifier is clicked.



12. Legend - Displays a list of themes that are displayed on the map.

Tools Menu:



1. Smoke Chaser allows the user to find locations by triangulating from ODF lookouts or by triangulating from VOR locations.

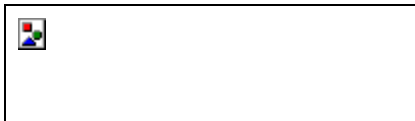
If the VOR tab is selected the selection boxes are populated with airports that have VOR devices. The azimuth entered is magnetic and the miles are nautical. The following example shows

triangulation using lookouts:

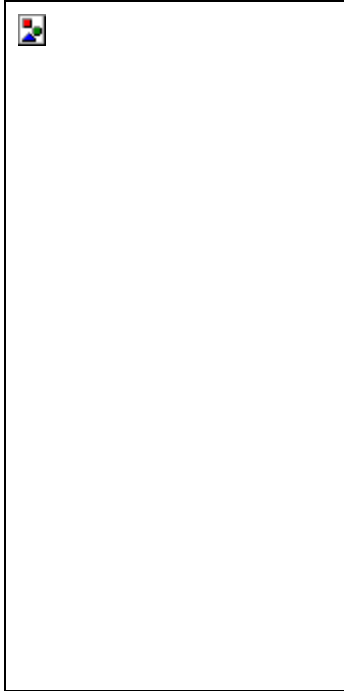


Smoke Chaser is a tool used when one or more lookouts report a suspected fire and radio an azimuth and distance. The pick list contains all the ODF lookouts and corrects for grid angle to show true directions. After the directions are entered the zoom button draws a black line from each lookout and re-centers the map. The identify tool may then be used to determine the legal location, or the latitude and longitude.

2. Temporary Flight Restrictions



To Create a TFR or Delete a TFR the user must select a fire ID from the select fire form and select continue. When deleting the TFR will be deleted for the fire identified. When creating a TFR a form will popup for the user enter information pertinent to the TFR. TFRs can be deleted and added by right clicking the mouse near a fire point location. A dropdown menu appears.



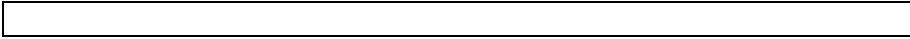
TFR Form



The Create Temporary Flight Restriction (TFR) tool is used when fire fighting operations require air space restrictions. This is especially important if a fire is in a Military Operations Area (MOA) or near a Military Training Route. The center of the TFR is the fire point selected by the user. The date fire name, fire number, and date boxes are automatically filled in. The user must enter the radius in nautical miles. The TFR tool then buffers that point with the radius specified. The TFR report shows the highest ground elevation in the buffer, the latitude and longitude, and the magnetic bearing and distance to the nearest aircraft VOR locator.



Tool bar:



The tool bar contains the following buttons from left to right:

Print - Prints what you see on your computer screen to the default printer.

Copy to clipboard - Copies what you see on your computer screen to the clipboard.

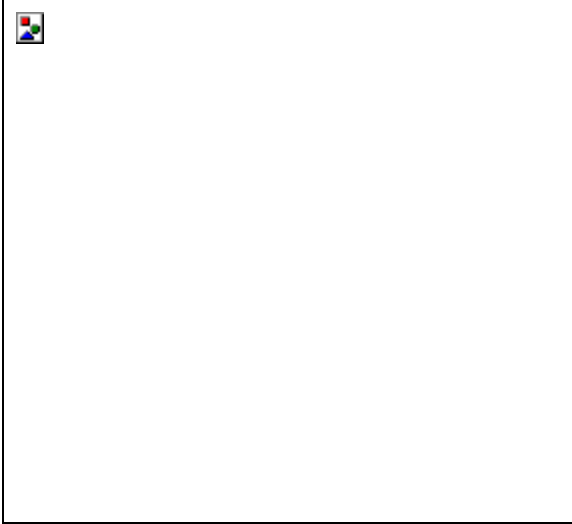
Set [Defaults](#) - Sets the default unit.

Zoom to State.

Zoom to Home Unit.

[Locate by Lat, Long, Legal, or Place Name](#)

Identify



When the Identify button is pressed clicking anywhere on the map will generate a report for that location. The report is copied to the clipboard automatically. To send the report to the default printer select print. For more information click on the following highlighted acronyms: Remote Automated Weather Station ([RAWS](#)), and very high frequency omnidirectional range ([VOR](#)).

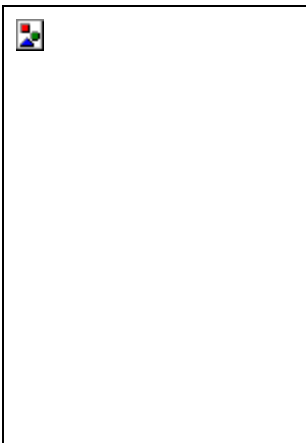
Zoom In

Zoom Out

Pan

Measure Length.

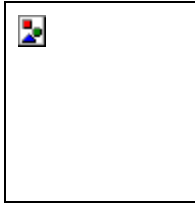
Click once to start, single to add to the measure line, double click to end and display the length measured.



Measure Area.

Click mouse to start, single click as many points around the object as you desire, double click to

end and display the area measured.



Move a Point.

This tool is used to interactively select and drag a point in the active theme to a new location on the computer screen. Push the left mouse button down near the point you wish to move and then keeping the left mouse button down drag the point to a new location. Release the mouse button to place the point. The point center will be placed where the finger pointer is when the mouse button is released.

Digitize a Point.

This tool is used to interactively place a point in the active theme using the mouse on the computer screen. Click on the location where you would like to insert the point and fill out the form that pops up.

Select a Point.

This tool is used to interactively select a point in the active theme using the mouse on the computer screen. Click on the point that you would like to edit and a form will popup so that you can edit the point.



Drop down box to select the active theme .

This theme shown in the box is the active theme. The move, select, and digitize tools and the edit options Add Location, Edit Location, and Delete Location operate on the active theme. For example to add a fire point from Fires and NFCAs make Fires and NFCAs the active theme and then select the pencil tool and click the location where you would like to add the point.

Display Map Tips

Display Map Title

Display Map Magnifier

Display Vicinity Map

Display a Legend

Refresh Map - Redraw the map

Status Bar:



The status bar at the bottom of the screen shows which tool is active, the latitude and longitude of the cursor, and the interval of tic marks when the map Title is active.

Right Mouse Click:

When either Fires and NFCAs or Burn Permits are the active theme a dropdown menu can be accessed when the right mouse button is depressed near a point.

?? Fires and NFCAs

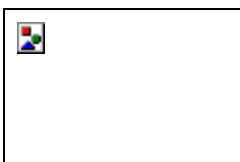


Create TFR - Creates a TFR around the fire.

Delete TFR - Deletes a TFR associated with the fire.

Create Report - Creates a fire report around the fire.

?? Burn Permits



Create Report - Creates a report describing the burn permit.

Data Entry Forms:

Incident Form:

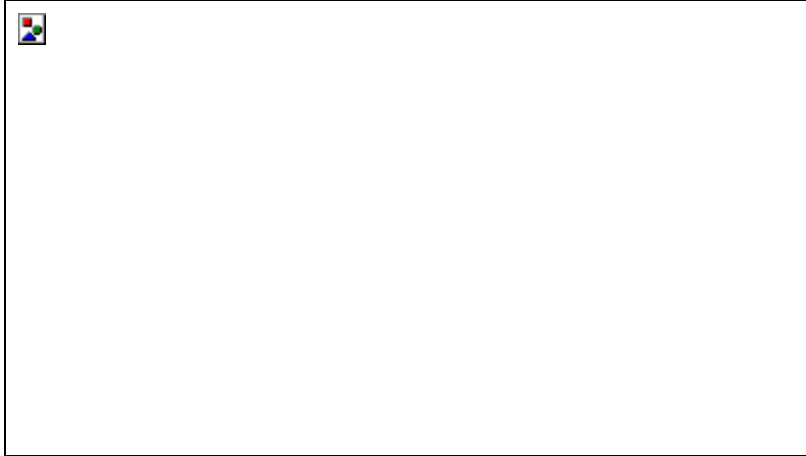
Input Boxes:

Incident Number - Combines the year in the first 4 digits with a sequential ID number in the last 4 digits.

Incident Date - The current date on the computer is automatically inserted. This cannot be changed.

Incident Time - The current time on the computer's clock is automatically inserted. This cannot be changed.

Incident Status - Enter the status of the incident if desired.



Change Status - The user can change the status of an incident to a Fire or NFCA or to a Miscellaneous or Assist. To do this click the change status button and select the radio button next to the destination status. Click OK and the appropriate data entry form will popup for you to enter attribute data.



Delete - The Incident selected will be deleted.

Move - The point will be moved to a new Latitude/Longitude location or a new legal description entered by the user.

Save - Changes made to the Incident Status will be saved.

Cancel - Close the form without doing any of the above.

Fire Form:

Input Boxes:

Fire Number - Combines the current calendar year, the ODF district, the ODF unit, and the fiscal year i.e. 00-711-0001-00.

Fire Type - Statistical, Non-statistical, or NFCA.

Fire Name - Up to 20 characters.

Fire Report Date - The date the fire was reported.

Fire Acres - The number of acres the fire consumed.

General Cause - Select from dropdown list.
Specific Cause - Select from dropdown list.

A large empty rectangular box with a thin black border. In the top-left corner, there is a small icon consisting of four colored squares (red, green, blue, and yellow) arranged in a 2x2 grid.

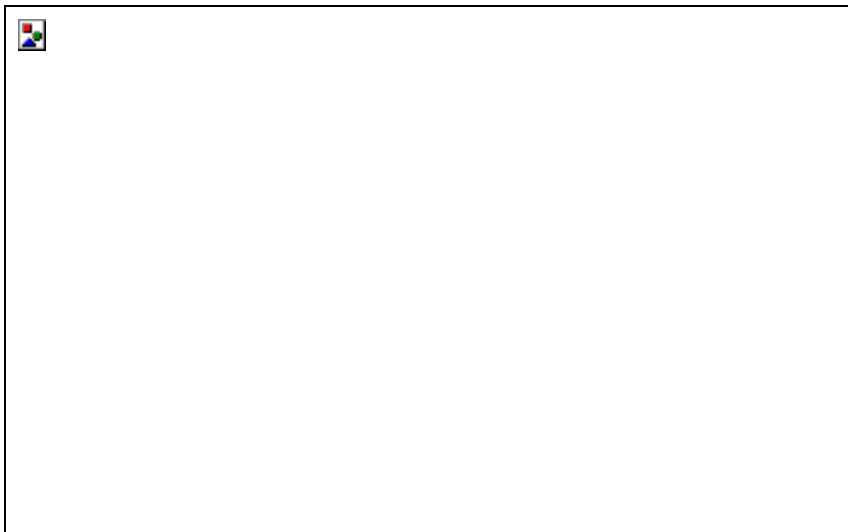
Delete - The fire point selected will be deleted.

Move - The fire point will be moved to a new Latitude/Longitude location or a new legal description entered by the user.

Save - Changes made to the form will be saved.

Cancel - Close the form without doing any of the above.

Create Report - A text report shown below will be shown in wordpad on the computer screen and written to disk in the fires subdirectory \shapes\fires.

A large empty rectangular box with a thin black border. In the top-left corner, there is a small icon consisting of four colored squares (red, green, blue, and yellow) arranged in a 2x2 grid.

Assist and Miscellaneous Form:

Input Boxes:

ID Number - Combines the year in the first 4 digits with a sequential ID number in the last 4

digits.

Type - Assists or Miscellaneous.

Incident Date - The date event was reported.

Agency Assisted - Enter up to 30 characters.

District Cost - Decimal Number.

Extended Cost - Decimal Number.



Delete - The point selected will be deleted.

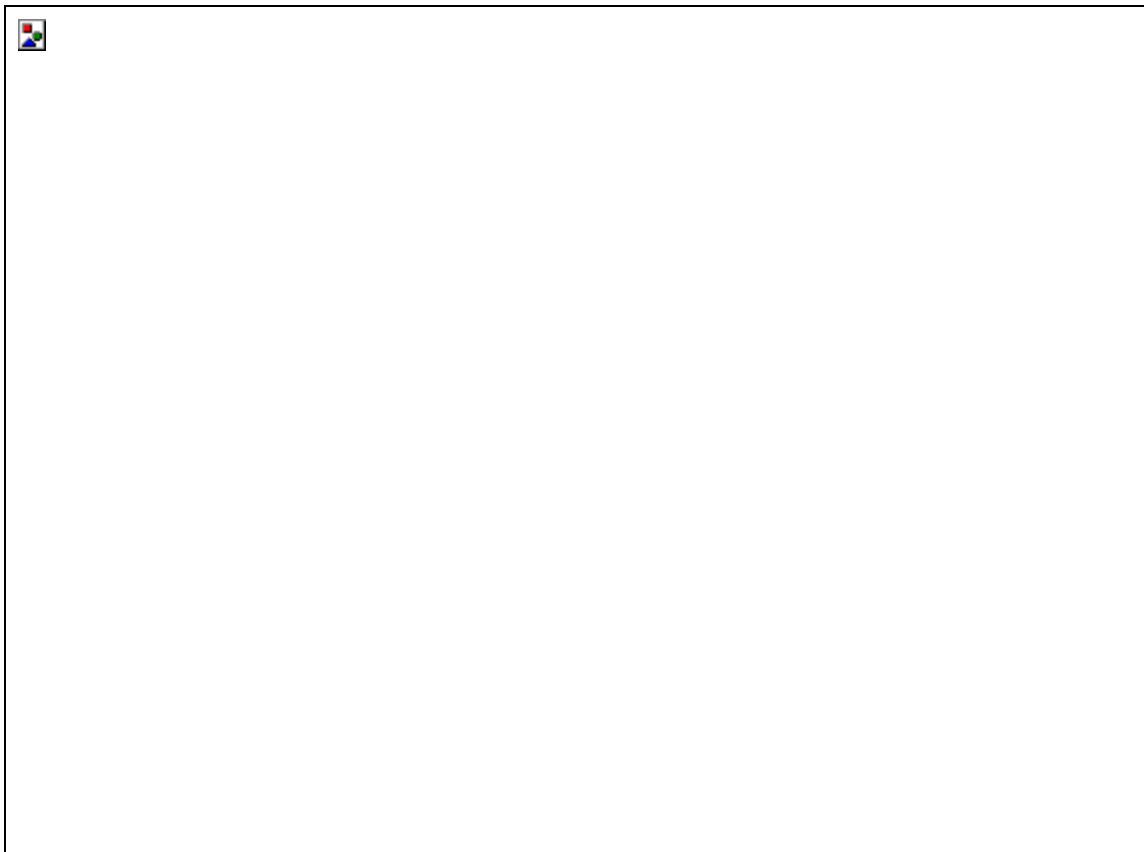
Move - The point will be moved to a new Latitude/Longitude location or a new legal description entered by the user.

Save - Changes made to the form will be saved.

Cancel - Close the form without doing any of the above.

Burn Permit Form:

Input Boxes



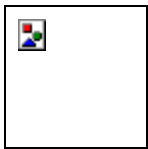
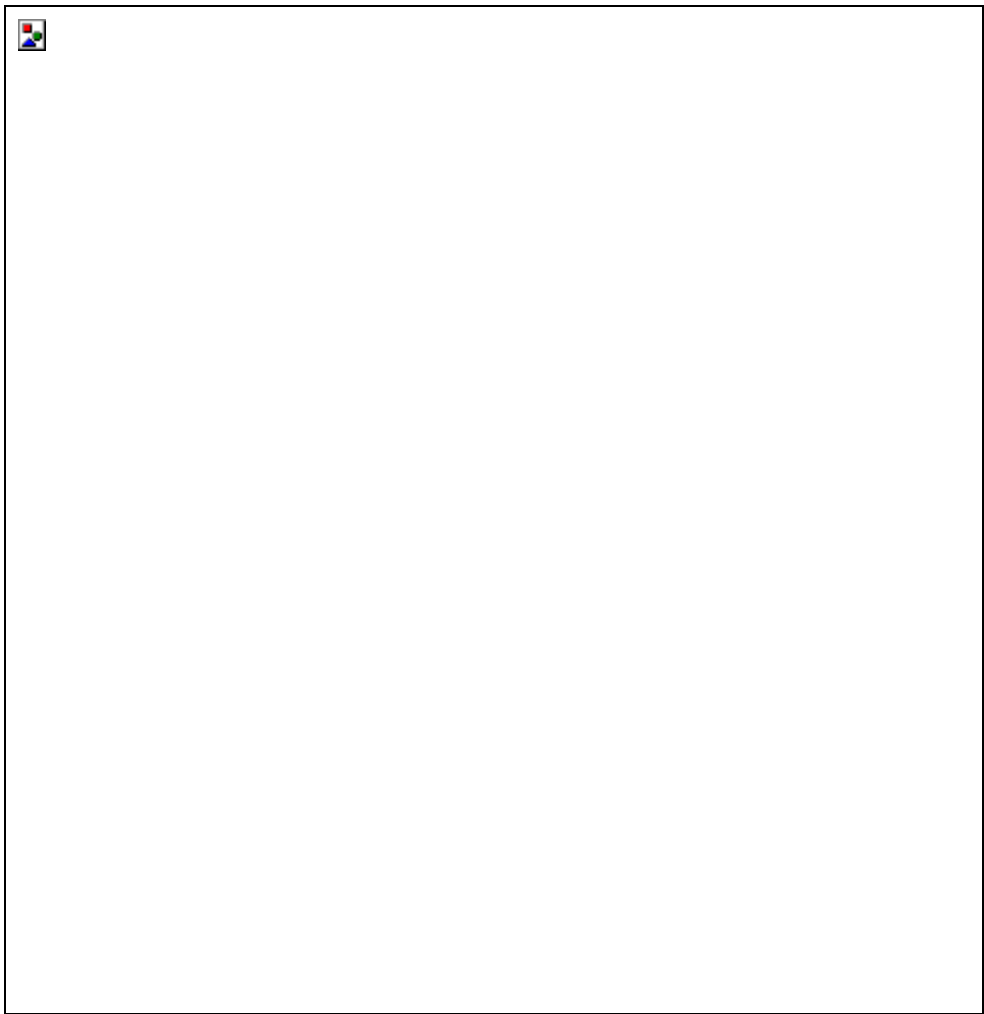
Delete - The burn permit point selected will be deleted.

Move - The burn permit point will be moved to a new Latitude/Longitude location or a new legal description entered by the user.

Save - Changes made to the form will be saved.

Cancel - Close the form without doing any of the above.

Create Report - A text report shown below will be shown in notepad on the computer screen and written to disk in the fires subdirectory \shapes\fires.



August 15, 2000

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