

Tutorial G

How to Use IFTDSS to Spatially Evaluate Fuels Treatment Effectiveness

Identify, Simulate, and Assess Effectiveness of
Fuels Treatments Across a Landscape

Overview

This landscape-based tutorial covers

- Acquiring LANDFIRE data and setting up a project in IFTDSS.
- Creating a run focusing on fire behavior across a landscape (IFT-FlamMap).
 - Establishing environmental parameters.
 - Reviewing spatial landscape input data and fire behavior output data.
- Identifying fuels treatment locations and manipulating the LANDFIRE data to reflect fuels treatments.
- Reviewing pre- and post-treatment fire behavior to evaluate fuels treatment effectiveness.
- Discussing fuels treatment caveats.

Introduction

You can use the spatial “fuels treatment across a landscape” pathways to assess where to locate fuels treatments and to evaluate how effective fuels treatments are at mitigating fire behavior potentials in a spatial context.

You can simulate fuels treatments in a landscape by manually drawing polygons. To simulate treatments, you use a set of tools to manually edit a LANDFIRE .lcp file. With these tools, you can alter values within the fuels treatment polygon (fuel model, canopy height, canopy base height, canopy bulk density, and canopy coverage) to reflect a fuels treatment.

After creating and configuring these polygons, you then run spatial fire behavior modules such as IFT-FlamMap, IFT-MTT, and IFT-RANDIG across the untreated and treated landscape to compare possible effects of treating the fuels on subsequent fire behavior, fire growth, and burn probability.

IFTDSS produces digital maps of percent difference for fire behavior parameters to identify where positive and negative changes have occurred across the landscape because of modeled fuels treatments.

Introduction

The output from the fuels treatment workflow can be useful for

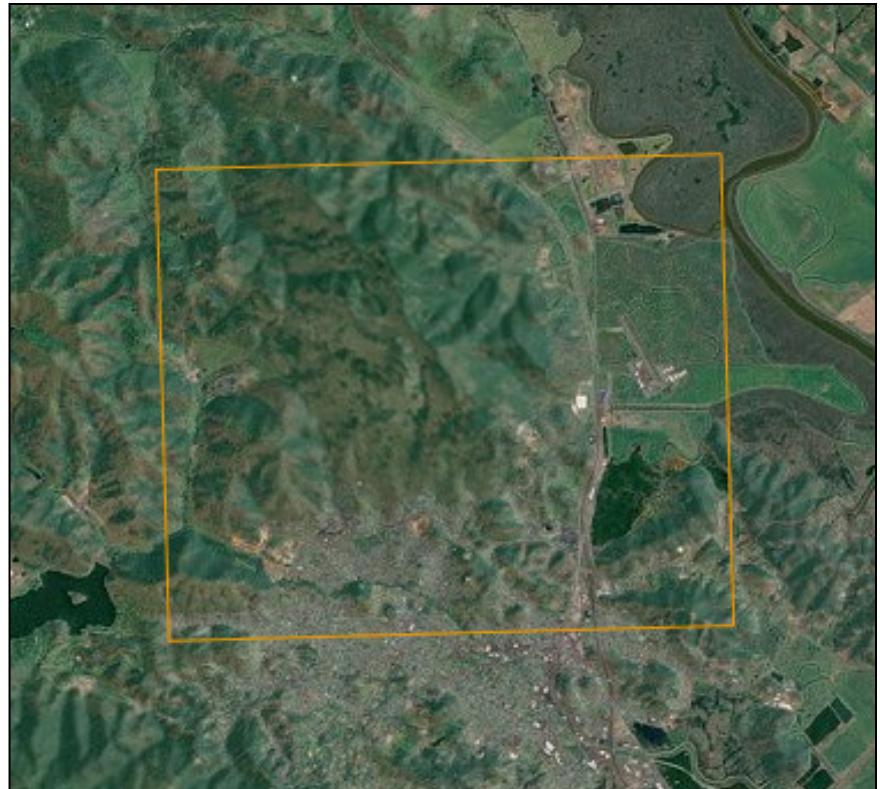
1. Identifying where fuels treatments may have the greatest influence for mitigating wildland fire at the stand or landscape scale.
2. Investigating the potential effectiveness of fuels treatments across spatial and temporal scales.
3. Providing tools and processes for fuels treatment planners to evaluate potential fuels treatment options, including no treatment, pile and burning, thin from below, thin by DBH, pile burn surface fuel, and prescribed burn at the stand level.

The following tutorial focuses on using the IFTDSS system to (1) identify where fuels treatments may have the greatest influence for mitigating wildland fire at the landscape scale, and (2) investigate the potential effectiveness of fuels treatments across spatial scales.

Tutorial Objectives

- Walk step by step through a fuels treatment pathway in IFTDSS.

There are multiple ways that fuels treatment effectiveness can be addressed. This tutorial uses one possible set of criteria for identifying fuels treatment locations and evaluating the effectiveness of fuels treatments, while introducing some of the functionality within IFTDSS.
- Identify where to perform fuels treatments based on high fire hazard potentials surrounding the Olompali State Historic Park (located near Novato, California).
- Investigate the potential effectiveness of fuels treatments on mitigating modeled fire behavior at the landscape level.
- Discuss caveats to this approach.

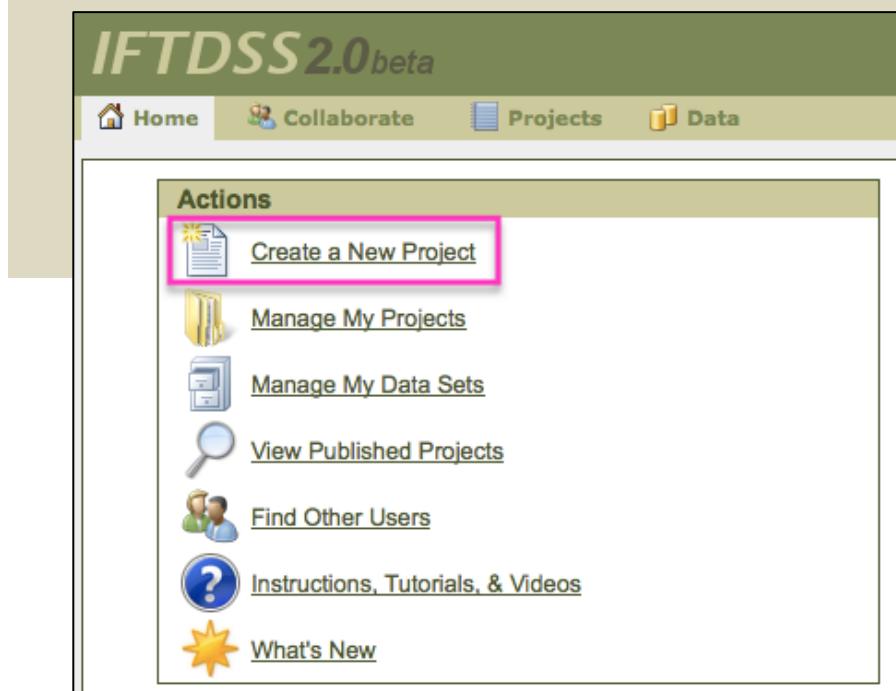


Getting Started

To begin, click **Create a New Project** under the Home tab.

- Choose a descriptive project name.
- If desired, fill in the optional information.

Choose **Next**.



Create New Project Help

Project Name
Fuels Treatment - Olompali SHP

Optional Information:

Organization Name
Sonoma Technology, Inc.

Project Start Date 1/8/13

Project End Date 2/8/13

Project Size 11,000 acres

Treatment Type Fuels Treatment

Project Status Planned

Description

Olompali State Historic Park:
(1) Identify where to perform fuels treatments based on high fire hazard potentials.
(2) Investigate the potential effectiveness of fuels treatments on mitigating modeled fire behavior at the landscape level.

Next

Getting Started

After creating a new project, you will see the page for creating a new run. The next step is to acquire LANDFIRE data, so we are going to navigate away from this page.

Access the project you created. In this example, we chose the **Fuels Treatment – Olompali SHP** link.

The screenshot shows the IFTDSS 2.0 beta interface. At the top, there is a navigation bar with links for Home, Collaborate, Projects, Data, About, Help, Feedback, and Log Out. The user is logged in as Banwell, Erin. A pink box highlights the 'Fuels Treatment - Olompali SHP' link in the Projects menu. Below the navigation bar, a green box displays a success message: 'Created project "Fuels Treatment - Olompali SHP".' On the left, there is a sidebar with a tree icon and a list of project types: Hazard Analysis, Risk Assessment, Fuels Treatment, and Prescribed Burn Planning. On the right, a larger box contains descriptive text about the tools available for Prescribed Burn Planning, Hazard Analysis, and Risk Assessment.

IFTDSS 2.0 beta

Home Collaborate Projects Data

About Help Feedback Log Out

Logged in as Banwell, Erin

Fuels Treatment - Olompali SHP

• Created project "Fuels Treatment - Olompali SHP".

Choose the type of run you would like to create:

Start ▶ By IFTDSS Workflows ▶ Back

Hazard Analysis

Risk Assessment

Fuels Treatment

Prescribed Burn Planning

IFTDSS currently provides tools for Prescribed Burn Planning, Hazard Analysis, and Risk Assessment. The Prescribed Burn Planning tools allow you to model fire behavior and fire effects and develop burn plan documentation. The tools available for assessing hazard allow you to model potential fire behavior across a landscape to identify areas that may be potentially hazardous if a fire were to occur. The risk assessment tools allow you to predict the potential benefit or loss of values at risk across a landscape given current vegetation conditions and assumptions about fire weather.

Getting Started

Now, we will acquire data from LANDFIRE.

IFTDSS 2.0 beta

Home Collaborate Projects Data

Logged in as Banwell, Erin

Create New Run

Fuels Treatment - Olompali SHP

Project Summary

Information	Edit
Organization Name: Sonoma Technology, Inc.	
Project Start Date: 1/8/13	
Project End Date: 2/8/13	
Project Size: 11,000 acres	
Treatment Type: Fuels Treatment	
Project Status: Planned	
Description: Olompali State Historic Park: (1) Identify where to perform fuels treatments based on high fire hazard potentials. (2) Investigate the potential effectiveness of fuels treatments on mitigating modeled fire behavior at the landscape level.	
Date Modified: 01/09/2013	
Date Created: 01/09/2013	

First, choose Acquiring data from LANDFIRE.

Area of Interest

Define your project area of interest by:

[Acquiring data from LANDFIRE](#)

[Manually defining the project area](#)

[Uploading a LCP file](#)

Runs

Getting Started

Select **Acquire data from LANDFIRE**, and then choose **Next**.

The screenshot shows a software interface with a green header bar containing icons for Home, Collaborate, Projects, and Data, and a user logged in as Tecuya. The main content area has a light gray background and displays the following text:

Select a Data Set and an Area of Interest for your Project

Note that the data set you select will define the area of interest for your project.

Acquire data from LANDFIRE

Use an existing data set: Olompali State Historic Park ▾

Upload a new data set

Next

A pink rectangular box highlights the "Acquire data from LANDFIRE" radio button. A pink rectangular box also highlights the "Next" button at the bottom left. An orange callout box on the right side contains the following tip:

Tip: If you completed Tutorial D or Tutorial E, you can choose **Use an existing data set** and select **Olompali State Historic Park** from the dropdown. Then choose **Next** and skip to page 13.

Selecting a Project Area of Interest

Navigate to your desired location using one of these methods:

- A** Use the navigation tools located in the top left portion of the map.
- B** Use the mouse. Click and drag to move; double-click to zoom in.
- C** Enter coordinates.

Tip: For this example, enter the following coordinates:

- **North:** 38.164505878997
- **East:** -122.54560796614
- **South:** 38.111039352952
- **West:** -122.62800542709

IFTDSS 1.1 beta [About](#) [Help](#) [Feedback](#) [Log Out](#)
Logged in as Banwell, Erin

Risk Assessment - Olompali SHP.

Set Up Project Area of Interest

Data Set Name

Resolution meter

North
46.211938222108

West
-123.9174490755

East
-76.98385531904

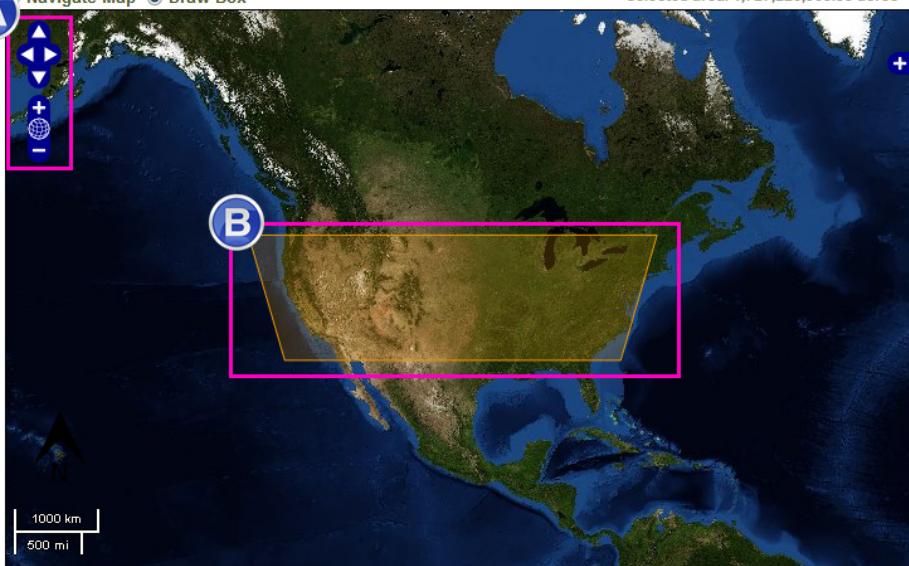
South
31.524441553863

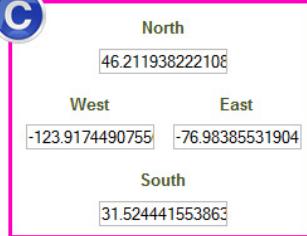
Define the area of interest for your project by using the Draw Box tool to select an area on the map below or by using the latitude and longitude coordinate boxes to the left. Once you define the area of interest for a project, it cannot be changed without creating a new project.

Currently, acquisition of LANDFIRE data is limited to 250,000 acres; however, this size limit will be increased to accommodate larger landscapes in future software releases.

Selected area: 1,727,220,963.55 acres

A Navigate Map Draw Box

B 

C 

1000 km
500 mi

Back Next

Selecting a Project Area of Interest

Name the data set.

Select a [LANDFIRE data layer](#) (LANDFIRE 2008 v 1.10 or LANDFIRE Refresh v 1.05 from 2001).

Select a fuel model type ([Scott and Burgan 40](#) or [Anderson 13](#)).

Set Up Project Area of Interest

Data Set Name
Olompali State Historic Park

LANDFIRE Data Layer
LANDFIRE 2008 (v 1.10)

Fuel Model
Scott and Burgan 40

North
38.164505878997

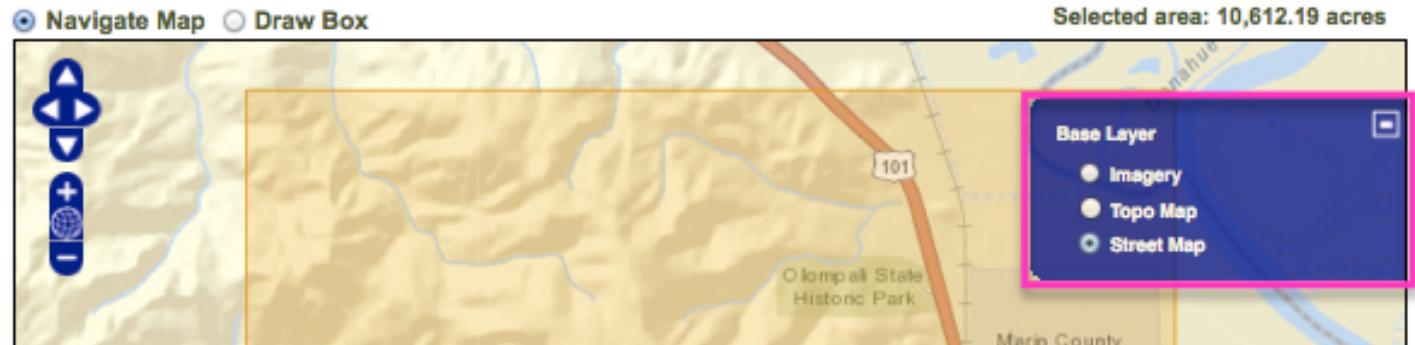
West
122.62800542709

East
122.54560796614

South
38.111039352952

Define the area of interest for your project by using the Draw Box tool to select an area on the map below or by using the lat/lon coordinates.

Click on the plus sign (+) in the upper right corner of the map to view different base layers (Imagery, Topo Map, or Street Map).



Selecting a Project Area of Interest

Choose **Next** to import LANDFIRE data.

There will be a short wait while IFTDSS imports the LANDFIRE data.

Tip: In this type of fuels treatment assessment, select a large data set area. By creating a large data set area, you can model fire behavior across a landscape to identify possible fire hazard areas where fuels treatments may be warranted.

Maximum area: Acquisition of LANDFIRE data is set to a limit of 400,000 acres.

Note: Once you select a data set, the project area cannot be changed. To change the project area, you must create a new project.

acres; however, this size limit will be increased to accommodate larger landscapes in future software releases.

Set Up Project Area of Interest

Data Set Name: Olompali State Historic Park

North: 38.164505878997

West: 122.62800542709

East: 122.5456079661

South: 38.111039352952

LANDFIRE Data Layer: LANDFIRE 2008 (v 1.10)

Fuel Model: Scott and Burgan 40

Selected area: 10,612.19 acres

Base Layer: Imagery, Topo Map, Street Map

30 meter resolution

Back **Next**

Creating a New Run

After acquiring the LANDFIRE data, you are returned to the **Project Summary** page.

For use in spatial modules, you now have

(A) a Project Area of Interest

and

(B) a Project Data Set.

For your next step, choose **Create New Run**.

A

Project Summary

Information

Organization Name: Sonoma Technology, Inc.
Project Start Date: 1/8/13
Project End Date: 2/8/13
Project Size: 11,000 acres
Treatment Type: Fuels Treatment
Project Status: Planned
Description: Olompali State Historic Park: (1) Identify where to perform fuels treatments based on high fire hazard potentials. (2) Investigate the potential effectiveness of fuels treatments on mitigating modeled fire behavior at the landscape level.
Date Modified: 01/09/2013
Date Created: 01/09/2013

Area of Interest

Northeast corner:
Latitude: 38.1645533°
Longitude: -122.5455350°

Southwest corner:
Latitude: 38.1110394°
Longitude: -122.6280054°

Total Area:
10,612.19 Acres
42,946,200 m²

Resolution: 30.0m x 30.0m

[Import Landscape data from LANDFIRE](#)
[Import Fuelbeds from LANDFIRE](#) [Upload Landscape Data Set](#)

Runs

Run Name	Pathway	Date Modified	Date Created	Actions
No data available in table				

Filters: (all) (all) (all)

[Create New Run](#)

Project Data Sets

Data Set Name	Date Modified	Date Created	Status	Actions
Olompali State Histo...	01/09/2013	01/09/2013	Ready	(all)

B

Creating a New Run

Choose the type of run you would like to create by choosing the following links:

Fuels Treatment

↳ Fuels Treatment across a Landscape

↳ LANDFIRE

↳ Manual treatment location
(user-defined treatments)
(IFT-FlamMap)

In this **run**, you will

- a. Select an area of interest.
- b. Input your environmental parameters.
- c. Review the spatial landscape data.
- d. Review the fire behavior output data and identify fuels treatment locations.
- e. Manipulate the LANDFIRE data to reflect fuels treatments.
- f. Review pre- and post-treatment fire behavior to evaluate fuels treatment effectiveness.

Note: Later you may want to model the same area using IFT-MTT, IFT-RANDIG, and/or the Worst Case Flame Length Risk pathways.

Choose the type of run you would like to create:

Start ▶ By IFTDSS Workflows ▶

↳ Hazard Analysis

↳ Risk Assessment

↳ **Fuels Treatment**

↳ Prescribed Burn Planning

Start ▶ By IFTDSS Workflows ▶ Fuels Treatment ▶

↳ **Fuels Treatment across a Landscape**

Start ▶ By IFTDSS Workflows ▶ Fuels Treatment ▶ Fuels

↳ **LANDFIRE**

**Manual treatment location (user-defined treatments)
(IFT-FlamMap)**

Manual treatment location (user-defined treatments) (IFT-MTT)

Manual treatment location (user-defined treatments)
(IFT-RANDIG)

Manual treatment location (user-defined treatments) (Worst
Case FL - Risk)

Selecting an Area of Interest

Tip: Give your runs descriptive names for future reference.

In this step, select an area of interest within the project boundary. For this example, we selected the entire project boundary. This approach is useful if you want to model fire behavior across a landscape.

After selecting an area of interest, choose **Next**.

Create New Run: Manual treatment location (user-defined treatments) (IFT-FlamMap)

Run Name: Olompali Fuels Treatment

Coordinates:

North	38.1645533
West	-122.6280355
East	-122.545535
South	38.1110393

The extent of the box in the map window shows the project area that you have selected for this run. To change the area for this run, use the Draw Box tool to select a smaller area within the box shown in the map window.

Selected area: 10,710.05 acres

Map controls: Navigate Map, Draw Box, Selected area: 10,710.05 acres

Map view: Satellite view of a hilly landscape with a large orange selection box covering most of the area. A scale bar indicates 1000 m / 2000 ft. A north arrow is present.

Next

Selecting a Data Set

Select the “Olompali State Historic Park (100%)” data set and choose **Next**, which takes you to the Review Landscape Data step.

The screenshot shows the IFTDSS software interface. At the top, there is a navigation bar with steps: Configure, Review Landscape Data, Inputs, Pre-Treatment Outputs, Post-Treatment Outputs, and Run. Below this is a toolbar with tabs for Olompali Fuels Treatment, Help, and Tools. The main area has a title 'Select Data Set'. Underneath it, there is a dropdown menu labeled 'Available Data Sets: Olompali State Historic Park. (100%)'. A note explains that percentages next to data set names indicate the percent that the data set covers the selected run area. Another note states that a copy of the selected data set will be made for the run. There is also an 'Import Polygons' section with a dropdown menu and a 'Next >' button highlighted with a pink box. A note on the right side provides instructions for creating polygon data sets and saving them for future use.

Configure Review Landscape Data Inputs Pre-Treatment Outputs Post-Treatment Outputs Run ▶

Olompali Fuels Treatment. - Manual treatment location (user-defined treatments) (IFT-...)

Help Tools

Select Data Set

Available Data Sets: Olompali State Historic Park. (100%)

Percentages next to data set names indicate the percent that the data set covers the selected run area. A copy of the data set that you select will be made for this run. Changes to the original data set will not affect this run. If you want to change the data set, re-import the selected data set into this run, return to this step later and click the Edit button.

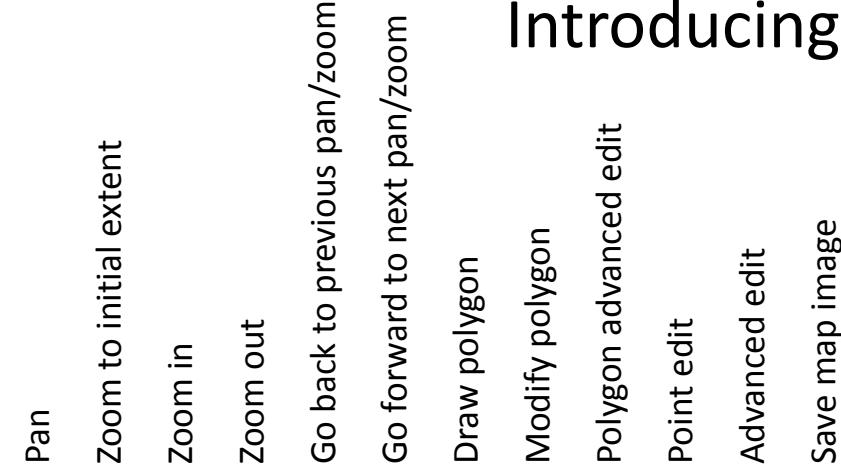
Import Polygons

Import Polygons (optional):

Next >

Note: In the risk assessment and fuels treatment workflows within IFTDSS, you must create polygon data sets. You have the option of saving these data sets for use in other runs (see page 41). If you have any saved polygon data sets, they will appear under the Import Polygons dropdown.

Introducing the Map Toolbar



Now you are on the **Review Landscape Data** step.

The map toolbar, located at the top of the map, provides tools for viewing and editing data.

Hover your cursor over each tool for a brief description of that tool.

Reviewing Spatial Landscape Data

The screenshot shows a software interface for reviewing spatial landscape data. On the left, there's a sidebar with 'Layers' and 'Exports' buttons, followed by sections for 'Base Layer' (Street Map, Topo Map, Imagery), 'Overlays' (USA Federal Lands, Drawn Polygons, Data Set Boundary), and 'Landscape' (Fire Behavior Fuel Model, Elevation, Slope, Aspect, Canopy Coverage, Canopy Height, Canopy Base Height, Canopy Bulk Density). A pink circle highlights the 'Fire Behavior Fuel Model' checkbox, which is checked. The main area is a map with a legend titled 'Fire Behavior Fuel Model' on the right. The legend lists 18 categories with corresponding color swatches: NB1: Urban/Developed (light gray), NB3: Agricultural (dark gray), NB8: Open Water (blue), NB9: Bare Ground (black), GR1(101) (yellow), GR2(102) (light yellow), GR7(107) (orange), GS1(121) (dark green), GS2(122) (medium green), SH2(142) (brown), SH7(147) (dark brown), TU2(162) (light green), TU5(165) (dark green), TL2(182) (cyan), TL3(183) (light blue), TL4(184) (blue), and TL6(186) (teal). A pink arrow points from the highlighted 'Fire Behavior Fuel Model' in the sidebar to the legend.

Now you can review your spatial landscape data using the map.

In this example, you can see the project area classified by **Fire Behavior Fuel Model**.

Note: The area below is dominated by the following fuel models:

- Brown pixels = SH7(148): Very high load, dry climate shrub
- Dark green pixels = TU5(165): Very high load, dry climate timber-shrub
- Blue pixels = TL9(189): Very high load broadleaf litter

Tip: Click on Fuel Models under the Help dropdown menu to read a description of the environment and fuels for each fuel model.

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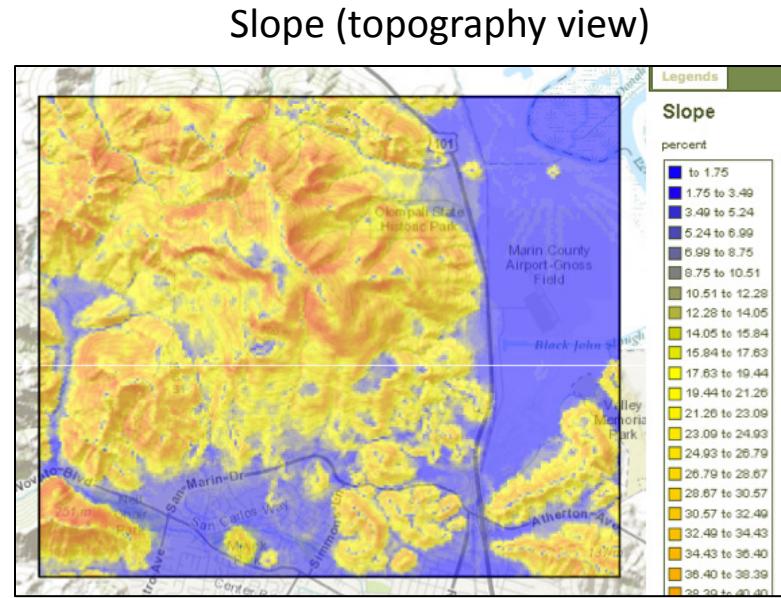
Reviewing Spatial Landscape Data

You can view the project area by the following LANDFIRE data layers:

- Fuel Model
- Elevation
- Slope
- Aspect
- Canopy Coverage
- Canopy Height
- Canopy Base Height
- Canopy Bulk Density

You can also view the project area using imagery, topography, or street maps within IFTDSS. Toggle between these layers under the Base Layer section on the Layers tab.

Canopy Height
(street view)

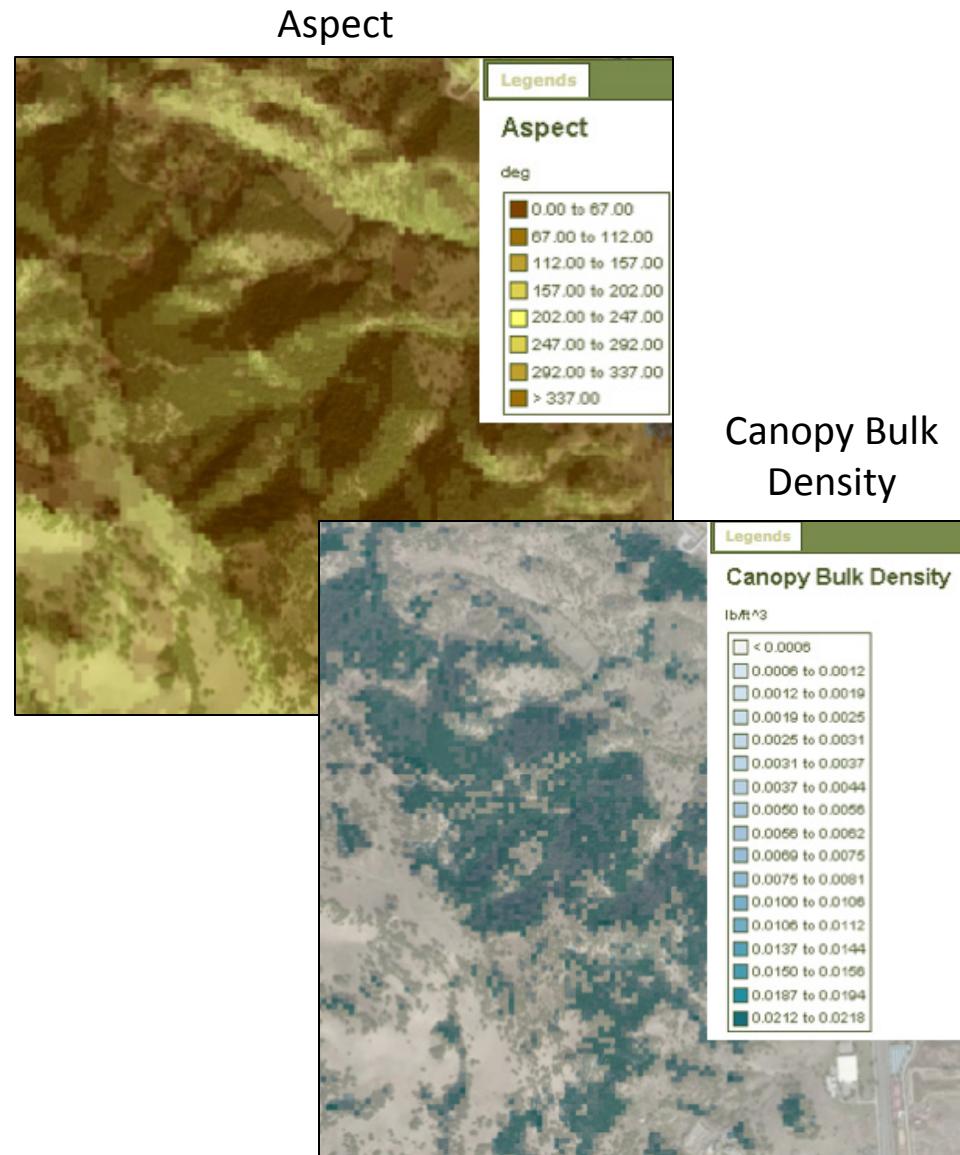


Reviewing Spatial Landscape Data

Tip: Fire hazard and fuels treatment placement efforts tend to concentrate on stand-level fuels and their characteristics without recognizing the spatial influence of **topography, winds, and adjacent fuels**.

Recognizing the spatial influence of these variables is important to fuels treatment placement because spatial patterns of landscape composition and structure influence fire spread and intensity.

Consider reviewing a number of fire-related descriptors (aspect, slope, etc.), rather than basing fire hazard estimates on a single variable (e.g., flame length).



Editing Spatial Landscape Data (One Grid at a Time)

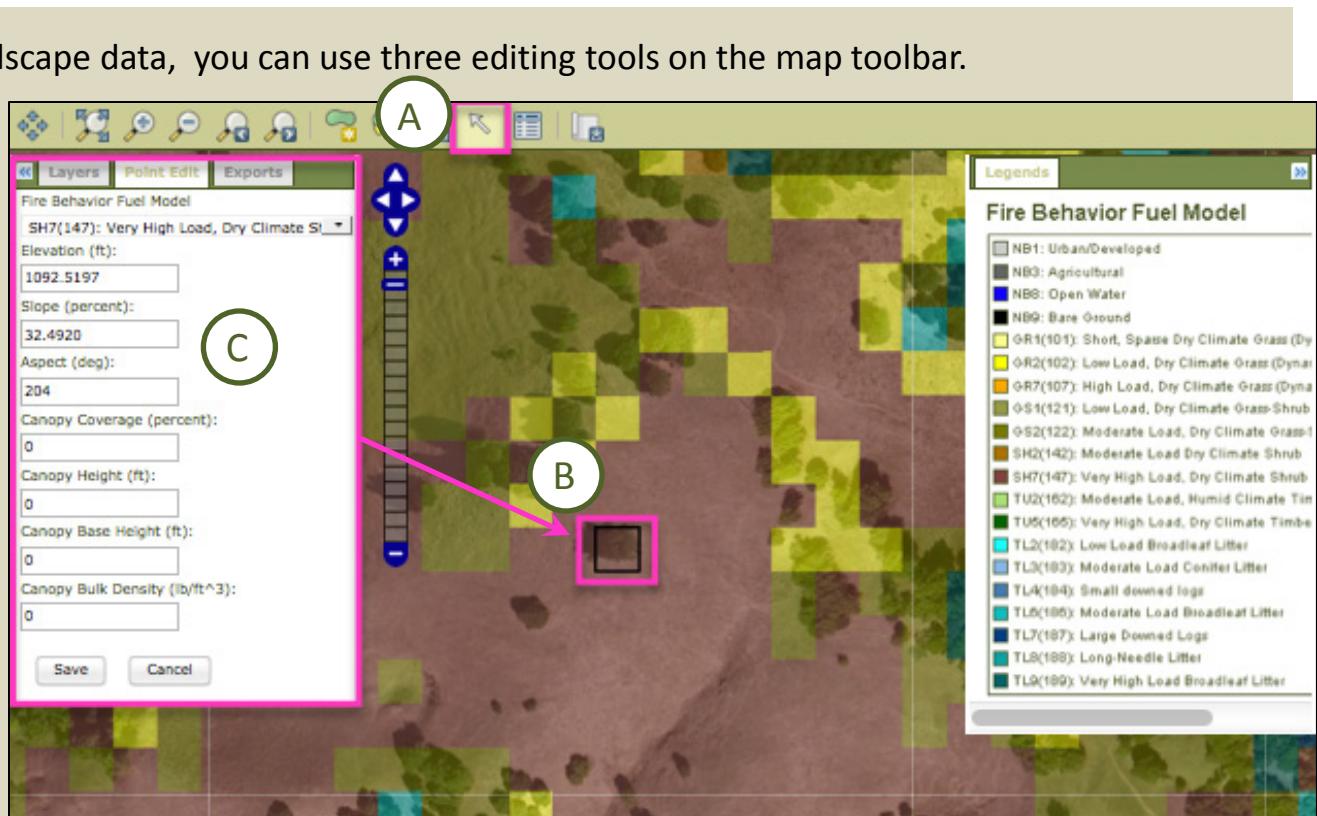
If you need to edit the spatial landscape data, you can use three editing tools on the map toolbar.

- **Point Edit:** edit one grid cell at a time
- **Advanced Edit:** edit grid cells across the entire run area.
- **Polygon Advanced Edit:** edit all pixels within a user-drawn polygon

In order to edit one grid at a time:

- Select the **Point Edit** tool.

- Click on the grid cell you would like to edit, and the **Point Edit** panel appears.
- Edit the grid cell data and choose **Save**.



The next page shows how to edit the spatial landscape data using the **Advanced Edit** tool.

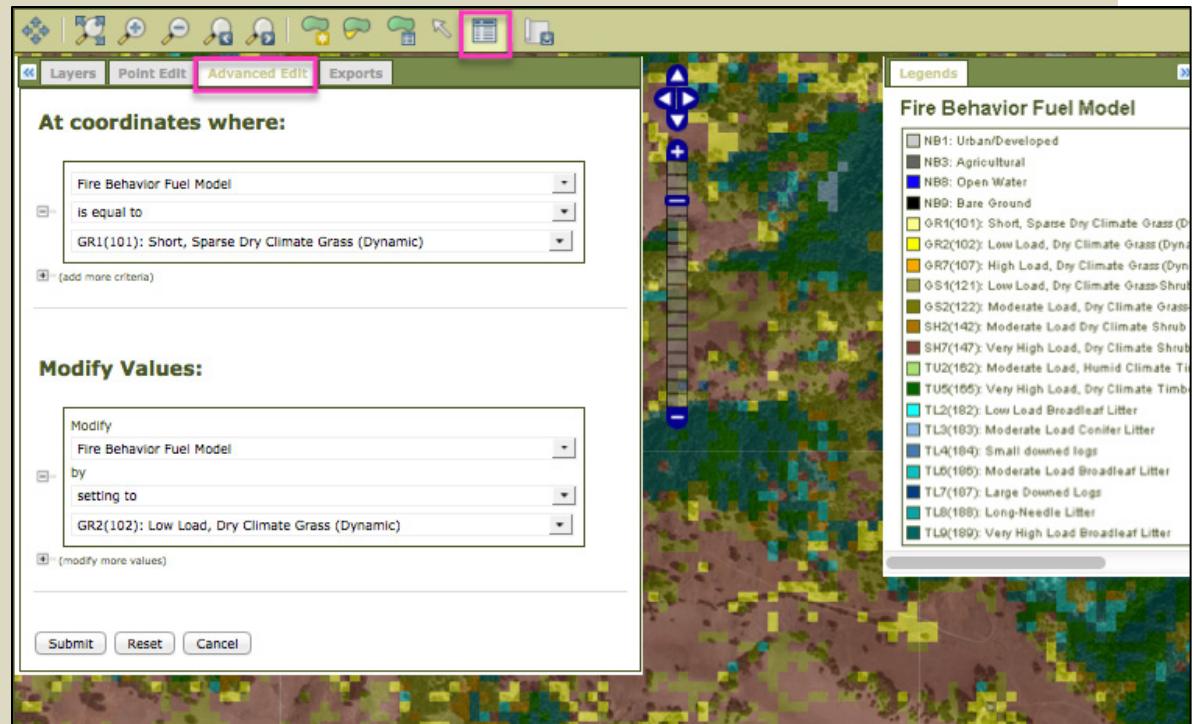
Editing Spatial Landscape Data (Multiple Grids Across the Run Area)

In the previous example, we showed how to edit grid cells one at a time. You can also use the **Advanced Edit** tool to edit multiple cells at once.

To get started, select the **Advanced Edit tool**. The  Advanced Edit panel appears.

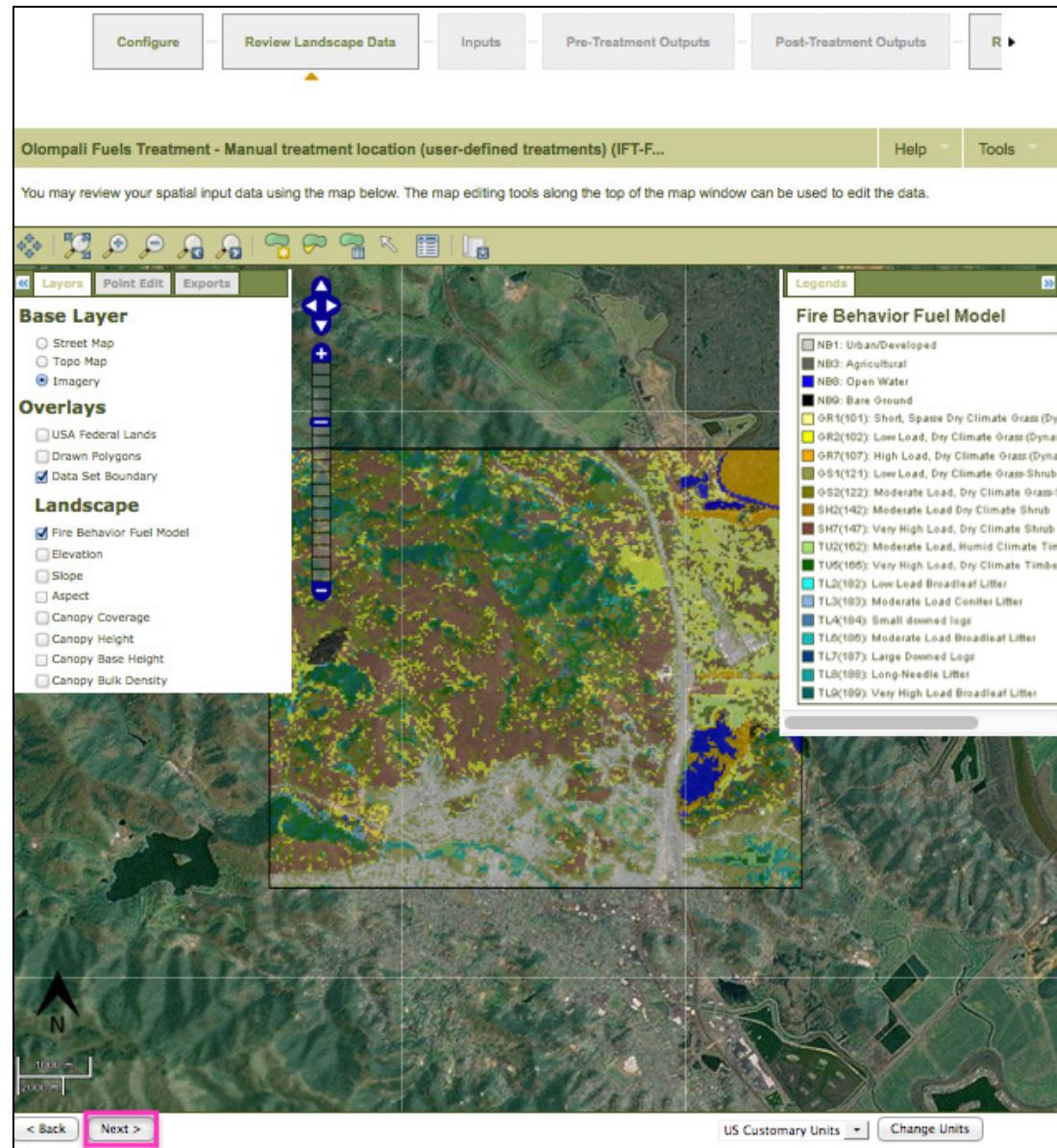
In this panel, you can modify any of the spatial data in query format so that multiple cells can be changed at once.

To learn how to edit pixels using the **Polygon Advanced Edit** tool, see pages 37 through 40.



Reviewing Spatial Landscape Data

After reviewing and editing the spatial landscape data, choose **Next**. This takes you to the **Inputs** step.



Inputting Environmental Parameters

The screenshot shows a software interface for fuel treatment planning. At the top, there is a navigation bar with tabs: 'Configure', 'Review Landscape Data', 'Inputs' (which is highlighted in green), 'Pre-Treatment Outputs', 'Post-Treatment Outputs', and 'Run'. Below the navigation bar, the title 'Olompali Fuels Treatment - Manual treatment location (user-defined treatments) (IFT-F...)' is displayed, along with 'Help' and 'Tools' buttons. The main content area is divided into sections: 'Properties' (with 'Crown Fire Calculation Method' set to 'Finney Method'), 'Fuel Moisture' (with five parameters listed: 1-hr Fuel Moisture at 6%, 10-hr Fuel Moisture at 7%, 100-hr Fuel Moisture at 8%, Live Herbaceous Fuel Moisture at 60%, and Live Woody Fuel Moisture at 90%), and 'Weather' (with two parameters listed: Wind Direction at 290 degrees and 20-ft Wind Speed at 15.00 mi/h). At the bottom, there are buttons for '< Back' and 'Next >', and a unit selection dropdown set to 'US Customary Units' with a 'Change Units' button.

Olompali Fuels Treatment - Manual treatment location (user-defined treatments) (IFT-F...)

Help Tools

Properties

Crown Fire Calculation Method Finney Method

Generate Gridded Winds No

Fuel Moisture

Parameter	Unit	Simulation #1
1-hr Fuel Moisture	percent	6
10-hr Fuel Moisture	percent	7
100-hr Fuel Moisture	percent	8
Live Herbaceous Fuel Moisture	percent	60
Live Woody Fuel Moisture	percent	90

Weather

Parameter	Unit	Simulation #1
Wind Direction	deg	290
20-ft Wind Speed	mi/h	15.00

< Back Next >

US Customary Units Change Units

Now you are on the **Inputs** step. The input fields are pre-populated with default values.

Definitions and possible value ranges are displayed when you hover your mouse cursor over the underlined parameters.

The next step is to input custom fuel moisture and weather information.

These inputs are covered on the next page.

Inputting Environmental Parameters

Select the crown fire calculation method and input dead and live fuel moisture, wind speed, and wind direction.

Tip: When assessing fire hazard and fuels treatment placement across large landscapes, especially in mountainous terrain, weather conditions can vary across diverse topographic settings.

Create multiple runs to test different weather scenarios that can produce

- Low fire behavior
- High fire behavior
- Extreme fire behavior

For this example, we input environmental characteristics that would produce high fire behavior.

Choose **Next**, which takes you to the pre-treatment outputs step.

There will be a short wait while the IFT-FlamMap module runs.

Properties

Crown Fire Calculation Method: Finney Method

Generate Gridded Winds: No

Fuel Moisture

Parameter	Unit	Simulation #1
1-hr Fuel Moisture	percent	4
10-hr Fuel Moisture	percent	6
100-hr Fuel Moisture	percent	8
Live Herbaceous Fuel Moisture	percent	55
Live Woody Fuel Moisture	percent	80

Weather

Parameter	Unit	Simulation #1
Wind Direction	deg	270
20-ft Wind Speed	mi/h	40

< Back **Next >**

Note: Finney is the recommended crown fire calculation method when using LANDFIRE 2008 (v 1.10) or LANDFIRE Refresh (v 1.05). The Scott-Reinhardt crown fire method may be more appropriate when using unmodified LANDFIRE data.

However, you should test each method to determine which works best for your local vegetation. The Scott-Reinhardt method will generally result in more crown fire being modeled across the landscape.

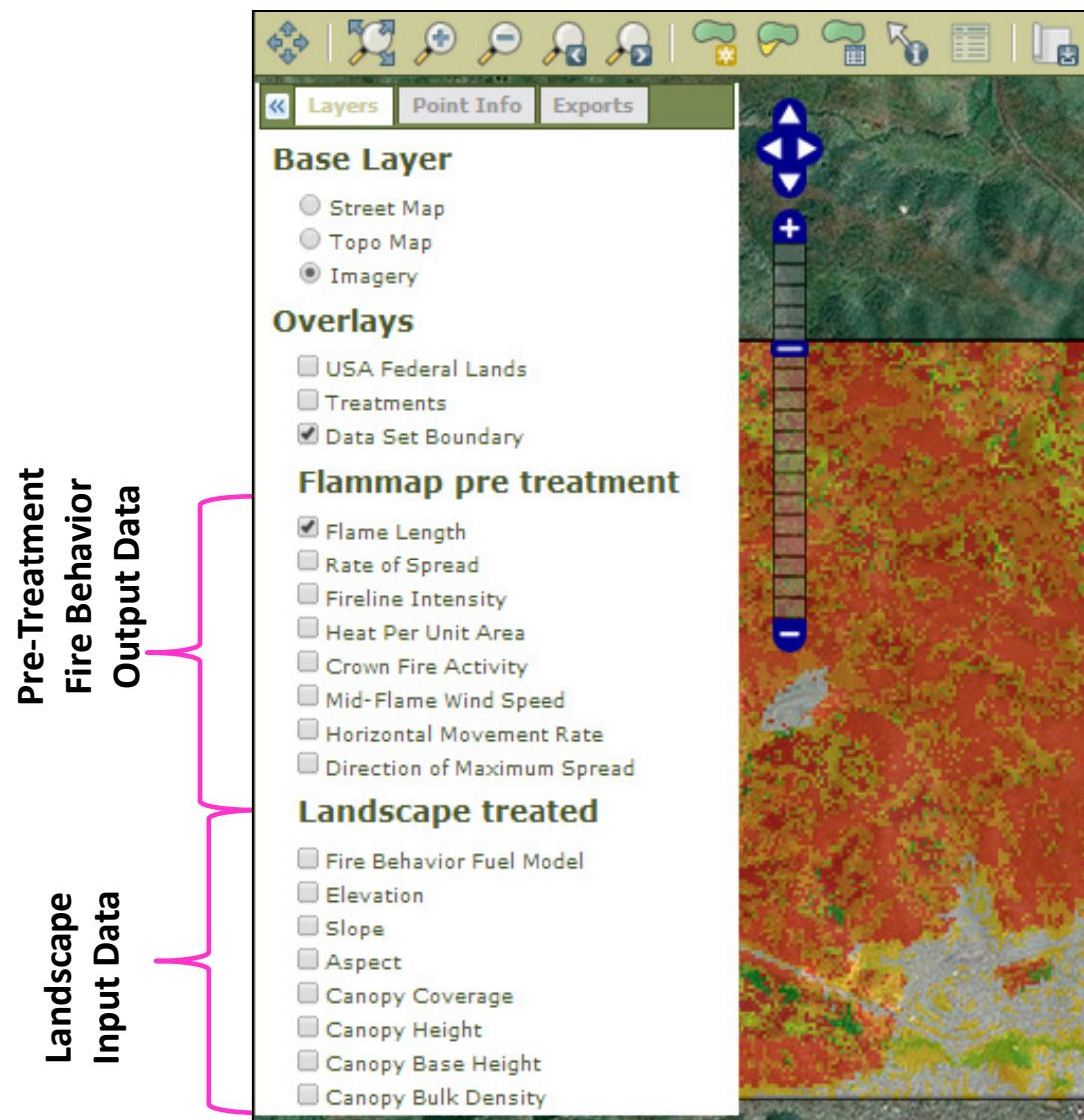
Reviewing Pre-Treatment Fire Behavior Output Data

After running the module, you can review your pre-treatment fire behavior output variables using the map.

On this page, you can view both your spatial landscape input data and your spatial fire behavior output data.

Fire behavior output variables include

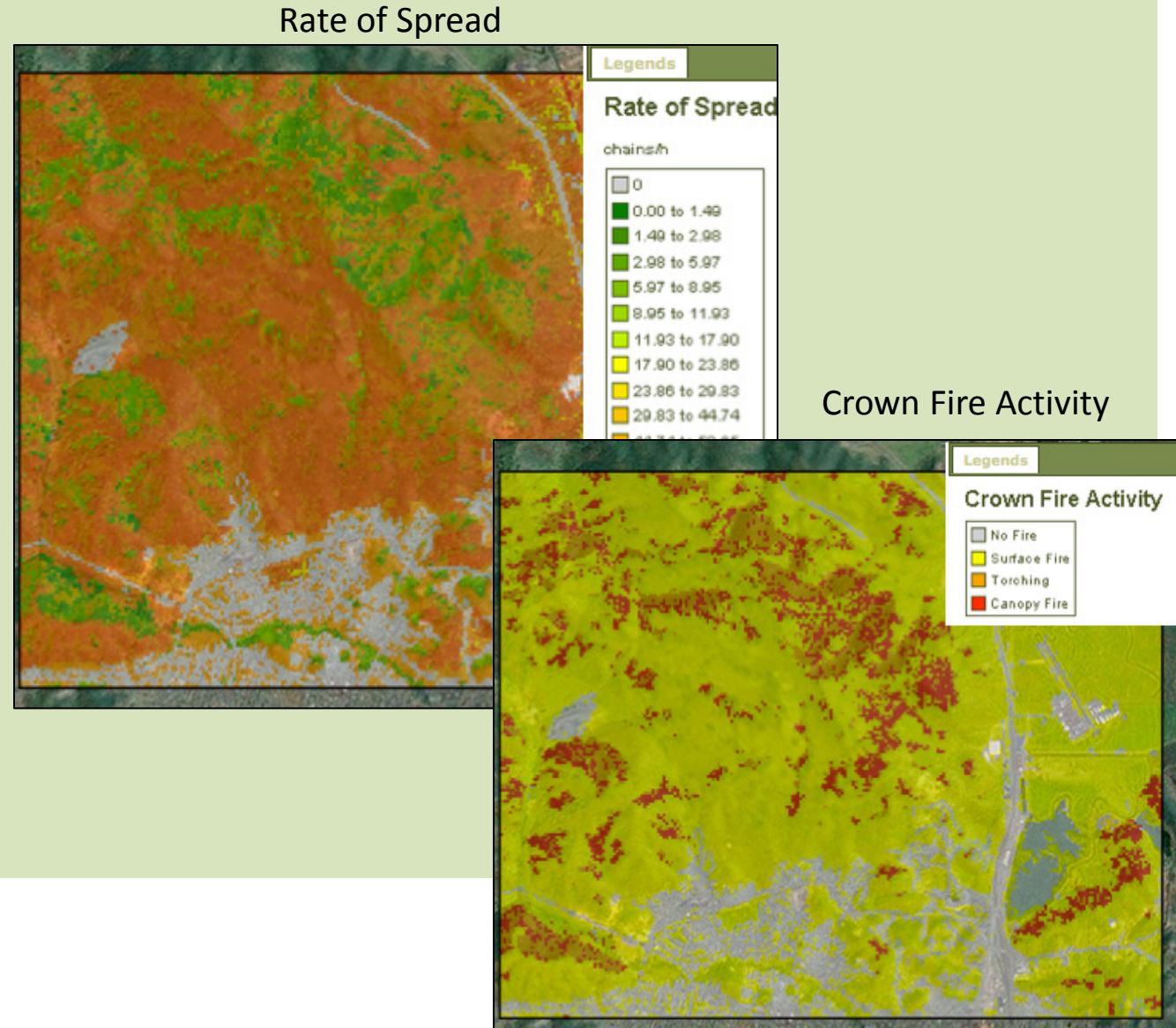
- Flame Length
- Rate of Spread
- Fireline Intensity
- Heat per Unit Area
- Crown Fire Activity
- Mid-flame Wind Speed
- Horizontal Movement Rate
- Direction of Maximum Spread



Reviewing Pre-Treatment Fire Behavior Output Data

Potential high fire hazard areas can be identified across a landscape using the modeled fire behavior with landscape data.

Next, we will identify where to perform fuels treatments based on high fire hazard areas.

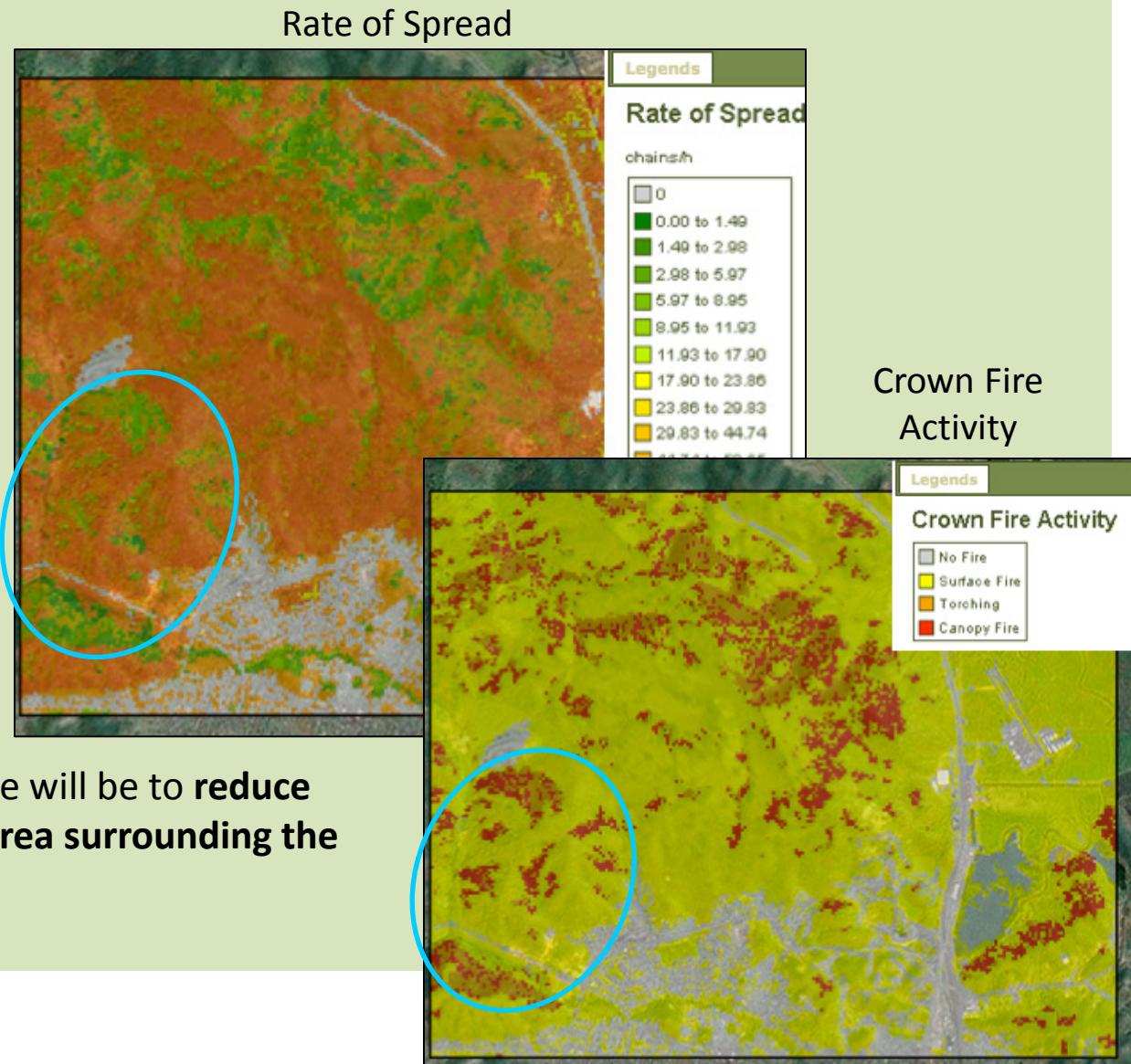


Identifying Fuels Treatment Locations

In this example, the areas with a low rate of spread (green pixels in upper left screenshot) are at risk for canopy fires (red pixels in lower right screenshot).

We would like to reduce the risk of canopy fires near the Wildland Urban Interface (grey pixels at bottom of screenshot).

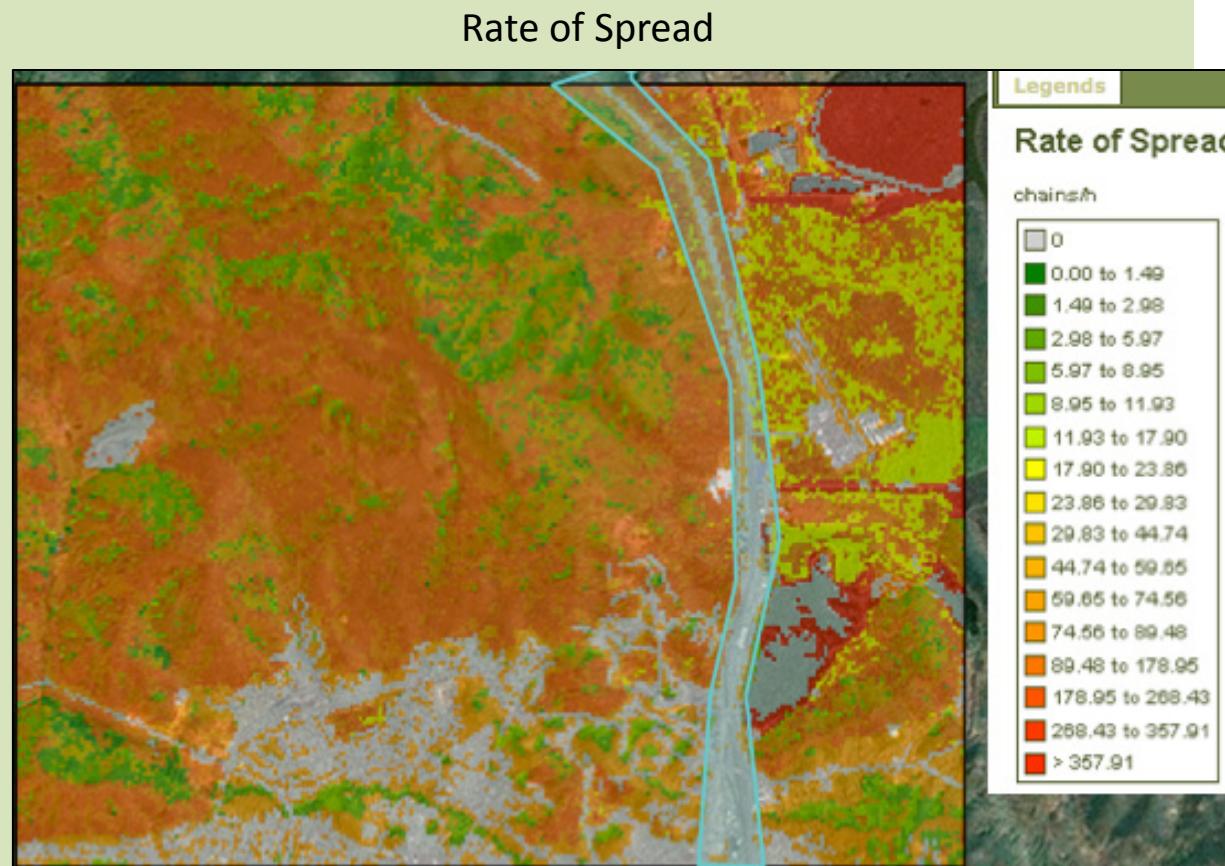
We have identified our first fuels treatment location (circled in blue). Our objective will be to **reduce canopy fire potential in the area surrounding the Wildland Urban Interface.**



Identifying Fuels Treatment Locations

Our next fuels treatment location will be the grassland/oak woodland buffer along U.S. Highway 101 (outlined in light blue).

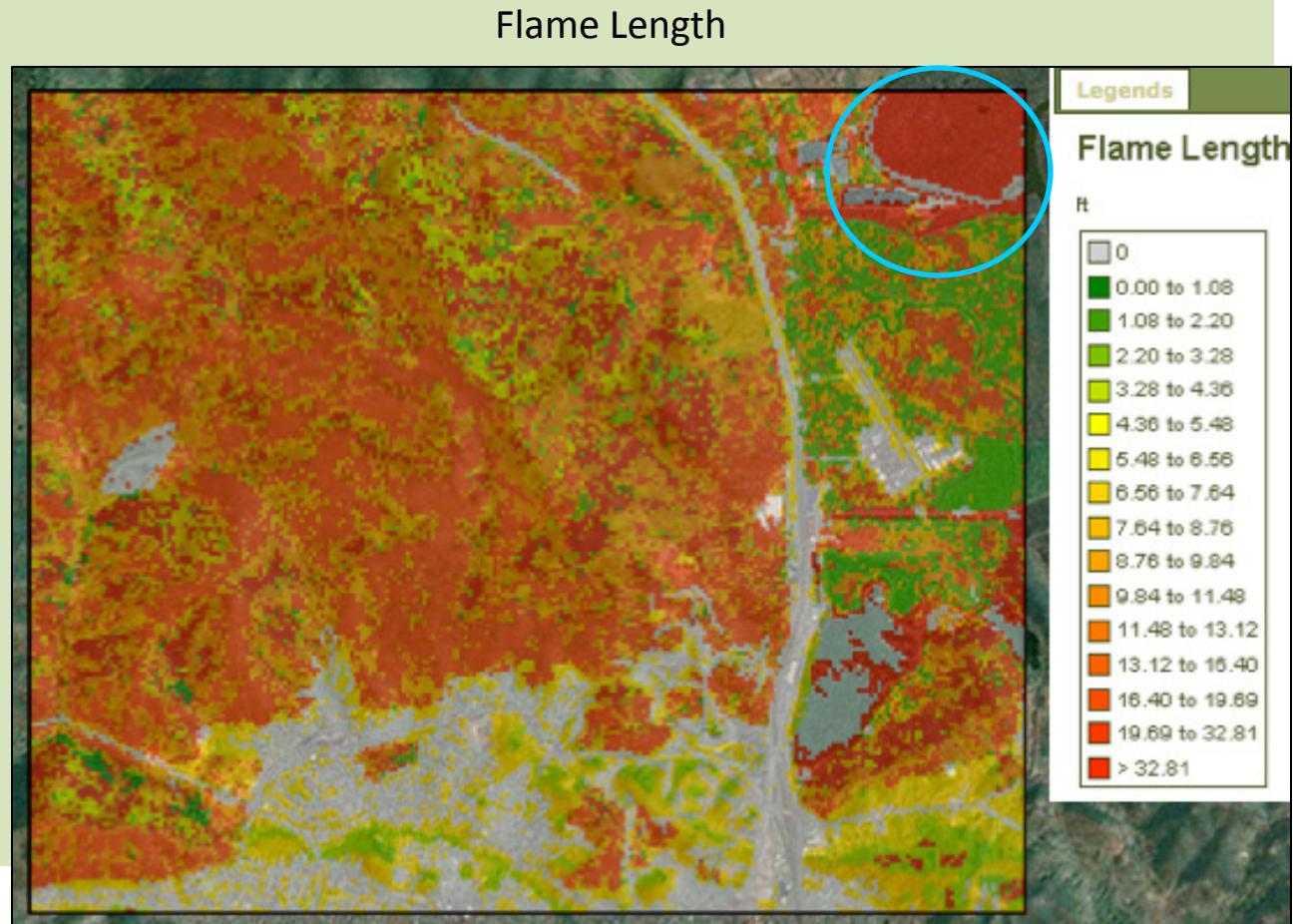
Our fuels treatment objective will be to **reduce the potential rate of spread adjacent to Highway 101** in order to decrease the likelihood of human-caused fire along the roadside, and to lower the risk of a wildfire jumping the highway.



Identifying Fuels Treatment Locations

Lastly, our third fuels treatment location will be Gross Field (the Marin County Airport). This area is classified as **high load – dry climate grass** (fuel model GR7(107)), and has the potential to reach flame lengths greater than 32 feet.

The objective of this fuels treatment (circled in blue) is to **reduce the potential flame lengths near the Marin County Airport.**



Identifying Fuels Treatment Locations

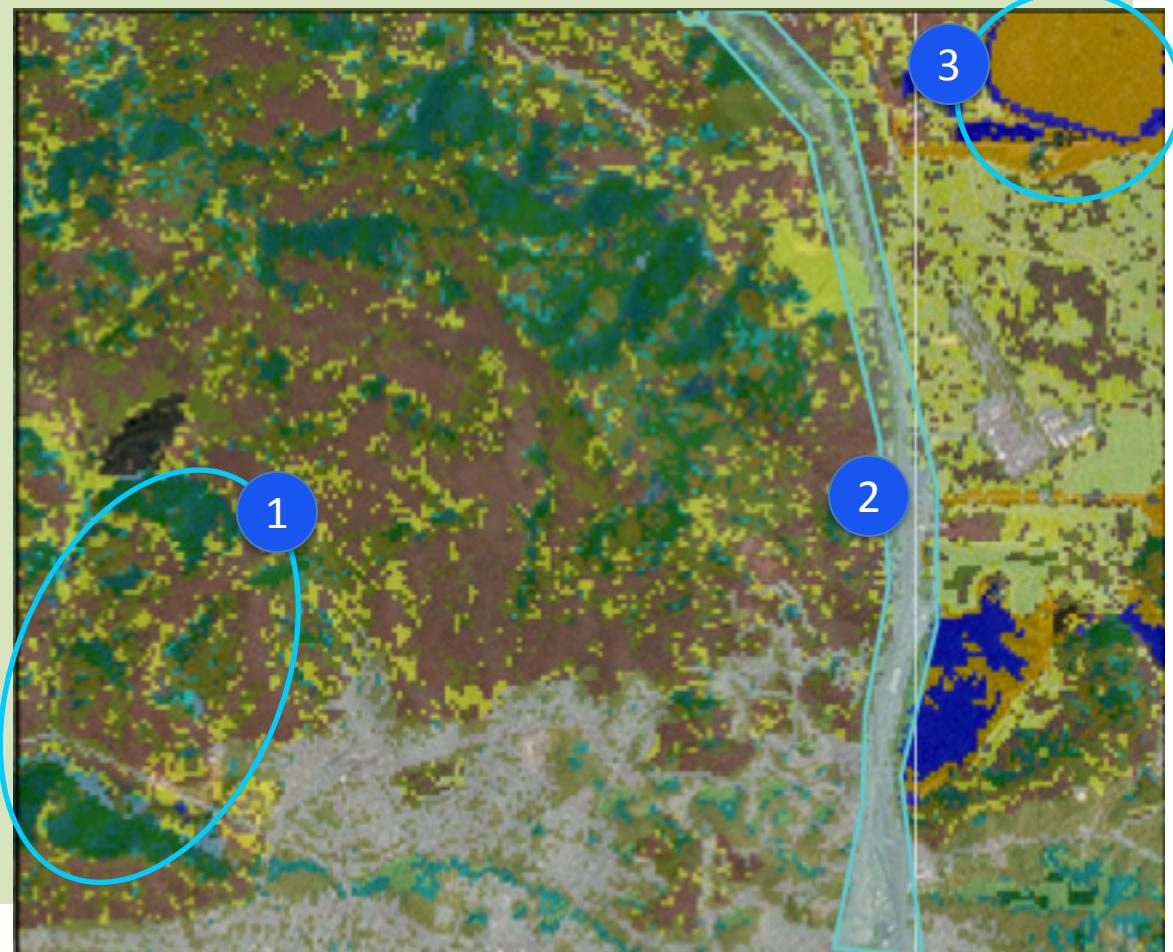
We identified three fuels treatment locations based on high fire hazards across the landscape.

Fuels Treatment Objectives:

- 1 Reduce canopy fire potential in the area surrounding the Wildland Urban Interface.
- 2 Reduce the potential rate of spread adjacent to Highway 101.
- 3 Reduce the potential flame lengths near the Marin County Airport.

In the next steps, you will learn how to outline these fuels treatments using the **Draw Polygon** tool.

Fire Behavior Fuel Model



Placing Fuels Treatments Across the Landscape

In the next few steps, you will create fuels treatments by drawing polygons and editing LANDFIRE data.

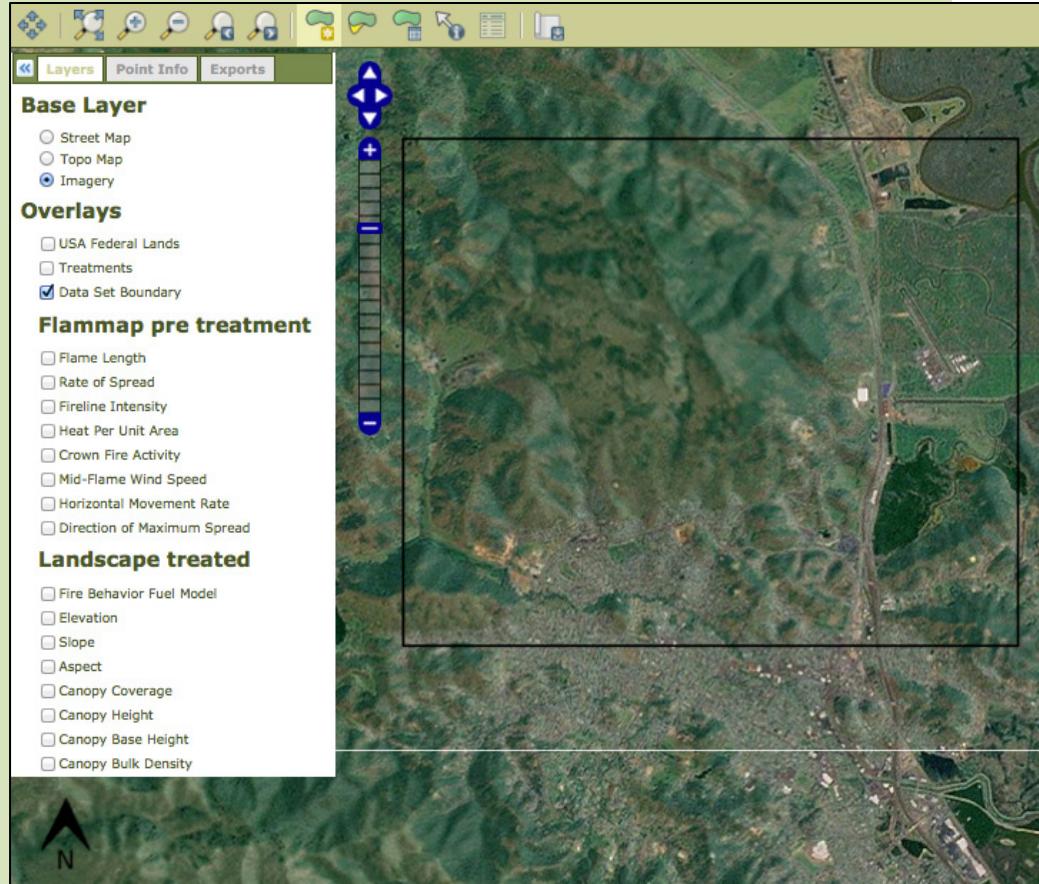
There are two methods for using the map tools to draw polygons.

1. **The freeform drawing method** is useful when

- You want to quickly and easily draw polygons.
- You have a small area of interest.
- You can see the entire area that your polygon will encompass without moving the map.

2. **The point and click method** is useful when

- You want to zoom in to make a detailed polygon.
- You need to move the map (using the pan tool) while you are drawing a polygon.



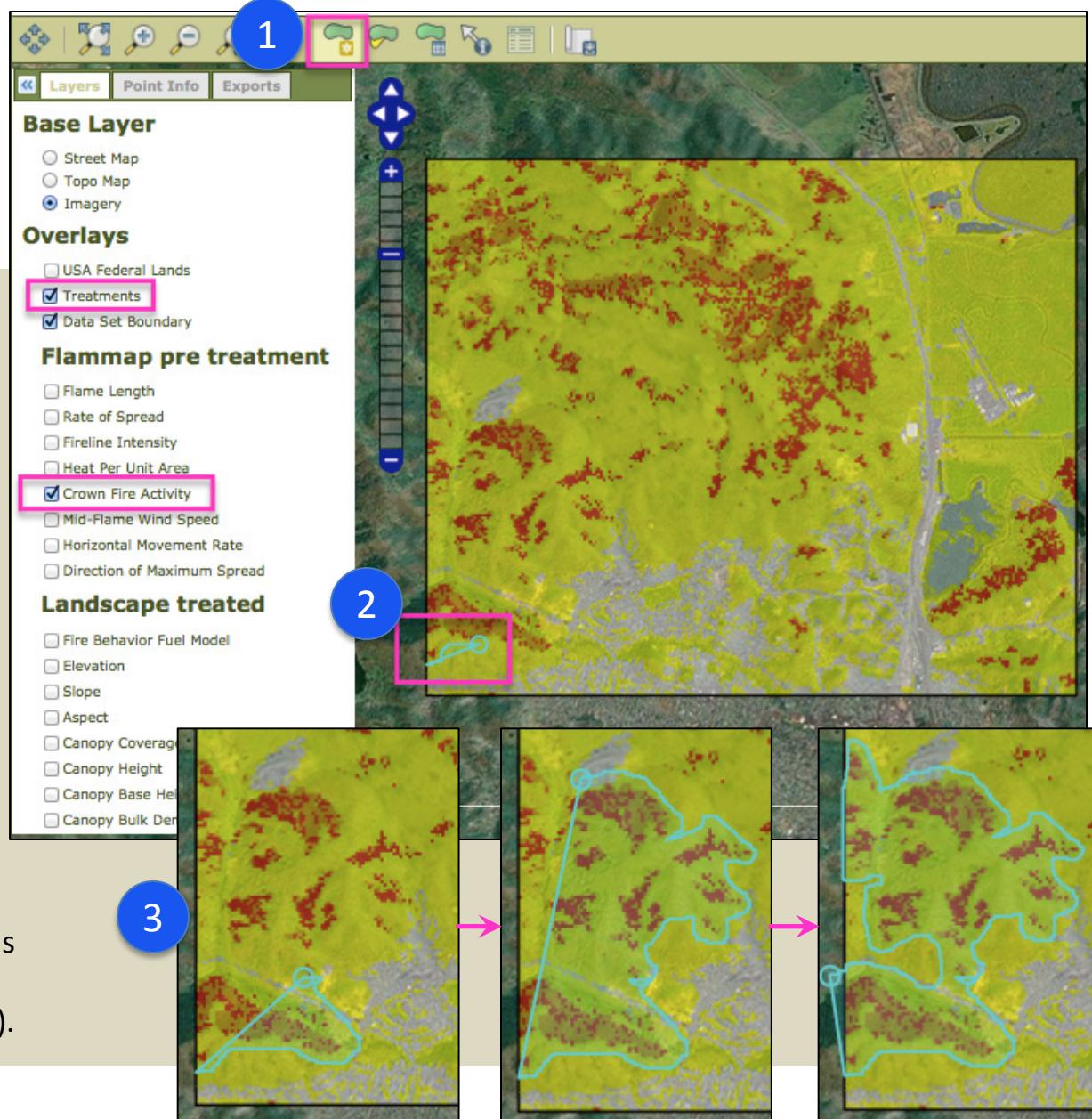
These polygon drawing methods are discussed on pages 33 through 36.

Placing Fuels Treatments – Freeform Drawing Method

In this step, you use the freeform drawing method to outline the fuels treatment near the Wildland Urban Interface.

- 1 Verify that the **Treatments** layer is selected, then select the **Draw Polygon** tool.
- 2 While holding down the **Shift** key, click on the map, hold down the left mouse button and start drawing your first polygon.
- 3 Continue to hold down the shift key and left mouse button. Moving the mouse as if it were a pencil, draw your polygon (outlining the red canopy fire pixels near the wildland urban interface).

Release the left mouse button when you are done drawing the polygon. This creates the polygon and opens the **Edit Feature** panel (shown on the next page).



Using the Edit Feature Panel to Define a Fuels Treatment Polygon

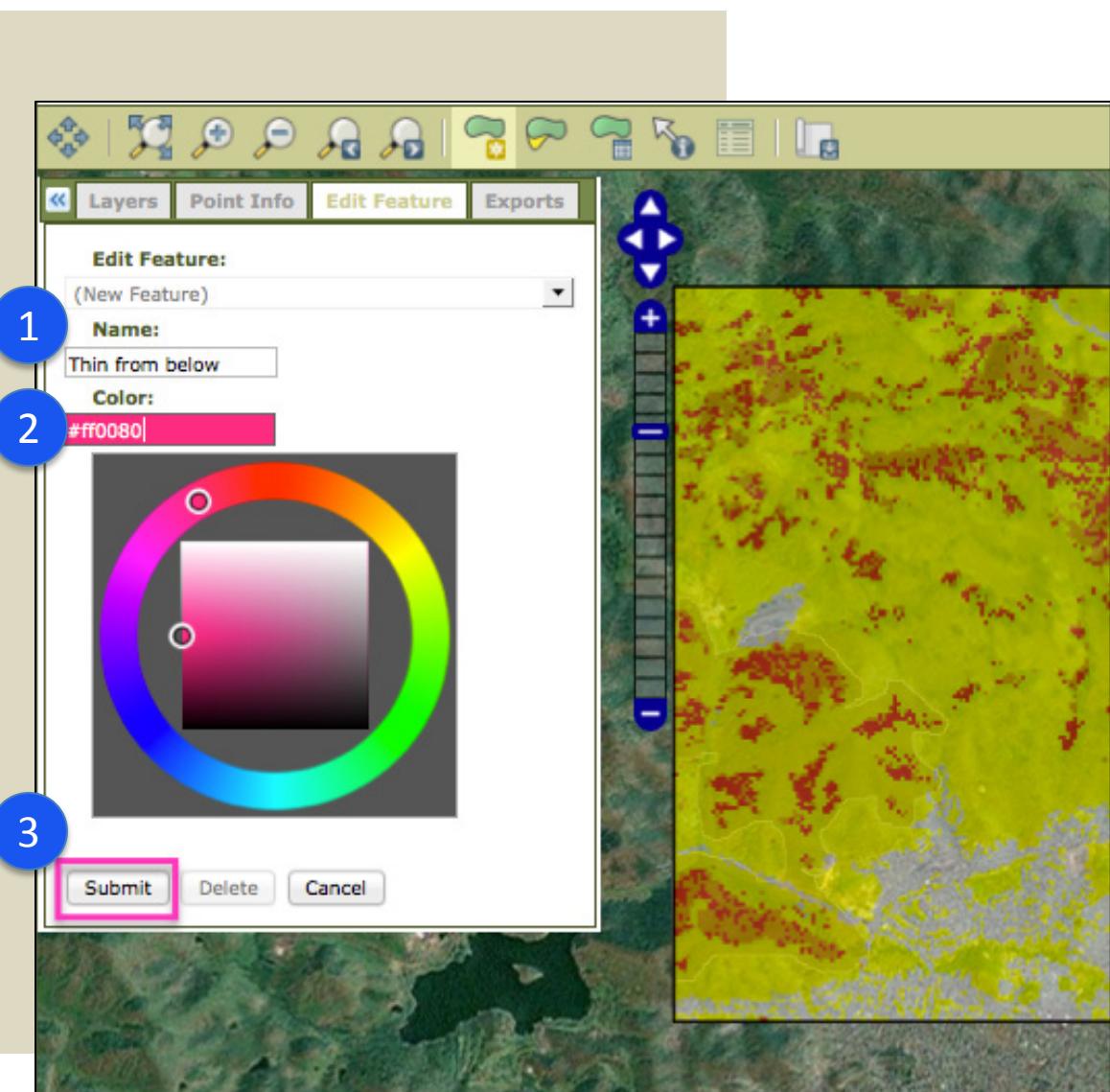
After you create the polygon, the **Edit Feature** panel appears. To edit the polygon,

1 Name the polygon.

2 Give the polygon a color.

- Click on the **Color** text box. A color wheel appears.
- Use the color wheel to choose a color.
- Use the inner box to choose the shade of the color selected.

3 Choose **Submit** to save the polygon data.



Placing Fuels Treatments – Point and Click Method

Next, define another fuels treatment.

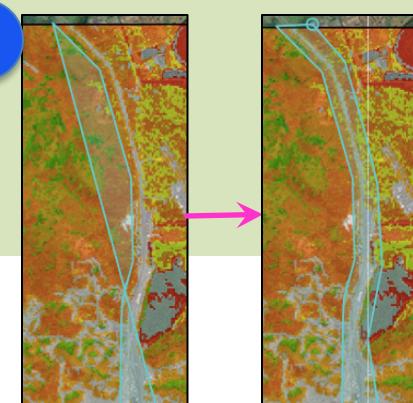
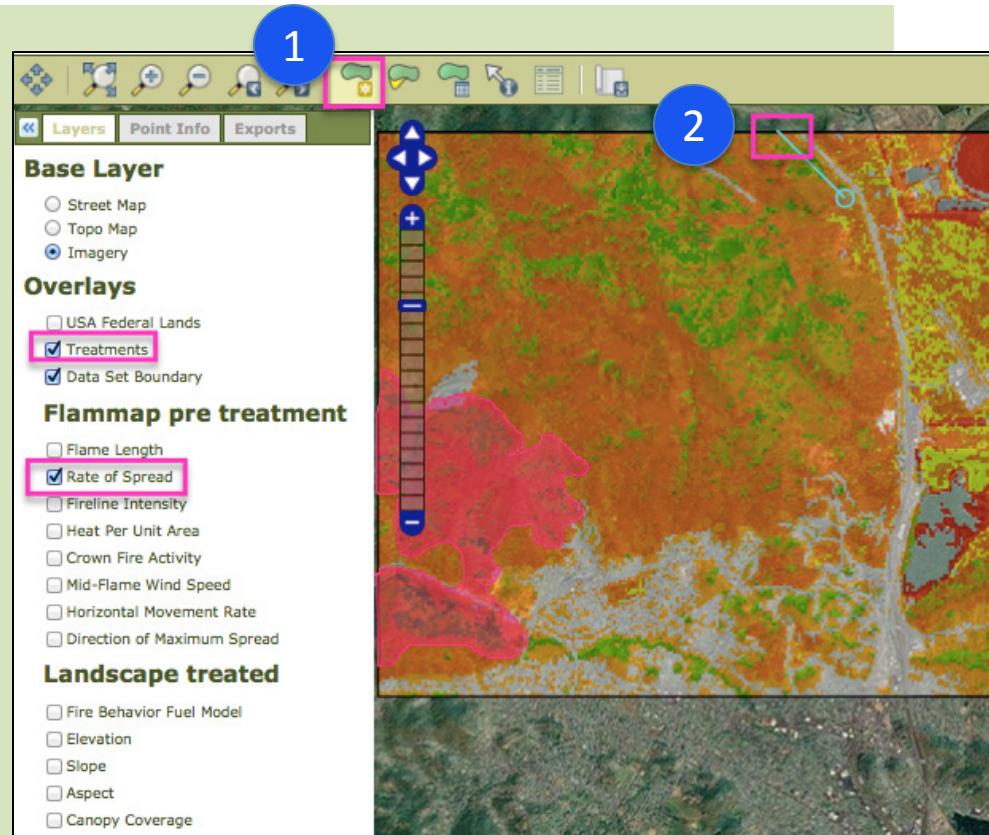
In this example, use the **point and click method** to draw a fuels treatment polygon around the Highway 101 buffer.

1 Select the **Draw Polygon** tool.

2 Click on the map and release to start drawing your first point.

3 Move the mouse to a new point and click to add another point. Before moving on, make sure the point is established (by moving the mouse away from the point). Continue this process until you are done drawing your polygon.

Double-click when you are done drawing the polygon to create the polygon and to open the **Edit Feature** panel (shown on the next page).



Using the Edit Feature Panel to Define a Fuels Treatment Polygon

After double-clicking to create the polygon, the **Edit Feature** panel appears. To edit the polygon,

1 Name the polygon.

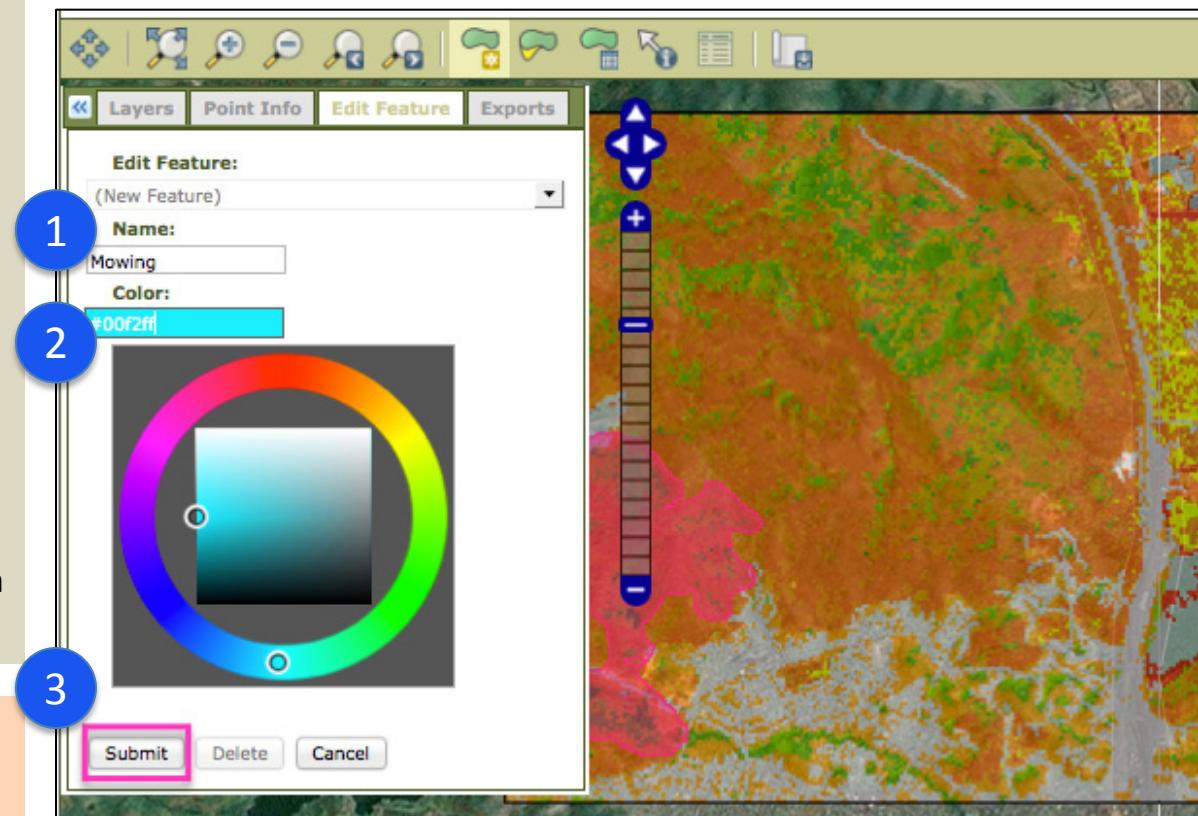
2 Give the polygon a color.

- Click on the **Color** text box. A color wheel appears.
- Use the color wheel to choose a color.
- Use the inner box to choose the shade of the color selected.

3 Choose **Submit** to save the polygon data.

Repeat the steps defined on pages 33 to 35 to draw the third fuels treatment on the landscape.

Choose your favorite draw polygon method.



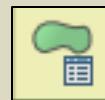
Editing LANDFIRE Data to Create Fuels Treatments

Now that we have created the fuels treatment polygons, the next step is to manually edit the landscape (LANDFIRE) data within these polygons to reflect fuels treatments.

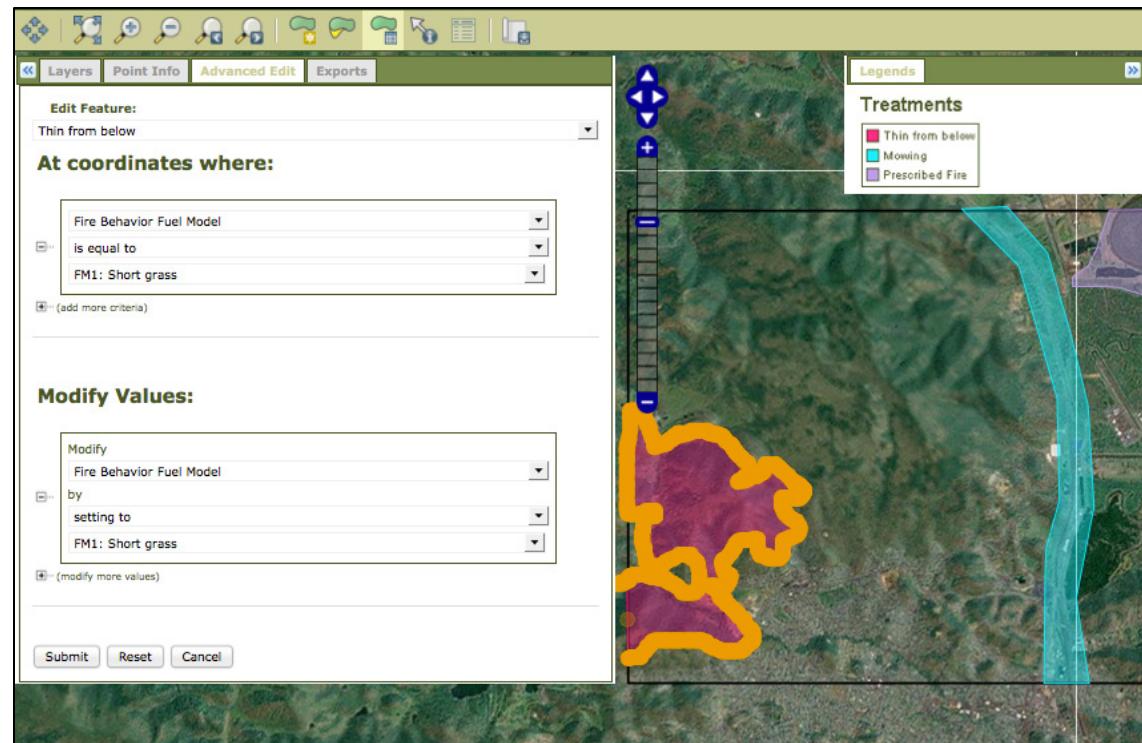
Within the fuels treatment polygons, you can edit

- The fire behavior fuel model
- Canopy coverage
- Canopy height
- Canopy base height
- Canopy bulk density

Select the **Polygon Advanced Edit** tool, and click on the **Thin from below** fuels treatment polygon.



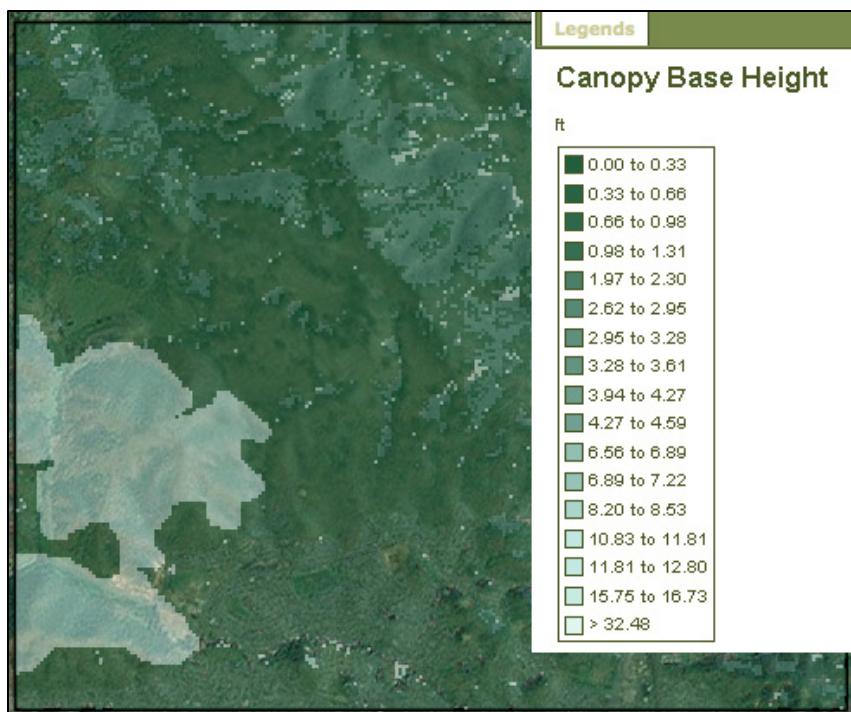
The **Advanced Edit** panel appears (discussed on next page).



Editing LANDFIRE Data to Create Fuels Treatments

You can modify the landscape data within a fuels treatment polygon using the **Advanced Edit** panel.

With the **Advanced Edit** panel, you can edit the pixels within the selected polygon using a query format. In this example, we will modify all pixels within the polygon that have a canopy base height less than 10 feet, and raise the canopy base height to 12 feet. Make these changes, and then choose **Submit** to make edits to the polygon.



Layers Point Info Advanced Edit Exports

Edit Feature:
Thin from below

At coordinates where:

Canopy Base Height
Is less than
10 ft

(add more criteria)

Modify Values:

Modify
Canopy Base Height
by
setting to
12 ft

(modify more values)

Submit Reset Cancel

Editing LANDFIRE Data to Create Fuels Treatments

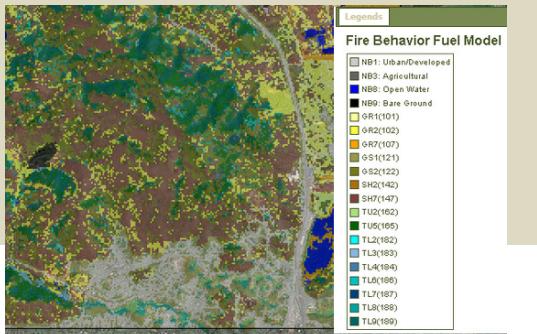
Next, we will modify the Mowing fuels treatment polygon.

On the **Advanced Edit** panel, under the **Edit Feature** dropdown, select **Mowing**.

For this fuels treatment, we want to apply our edits to all pixels within the polygon. To do this, click on the minus sign () to the left of the **At coordinates where** box.

Now, the modifications will be applied to the entire polygon. For this **Mowing** fuels treatment, change the fire behavior fuel model to **NB9: Bare Ground**.

Choose **Submit**.



The screenshot shows two panels of the "Advanced Edit" interface. The top panel shows the "Edit Feature" dropdown set to "Mowing". The "At coordinates where:" section has a minus sign () selected. The "Modify Values:" section shows "Canopy Base Height" being modified from "less than 10 ft" to "setting to 12 ft". The bottom panel shows the same interface after submission, with the message "Modified data at 2958 distinct coordinates." and the "Fire Behavior Fuel Model" being modified from "by" to "setting to NB9: Bare Ground".

Editing LANDFIRE Data to Create Fuels Treatments

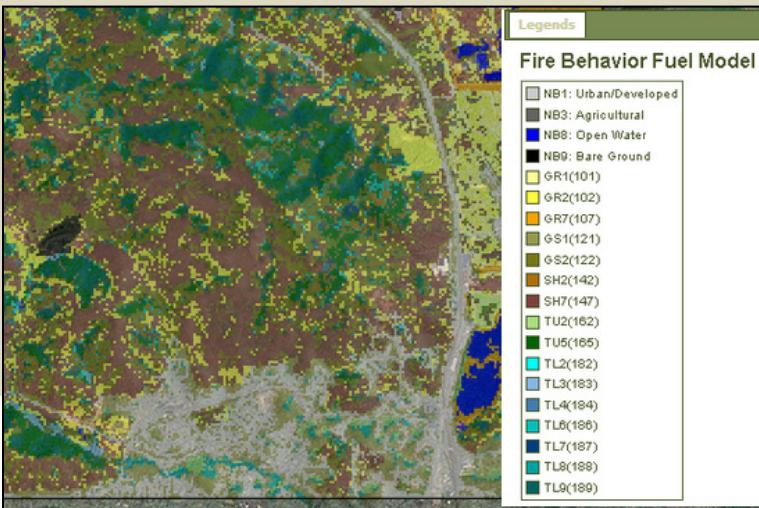
Next, we will modify the Prescribed Fire fuels treatment polygon.

On the **Advanced Edit** panel, under the **Edit Feature** dropdown, select **Prescribed Fire**.

As you did for the **Mowing** fuels treatment, change all pixels within the prescribed fire polygon to **NB9: Bare Ground**.

Choose **Submit**.

Next, we will re-run the IFT-FlamMap model. This way, we can compare the pre- and post-treatment fire behavior outputs.



Layers Point Info Advanced Edit Exports

• Modified data at 1459 distinct coordinates.

Edit Feature:
Prescribed Fire

At coordinates where:
(Modifications will be applied to the entire data set.)

+-- (add more criteria)

Modify Values:

Modify
Fire Behavior Fuel Model
by
setting to
NB9: Bare Ground

+-- (modify more values)

Submit Reset Cancel

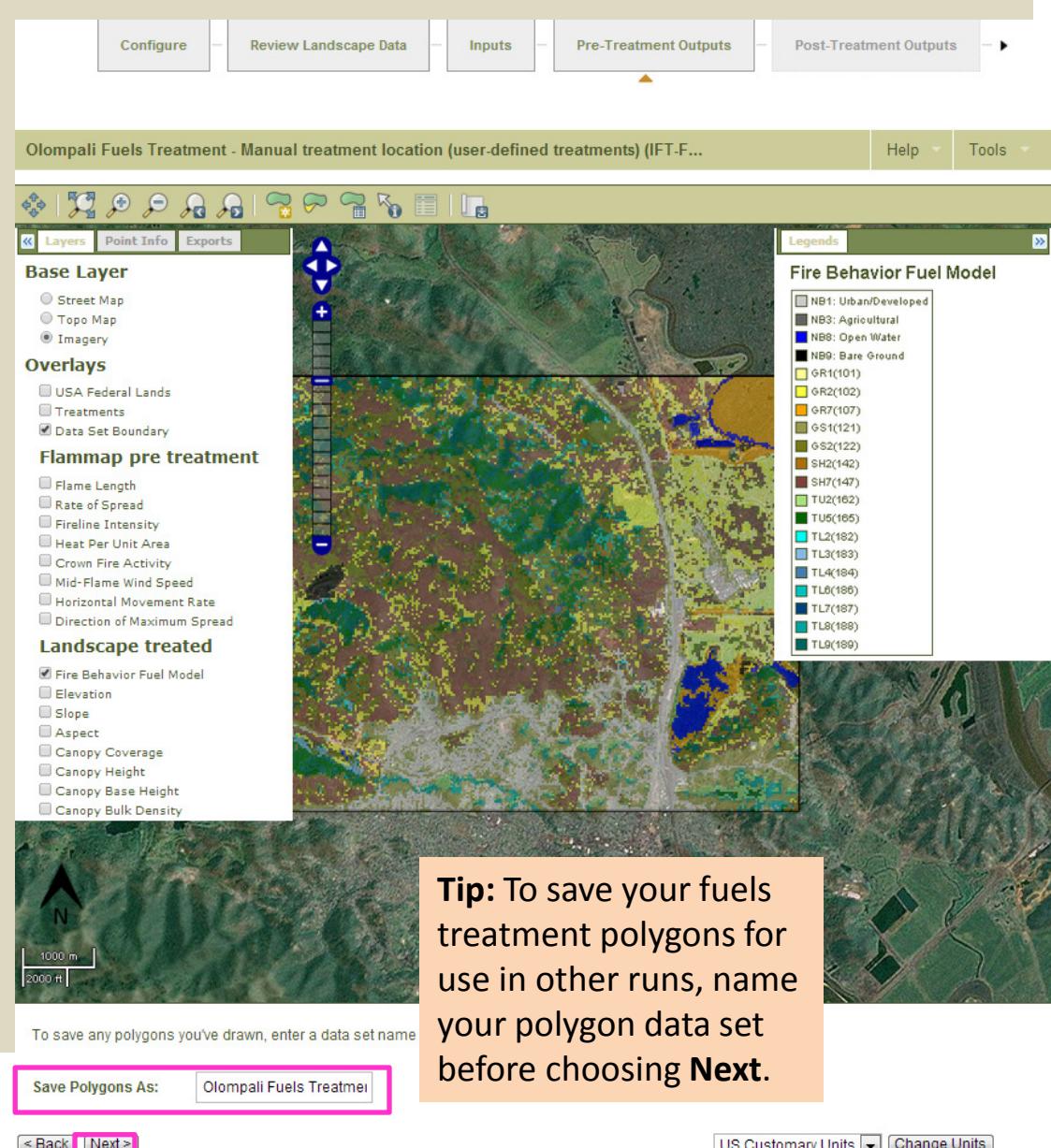
Reviewing Fuels Treatment Edits and Re-Running IFT-FlamMap

Review your fuels treatment edits. After you are done identifying and editing landscape data to create fuels treatments, choose **Next**.

This will re-run IFT-FlamMap under the same environmental conditions. In the next step, we will compare the pre- and post-treatment fire behavior outputs.

This way, we can evaluate the effectiveness of our fuels treatments.

There will be a short wait while the IFT-FlamMap module re-runs.

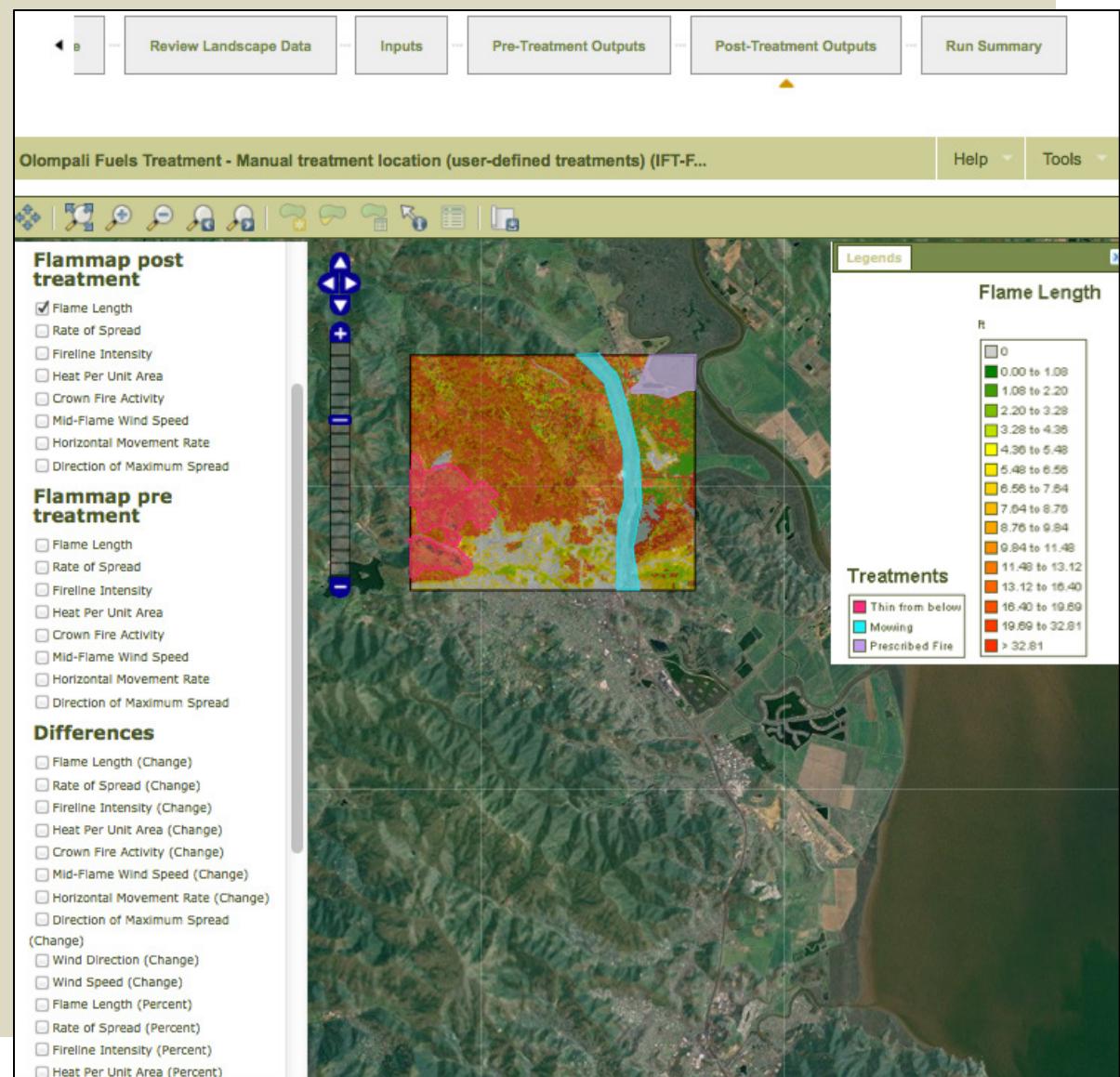


Evaluating Fuels Treatment Effectiveness

Now you are on the Post-Treatment Outputs step.

In this step, we will review the pre-treatment fire behavior, post-treatment fire behavior, and the differences between the pre- and post-treatment fire behavior (change and percent differences) to evaluate fuels treatment effectiveness based on the objectives defined on page 31.

We will review and evaluate fuels treatment effectiveness in the next few pages.



Evaluating Fuels Treatment Effectiveness

Fuels Treatment Objectives:

- 1. Reduce canopy fire potential in the area surrounding the Wildland Urban Interface.**
2. Reduce the potential rate of spread adjacent to Highway 101.
3. Reduce the potential flame lengths near the Marin County Airport.

The Thin from Below fuels treatment was effective in reducing canopy fire potential surrounding the wildland urban interface.

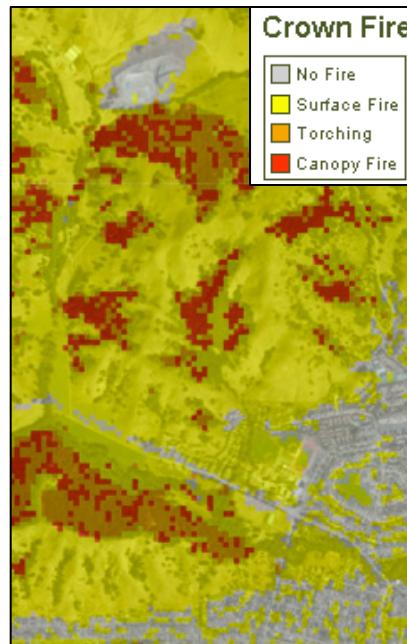
A majority of the canopy fire (red) and torching (orange) pixels were reduced to surface fire (yellow) following the fuels treatment.

Thin from Below
Fuels Treatment Unit

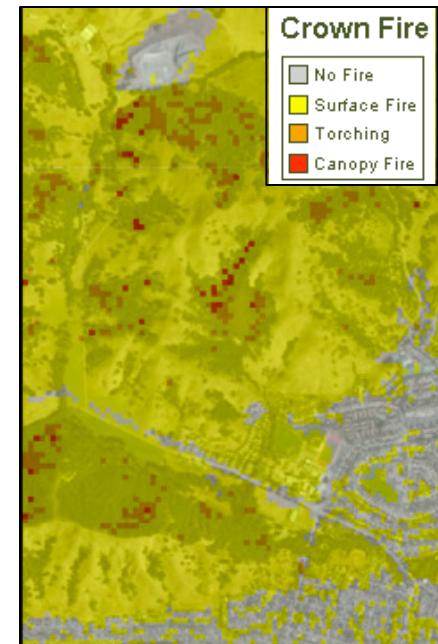


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Pre-Treatment
Crown Fire Activity



Post-Treatment
Crown Fire Activity



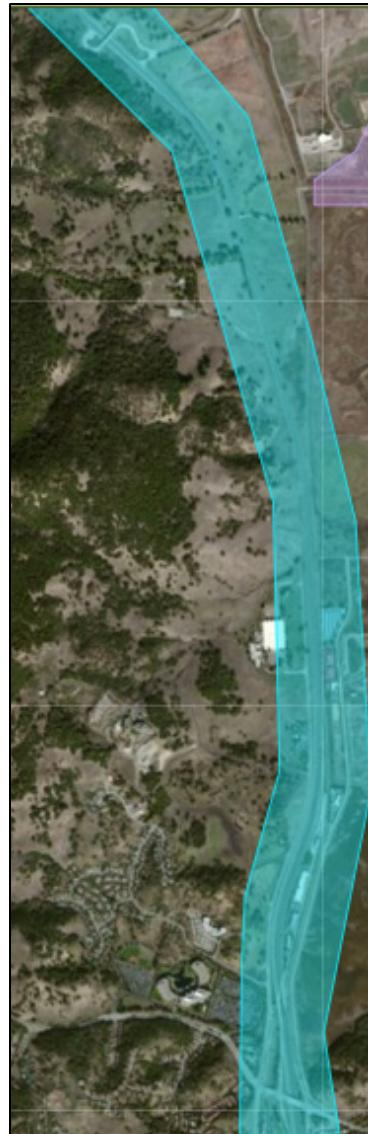
Evaluating Fuels Treatment Effectiveness

Fuels Treatment Objectives:

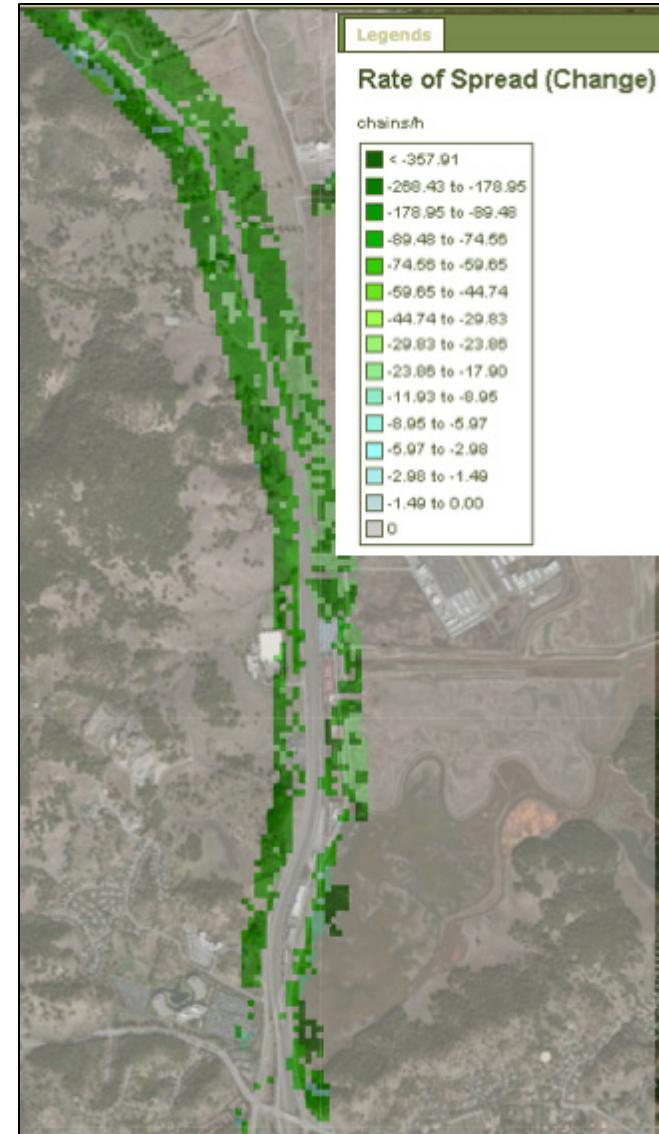
1. Reduce canopy fire potential in the area surrounding the Wildland Urban Interface.
2. **Reduce the potential rate of spread adjacent to Highway 101.**
3. Reduce the potential flame lengths near the Marin County Airport.

The map shows that the change in the rate of spread is negative. Therefore, the mowing fuels treatment was effective in reducing the potential rate of spread adjacent to Highway 101.

Mowing Fuels Treatment Unit



Rate of Spread (Change)



Evaluating Fuels Treatment Effectiveness

Fuels Treatment Objectives:

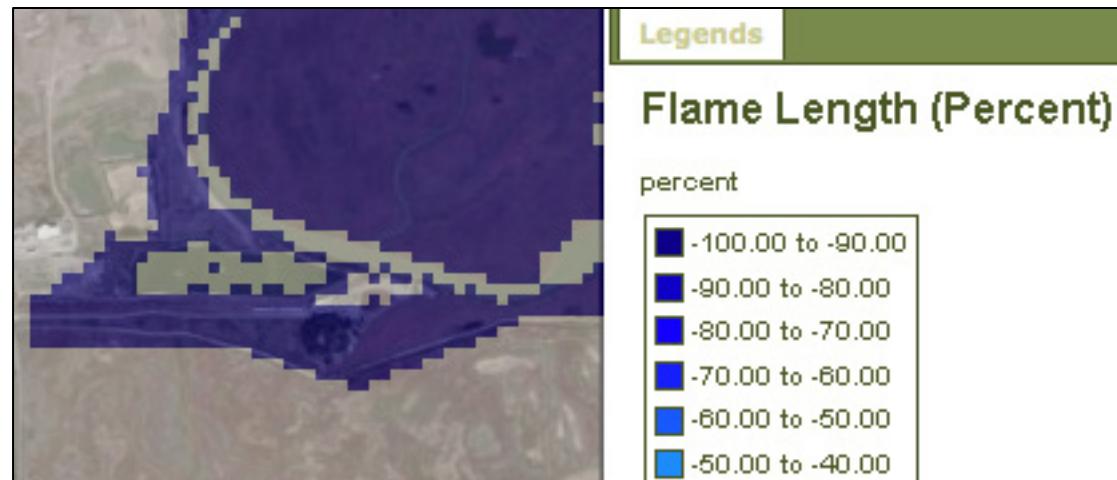
1. Reduce canopy fire potential in the area surrounding the Wildland Urban Interface.
2. Reduce the potential rate of spread adjacent to Highway 101.
3. **Reduce the potential flame lengths near the Marin County Airport.**

Prescribed Fire
Fuels Treatment Unit



The map shows a 90% to 100% reduction in flame length in the treatment unit. The Prescribed Fire fuels treatment was effective in reducing the potential flame lengths near the Marin County Airport.

Flame Length (Percent)



Next Steps: Assessing Further Needs

The information from this fuels treatment effectiveness assessment can be used with other ecological and natural resource planning information to assess areas within the landscape that may warrant fuels treatment.

Next steps:

- Review aerial photography
- Make a site visit
- Continue to conduct additional fuels treatment analyses; for example,
 - Create additional fuels treatments and re-run model
 - Edit existing fuels treatments and re-run model
 - Model the same area using IFT-MTT, IFT-RANDIG, and/or the Worst Case Flame Length Risk pathways

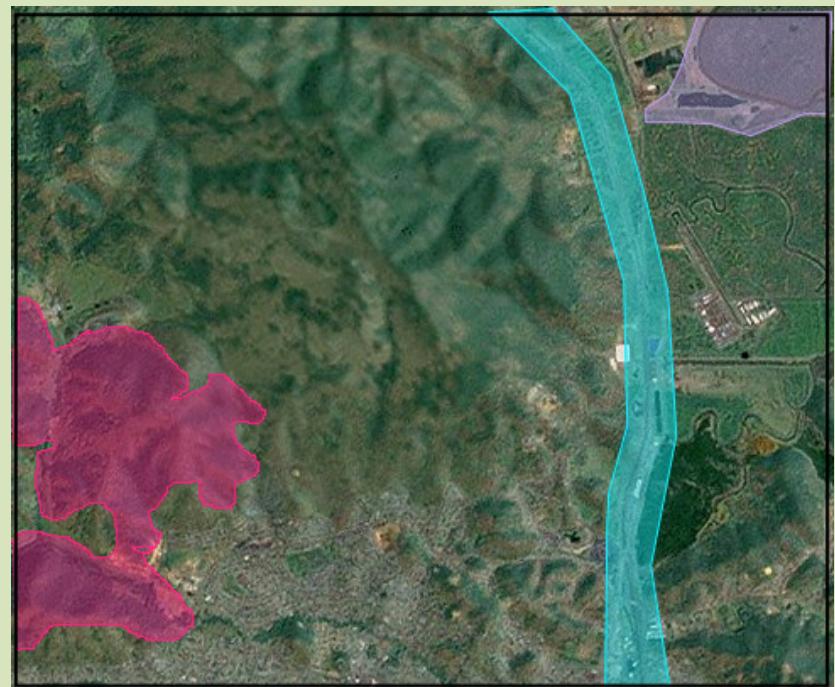
-  **Manual treatment location (user-defined treatments) (IFT-FlamMap)**
-  **Manual treatment location (user-defined treatments) (IFT-MTT)**
-  **Manual treatment location (user-defined treatments) (IFT-RANDIG)**
-  **Manual treatment location (user-defined treatments) (Worst Case FL - Risk)**

Information You Need to Know

Fire behavior values are calculated pixel-by-pixel and are **simulated independently** with respect to the surrounding pixels in the landscape input file.

Fire behavior in locations, roads, or hazardous fuel types in proximity to the area under assessment **do not** affect the burning potential of the pixel, or point location, being assessed. In other words, fire behavior in pixels surrounding fuels treatment units will not be affected by the fuels treatments.

The LANDFIRE data resolution is coarse (30 x 30 m spatial resolution), which affects data interpretation.



Review

Using the Fuels Treatment workflow in IFTDSS, we were able to

- Acquire LANDFIRE data and set up a project in IFTDSS.
- Create a run focused on fire behavior across a landscape (IFT-FlamMap).
 - Establish environmental parameters.
 - Review spatial landscape data and fire behavior output data.
- Identify fuels treatment locations and manipulate the LANDFIRE data to reflect fuels treatments
- Review pre- and post-treatment fire behavior to evaluate fuels treatment effectiveness.



Additional Help

The screenshot shows the IFTDSS 2.0 beta interface. At the top, there's a green header bar with the title "IFTDSS 2.0 beta". Below the header are four menu items: "Home", "Collaborate", "Projects" (which is highlighted in blue), and "Data". To the right of these are links for "About", "Help" (which is highlighted with a pink box and a circled number 1), "Feedback", and "Log Out". A message at the bottom right says "Logged in as Lorentz, Kimberly".

To navigate to additional tutorials in the IFTDSS online help content,

- 1 Click the **Help** button.
- 2 Then select **Getting Started (Tutorials and Videos)** from the side menu.

On that page, you'll find links to tutorials and videos on such topics as hazard analysis, prescribed burn planning, fuels treatment, spatial analysis across a landscape, and many more.

This screenshot shows a sidebar menu from the IFTDSS help system. The menu items are: "Interagency Fuels Treatment Decision Support System", "Getting Started (Tutorials and Videos)" (which is highlighted with a pink box and a circled number 2), "Concepts", "Hazard Analysis", "Prescribed Burn Planning", "Risk Assessment", "Fire and Fuels Application (FFA) Tools", "Reference Material", and "IFTDSS Compared with Other Systems".