

# **Tutorial H – Creating a Values-at-Risk Map for use in the IFTDSS Risk Assessment Workflows**

# Introduction

IFTDSS provides two approaches for assessing fire hazard and risk across the landscape. These include the Worst-Case Flame Length Approach and Flame Length Probabilities Approaches. Both of these approaches require the user to define values-at-risk, and map these out as a series of polygons. This tutorial will walk you through the process of defining and creating a values-at-risk map.

Steps covered in this tutorial include:

- [Background on Values-at-risk](#)
- [Response Functions \(Definitions\)](#)
- [Introduction the Map Toolbar](#)
- [Defining Values at Risk: Methods](#)
- [Defining Values at Risk: Using the Free-form Drawing Method to create polygons](#)
- [Defining Values at Risk: Using the Edit Feature Panel to Specify Values at Risk Response function](#)
- [Defining Values at Risk: Using the Point and Click Method to create polygons](#)
- [Defining Larger Values at Risk](#)
- [Defining Smaller Values at Risk](#)
- [Editing Values at Risk](#)
- [Defining Values at Risk: Assigning a Background](#)
- [Reviewing and Saving Your Values-at-Risk Map](#)
- [Review](#)
- [Additional Help](#)

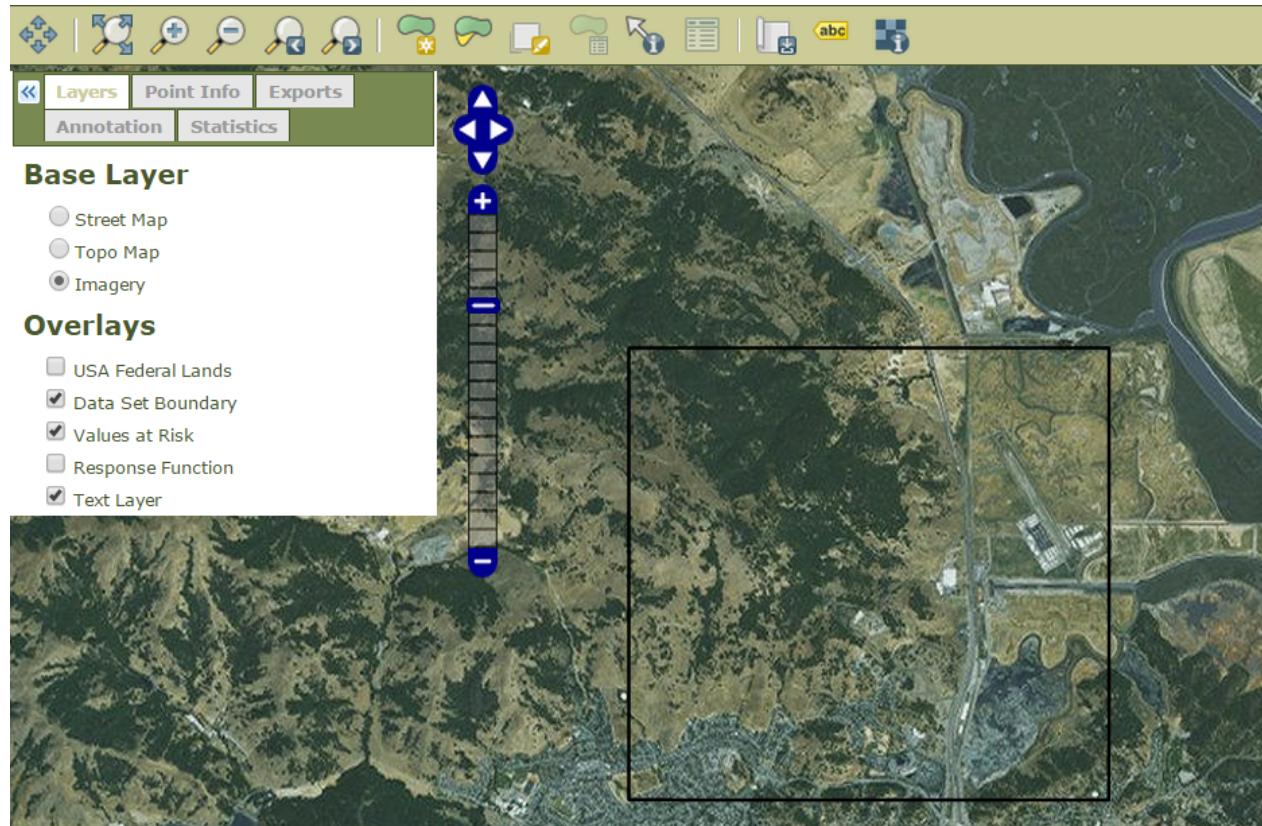
[\*\*Click here for a pdf version of this tutorial\*\*](#)

We will focus this values-at-risk tutorial on the area within the following coordinates:

- North: 38.155672364916
- East: -122.5502871142
- South: 38.120028050516
- West: -122.5986956225



**Note:** All references cited in this tutorial are in the IFTDSS online help bibliography; access it by navigating to **Reference Material > Bibliography**.



## Background: Values-at-risk

Values at risk, also known as highly valued resources, (HVR) are features on the landscape that are influenced positively and/or negatively by fire. A value at risk can have ecological, economic, or social importance.

Some examples of values at risk include:

- Airports
- Archeological sites
- Conifer forests
- Highway buffers
- Historic buildings
- Wildland-urban interface

# Response Functions (Definitions)

Response functions describe the effect of fire on the values at risk.

Response functions are mathematical relationships between fire characteristic (e.g., flame length) and fire outcome (see the table above; this table is also available in the online help). There are 14 pre-defined response functions.

| RESPONSE<br>FUNCTION | DESCRIPTION   | NET VALUE CHANGE MULTIPLIER<br>BASED ON USER-DEFINED FLAME<br>LENGTH CLASSES |          |      |              |
|----------------------|---|--|----------|------|--------------|
|                      |   | LOW  | MODERATE | HIGH | VERY<br>HIGH |
| 1                    | All fire is beneficial; strong benefit at low and moderate fire intensities and moderate benefit at high and very high intensity. | +80  | +80      | +40  | +40          |
| 2                    | All fire is beneficial; moderate benefit at low fire intensity and mild benefit at higher intensity.                              | +50  | +20      | +20  | +20          |
| 3                    | Strong benefit at low fire intensity, decreasing to a strong loss at very high intensity.   | +60  | +20      | -20  | -60          |
| 4                    | Moderate benefit at low fire intensity, decreasing to a moderate loss at very high fire intensity                                 | +30  | +10      | -10  | -30          |
| 5                    | Slight benefit or loss at all fire intensities  | 0  | 0        | 0    | 0            |
| 6                    | Mild increasing loss from slight benefit or loss at low intensity to a moderate loss at very high intensity.                      | 0  | -10      | -20  | -30          |
| 7                    | Moderate increasing loss from mild loss at low intensity to a strong loss at very high intensity.                                 | -10  | -30      | -50  | -80          |
| 8                    | Slight benefit or loss at all fire intensities, except a moderate loss at very high intensity.                                    | 0  | 0        | 0    | -50          |

|    |   |     |     |     |     |
|----|---|-----|-----|-----|-----|
| 9  | Slight benefit or loss at low and moderate fire intensities and a mild loss at high and very high intensities.                  | 0   | 0   | -20 | -20 |
| 10 | Mild loss at all fire intensities   | -20 | -20 | -20 | -20 |
| 11 | Moderate loss from fire at all fire intensities   | -50 | -50 | -50 | -50 |
| 12 | Strong loss from fire at all fire intensities.  | -80 | -80 | -80 | -80 |
| 13 | Loss increases from slight loss at low intensity to strong loss at very high intensity.   | -10 | -60 | -70 | -80 |
| 14 | Slight benefit or loss from fire at low and moderate intensities and a strong loss from fire at high and very high intensities. | 0   | 0   | -80 | -80 |

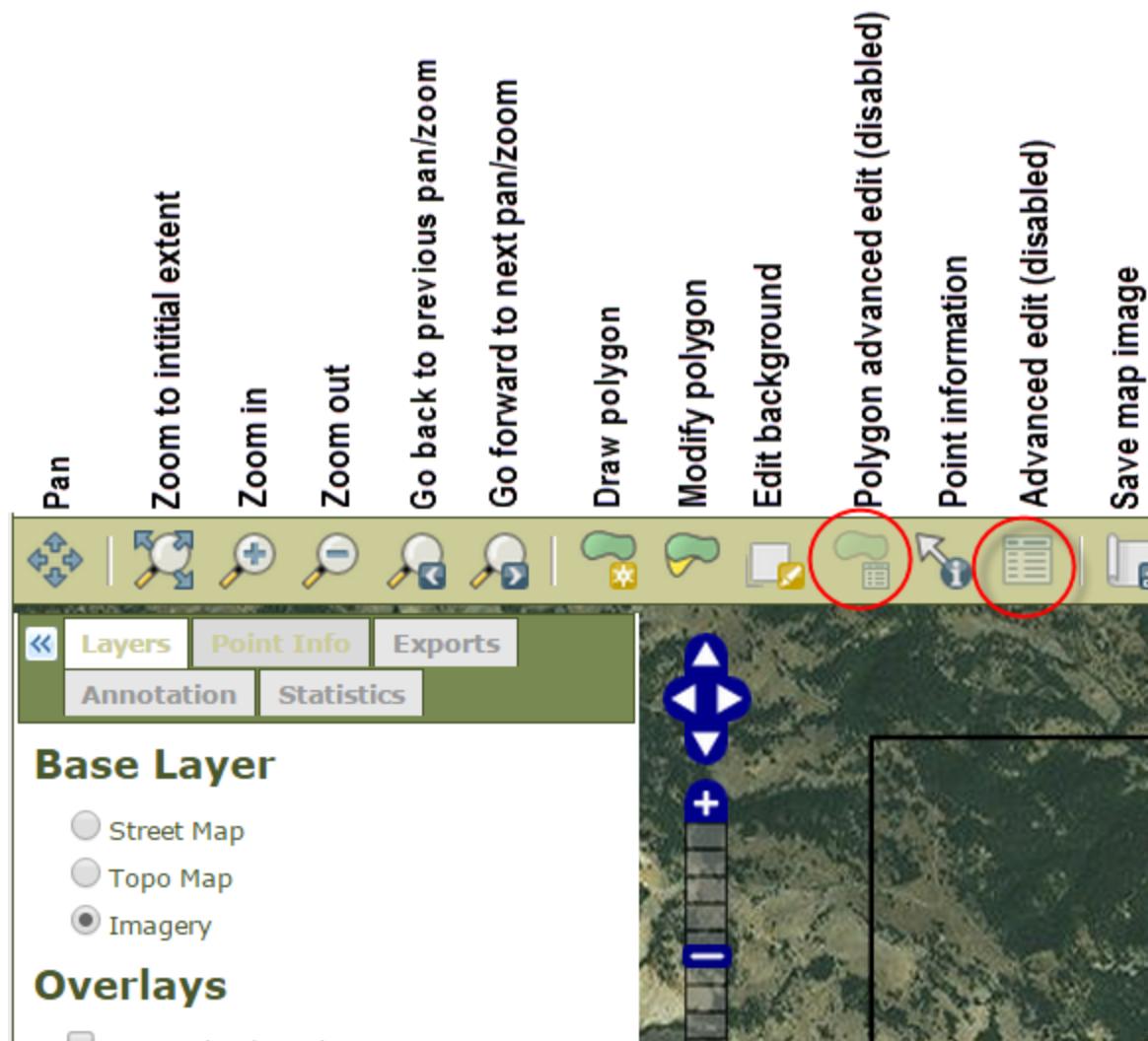
(Table modified from Calkin et al., 2010a)

# Introduction to the Map Toolbar

To create the values at risk polygons, we'll use the map toolbar located at the top of the map; the toolbar provides tools for drawing your values at risk.

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

Tools that **Advanced** are disabled are faded out (for example, the **Polygon Edit** and **Advanced Edit** tools, circled here in red).



# Defining Values at Risk: Methods

To create a values-at-risk map, you will draw polygons across the landscape and assign each one a response function.

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

1. The **free-form 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 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 in the next four sections.

# Defining Values at Risk: Using the Free-form Drawing Method to create polygons

In this step, you use the free-form drawing method to **define values at risk** and assign each value at risk a response function.

In this example, you draw a polygon over the wildland-urban interface.

1. Select the **Draw Polygon** tool.
2. Hold down the **shift** key and the **left mouse button** at the map location where you want to 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 wildland-urban interface).

**Let go of the left mouse button and shift key when you are done drawing the polygon.** This creates the polygon and opens the **Edit Feature** panel (shown in the next step).

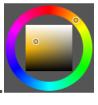


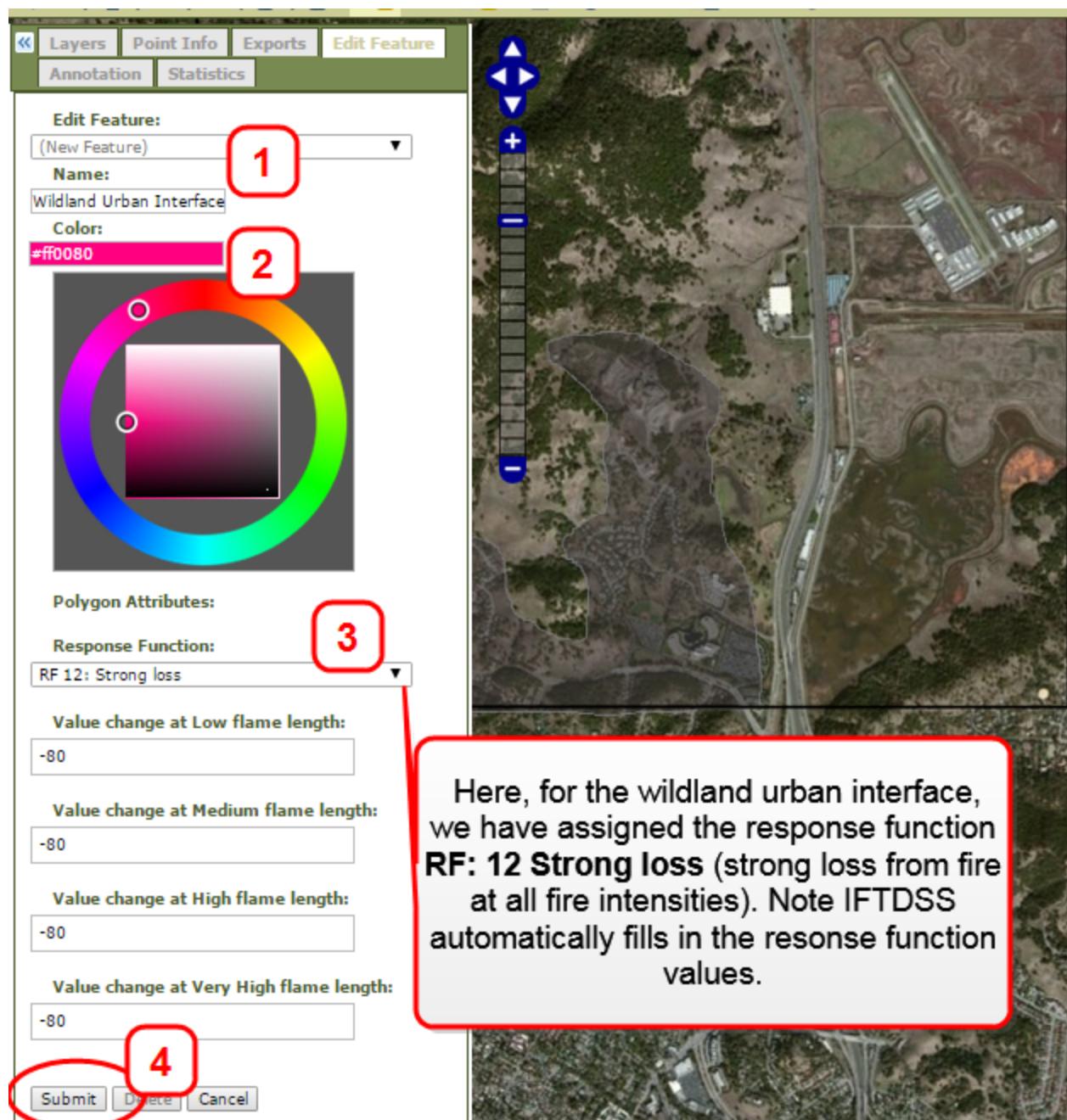
**Tip:** Define your largest values at risk first (e.g., wildland-urban interface, oak woodlands).



# Defining Values at Risk: Using the Edit Feature Panel to Specify Values at Risk Response function

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. Assign a response function to the polygon
4. Choose **Submit** to save the polygon data.



**Tip:** Click on **Response Functions** under the **Help** dropdown menu to read a description of each response function and to find additional resources.

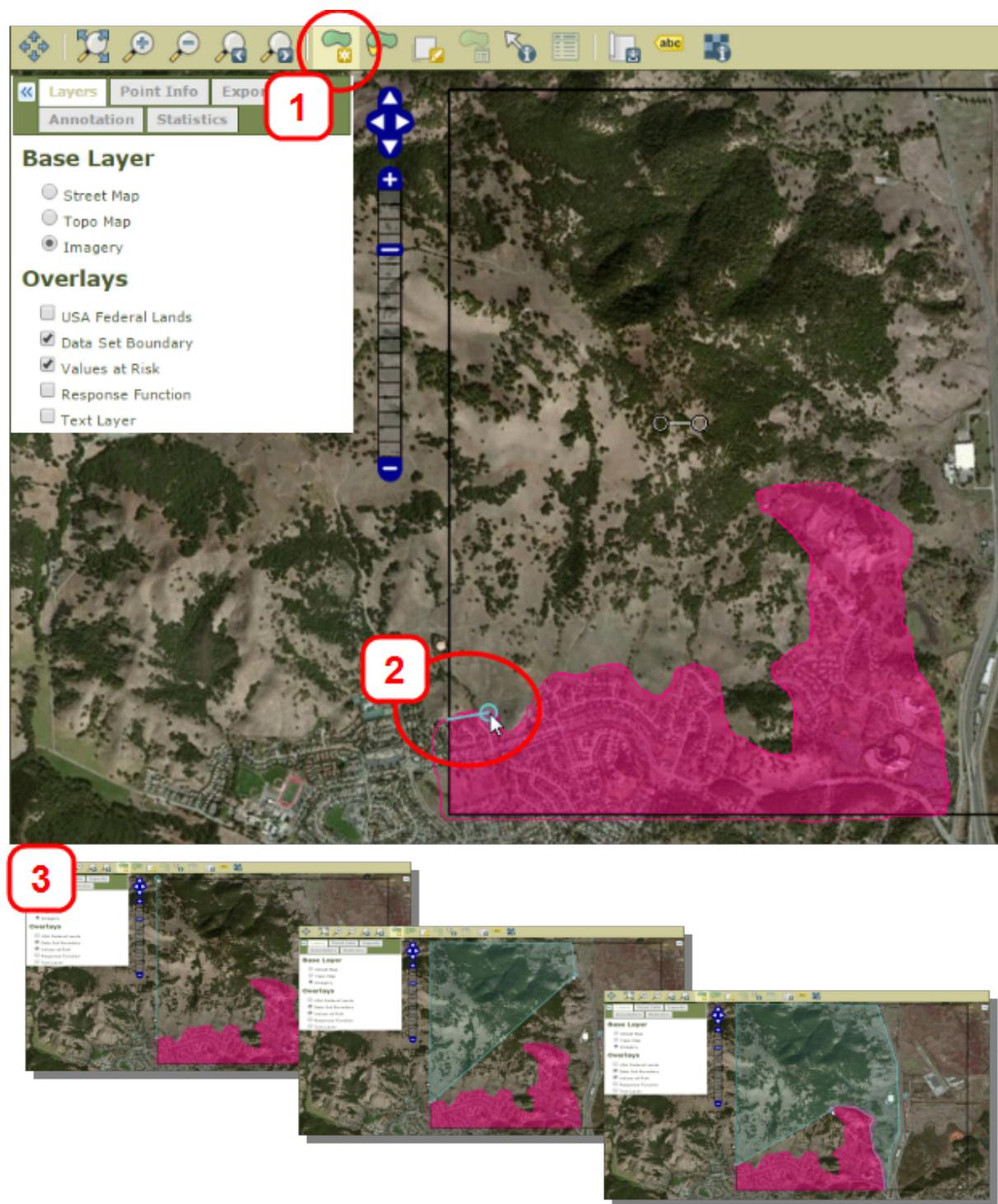
# Defining Values at Risk: Using the Point and Click Method to create polygons

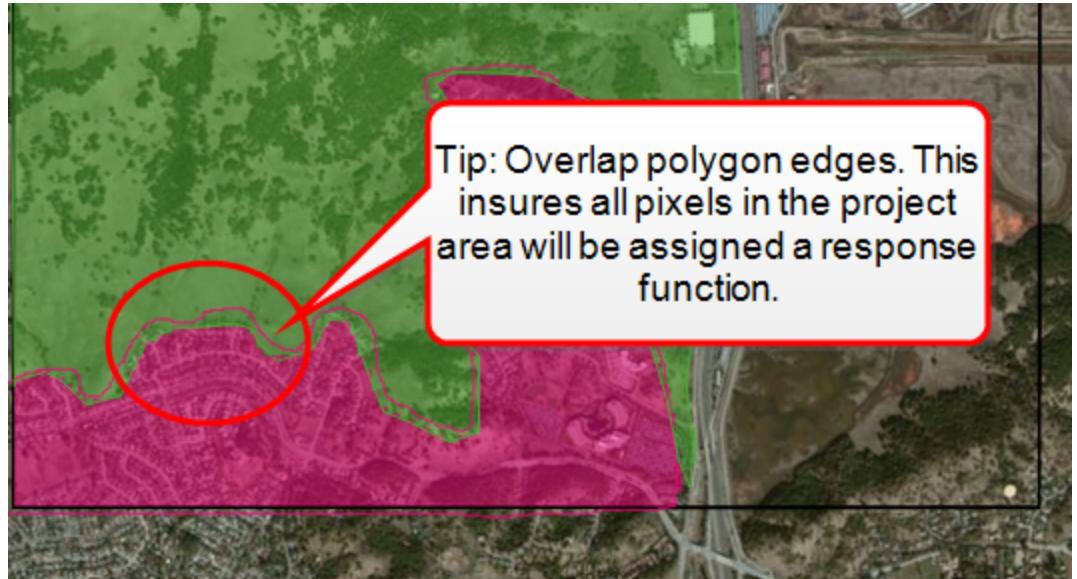
Next, define another value at risk.

In this example, use the **point and click method** to draw a polygon over the private land (oak woodlands).

1. Select the **Draw Polygon** tool.
2. Click on the map and release to start drawing your first polygon.
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).

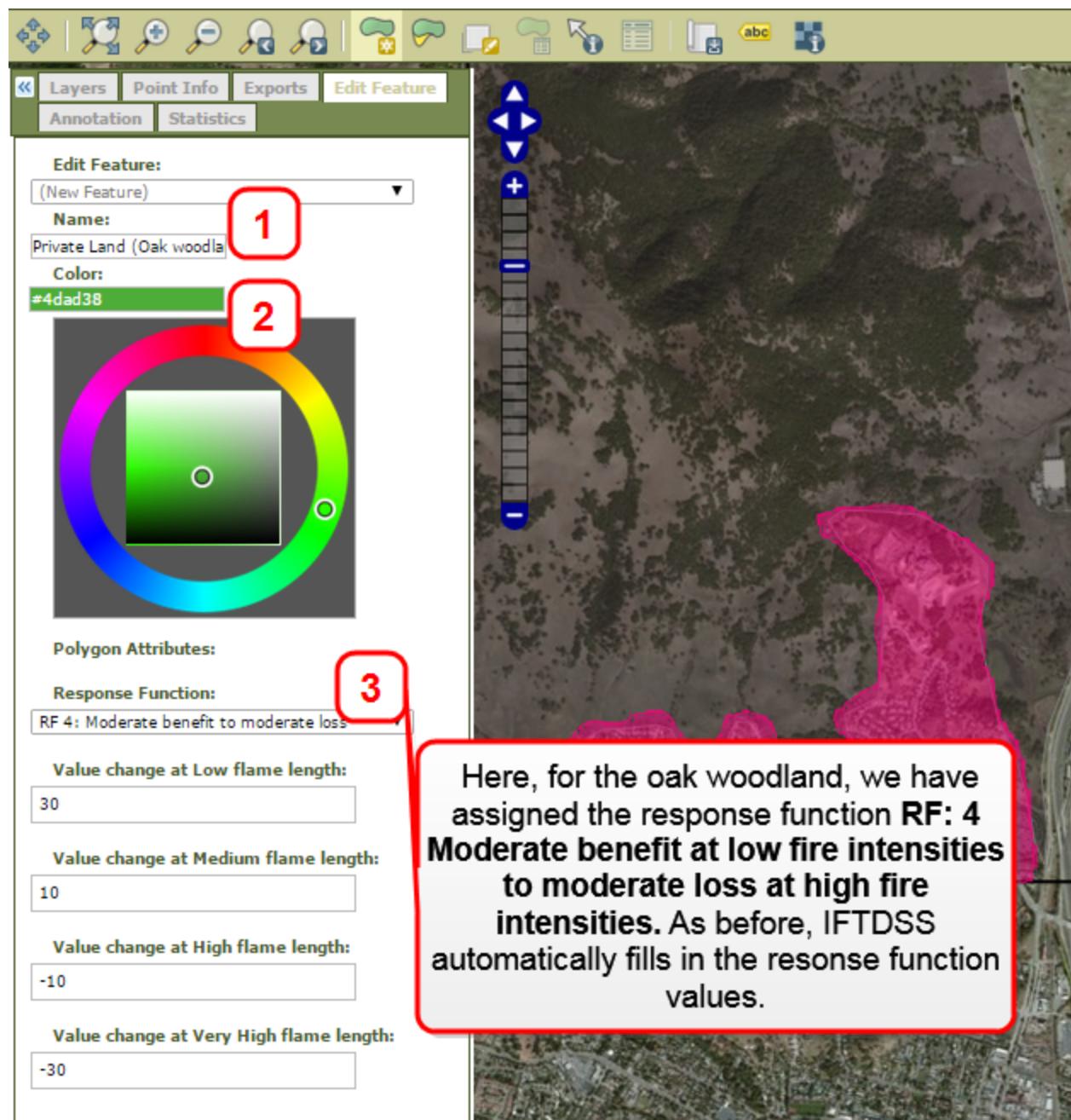




After double-clicking to create the polygon, the **Edit Feature** panel appears. To edit the polygon:

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. Assign a response function to the polygon (see page 19 and the box to the lower right on this page). Here we have assigned to the oak woodland the response function RF 4: Moderate benefit at low fire intensities to moderate loss at high fire intensities. As before, IFTDSS automatically fills in the response function values.

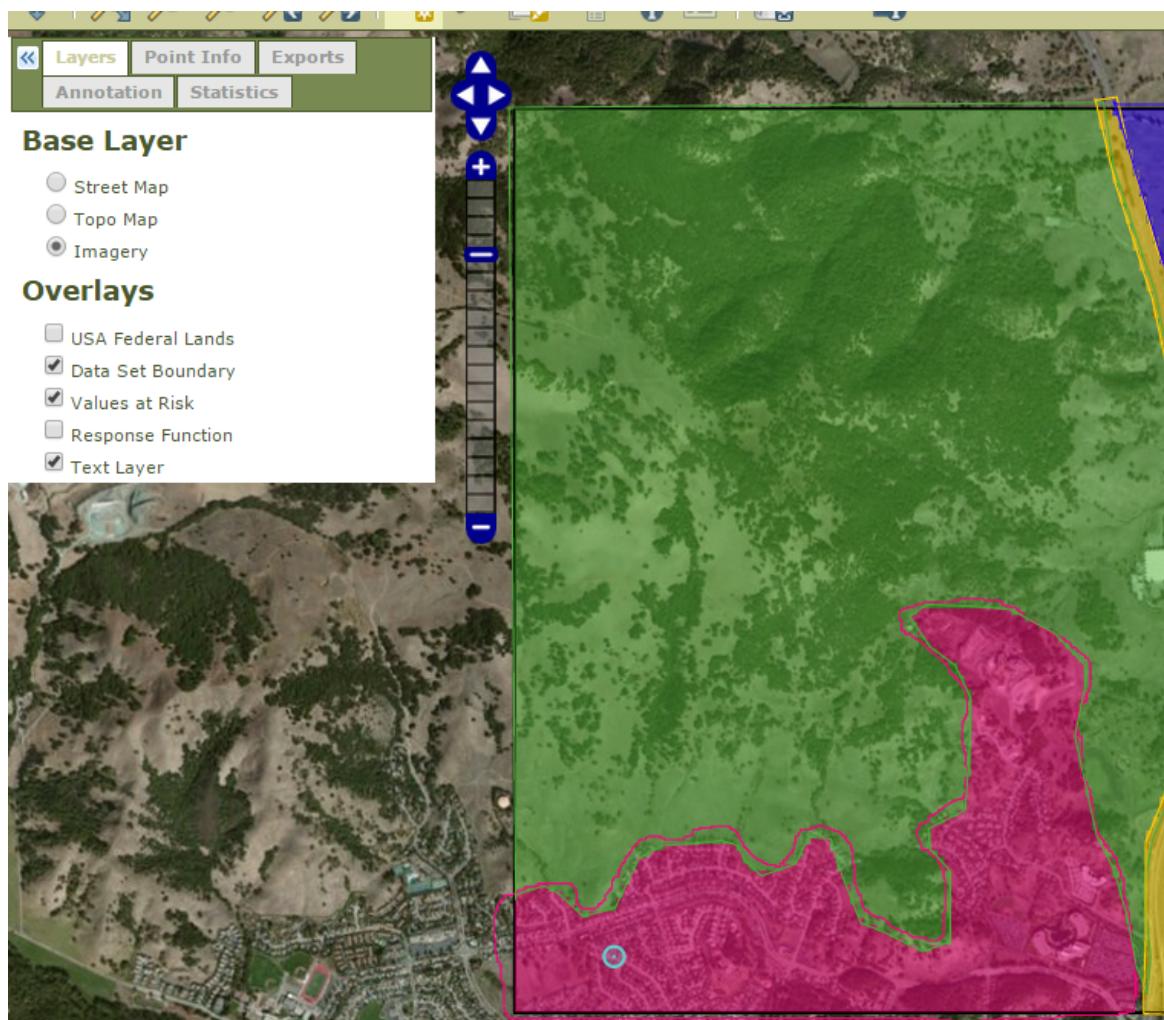
Choose **Submit** to save the polygon data.



# Defining Larger Values at Risk

Continue to fill your entire area of interest with polygons representing the larger values at risk. **Define your largest values at risk first** (e.g., wild-land-urban interface, oak woodlands).

**Try it out:** Define your own large values at risk, using both of the polygon drawing methods, and assign those values at risk a variety of response functions.



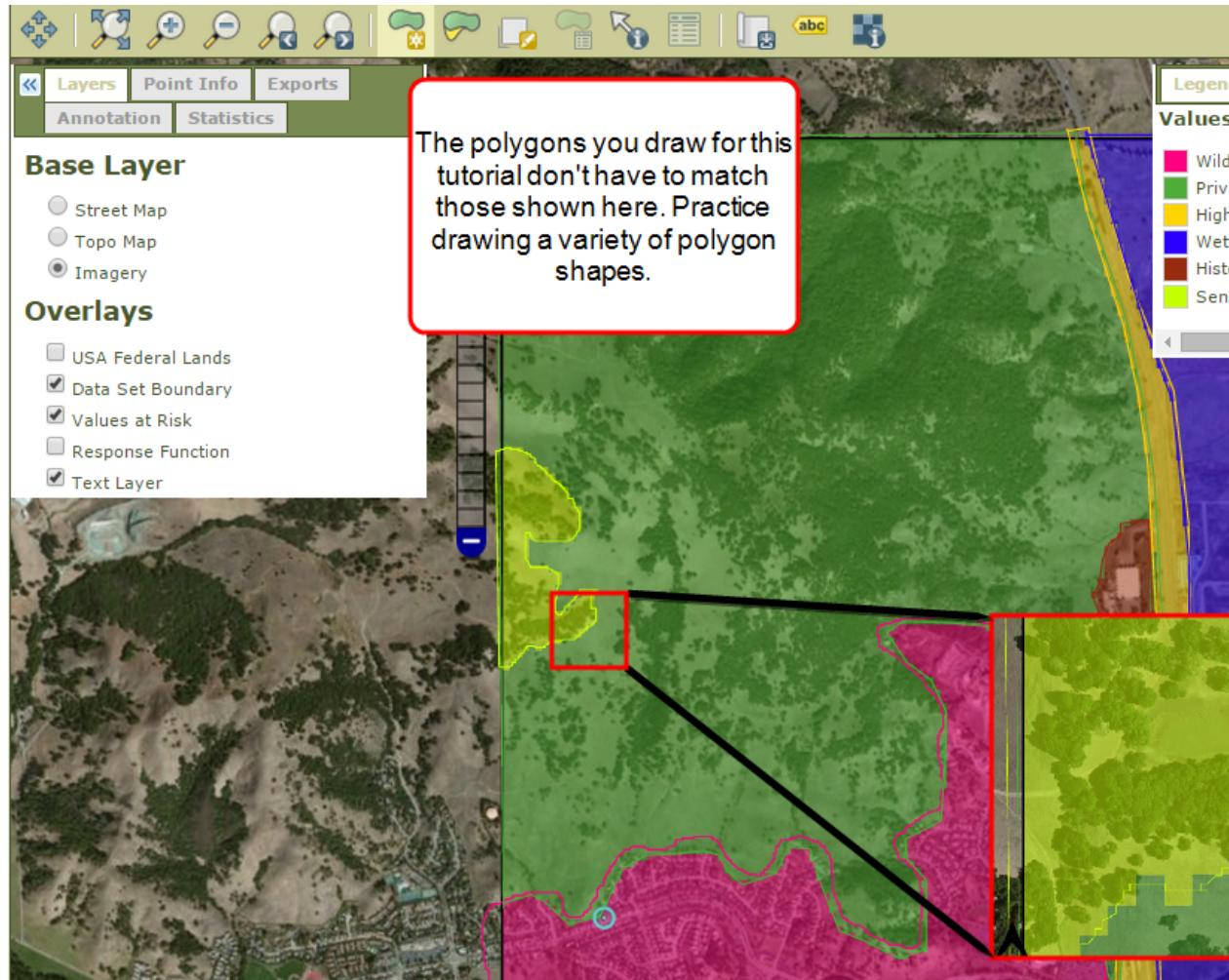
# Defining Smaller Values at Risk

After defining your larger values at risk, draw smaller values of risk (e.g., archeological sites, endangered species habitat, structures) on top of the larger values at risk.

The smaller polygons replace the larger polygons beneath.



**Tip:** Creating a detailed values-at-risk map (with multiple response functions) produces better outputs.



Once you create a polygon, the data area is rasterized. If your polygon line encompasses less than half of a pixel, that pixel will not be included in your polygon. If your polygon line encompasses more than half of a pixel, that pixel will be included in your polygon.

# Editing Values at Risk

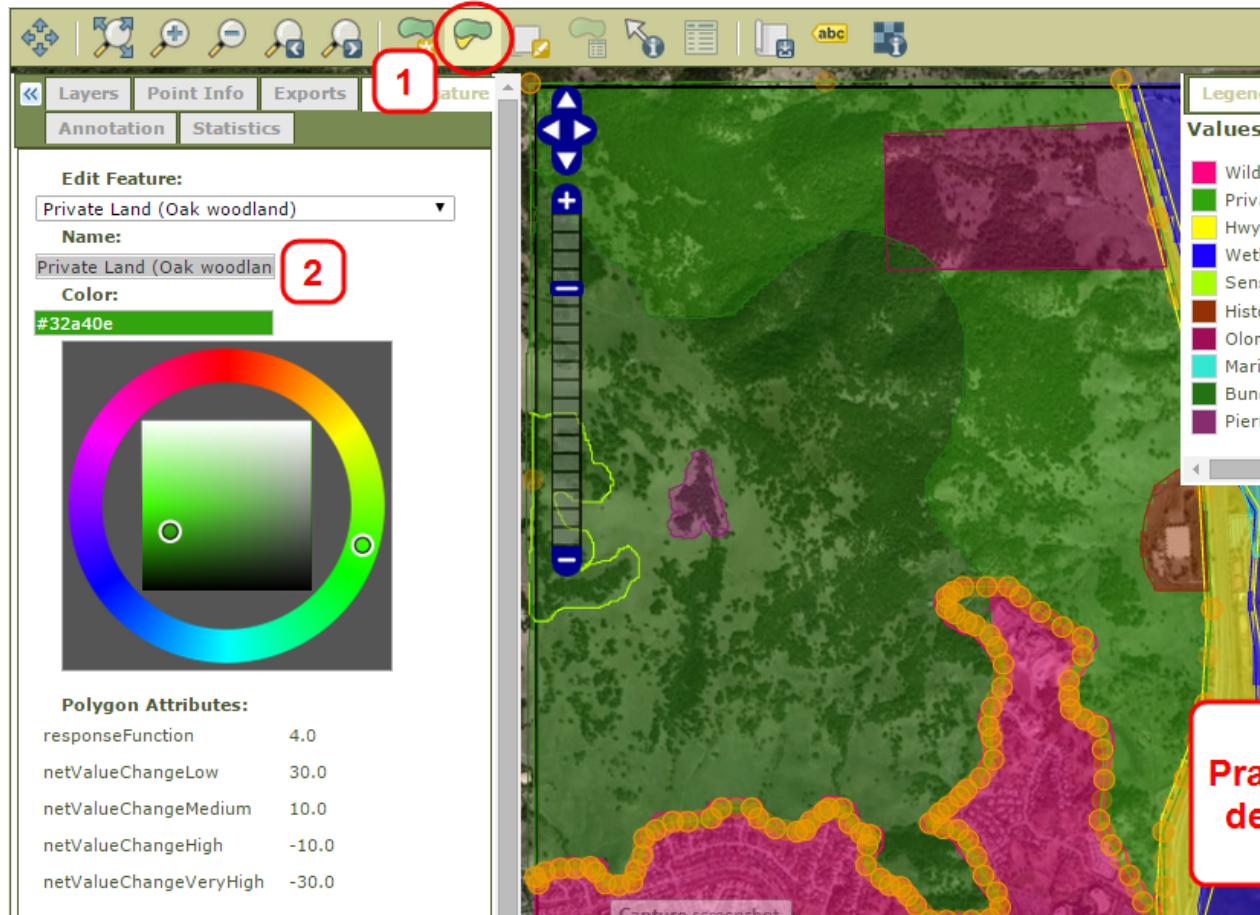
You can also edit your polygons using the **Modify Polygon** tool.

1. Select the **Modify Polygon** tool.
2. Select the feature (value at risk) you would like to edit using the **Edit Feature** drop-down list.

In the **Edit Feature** panel, you can edit the polygon's name, color, or response function.

You can also delete a polygon using the **Delete** button at the bottom of the panel.

If you delete a polygon, the assigned background will replace the deleted polygon.

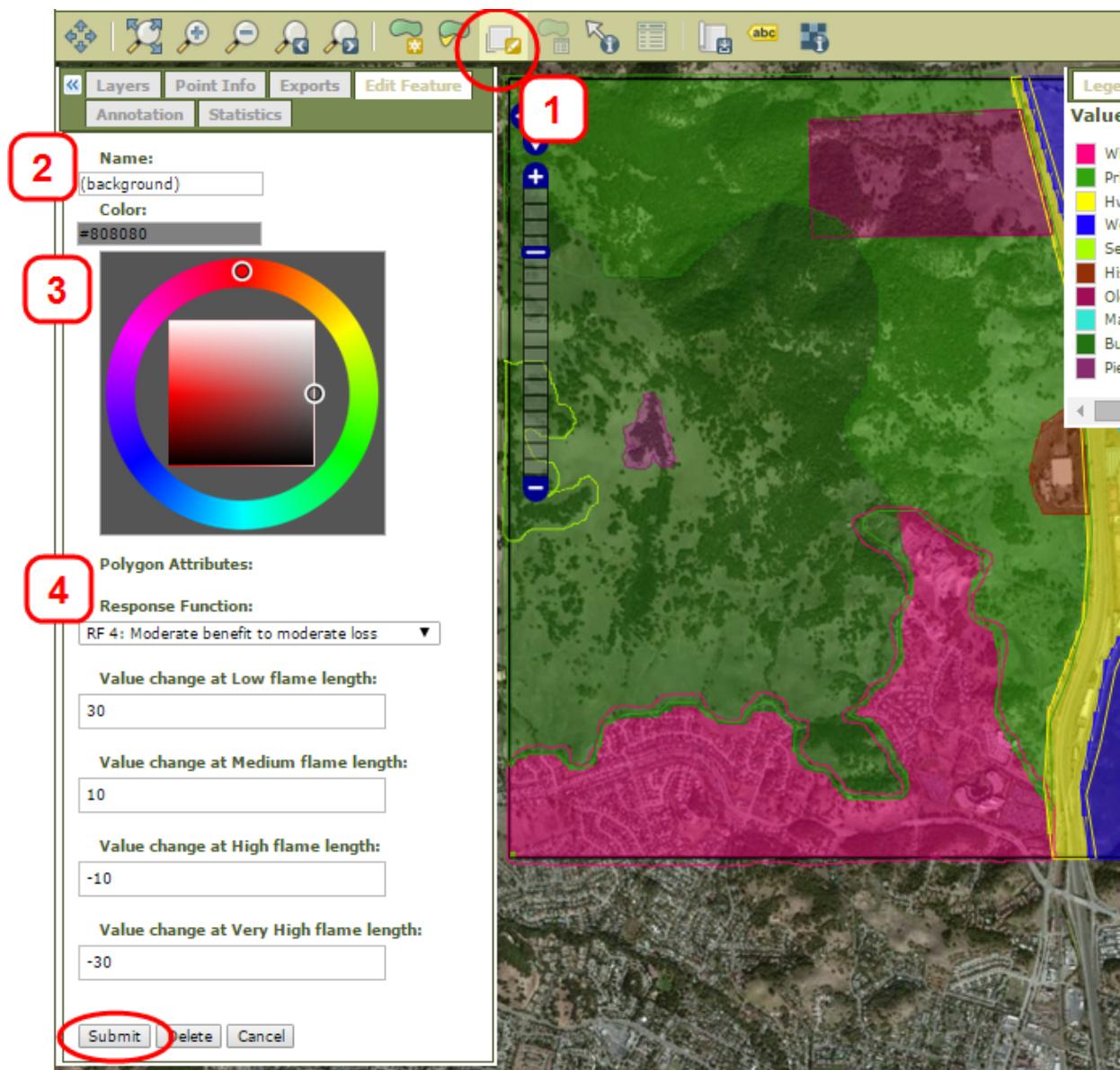


# Defining Values at Risk: Assigning a Background

In order for IFTDSS to calculate an output in the risk pathways, **every grid cell within the area of interest needs a response function**. To fill this requirement without having to define values at risk for every pixel, you can assign a background to your values-at-risk map. To ensure every grid cell is assigned a response function, assign a response function to the background using the following steps:

1. Select the **Edit Background** tool.
2. The **Edit Feature** panel will appear. If you prefer, you can change the background's name from background).
3. Assign the background a color.
4. Assign the background a response function.

Assigning the background a response function of 4 tells IFTDSS to assume that the areas without a polygon will burn with a moderate benefit under low flame lengths to a moderate loss under very high flame lengths.

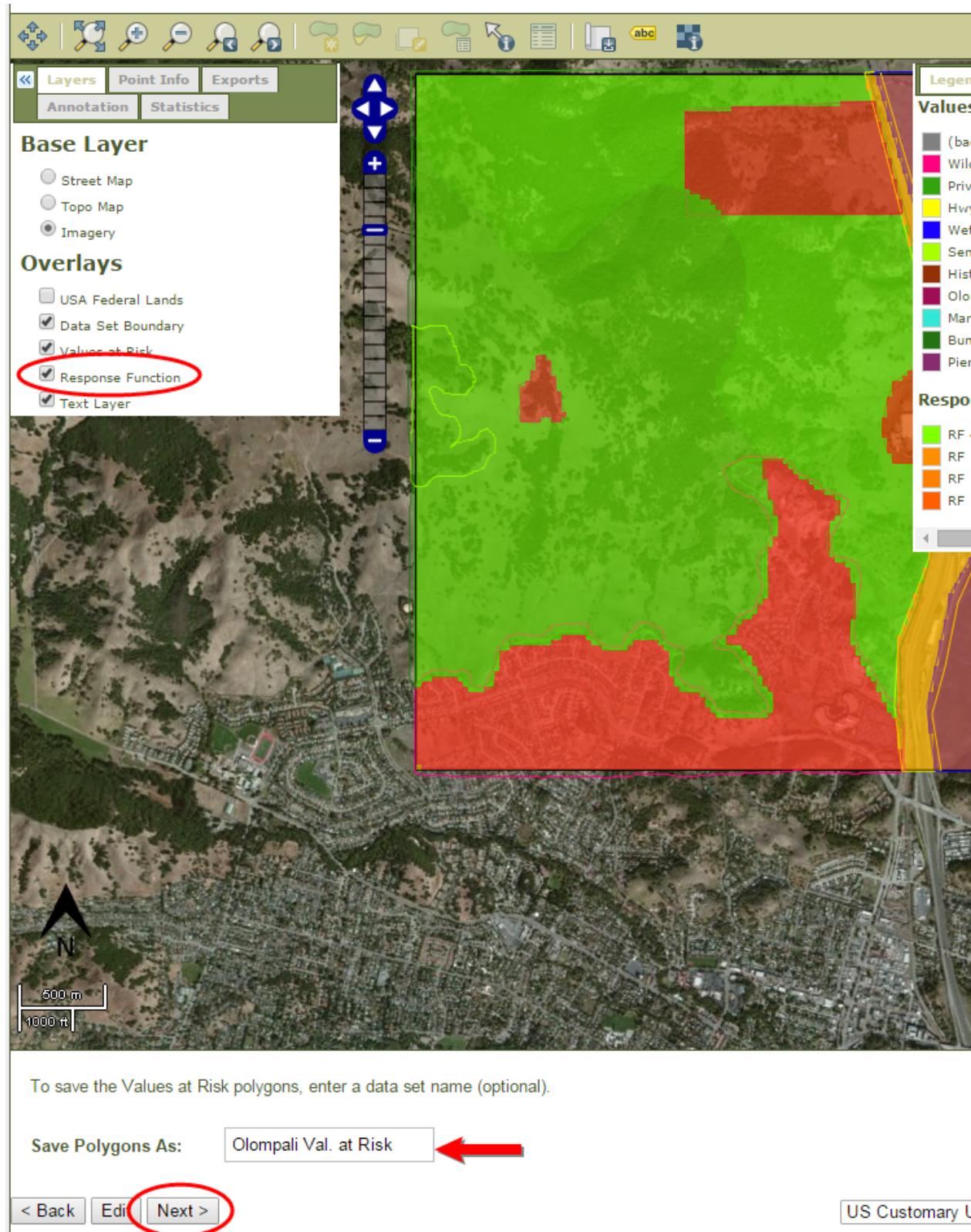


## Reviewing and Saving Your Values-at-Risk Map

You can use the **Layers** panel to view your values at risk or the response functions that you assigned to your values at risk.

To save your values-at-risk map for use in future runs, type a descriptive name into the “**Save Polygons As**” text box.

To continue the risk assessment pathway, when your values-at-risk map is complete, choose **Next**.



# Review

In this tutorial we covered the process of defining and creating a values-at-risk map. Steps covered in this tutorial included:

- Background on Values-at-risk
- Response functions - what they are
- Introduction the Map Toolbar
- Defining Values at Risk: Methods
- Defining Values at Risk: Using the Freeform Drawing Method to create polygons
- Defining Values at Risk: Using the Edit Feature Panel to Specify Values at Risk Response function
- Defining Values at Risk: Using the Point and Click Method to create polygons
- Defining Larger Values at Risk
- Defining Smaller Values at Risk
- Editing Values at Risk
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- Reviewing and Saving Your Values-at-Risk Map

# Additional Help

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

- Click the **Help** button.
- 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.

