

Developing Treatment Alternatives (Tutorial)

Management Scenario

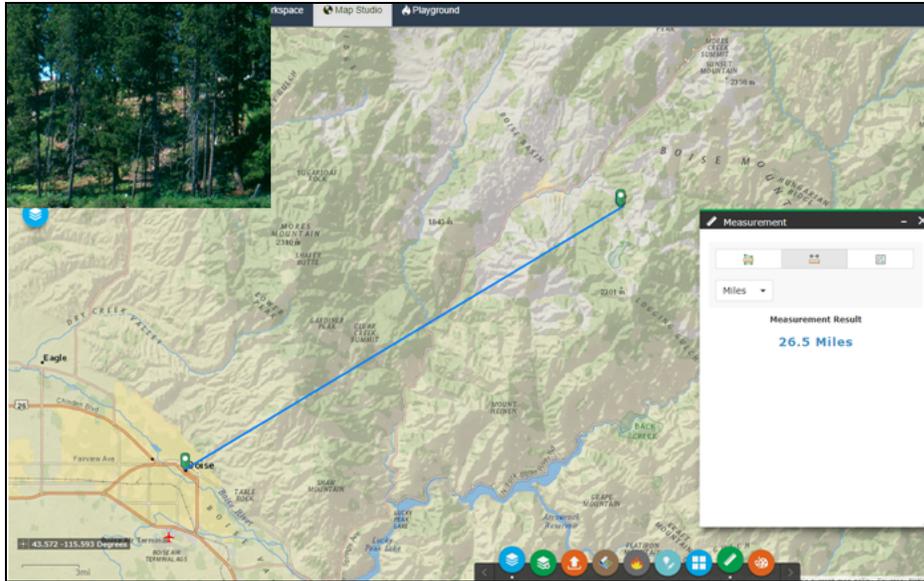
You are a Fuels Technician on the Idaho City Ranger District, Boise National Forest, about 30 miles northeast of Boise, Idaho. In this scenario you will use IFTDSS to plan a hazardous fuels reduction project.

Through observation and based on Forest Plan direction, you see a need for some sort of fuels reduction treatment in the mixed conifer stands in Granite Creek drainage, approximately 4 miles east of Idaho City. The area hasn't been treated in decades and the understory and surface fuels could contribute to uncharacteristically intense fire behavior. This would not only pose a hazard to the community of Idaho City and adjacent private land, but also cause undue mortality in this fire-adapted low elevation Ponderosa pine ecosystem that thrives on frequent but low severity fires.

Your objectives are to:

- Reduce surface fuel loading and the overall horizontal and vertical fuelbed continuity to reduce the fire hazard to adjacent private land and the community of Idaho City
- Return low intensity fire to fire adapted vegetation communities.
- Locate areas where our actions will be most effective
- Evaluate what type of treatment will help achieve these objectives
- Demonstrate the need for treatment, both quantitatively and spatially, to members of your district interdisciplinary (ID) team.

You'll use IFTDSS to plan a treatment around these objectives.

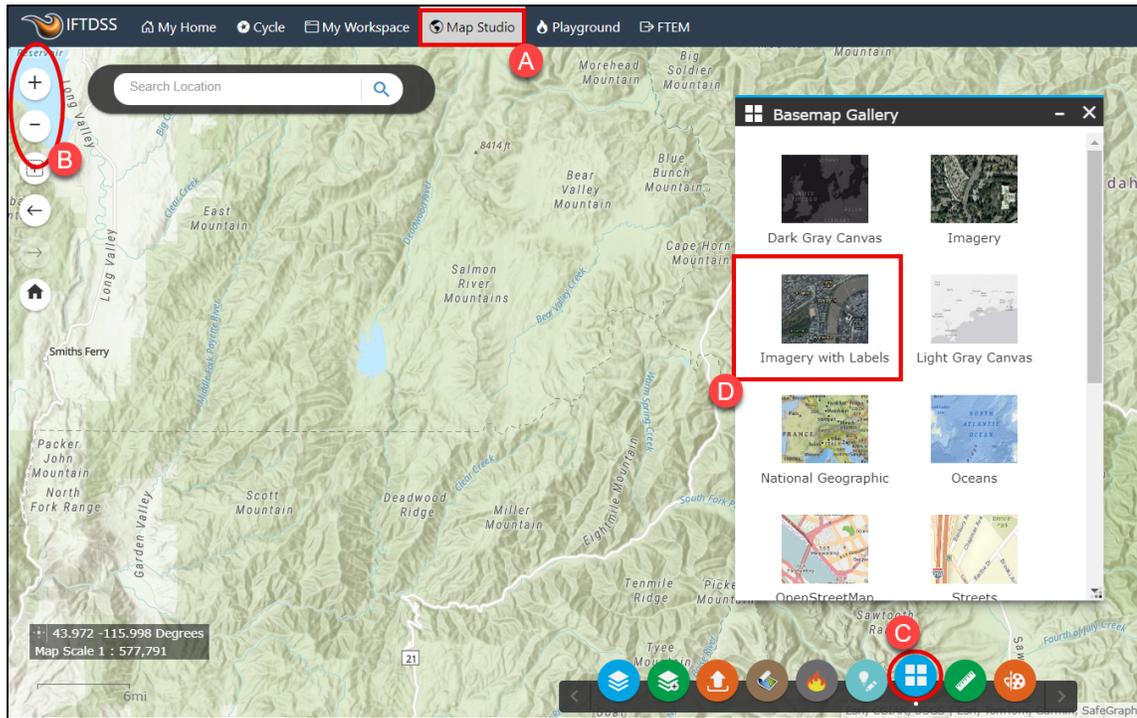


Previewing the Landscape

The first step takes place in Map Studio to get a good look at the area and create a landscape to start working from. To do this:

- A. Access Map Studio from the top navigation panel, visible on any page in IFTDSS.
- B. Use the **Zoom** widgets, and mouse, to locate your area. The location search box at the top of Map Studio can also be helpful.
- C. Open the **Basemap Gallery** to choose a more detailed basemap.

D. Select "Imagery with Labels" and close the Basemap Gallery widget.



Create the Landscape

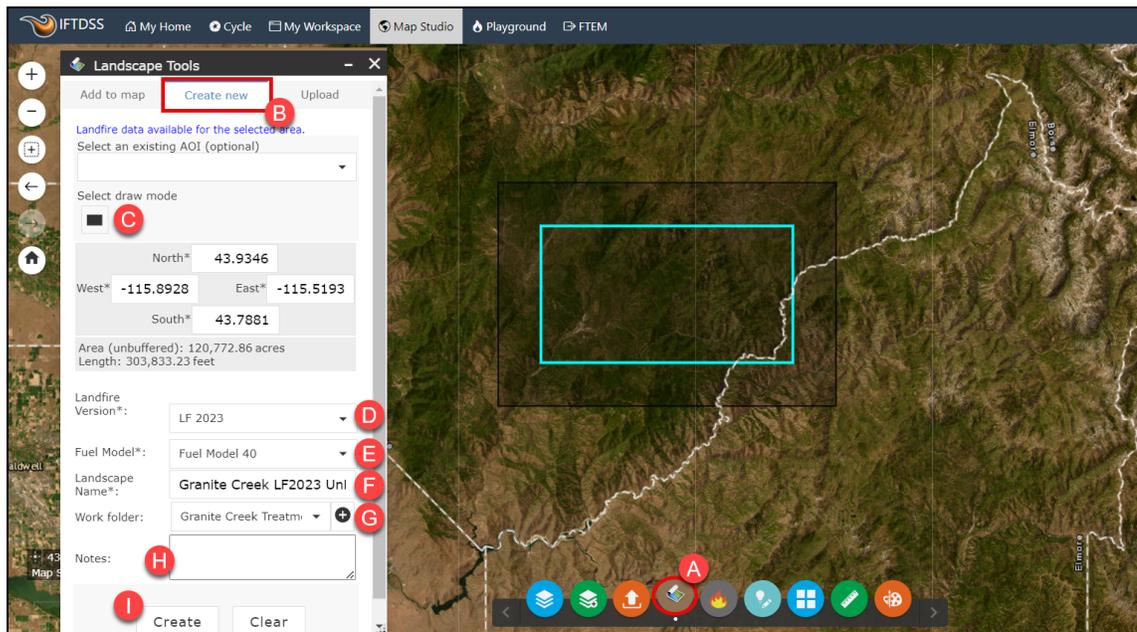
The landscape serves as a starting point for the rest of the analysis. To create a landscape:

- A. Click on the **Landscape Tools widget** at the bottom of the screen.
- B. Select the **Create New** tab to create a new landscape.
- C. Select **Draw Mode**, then drag across the area you'd like to analyze. For this example you can follow along by inputting the coordinates below directly into the fields:
 - East: -115.5193
 - West: -115.8928
 - North: 43.9346
 - South: 43.7881
- D. Select a version of LANDFIRE data for the landscape, in this case 2023.
- E. Select the fire behavior fuel model type (13 or 40), here Fuel Model 40 was chosen.

- F. Name the new landscape "Granite Creek LF2023 UnEd." Include the name, LANDFIRE version, and its editing/treatment status. This makes it easy to discern this landscape from others once you start editing.

Important! Try to keep the entire name around 30 characters long to ensure it runs smoothly in future IFTDSS operations.

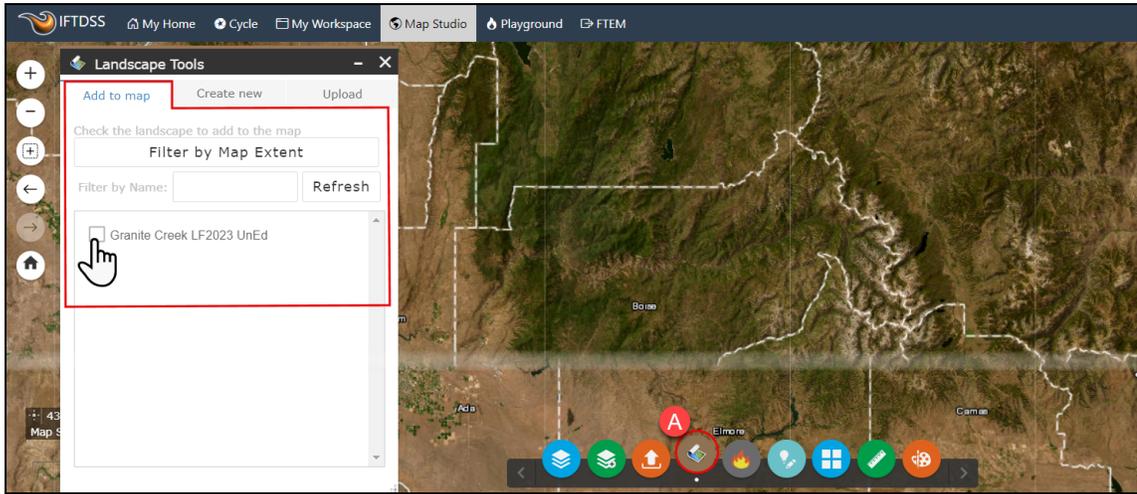
- G. Choose or create a new folder for this landscape, this is where the landscape is stored in **My Workspace**. For this example, use the + button next to the folder name to add a new folder, name it "Granite Creek Treatments."
- H. (Optional) Add any notes you'd like to include about this landscape. Notes may be viewed in My Workspace by selecting the model run and viewing the right hand metadata panel.
- I. Once everything looks good, click **Create** and wait for the landscape to process. Close the Landscape Tools widget.



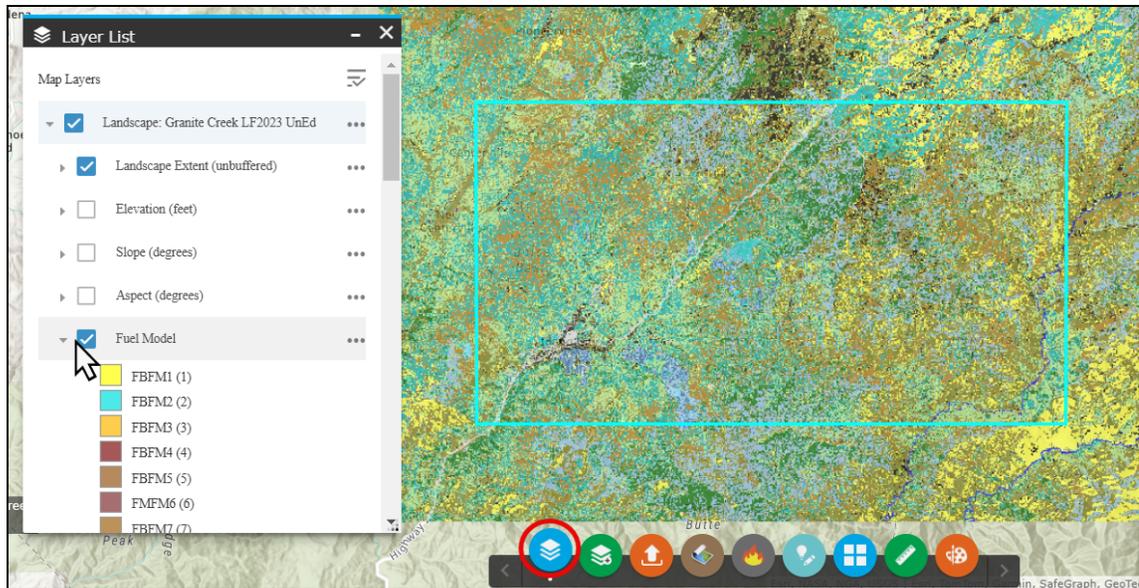
Displaying and Assessing the Landscape

Start assessing the landscape in Map Studio:

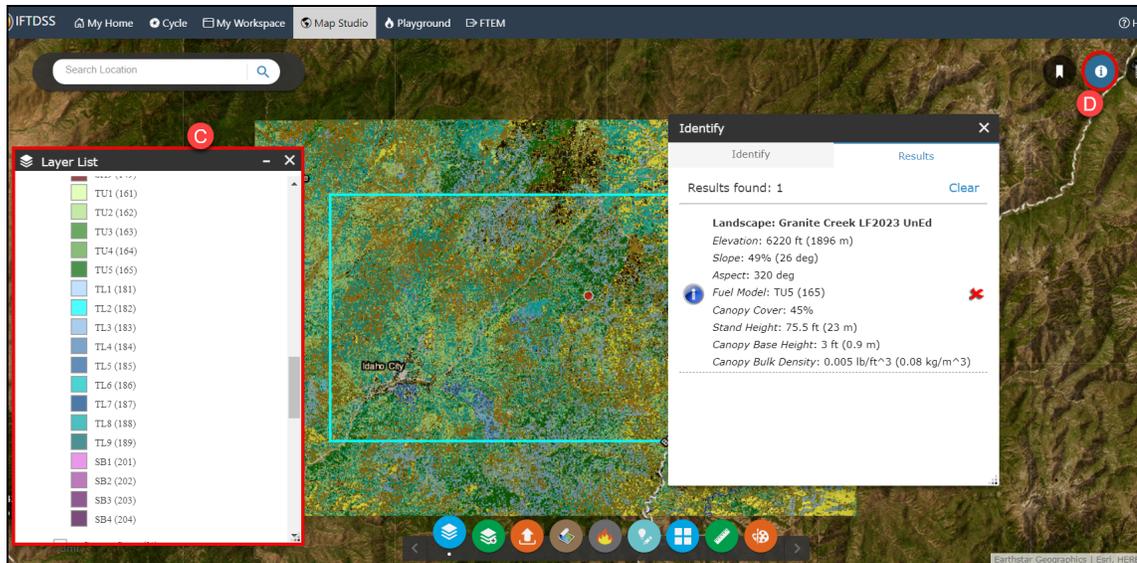
- A. Use the **Landscape Tools widget** to select the landscape under the "Add to Map" tab. This adds the landscape to the map and the map's **Layer List**. Close the Landscape Tools widget.



- B. Open the **Layer List widget**, ensure your landscape is checked, and view the landscape layers by clicking the drop-down arrow to the left of the checkbox. You can select and unselect the landscape layers to view. View the legend for each layer by clicking the drop-down arrow to the left of the checkbox for that layer.

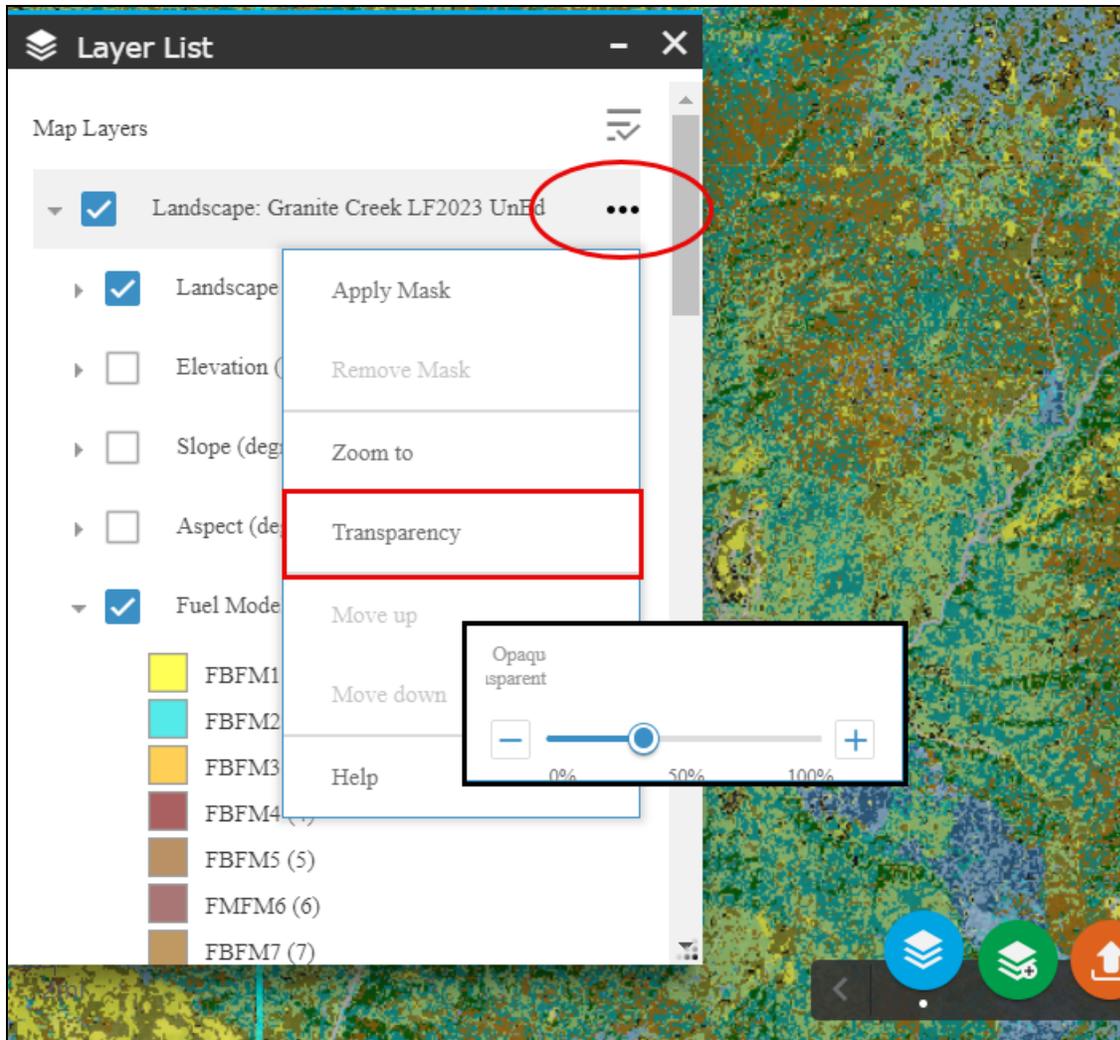


- C. You'll want to look at the fuel models to make sure they correspond to what you're seeing on the ground in this area, so ensure the fuel model box is selected.
- D. Click the **Identify widget** in the upper right corner of the page to view more information for different areas of the landscape. Clicking on a pixel displays the information for the pixel. For example, by clicking on areas of the landscape you can see that the green-blue pixels on the map correspond to areas of Fuel Model 188 (TL8). Continue examining various areas of interest on the landscape to learn more about what fuel models are present and where. Notice that all of the landscape characteristics come up in the Identify box when you click on the landscape.



Adjust Transparency

It may be helpful to adjust the transparency of the layer to better see roads, landscape characteristics, or other features. To do this, click **More Options** to the right of the landscape name in **Layer List**. In the drop-down menu of options, choose **Transparency** to open a slider bar allowing you to adjust the transparency level for that layer. Once satisfied with the level of transparency, close the slider bar by clicking the **More Options** button.



Adding Reference Layers

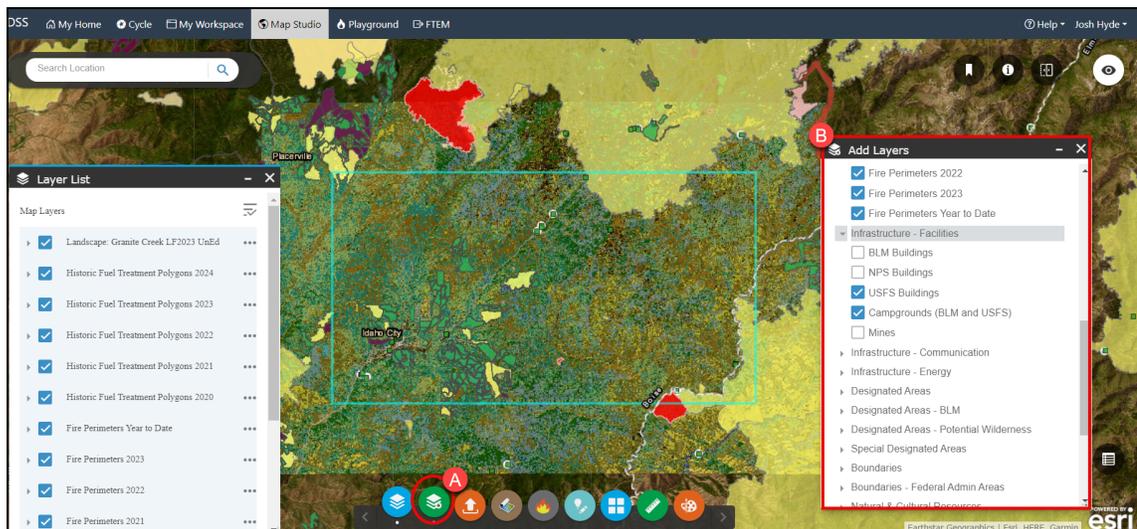
Before doing a full assessment of the landscape characteristics, you'll want to view previous fires or treatments that may have occurred in this area:

- A. Click the **Add Layers widget**  at the bottom of the screen, and make sure the **IFTDSS Reference Layers** tab is selected. There are options for several data layers including historic disturbances and treatments, ownership, fire environment, and others.

B. In this example we'll turn on the following reference layers for a better understanding of the area history and infrastructure:

- Disturbance History Historic Fuel Treatments (selecting fire perimeters spanning from 2010 to present).
- Disturbance History Historic Wildfires (selecting disturbances spanning from 2010 to present).
- Infrastructure - Facilities (selecting USFS Buildings and Campgrounds).

C. As each layer is turned on, it appears in the **Layer List widget**. Looking at the area we see Idaho City in the southwest; the area surrounding the town has been the focus of several recent fuel treatments. There are fire scars in the north and east of our landscape boundary. Running through the center of the landscape is a road along which campgrounds and some USFS buildings are located. Most of the basin east of the road is not showing recent treatments or fire scars. The **Identify widget** can be used on any of these layers to provide specific details.



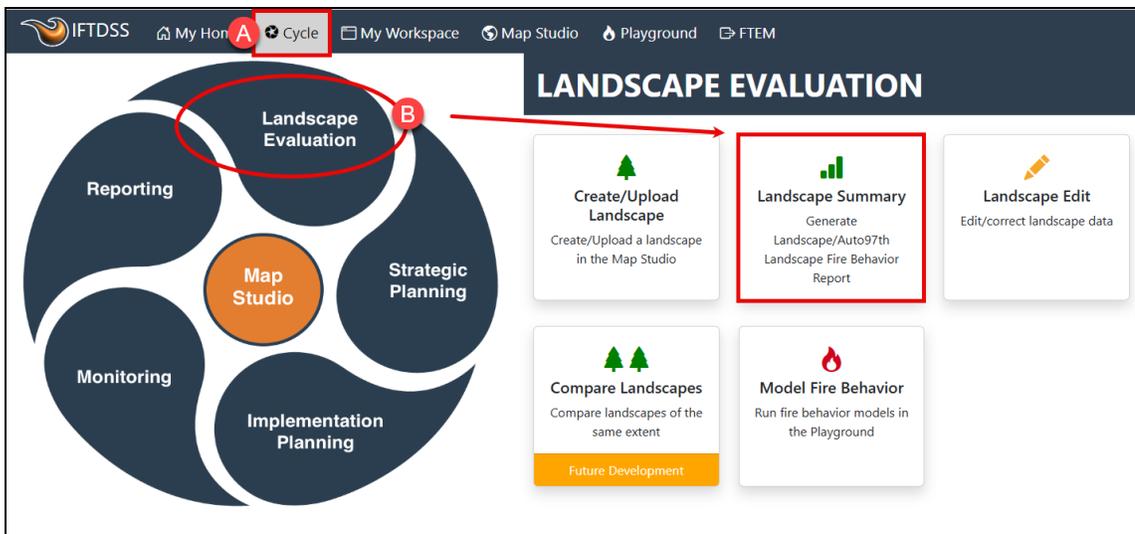
After doing an assessment of all the landscape characteristics (Elevation, Slope, Aspect, Canopy Cover, Stand Height, Canopy Base Height and Canopy Bulk Density) you determine that the LANDFIRE 2023 data in this landscape reflects existing conditions, including previous fire and treatments. If there had been a more recent disturbance since this 2023 data was produced, such as a fire or fuels treatment, it could be easily represented by [creating a polygon](#) using the **Create/Edit Shapes widget** to reflect the disturbance area, then using the [Landscape Editing](#) task in the Planning Cycle to make changes to that area and save them.

Next, run a summary report and compare these fuel models with potential landscape fire behavior.

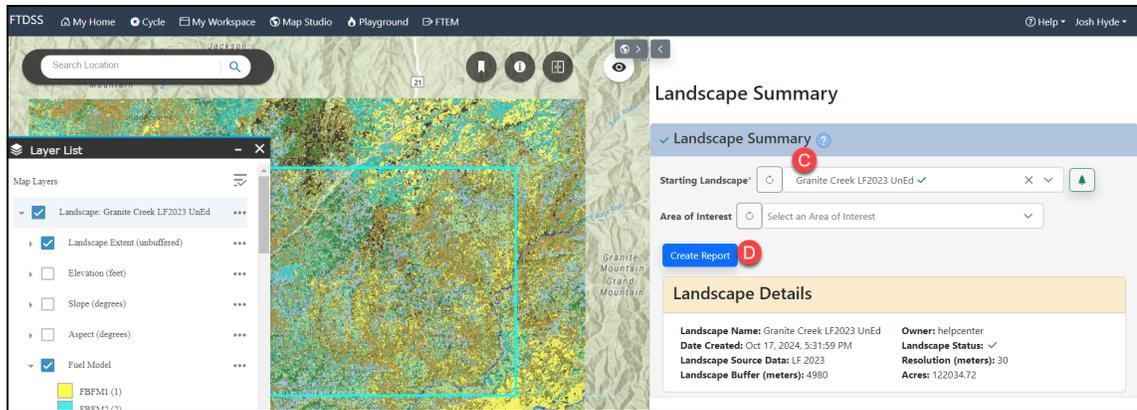
Summarizing the Landscape

Creating a Automatic 97th Percentile Landscape Fire Behavior (Auto97th) Report, runs basic fire behavior across the landscape for 97th percentile weather conditions. The results are available as a downloadable report and the model outputs may be views in Map Studio. To create these:

- A. Click on **Cycle** in the top navigation.
- B. Ensure the **Landscape Evaluation** stage is selected, then click the **Landscape Summary** task.

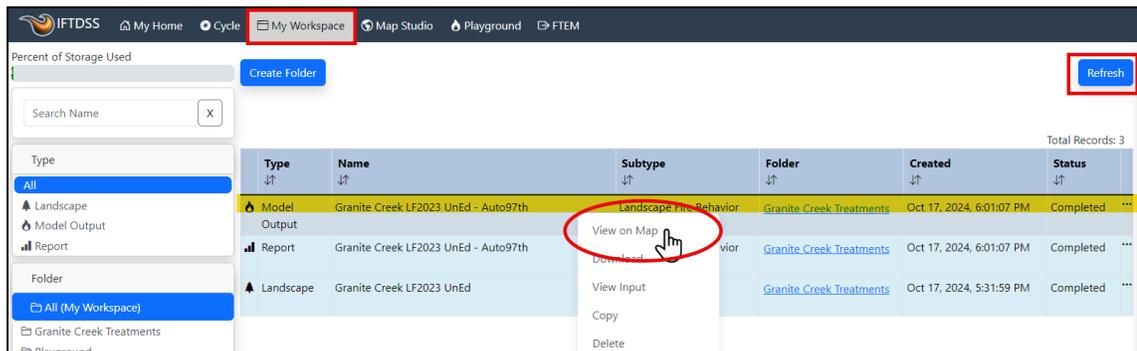


- C. In **Landscape Summary**, click the drop-down menu next to **Starting Landscape**. If the newly created landscape doesn't appear in the drop-down, use the **Refresh** button after giving the landscape a short time to process. The landscape appears with a green check next to it which indicates it has been successfully created and may now be used throughout IFTDSS. If you wanted to create a report just for an area of interest, you'd use the Area of Interest drop-down menu to select a shape or shapefile. For this example, leave the Area of Interest field blank in order to produce a report for the entire landscape.
- D. Click **Create Report**.



- E. The modeling and report process will begin running. During this time, we can navigate to **My Workspace** and use the **Refresh** button to see when the model and report have completed. When completed, right click on the model output, "Granite Creek LF2023 UnEd - Auto97th", to view the file options. Select "View on Map," this will open the model outputs in **Map Studio**.

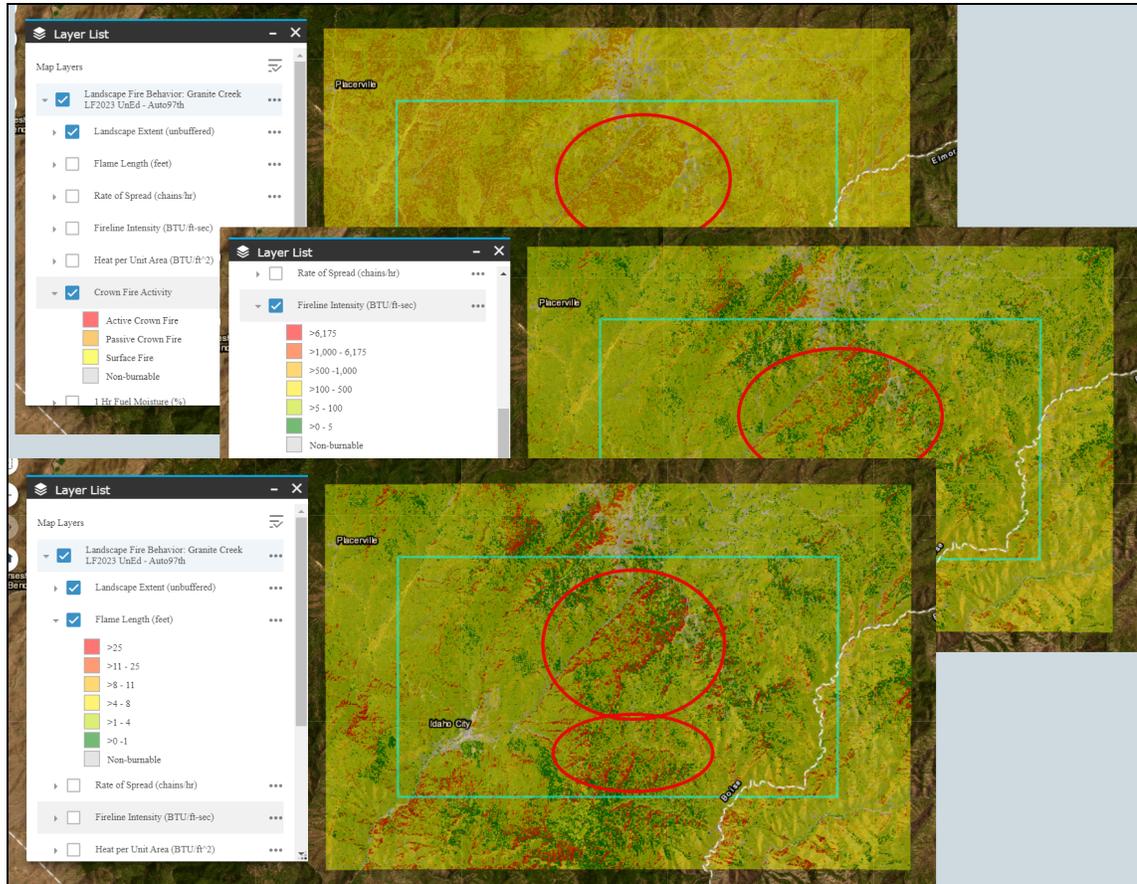
Note: Model outputs are stored in the same folder as the landscape file they were created from. In this case, the "Granite Creek Treatments" folder.



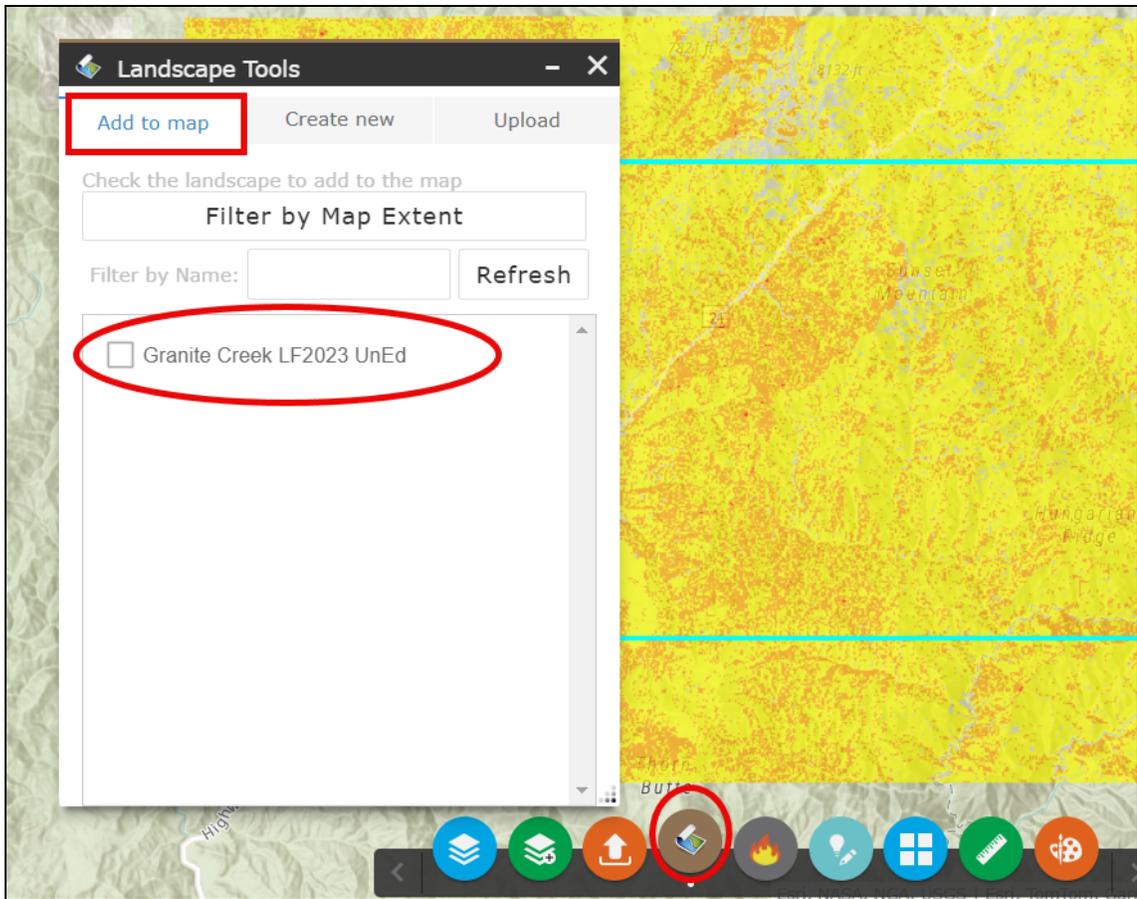
Comparing Landscape Features and Model Outputs with the Swipe widget

Using the widgets in Map Studio we can evaluate the predicted basic fire behavior given 97th percentile fuel moisture conditions on the landscape.

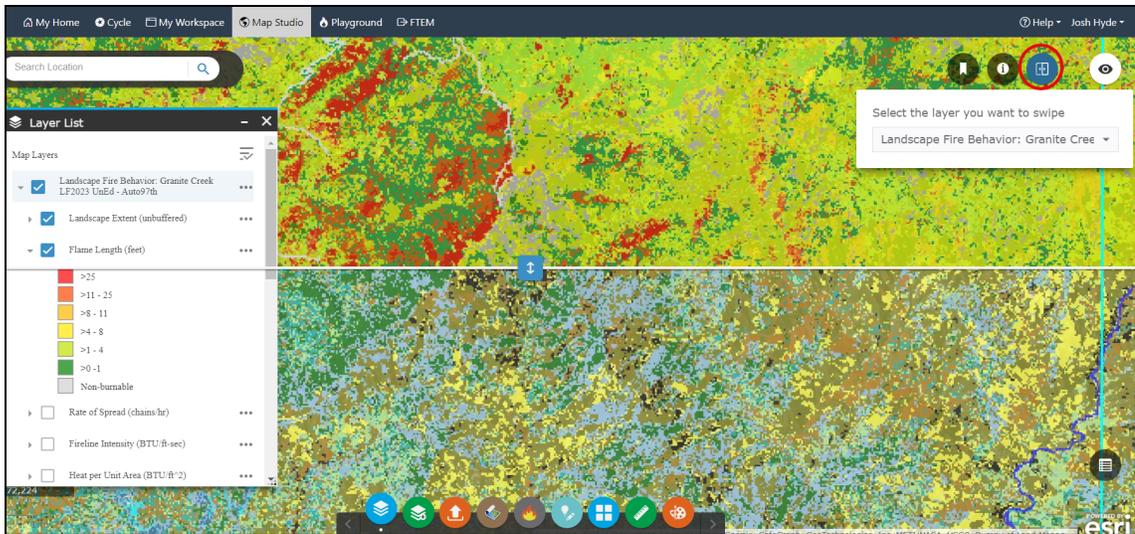
- A. On the **Layer list**, toggling between the fire behavior outputs, flame length appears to be the most pronounced in the center of the landscape just east of the road, as well as in the south central part of the landscape. These same areas are also predicted to have greater fireline intensity and more instances of passive crown fire.



- B. To compare these model outputs with landscape features, add the Granite Creek LF2023 unedited landscape back to Map Studio by opening the **Landscape Tools** widget, clicking the **Add to Map** tab and using the checkbox to add the "Granite Creek LF2023 UnEd." Close the Landscape Tools widget.



- C. Click the **Swipe widget**  in the top right of Map Studio. Swiping back and forth between the fire behavior layer and the landscape, as well as using the **Identify widget** , it becomes easier to see some trends in these areas of high fire behavior such as higher flame lengths typically predicted on:
- Areas with TU5, TL8 or TU3 fire behavior fuel models.
 - North or northwest facing aspects.



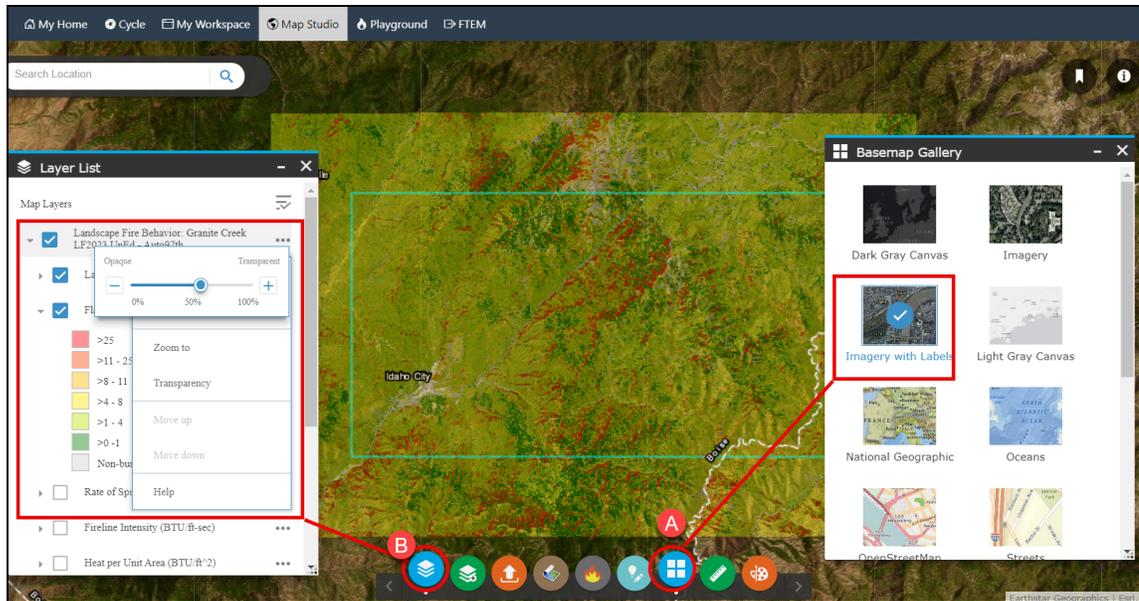
With this information, you decide to create two areas of interest, or areas on which you'd like to focus the analysis and treatments.

Creating Areas of Interest

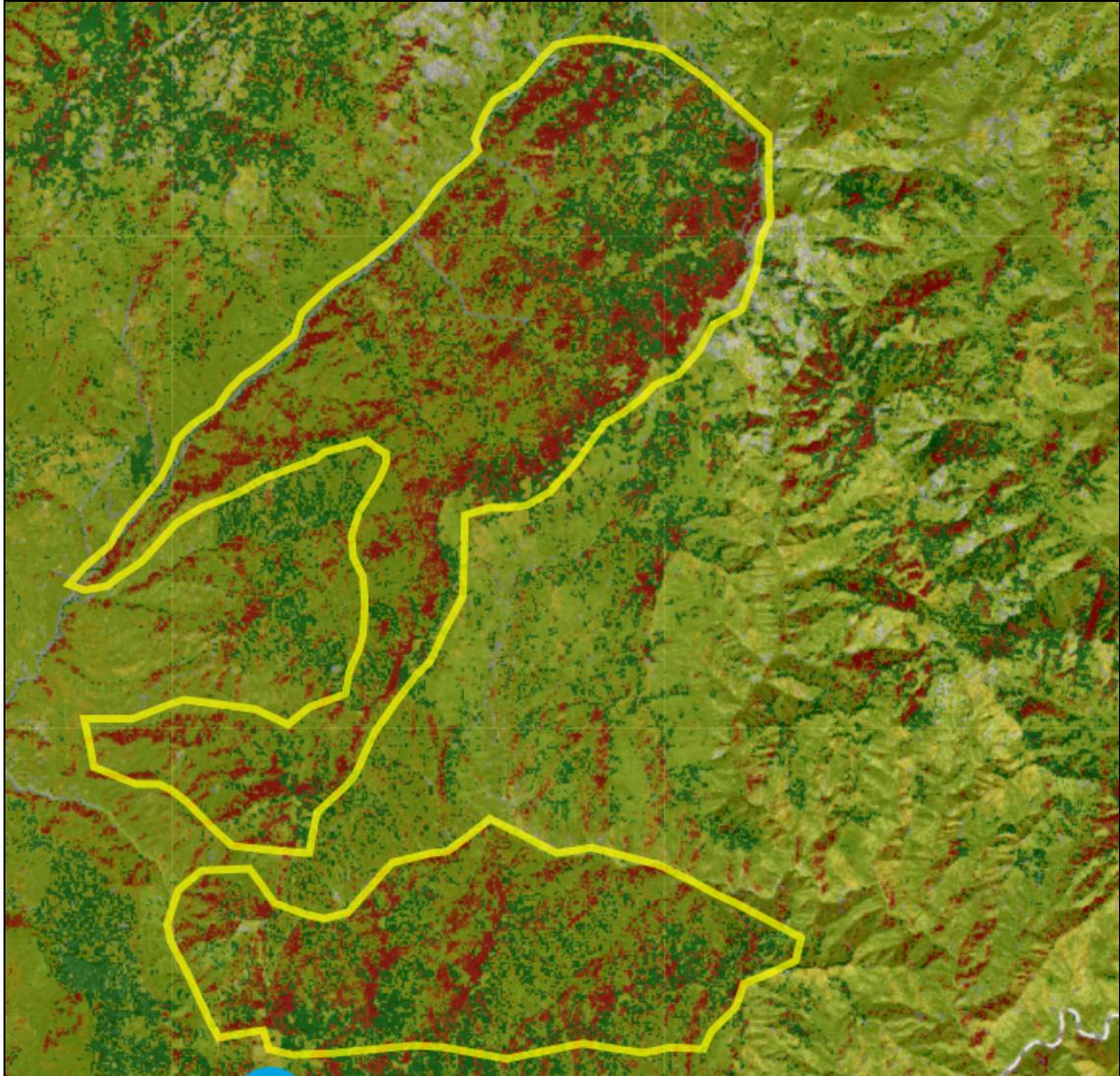
To create an Area of Interest (AOI), or polygon, you'll first adjust the layer visibility to make it easier to identify the areas on which you'd like to focus:

Tip: If you would prefer to follow this tutorial using the exact shape depicted in the examples, it may download "GraniteCrkProposedTreatmentAreas.zip" to your computer. Once downloaded, open the **Upload Shapefile widget** in Map Studio, select "GraniteCrkProposedTreatmentAreas.zip" from your computer, then save it as "Granite Creek Proposed Treatment Areas". This will replace steps A-G below.

- A. If you have not done so already, open the **Basemap Gallery widget** and change the basemap to "Imagery with Labels" so you can see landscape imagery, then close the Basemap Gallery widget.
- B. Set up the **Layer List widget** to show the 97th percentile fire behavior output layer for "Flame Lengths," and set the transparency so you can see roads and topography as you create your AOI, or treatment area.

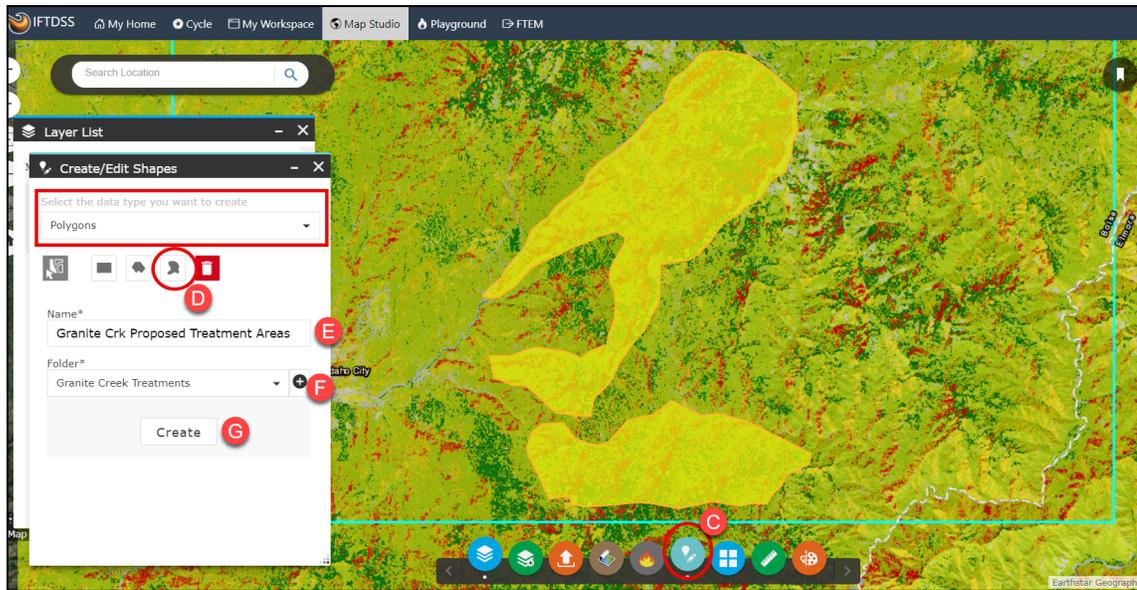


- C. Open the **Create/Edit Shapes widget** at the bottom of the screen and ensure **Polygons** is selected in the drop-down box. You will create two shapes similar to those shown below (they need not match exactly).



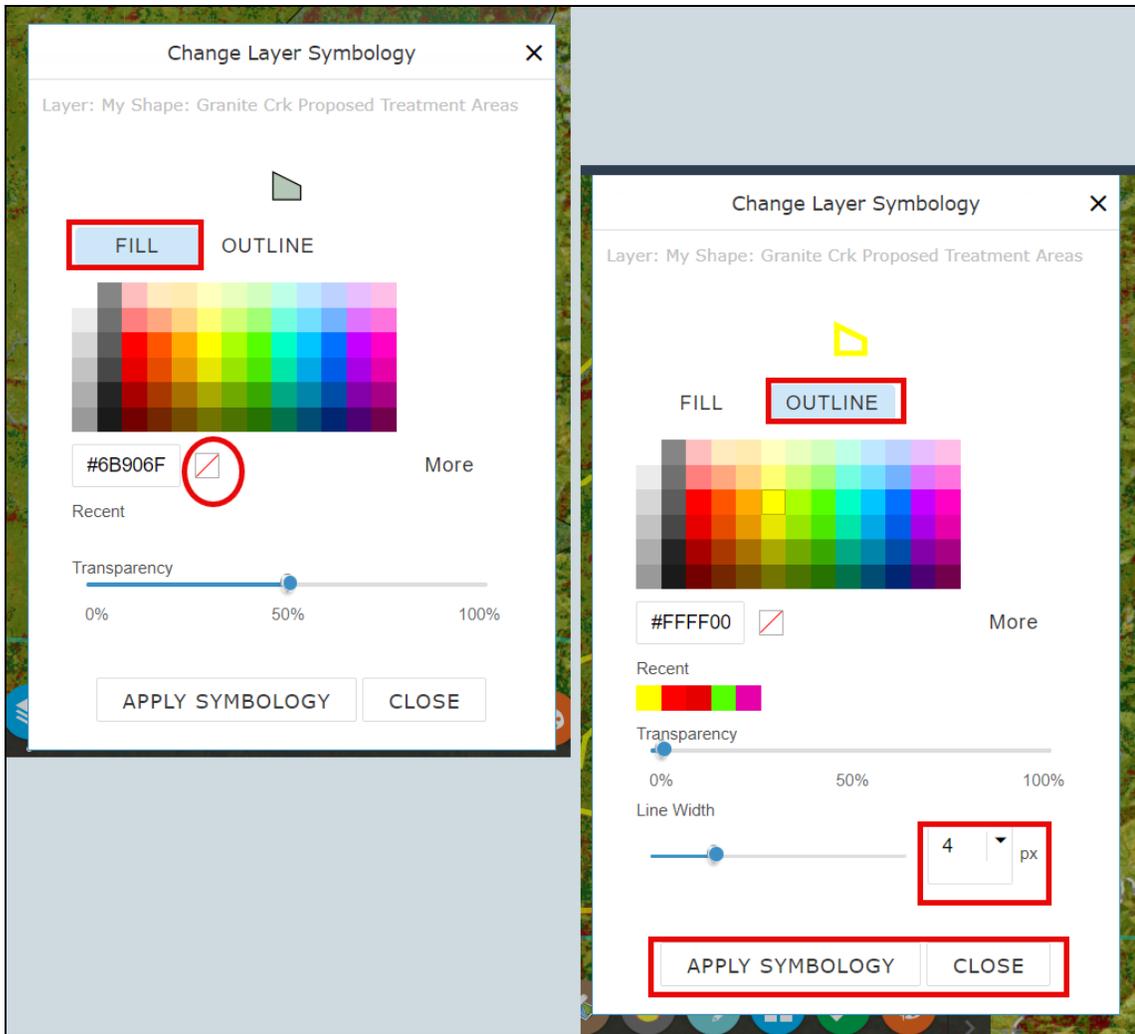
- D. In the **Create/Edit Shapes widget** , select the **Freehand Polygon**  option, and draw two shapes around the areas of significant fire behavior.
- E. Name this "Granite Creek Proposed Treatment Areas".
- F. Select the "Granite Creek Treatments" folder. This will ensure the AOI is filed in the same location in **My Workspace** as all the other Granite Creek project files.

- G. Click **Create**. These two areas are now saved as a single shape and available in the **Layer List widget** in Map Studio, as well as in your "Granite Creek Treatments" folder in **My Workspace**. Close the Create/Edit Shapes widgets.

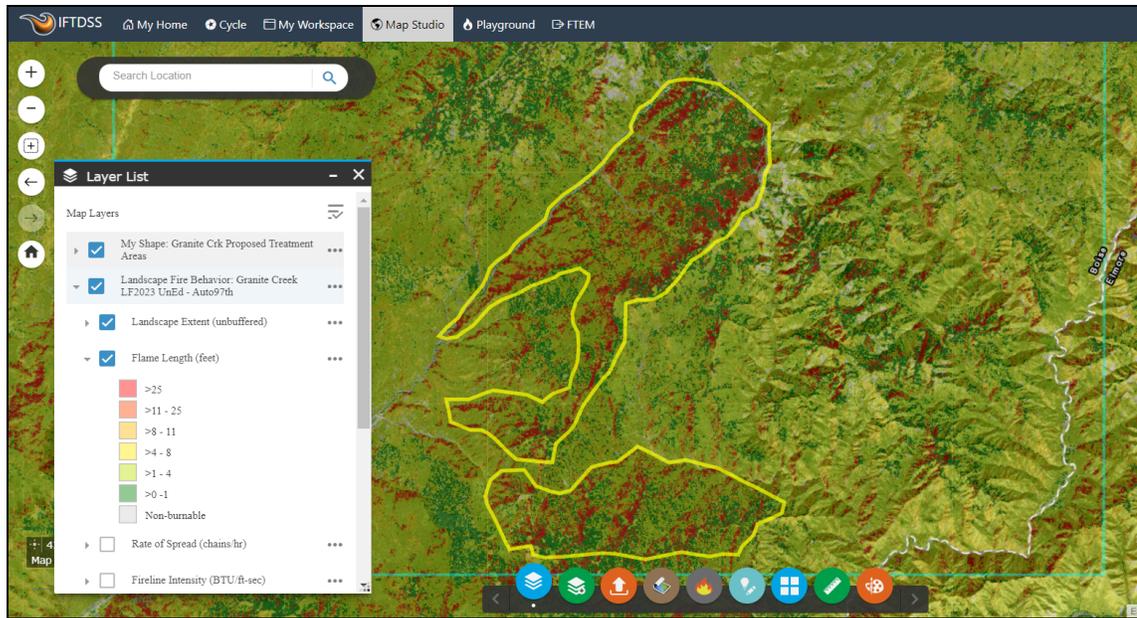


To make the shapes easier to see, locate the shape in **Layer List**, click **More Options**, and select **Change Symbology**.

- H. In the "Change Layer Symbology" window, you may change the fill and outline. In this example we've set the fill to be transparent and outline to be yellow and four pixels wide. When finished, click **Apply Symbology** then **Close** to apply these changes.



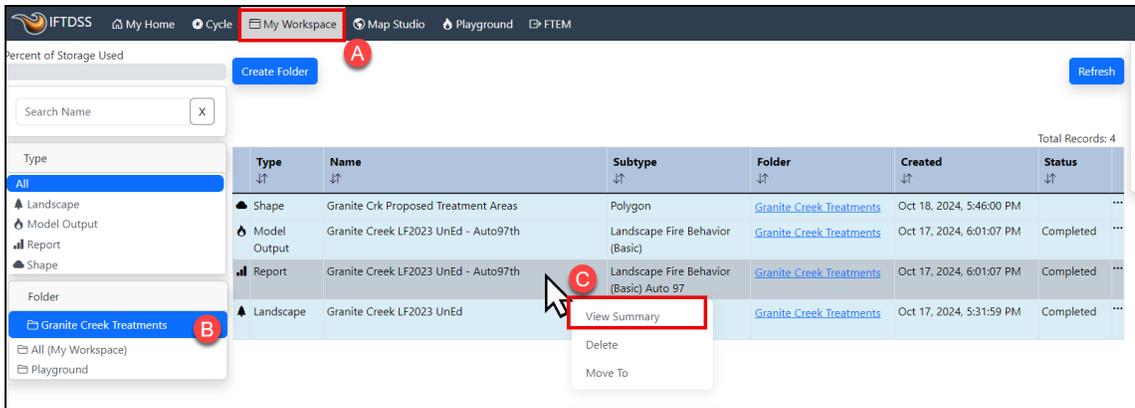
- I. Anytime this set of shapes are opened in Map Studio, they will appear with this symbology.



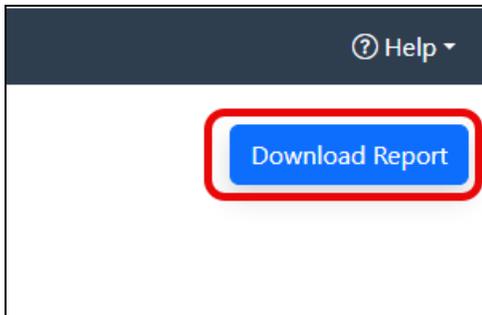
Reviewing the Auto97th Report

Now that you've thoroughly reviewed the map to assess the landscape, modeled fire behavior, and areas for treatment, you'll want to look at the corresponding landscape and fire behavior summary reports.

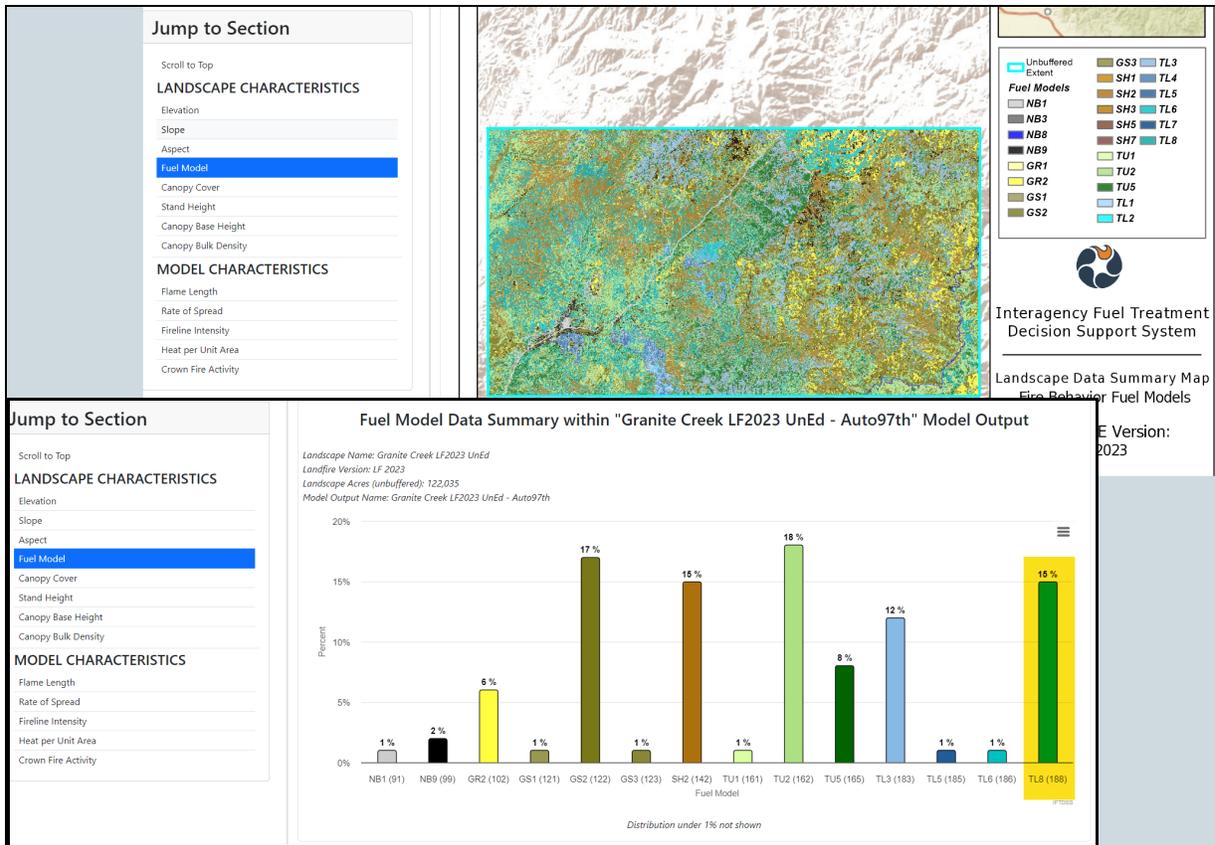
- A. Navigate away from Map Studio and click on **My Workspace** at the top of the screen.
- B. Select the "Granite Creek Treatments" folder.
- C. Locate the "Granite Creek LF2023 UnEd - Auto97th", right click on the file to view options, and select **View Summary**. The report will open in a new browser tab.



D. In the top right of the report, click **Download Report** to save a copy to your local computer, you'll refer to this PDF later in this tutorial.

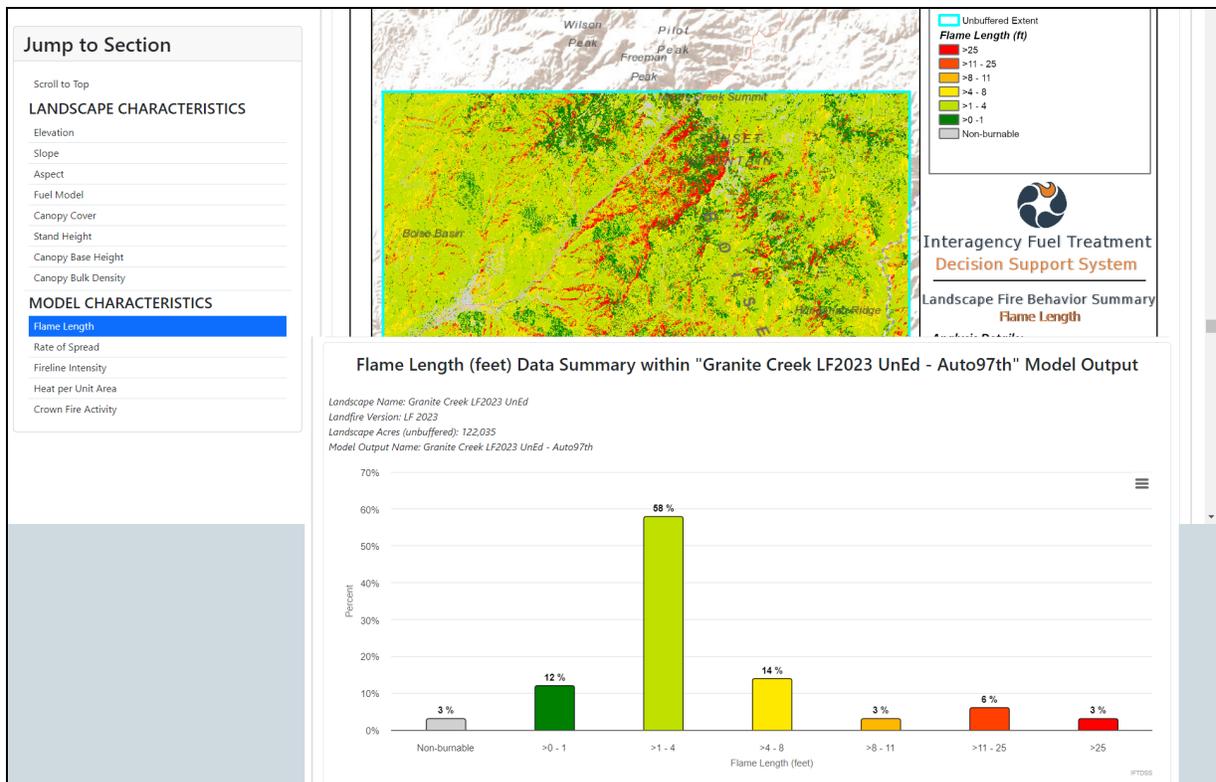


All of the landscape characteristics and fire behavior outputs you viewed in Map Studio are quantitatively displayed in several different formats in this report. You'll find a lot of value in these reports because they break each component (Canopy Cover, Canopy Base Height, Rate of Spread, etc.) down in a way that makes it even easier, after viewing the spatial data, to assess the landscape and 97th percentile modeled fire behavior. For example, in viewing the Fuel Model map, you can see that there is a lot of Fuel Model TL8 on the landscape, but it's not until you take a look at the graphs that you can really assess that, in fact, 15% of this landscape is attributed to the TL8 fuel model.



Take a good look at the report in it's entirety, including the Flame length outputs:

These graphs indicate that, given 97th percentile weather and fuel moisture conditions, about a quarter of the overall landscape would experience flame lengths over four feet. The specific areas on this landscape where more intense, "problem" fire behavior is seen, is where our treatments are focused.



Notice the Auto97th Fire Behavior section of the report has recorded the 97th percentile weather and fuel moisture inputs used to run the fire behavior model. You'll want to use these values when you re-run the fire behavior model a little later in this tutorial. If you have not already saved a pdf copy of the report, scroll up to the top of the report, look to the top right, and click the **Download Report** button to save this report as a PDF on your local machine.

Jump to Section

Scroll to Top

LANDSCAPE CHARACTERISTICS

Elevation

Slope

Aspect

Fuel Model

Canopy Cover

Stand Height

Canopy Base Height

Canopy Bulk Density

MODEL CHARACTERISTICS

Flame Length

Rate of Spread

Fireline Intensity

Heat per Unit Area

Crown Fire Activity

Interagency Fuel Treatment Decision Support System

Landscape Fire Behavior Summary

Flame Length

Analysis Details:
 Date: 10/17/2024
 LANDFIRE Version: LF 2023
 IFTDSS Username: helpcenter
 LCP Name: Granite Creek LF2023 UnEd

Model Inputs:
 Wind Type: Gridded Winds
 Wind Speed: 9
 Wind Direction: 315
 Crown Fire Method: Scott/Reinhardt
 Foliar Moisture: 100
 Weather Station Used: TOWN CREEK
 Initial Fuel Moisture:
 - 1 hr FM: 2
 - 10 hr FM: 3
 - 100 hr FM: 6
 - Herb FM: 84
 - Woody FM: 107
 Conditioning Type: On - Extreme Idaho Batholith
 * Note: This analysis was run at the 97th percentile with auto-generated inputs.

Each chart also has a download button to right so it may be downloaded individually for use in your own documents, tables have download options as well.

Flame Length (feet) Data Summary within "Granite Creek LF2023 UnEd - Auto97th" Model Output

Landscape Name: Granite Creek LF2023 UnEd
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Model Output Name: Granite Creek LF2023 UnEd - Auto97th

Flame Length (feet) Data Summary within "Granite Creek LF2023 UnEd - Auto97th" Model Output

Landscape Name: Granite Creek LF2023 UnEd
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Model Output Name: Granite Creek LF2023 UnEd - Auto97th

Copy CSV PDF Excel Print

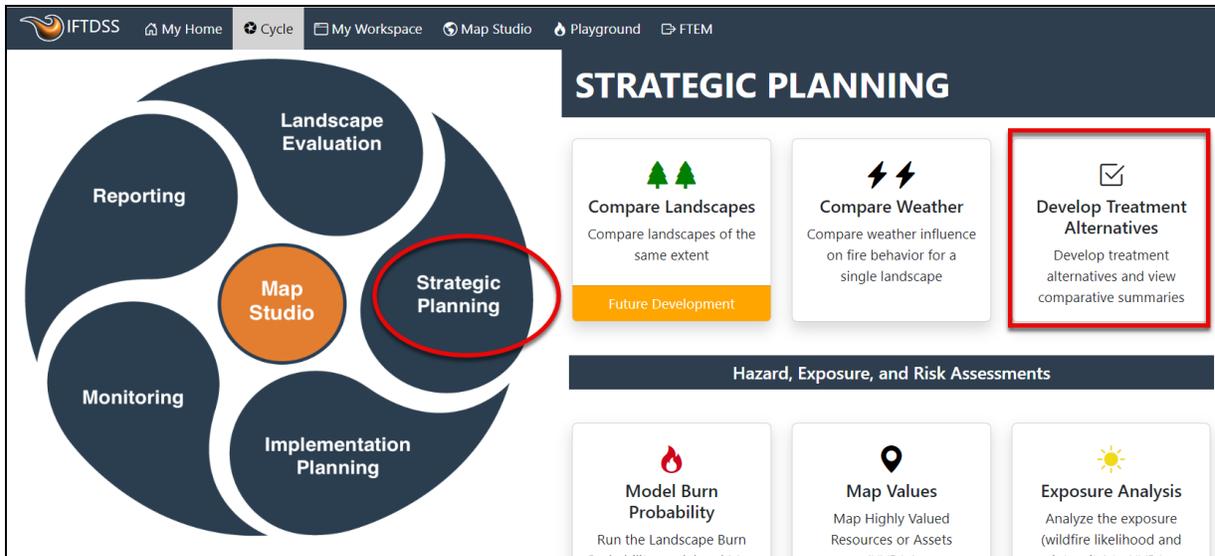
Flame Length (feet)	Pixels in LCP ↓↑	Acres in LCP ↓↑	Percent in LCP ↓↑
Non-burnable	19,014	4,229	3%
>0 - 1	65,866	14,648	12%
>1 - 4	320,717	71,326	58%
>4 - 8	78,600	17,480	14%
>8 - 11	16,793	3,735	3%
>11 - 25	33,576	7,467	6%
>25	14,164	3,150	3%

Next, its time to develop some treatment alternatives.

Developing Treatment Alternatives

Now that you have a baseline data for the landscape and fire behavior, and specific areas for which you'd like to propose treatments, you'll move on to the Develop Treatment Alternatives workflow. This task is under the **Strategic Planning** stage of the **Cycle**. Here you will develop and compare fuel treatment alternatives so you can determine how changes in the fuels characteristics affect fire behavior outputs.

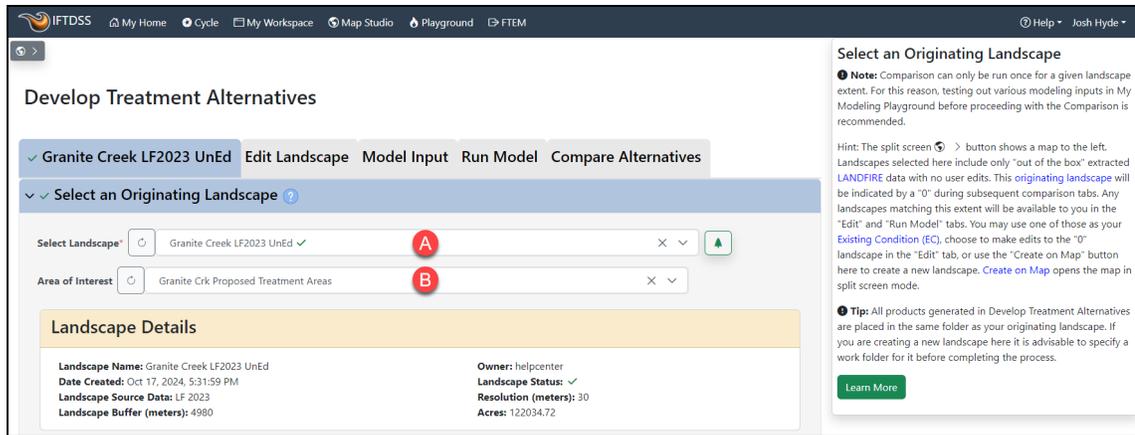
Start by selecting the **Develop Treatment Alternatives** task.



The Develop Treatment Alternatives screen contains five tabs, or steps. You'll proceed through each one using the steps below.

Pick a landscape and area of interest

- A. Select the "Originating Landscape" (Granite Creek LF2023 UnEd). The Originating landscape sets the landscape extent for the rest of the workflow. Originating landscapes displayed in the drop-down menu will always be un-edited LANDFIRE layers. Any edited layers you've created that match that extent will become available in subsequent tabs.
- B. Select the AOI created earlier in Map Studio (Granite Creek Proposed Treatment Areas). This will constrain the analysis to the treatment areas. If Area of Interest was left blank, the analysis would be applied to the entire landscape.



Notice the Right Hand Panel offers information regarding how to use the landscapes correctly in this task. Make it a point to read through these panels for each page, they contain helpful information.

Edit the landscape to simulate treatment scenarios

Next, move to the **Edit Landscape** tab. In this step a rule set will be created and applied to simulate a thin, followed by a pile burn inside of the treatment areas. Editing landscapes to simulate treatments is a process which varies by landscape. Often fuels staff work with silviculturist to model stand characteristics. The goal of landscape editing is to create a landscape that produces the fire behavior you would expect following the treatment.

This tutorial will proceed with set of sample rules representing a landscape with fire behavior fuel models that produce less severe fire behavior. They also include a less dense canopy, slightly less canopy cover, and canopy base heights of around five meters.

- A. Select the "Granite Creek LF2023 UnEd" landscape as your starting landscape. If you'd like to see your selected landscape while editing, click the **Split Screen**  button in the top left.
- B. Click **User Created Edit Rules** to display editing options.
- C. Use the drop-down fields to create your first rule.
 - Under "where conditions exist", select "Fuel Model" as the attribute. For "Operator" select "Equal to", and for "Value" select TL8.

- Under "modify the following values", select "Fuel Model" as the attribute. For "Operator" select "Equal to", and for "Value" select TL6.
- Under "Apply to Landscape Mask", select "Granite Crk Proposed Treatment Areas"

This rule states that where fuel model is TL8, it will be changed to TL6, within the confines of the Granite Crk Proposed Treatment Areas polygon.

Click **Add to Rules**.

▼Add User Created Edit Rule ?

Where these conditions exist:

Attribute	Operator	Value
Fuel Model	is equal to	188 - (TL8) Long-Needle Litter

Add Row

Modify the following values:

Attribute	Modifier	Value
Fuel Model	set to	186 - (TL6) Moderate Load Broadleaf Litter

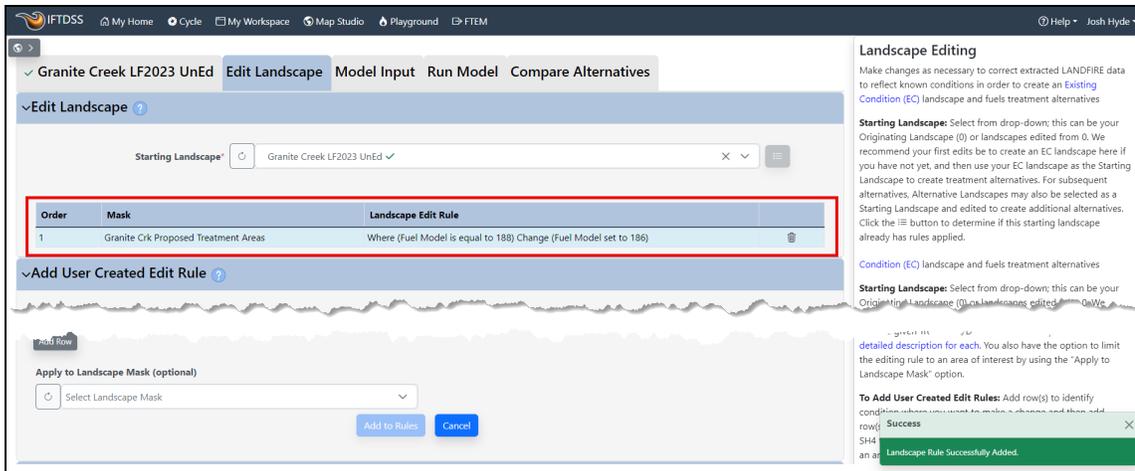
Add Row

Apply to Landscape Mask (optional)

Granite Crk Proposed Treatment Areas

Add to Rules Cancel

- D. A green pop-up will confirm this action in the bottom right. Scrolling to the top, we can see this rule has been listed as rule 1.



E. Repeat this process three more times to add the following rules, using the Area of Interest and **Add to Rules** button to apply each one.

- Where Fuel Model is equal to TU5, Change Fuel Model set to TL6 inside the Proposed Area of Interest (This sets all TU5 fuel model cells to TL6).
- Where elevation is greater or equal to 0, multiply Canopy Cover by 0.85. While still in the "Modify the following Values" section, use the **Add Row** button to add a row and multiply Canopy Bulk Density by 0.5 inside the Proposed Area of Interest. (This reduces the canopy cover by 15% and cuts the canopy bulk density by half. Selecting anywhere with an elevation higher than 0 ensures that all of the cells inside of the area of interest receive this edit).
- Where Canopy Base Height is greater than 0 meters), clamp Canopy Base Heights to a minimum of at least 5 meters within the proposed area of interest. (Anywhere canopy base heights are over 0, the new minimum height will be 5 meters. Any canopy base heights above five meters are unaffected).

F. When all rules are applied, the list at the top of the page should look like the image below.

Develop Treatment Alternatives

[✓ Granite Creek LF2023 UnEd](#)
[Edit Landscape](#)
[Model Input](#)
[Run Model](#)
[Compare Alternatives](#)

[v Edit Landscape ?](#)

Starting Landscape: Granite Creek LF2023 UnEd

Order	Mask	Landscape Edit Rule	
1	Granite Crk Proposed Treatment Areas	Where (Fuel Model is equal to 188) Change (Fuel Model set to 186)	🗑️
2	Granite Crk Proposed Treatment Areas	Where (Fuel Model is equal to 165) Change (Fuel Model set to 186)	🗑️
3	Granite Crk Proposed Treatment Areas	Change (Canopy Cover multiply by 0.85 AND Canopy Bulk Density multiply by 0.5 kg/m ³)	🗑️
4	Granite Crk Proposed Treatment Areas	Where (Canopy Base Height is greater than 0. meters) Change (Canopy Base Height clamp to a minimum 5 meters)	🗑️

[> Add Default Fuels Treatment / Disturbance Edit Rule ?](#)

[v Add User Created Edit Rule ?](#)

Where these conditions exist:

Attribute	Operator	Value

G. The rules will be implemented in the order in which the rules are numbered.

To finalize and create your edited landscape, scroll to the bottom of the editing page, give the new landscape a descriptive name: "Granite Creek Thin and Pile", and click **Save New Landscape**.

Name Edited Landscape ?

Granite Creek Thin and Pile

[Save New Landscape](#)

Important! Keep the landscape names around 30 characters in length so they run smoothly through the comparison and reporting process within IFTDSS.

Proceed to the **Model Input** tab.

Enter parameters for a fire behavior modeling scenario

In the **Modeling Input** tab you'll use 97th percentile weather and fuel moisture inputs that were supplied in the PDF report you downloaded earlier. Open the PDF copy of the Auto97th report and scroll until you find Crown fire output map, values will be displayed in the bottom right of the map box. If you did not save a PDF copy, you could also obtain this information by accessing my Auto97th report in **My Workspace**, but with a PDF, you don't have to navigate back to this point in the treatment alternatives task.

- A. Enter the inputs for wind, crown fire inputs, and initial fuel moisture.
- B. By not clicking **+ add row** under the "Initial Fuel Moisture" section, the fuel moistures will remain the same for all fuel models across the landscape. If you had clicked **+ add row**, you could enter specific fuel models and assign unique moisture conditions for each one.
- C. For fuel moisture conditioning, select the radio button for **Condition (Select Classified Weather Stream)** and then select "Extreme" as your weather stream.

D. Click **Save Inputs** at the bottom of the screen and move to the **Run Model** tab.

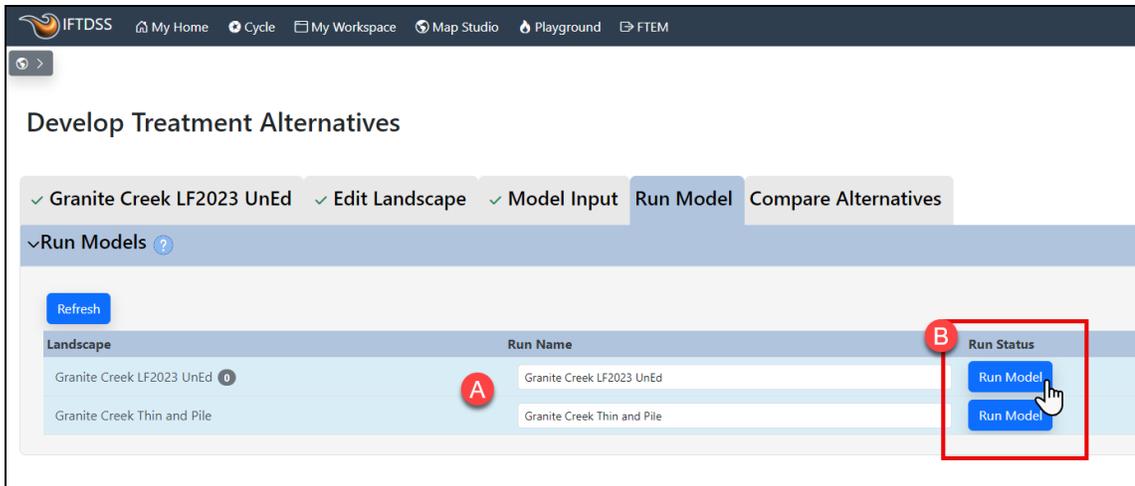
The screenshot shows the 'Model Input' tab of a software interface. At the top, there are navigation tabs: 'Granite Creek LF2023 UnEd', 'Edit Landscape', 'Model Input' (selected), 'Run Model', and 'Compare Alternatives'. Below the tabs, there are several sections:

- Wind Settings:** Includes radio buttons for 'Gridded Winds' (selected), 'Static Direction', 'Wind Blowing Uphill', and 'Wind Blowing Downhill'. There are input fields for 'Wind Speed*' (9 mph) and 'Wind Direction*' (315 degrees). A red callout box 'A' is next to the 'Wind Blowing Uphill' radio button.
- Crown Fire Inputs:** Includes a dropdown for 'Crown Fire Method*' (Scott/Reinhardt) and an input field for 'Foliar Moisture Content*' (100 percent).
- Initial Fuel Moisture:** Includes a table with columns for 'Fuel Model', '1hr FM', '10hr FM', '100hr FM', 'Herb FM', and 'Woody FM'. The 'All' row has values 2, 3, 6, 84, and 107. An 'Add Row' button is below the table. A red callout box 'B' is next to the 'Add Row' button.
- Fuel Moisture Conditioning:** Includes radio buttons for 'Do Not Condition (Use Initial Fuel Moistures)', 'Condition (Select Classified Weather Stream)' (selected), and 'Condition (Upload Weather Stream File)'. A dropdown for 'Pick Weather Stream*' is set to 'Extreme'. A red callout box 'C' is next to the 'Condition (Select Classified Weather Stream)' radio button.
- Save Inputs:** A blue button at the bottom left. A red callout box 'D' is next to it.

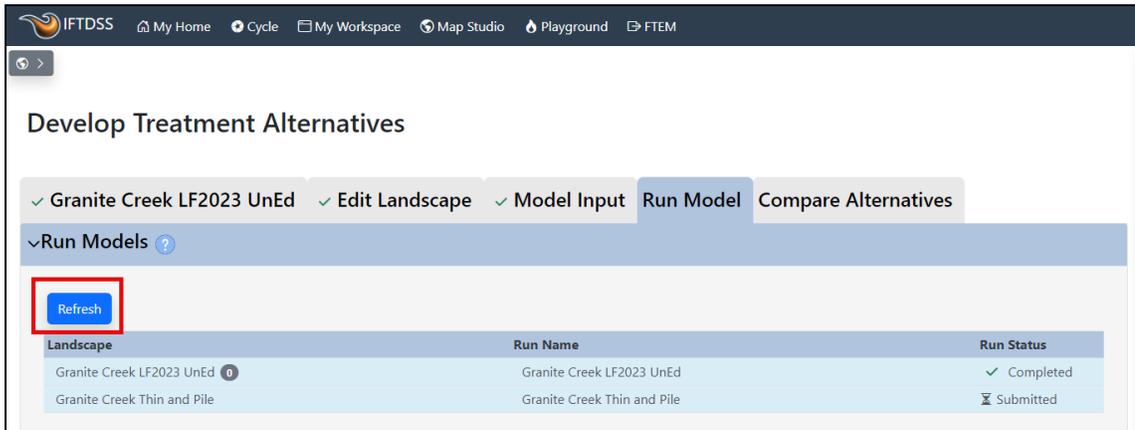
Running Fire Behavior

You'll want to run the fire behavior model on both of these landscapes here so you can compare the results:

- Examine the names next to each of the landscapes. If you wanted, you could rename them here, but leave them as-is for this tutorial.
- Click **Run Model** next to each landscape.



- C. Give the models a couple minutes to run. Click the **Refresh** button to the left above "Landscape" to see the model status, until both are completed.



Next, move to the **Compare Alternatives** tab.

Compare Alternatives

Once on the **Compare Alternatives** tab, you'll select each landscape you want to compare. They will be numbered in the order you select them, and from reading the right hand panel information, you'll see that this order is very important:

- A. First, select the edited landscape so it has a "1" next to it. Then, select the original landscape, so it has a "2" next to it.

This order tells IFTDSS to calculate the difference created by your treated landscape (1) on your original landscape (2). For example, if your new landscape has flame lengths of 3 feet, and the original has flame lengths of 7 feet, the difference will be: $3 - 7 = -4$. Or in other words, a 4 foot *reduction* in flame length resulting from the treatment.

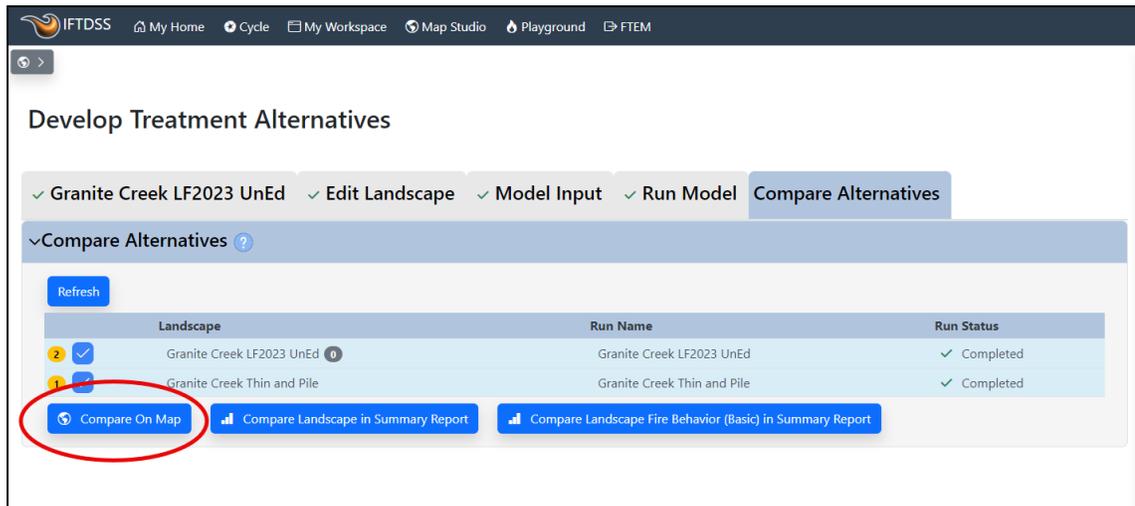
- B. Now you'll want to view comparison outputs on the map and as a report. First, click the **Compare Landscape in Summary Report** button.
- C. Click **Create Report**. While the report builds, click **Close** to close this box.

The screenshot shows the IFTDSS interface for 'Develop Treatment Alternatives'. The 'Compare Alternatives' section is active, displaying a table of landscapes and their run statuses. The 'Compare Landscape in Summary Report' button is highlighted with a red box and labeled 'B'. A modal window titled 'Landscape Compare' is open, showing report details and a 'Create Report' button highlighted with a red circle and labeled 'C'.

Landscape	Run Name	Run Status
Granite Creek LF2023 UnEd	Granite Creek LF2023 UnEd	✓ Completed
Granite Creek Thin and Pile	Granite Creek Thin and Pile	✓ Completed

- D. Repeat the process for the **Compare Landscape Fire Behavior (Basic) in Summary Report** button, selecting **Create Report**, and closing the box while the report builds.

- E. While the reports are building, we can view the results geospatially by clicking **Compare on Map**.

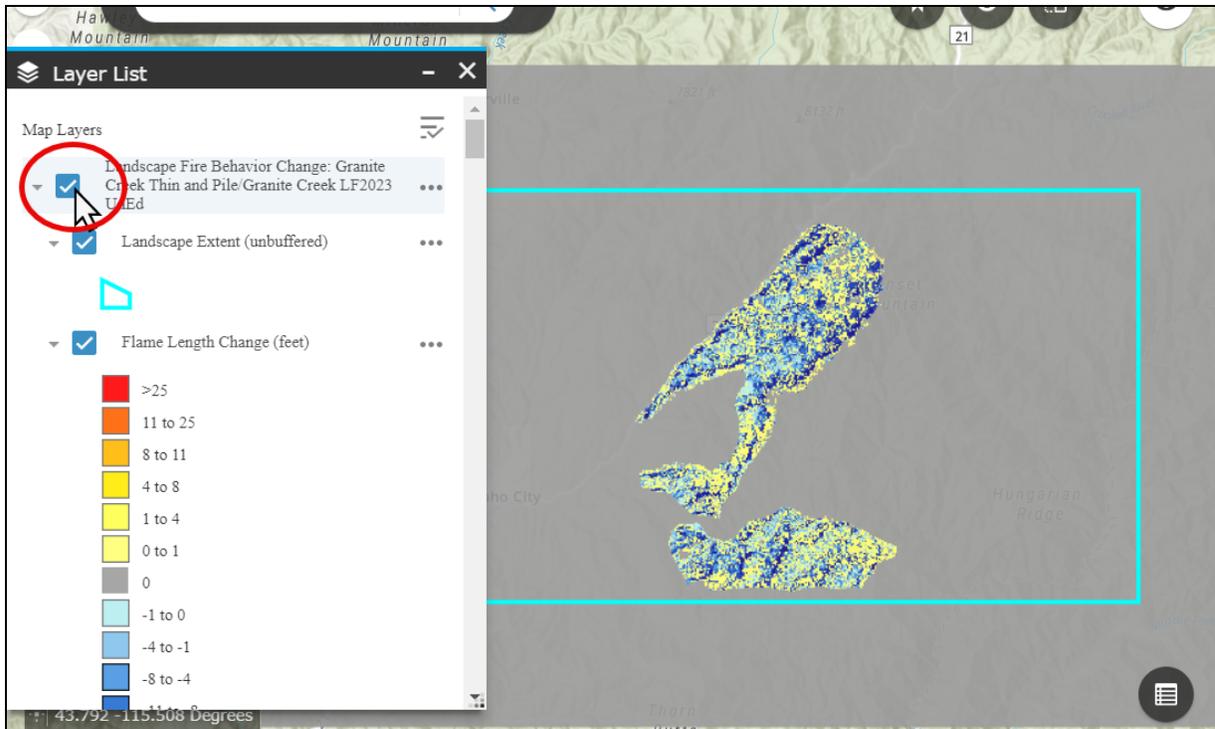


Comparing the Alternatives

Viewing Treatment Effects

After clicking **Compare on Map**, the map appears in splitscreen mode. This allows you to view information from each tab on the right side of the screen, while allowing you to view my map on the left. You can open or close this feature anytime by selecting the opposing arrows icon at the top of the screen.

The Layer List is open and displays several available comparison layers, turned off by default. To view the change in Flame Length after the treatment, check the box next to: "Model Output Change: Granite Creek Thin and Pile/Granite Creek LF2023 UnEd." This layer shows the difference between post-treatment and pre-treatment flame lengths. With a glance, you can see the dark blue on many West/Northwest facing slopes that had initially shown very high flame lengths, are now indicating significantly decreased flame lengths and fire intensity.



To return to these maps later, you can either access them in your project folder in **My Workspace**, or select the "Granite Creek LF2023 UnEd" landscape and "Granite Crk Proposed Treatment Areas" combination in the **Develop Treatment Alternatives** task, and click through each tab to get back to this point.

To access the summary reports, you can either find them in your project folder in **My Workspace**, or click the **Compare in Summary Report** button again and click on the links displayed in the pop-up box.

In this case, navigate to **My Workspace** and right click on "Granite Creek Thin and Pile/Granite Creek LF2023 UnEd - compare model...". Select **View Summary**.

IFTDSS My Home Cycle My Workspace Map Studio Playground FTEM

Percent of Storage Used Create Folder Refresh

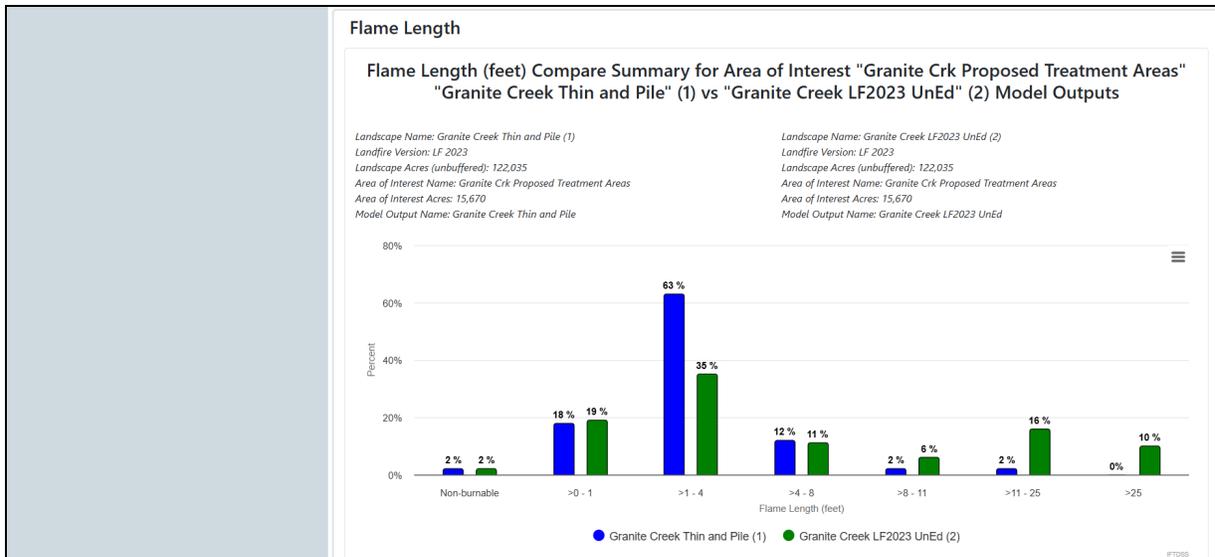
Search Name X

Total Records: 11

Type	Name	Subtype	Folder	Created	Status
Report	Granite Creek Thin and Pile/Granite Creek LF2023 UnEd - compare model/Granite Crk Proposed Treatment Areas	Landscape Fire Behavior (Basic) Compare	Granite Creek Treatments	Oct 24, 2024, 3:34:49 PM	Completed
Report	Granite Creek Thin and Pile/Granite Creek LF2023 UnEd - compare LCP/Granite Crk Proposed Treatment Areas		Granite Creek Treatments	Oct 24, 2024, 3:34:38 PM	Completed
Model	Granite Creek Thin and Pile		Granite Creek Treatments	Oct 23, 2024, 4:51:25 PM	Completed

Review the pre- and post-treatment results for each fire behavior characteristic. These reports have the same quantitative components as the reports you viewed earlier, but they compare the change in acreages in the specified treatment area, or mask, before and after the selected treatment was applied.

In the below bar chart, green correlates to pre-treatment, while blue indicates post-treatment results in the bar chart. You can see from this bar chart that the number of acres in the lower flame length bins goes up post-treatment, while the number in the higher flame length bins goes down, indicating a decrease in higher flame length post-treatment. For example, there is only 2% of the post-treatment area in which 11-25 foot flame lengths are predicted, compared to 16% of the pre-treatment areas. The table quantitatively supports this, clearly showing the acres shifting toward the lower flame length bins, post-treatment.



Flame Length (feet) Compare Summary for Area of Interest "Granite Crk Proposed Treatment Areas" "Granite Creek Thin and Pile" (1) vs "Granite Creek LF2023 UnEd" (2) Model Outputs

Landscape Name: Granite Creek Thin and Pile (1)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 122,035
Area of Interest Name: Granite Crk Proposed Treatment Areas
Area of Interest Acres: 15,670
Model Output Name: Granite Creek Thin and Pile

Landscape Name: Granite Creek LF2023 UnEd (2)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 122,035
Area of Interest Name: Granite Crk Proposed Treatment Areas
Area of Interest Acres: 15,670
Model Output Name: Granite Creek LF2023 UnEd

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Flame Length (feet)	Granite Creek Thin and Pile (1) Pixels in AOI	Granite Creek LF2023 UnEd (2) Pixels in AOI	Granite Creek Thin and Pile (1) Acres in AOI	Granite Creek LF2023 UnEd (2) Acres in AOI	Granite Creek Thin and Pile (1) Percent in AOI	Granite Creek LF2023 UnEd (2) Percent in AOI
Non-burnable	1,395	1,395	310	310	2%	2%
>0 - 1	12,783	13,612	2,843	3,027	18%	19%
>1 - 4	44,598	24,846	9,918	5,526	63%	35%
>4 - 8	8,620	7,970	1,917	1,772	12%	11%
>8 - 11	1,632	3,916	363	871	2%	6%
>11 - 25	1,368	11,471	304	2,551	2%	16%
>25	66	7,252	15	1,613	0%	10%

Landscape 2 is always the landscape being compared against

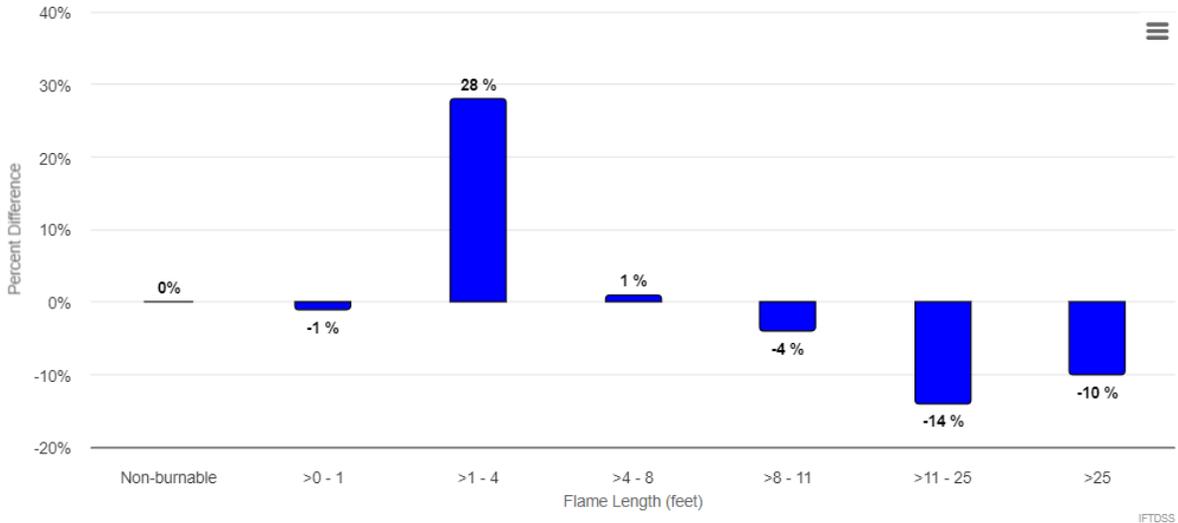
The Percent Difference Graph for Flame Lengths demonstrates the shift toward lower Flame Lengths post-treatment. You can see the positive percent difference in the 1-4 foot bin, while the bins correlating to higher Flame Lengths indicate a drop in the percent difference. The Pie Charts tell the same story, plainly showing the smaller sections of red/orange/yellow in the post-treatment chart.

Flame Length Percent Difference for Area of Interest "Granite Crk Proposed Treatment Areas"

"Granite Creek Thin and Pile" (1) vs "Granite Creek LF2023 UnEd" (2) Model Outputs

Landscape Name: Granite Creek Thin and Pile (1)
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Area of Interest Name: Granite Crk Proposed Treatment Areas
 Area of Interest Acres: 15,670
 Model Output Name: Granite Creek Thin and Pile

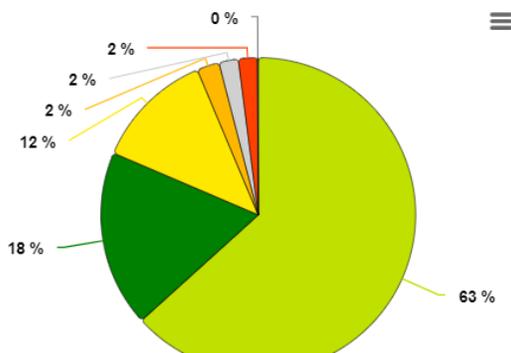
Landscape Name: Granite Creek LF2023 UnEd (2)
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Area of Interest Name: Granite Crk Proposed Treatment Areas
 Area of Interest Acres: 15,670
 Model Output Name: Granite Creek LF2023 UnEd



Landscape 2 is always the landscape being compared against

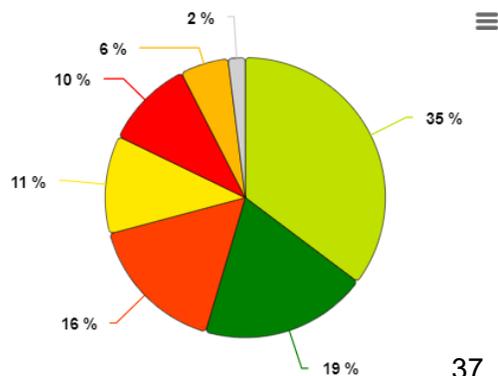
Flame Length (feet) Compare Summary for Area of Interest "Granite Crk Proposed Treatment Areas" within "Granite Creek Thin and Pile" Model Output

Landscape Name: Granite Creek Thin and Pile (1)
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Area of Interest Name: Granite Crk Proposed Treatment Areas
 Area of Interest Acres: 15,670
 Model Output Name: Granite Creek Thin and Pile



Flame Length (feet) Compare Summary for Area of Interest "Granite Crk Proposed Treatment Areas" within "Granite Creek LF2023 UnEd" Model Output

Landscape Name: Granite Creek LF2023 UnEd (2)
 Landfire Version: LF 2023
 Landscape Acres (unbuffered): 122,035
 Area of Interest Name: Granite Crk Proposed Treatment Areas
 Area of Interest Acres: 15,670
 Model Output Name: Granite Creek LF2023 UnEd



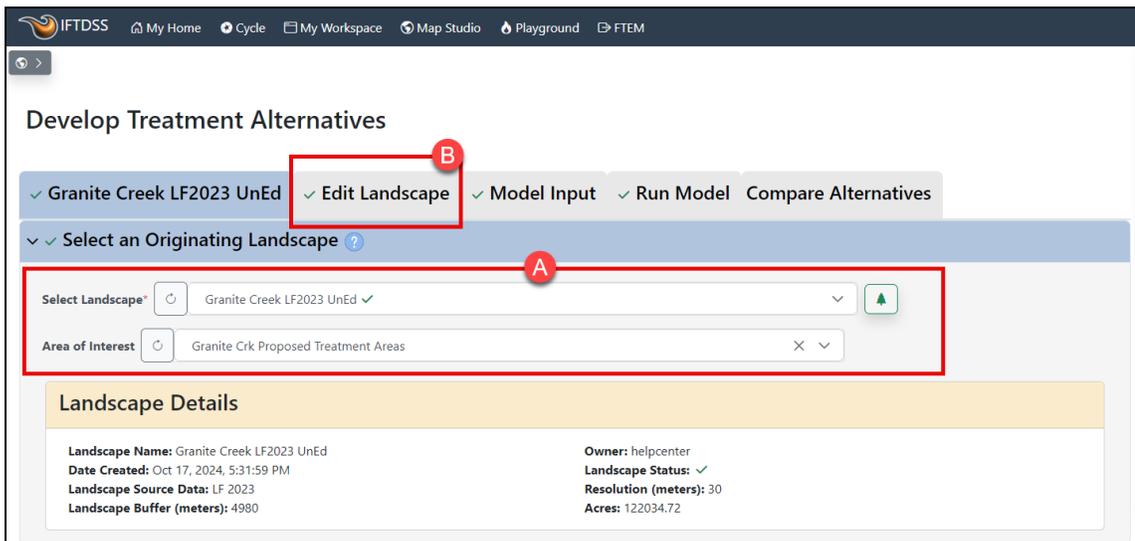
- >1 - 4
- >0 - 1
- >4 - 8
- >8 - 11
- Non-burnable
- >11 - 25
- other
- >25
- >8 - 11

Scroll through the rest of the summary report to view the rest of fire behavior characteristics. You'll notice that rates of spread and crown fire activity are also less severe on the post-treatment version of the landscape.

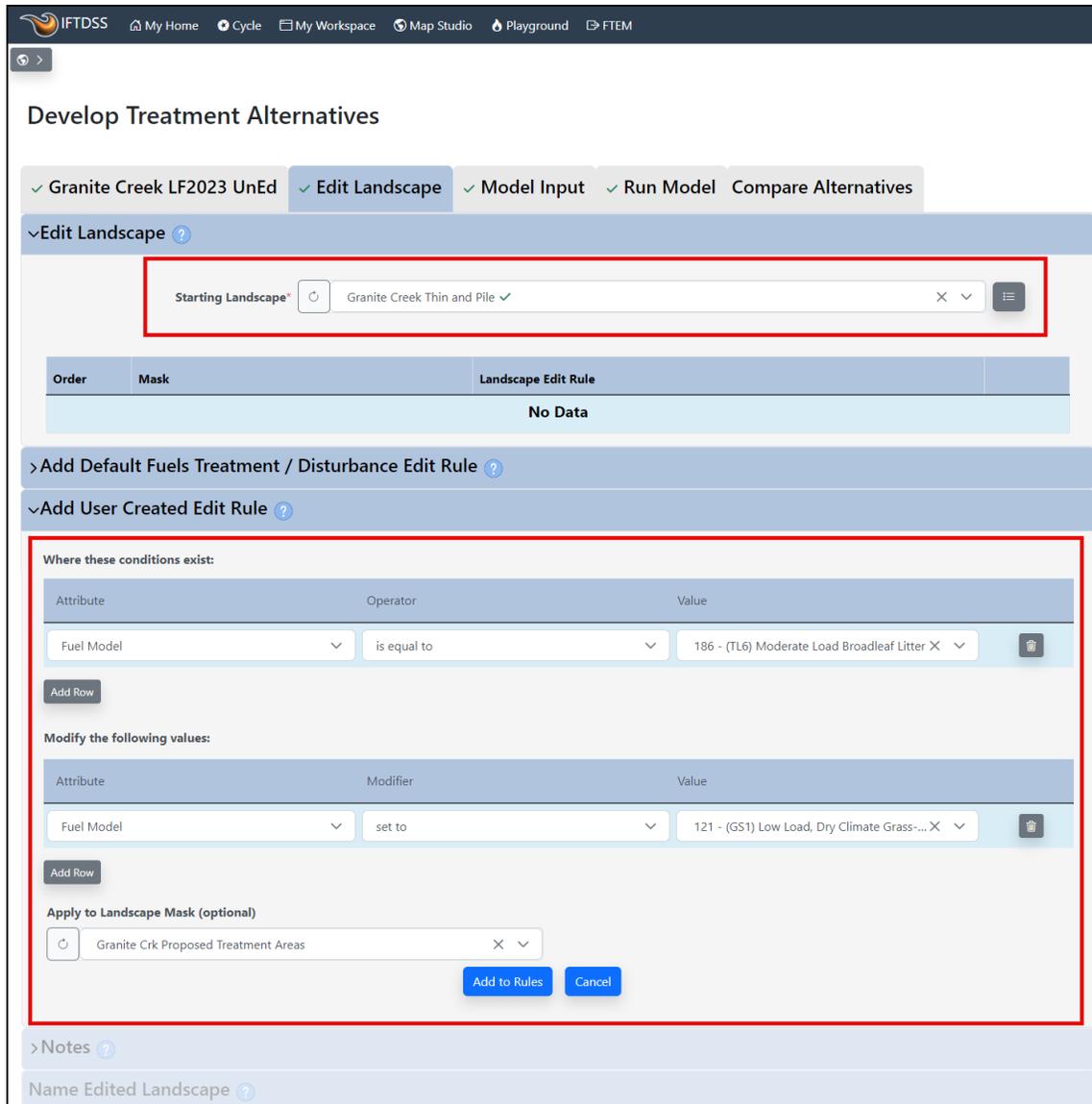
Adding an Additional Treatment to Treatment Alternatives

Now you'll look at the effects of applying a subsequent broadcast burn after the light thinning/pile burning. One of the initial objectives is to re-introduce low intensity fire in this area and it's an important step in treating this landscape. Additionally, you can see how this follow-up treatment will affect modeled fire behavior. For this example we will change some shrub and timber fuel models to grass in order to represent the conditions post broadcast burn.

- A. Navigate to the Develop Treatment Alternatives workflow again and select the same Originating Landscape and AOI.
- B. Navigate to the **Edit Landscape** tab.



- C. This time, choose the landscape with your earlier edits as the Starting Landscape: "Granite Creek Thin and Pile."
- D. Scroll down to the **Add User Created Rule** section and create a rule that states:
 - Where fuel model is equal to TL6
 - Modify the fuel model by setting it to GS1.
 - Apply to Landscape Mask "Granite Crk Proposed Treatment Areas"
- E. Click **Add to Rules**.



- F. Create two more rules using the "Granite Crk Proposed Treatments" mask:
- Where grass fuel model 122 exists, change to fuel model to Grass 121. Apply this rule to "Granite Crk Proposed Treatments" and select Add to Rules.
 - Where shrub fuel model SH7 exists, change to fuel model to Grass 121. Apply this rule to "Granite Crk Proposed Treatments" and select Add to Rules.

When completed, the rule should match the image below:

IFTDSS My Home Cycle My Workspace Map Studio Playground FTEM

Develop Treatment Alternatives

✓ Granite Creek LF2023 UnEd
 ✓ Edit Landscape
 ✓ Model Input
 ✓ Run Model
 Compare Alternatives

✓ Edit Landscape ?

Starting Landscape* Granite Creek Thin and Pile ✓

Order	Mask	Landscape Edit Rule	
1	Granite Crk Proposed Treatment Areas	Where (Fuel Model is equal to 186) Change (Fuel Model set to 121)	🗑️
2	Granite Crk Proposed Treatment Areas	Where (Fuel Model is equal to 122) Change (Fuel Model set to 121)	🗑️
3	Granite Crk Proposed Treatment Areas	Where (Fuel Model is equal to 147) Change (Fuel Model set to 121)	🗑️

> Add Default Fuels Treatment / Disturbance Edit Rule ?

✓ Add User Created Edit Rule ?

Where these conditions exist:

Attribute	Operator	Value

Name Edited Landscape ?

Granite Creek Thin PileBurn Broadcast

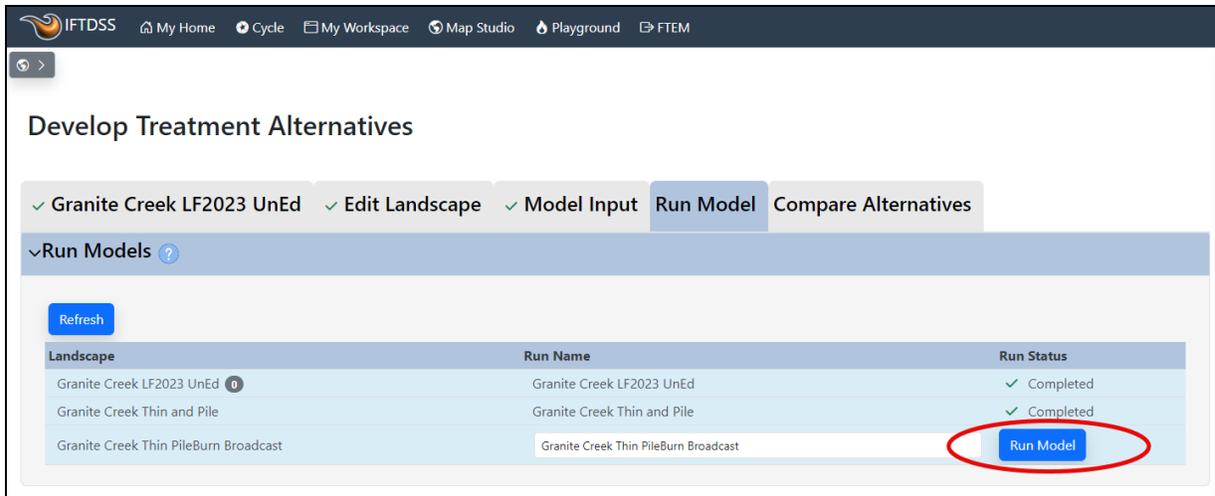
Save New Landscape

G. Name the new landscape "Granite Creek Thin PileBurn Broadcast" and click **Save New Landscape**.

Run the model

Skip the Model Input tab this time, that input was saved from your last run, and the weather parameters must be kept constant in order to compare the results of the landscape changes.

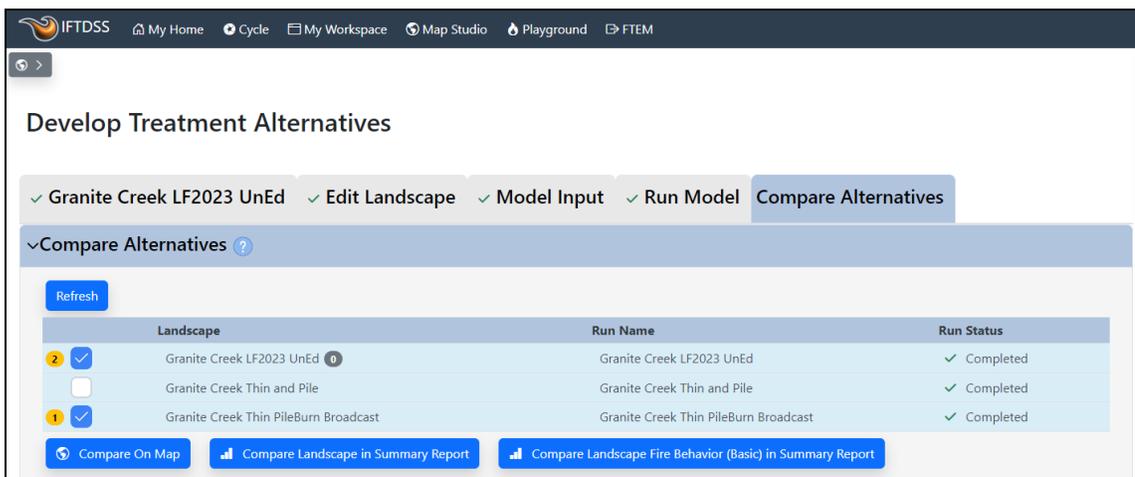
Go to the **Run Model** tab and click **Run Model**.



Next, move to the **Compare Alternatives** tab. Use **Refresh** to check on the model status until the model run has completed.

Compare the original landscape with this new one by selecting:

- "Granite Creek Thin PileBurn Broadcast" as landscape "1."
- Select "Granite Creek LF2023 UnEd" as landscape "2."
- Click both **Compare Summary Report** buttons to initiate those reports.
- Click **Compare on map**, to get a map view of your changes.



Comparing Added Treatments

Before evaluating the reports, we'll do a quick comparison between the two treatment alternatives:

A. Unselect both landscapes and select the following:

1. "Granite Creek Thin PileBurn Broadcast"
2. "Granite Creek Thin Pile Burn"

This will compare the earlier treatment, the thin and pile burn, with the new treatment, the thin and pile burn followed by a broadcast burn.

B. Select **Compare on Map** and view the fire behavior layers produced in the Layer List. Checking the fire behavior layers from the Layer List, we see that flame lengths are modeled to be lower on the landscape which has also had a broadcast burn.

Help ▾ Josh Hyde ▾

Develop Treatment Alternatives

✓ Granite Creek LF2023 UnEd ✓ Edit ✓ Input ✓ Run **Compare**

∨ Compare Alternatives ?

Refresh

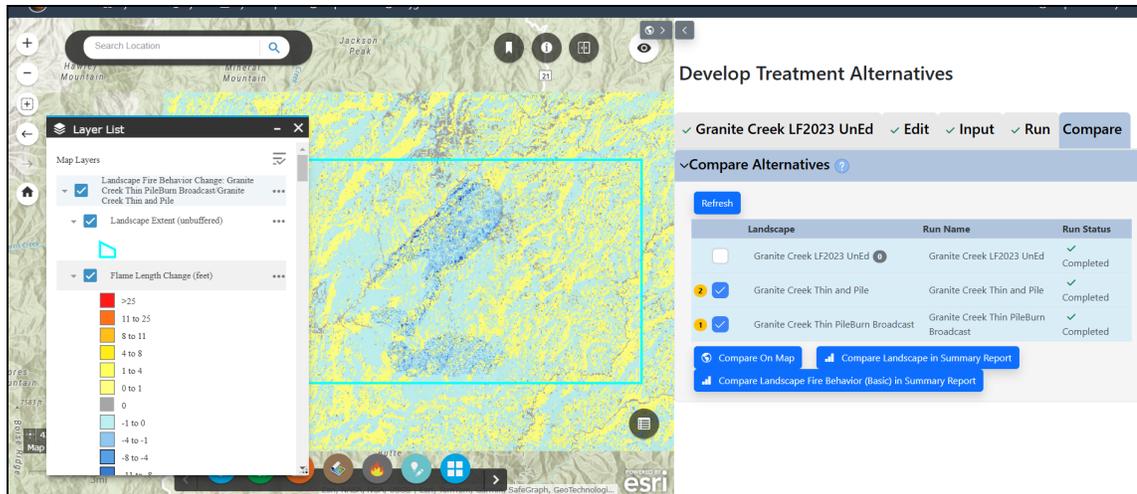
	Landscape	Run Name	Run Status
<input type="checkbox"/>	Granite Creek LF2023 UnEd ⁰	Granite Creek LF2023 UnEd	✓ Completed
² <input checked="" type="checkbox"/>	Granite Creek Thin and Pile	Granite Creek Thin and Pile	✓ Completed
¹ <input checked="" type="checkbox"/>	Granite Creek Thin PileBurn Broadcast	Granite Creek Thin PileBurn Broadcast	✓ Completed

A

Compare On Map Compare Landscape in Summary Report

B Compare Landscape Fire Behavior (Basic) in Summary Report

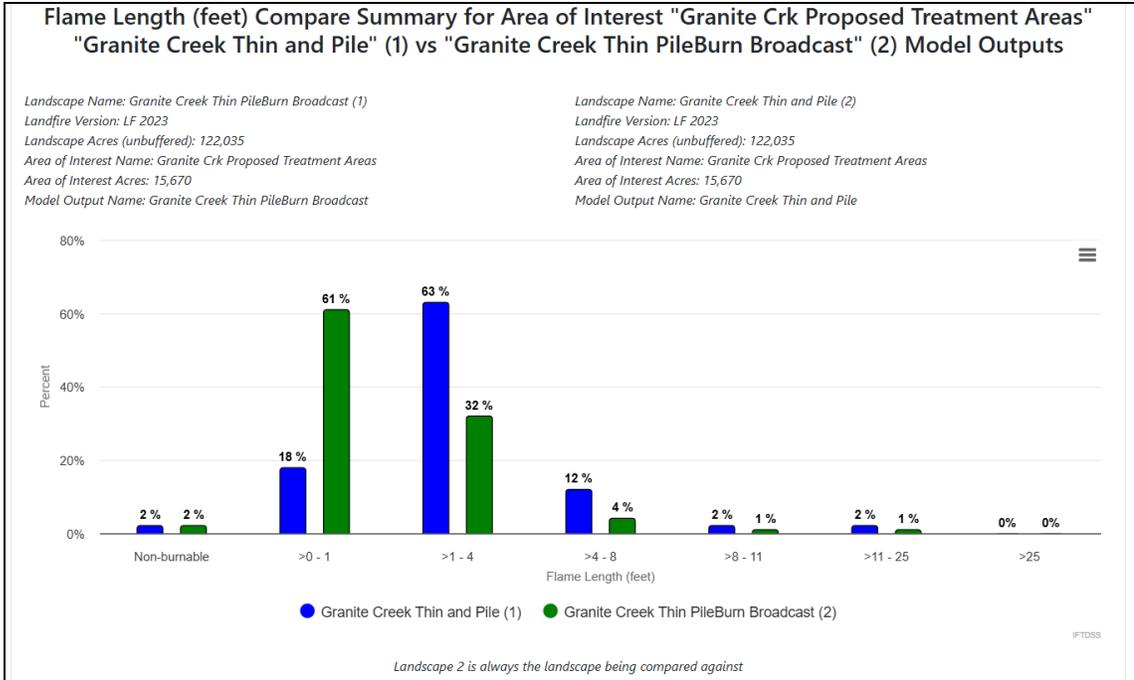
- C. Evaluating the fire behavior and flame length, we see a lot of blue shading within the treatment areas, indicating that a broadcast burn is modeled to further reduce flame lengths. Turning flame lengths off and turning on rate of spread shows a similar trend.



- D. Next, use the **Compare Landscape in Summary Report** and **Compare Landscape Fire Behavior (Basic) in Summary Report** buttons to create a set of comparison.

Review summary reports

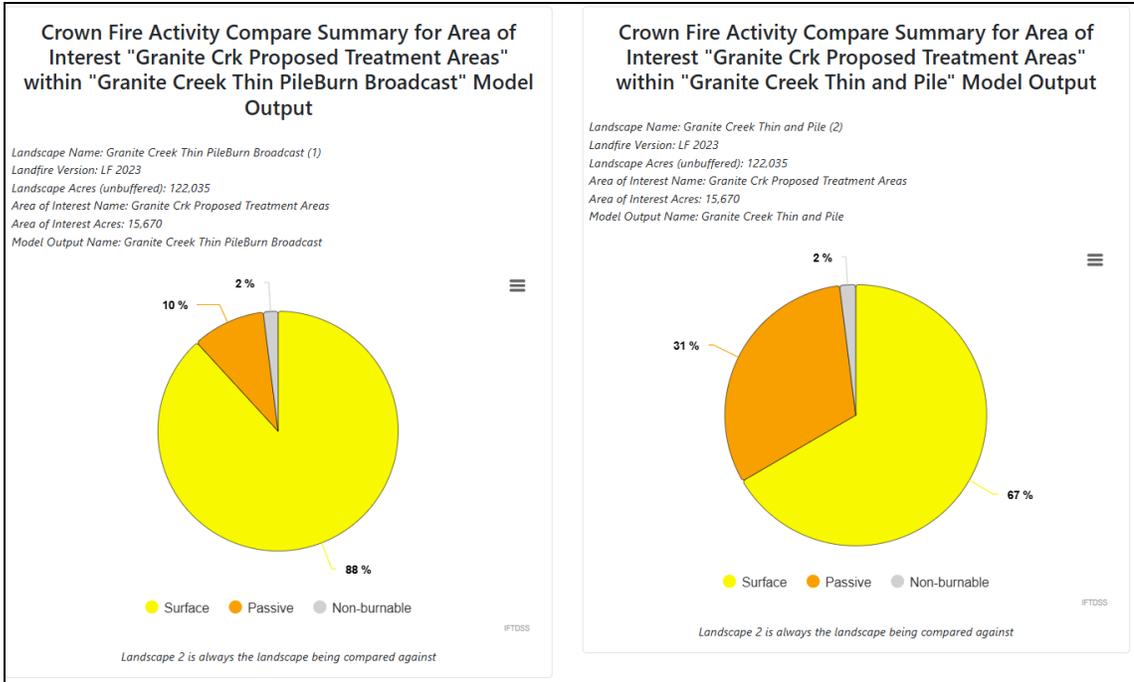
- A. When the Compare Landscape Fire Behavior (Basic) in Summary Report is finished, select **View Report**.
- B. The table for flame lengths indicates a further reduction in flame lengths, where as 0-1 foot and 1-4 foot flame lengths were 18% and 63% respectively, the post treatment flame lengths for the new treatment have shifted to 61% and 32%. Scrolling through the report, rates of spread have also been reduced.



C.

Scroll through the rest of the fire behavior model outputs in the report. Their story is the same, reduced rates of spread, as well as almost no crown fire activity post-treatment.

The pie charts tell the same story, plainly showing the shift to significantly lower flame lengths in the post-treatment chart.



Conclusion

You could continue this process and model a more invasive treatment, such as heavier thinning or increased mortality from a more severe broadcast (prescribed) burn, but these results achieve your initial preliminary objectives, and are a good place to start with a project proposal for the District ID Team.

From this process, it's clear that the expected fire behavior, given 97th percentile fire weather and fuel moisture conditions, in the identified treatment areas is much more intense than what would be considered characteristic in this frequent, but low intensity, fire regime. The reports and maps demonstrate how these proposed treatments help achieve the preliminary objectives to reduce surface fuel loading and the overall horizontal and vertical fuelbed continuity, as well as helping to return low intensity fire in these treatment areas.