

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

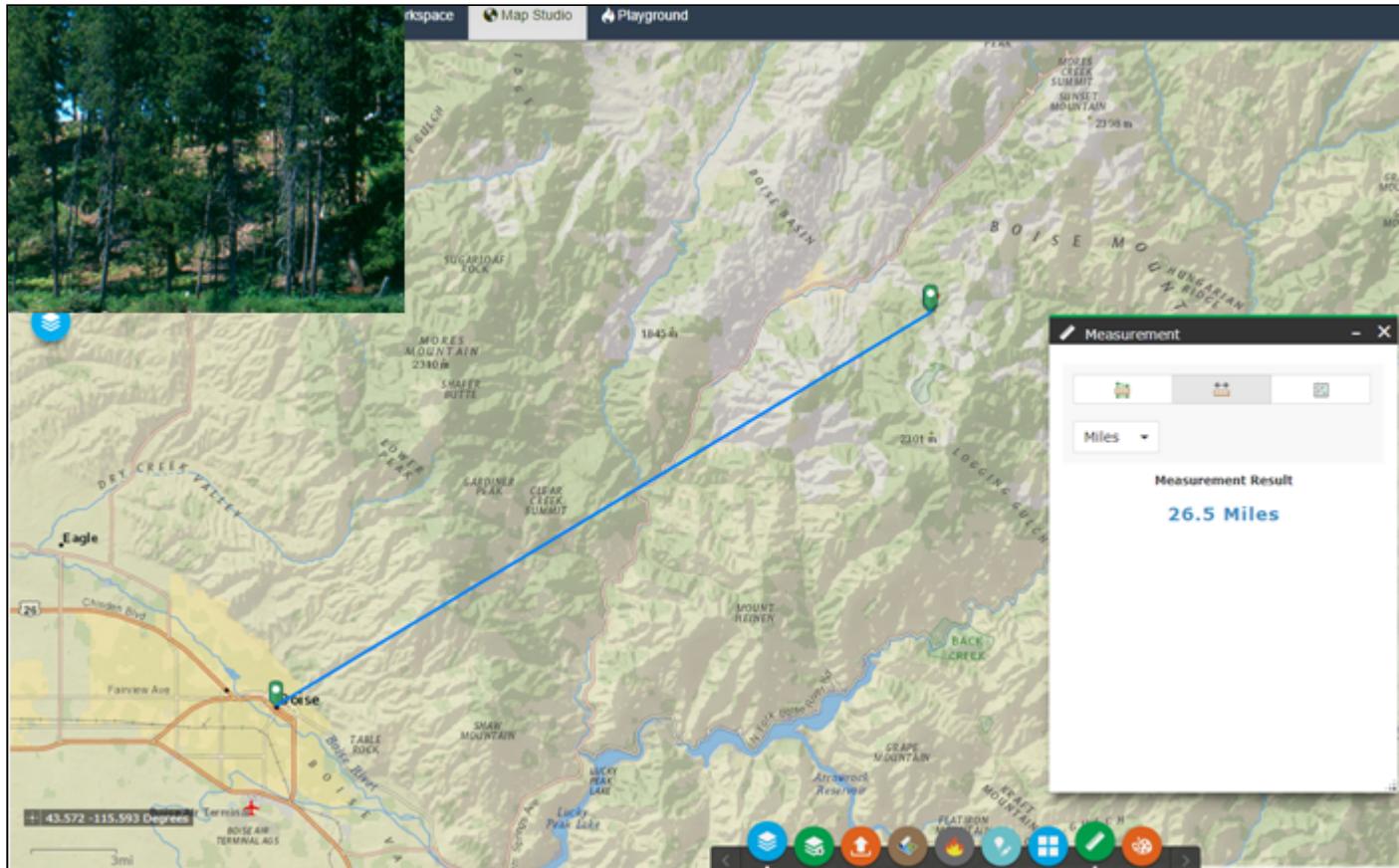
Return low intensity fire to fire adapted vegetation communities.

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.

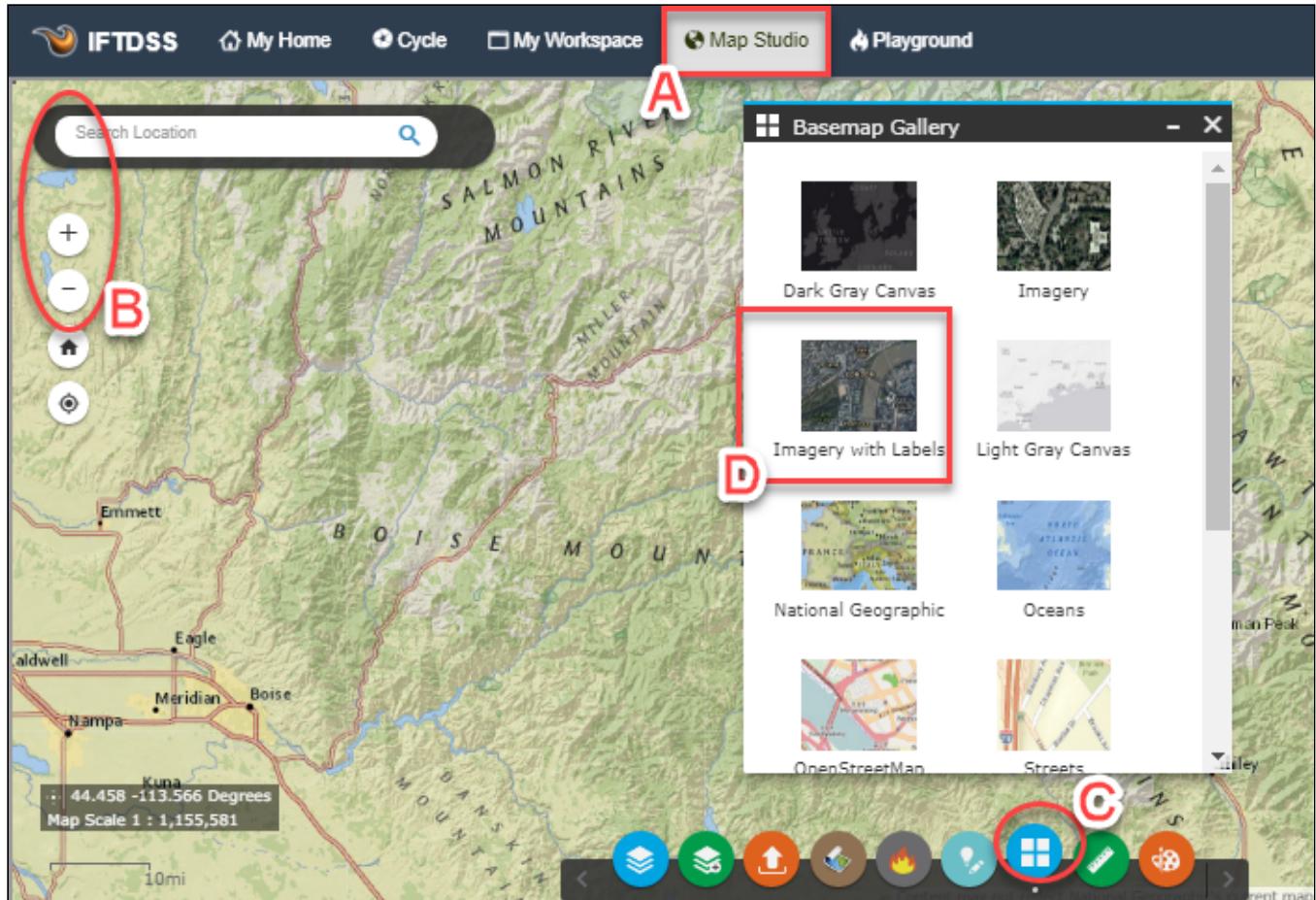
You'll use IFTDSS to plan a treatment around these objectives.



Previewing the Landscape

The first step will take 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 baselayer.
- D. Select "Imagery with Labels".



Create the Landscape

Next, you'll create your landscape, which will serve as a starting point for the rest of the analysis. To do this:

- 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: -115.5848

West: -115.8096

North: 43.8854

South: 43.7675

- D. Select the version of LANDFIRE data you're using, in this case 2014.

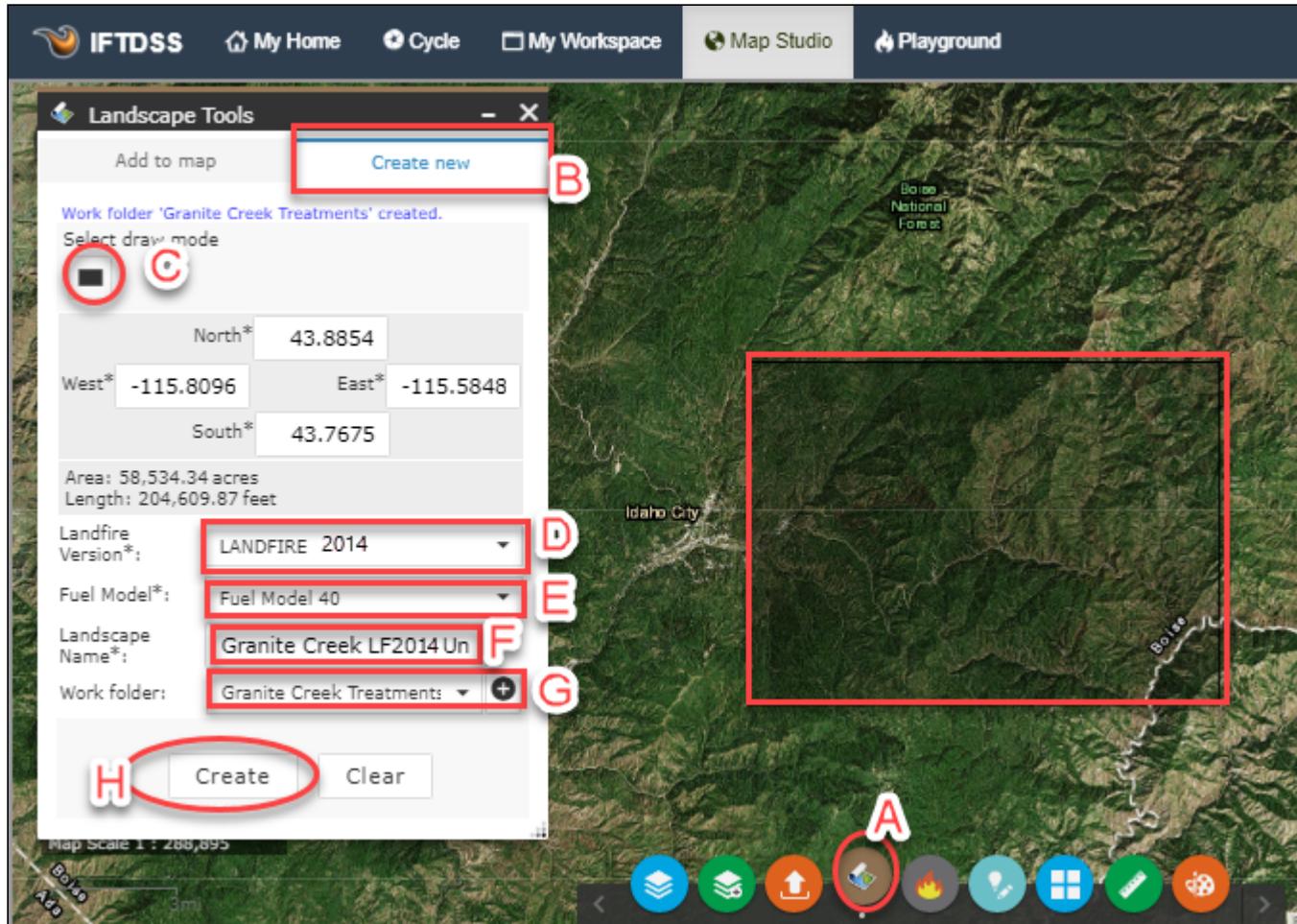
- E. Select the fire behavior fuel model type (13 or 40), here Fuel Model 40 was chosen.

F. Name the new landscape "Granite Creek LF2014 unedited". Included the name, Landfire version, and its editing/treatment status to make it easy to discern this landscape from others once you start editing.

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 will be 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".

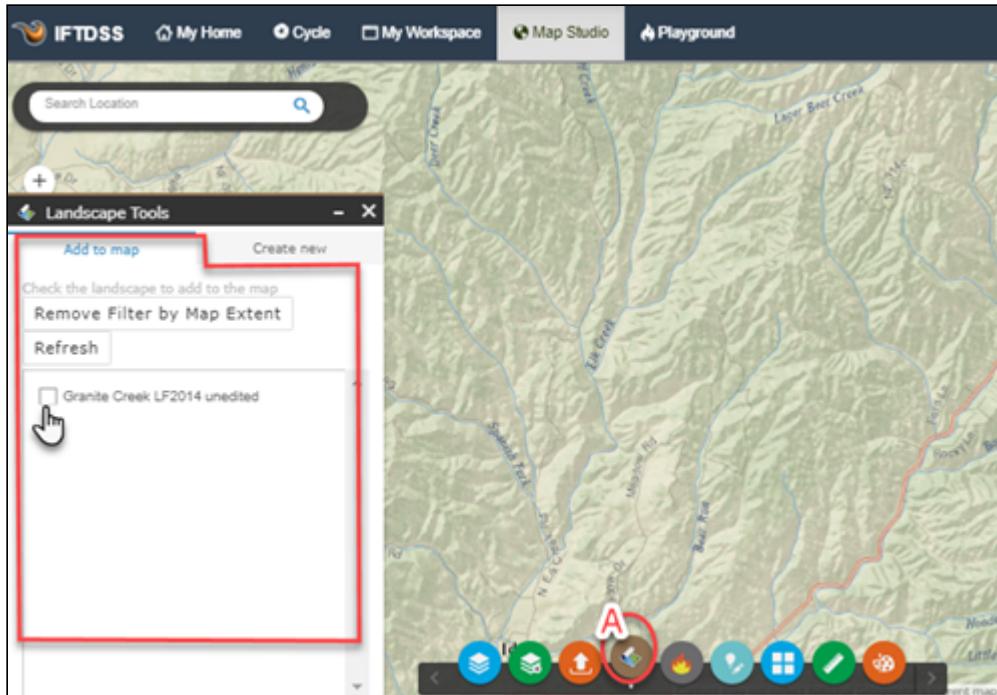
H. Once everything looks good, click the **Create** button and wait a minute for the landscape to process.



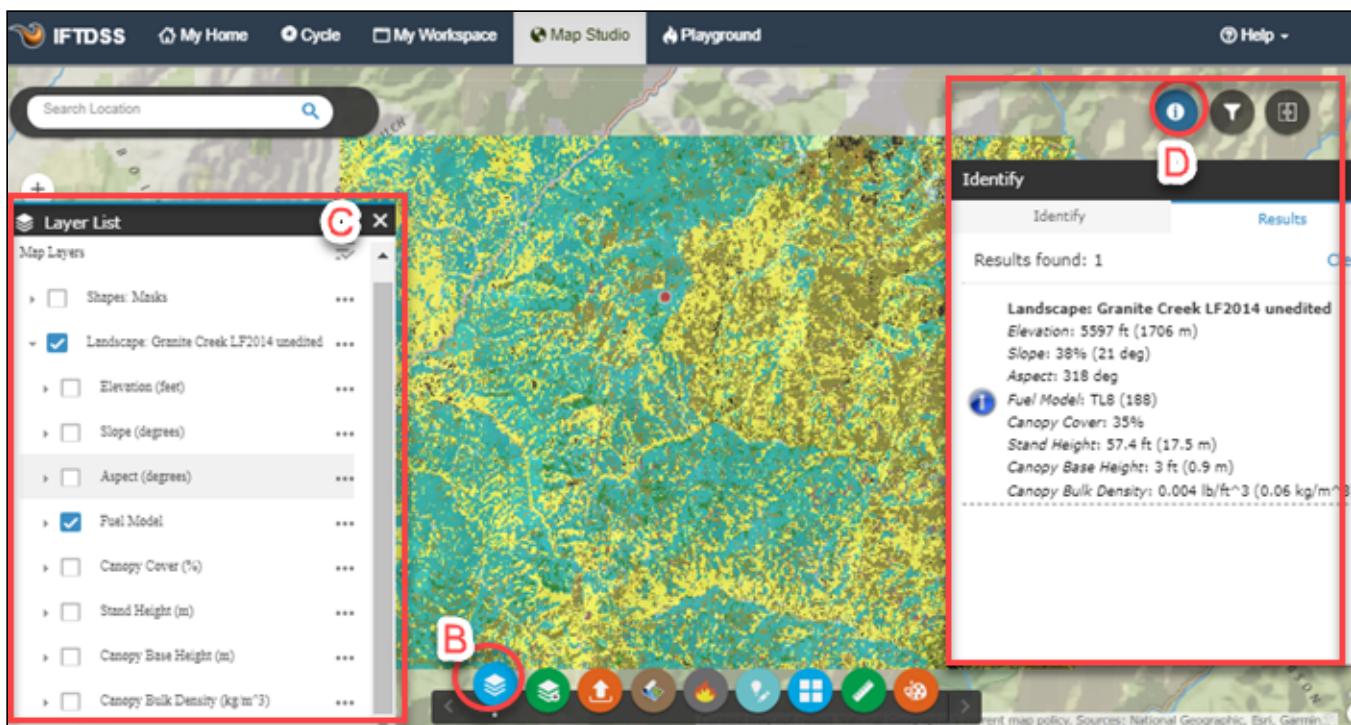
Displaying and Assessing the Landscape

Assess the landscape in Map Studio, first:

- A. Using the **Landscape Tools**  widget to check the landscape under the "Add to Map" tab, this adds the landscape to the map and the map's **Layer List**.

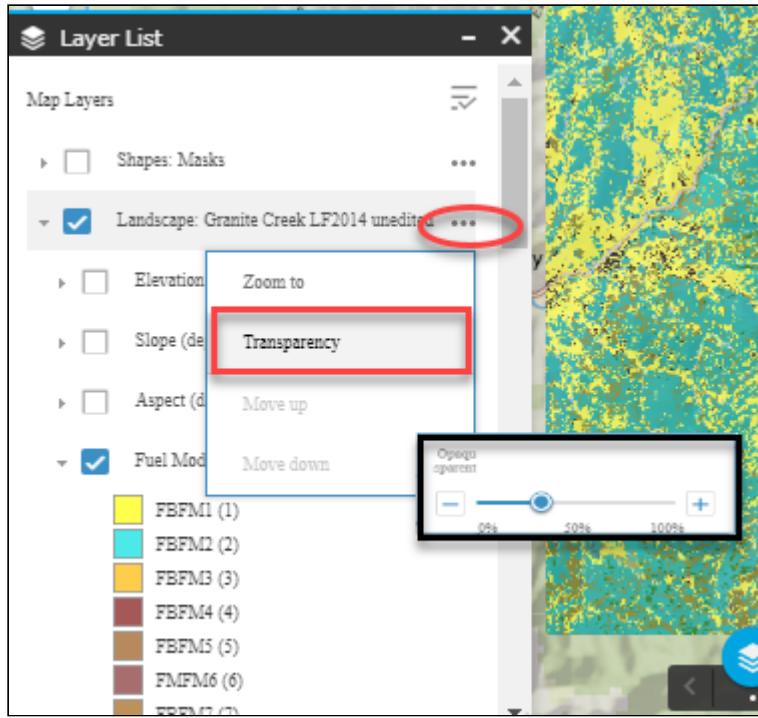


- B. Open the **Layer List** widget , ensure your landscape is checked, and view the landscape layers by clicking the drop-down arrow to the left of the checkbox. You can check and uncheck the landscape layers you'd like to view. You'll want to look at the fuel models to make sure they correspond to what your seeing on the ground in this area, so ensure that box is checked.
- C. View the legend for each layer by clicking the clicking the drop-down arrow to the left of the checkbox for that layer. In this case, check the box next to "Fuel Models", then click on the arrow to the left of the checkbox to drop-down to the Fuel Model layer legend.
- D. Click the **Identify** widget in the upper right corner of the page to view more information for each pixel. Select the layer you'd like to view (Granite Creek LF2014 Unedited), then click on the landscape in an area you'd like to know more about. The "Identify information box" populates with the landscape information for this pixel. For example, by clicking 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 with the **Identify** widget, not just the characteristic you specified in your **Layer List**.



Adjust Transparency

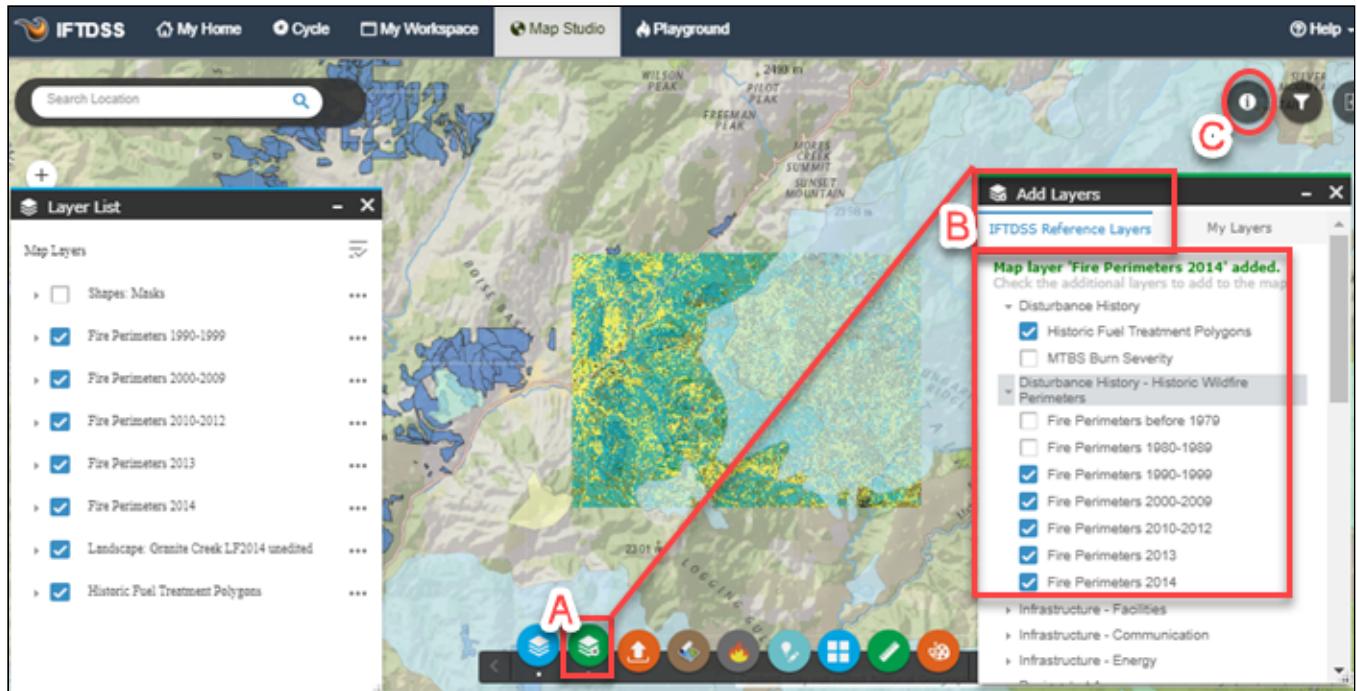
It may be helpful to adjust the transparency of the layer to better see roads, landscape characteristics, and other map features. To do this, click **More Options** *** to the right of the Landscape name in **Layer List**. A drop-down box of options opens. Choose **Transparency**, which opens a slider 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 once more.



Adding Reference Layers

Before doing a full assessment of the landscape characteristics, you'll want to view previous fires that may have occurred in this area. This is easy to do:

- A. Click the **Add Layers**  widget at the bottom of the screen, and make sure the "IFTDSS Reference Layers" tab is selected. You'll notice there are many options for additional data layers, including "Ownership" and "Critical Habitat Areas".
- B. For now, focus on disturbance history. Click the drop-down arrow next to "Disturbance History" and use the checkbox to select "Historic Fuel Treatment Polygons". Next, expand the drop-down for "Disturbance History - Historic Wildfire Perimeters", and select the perimeters for years 1990-1999, 2000-2009, 2010-2012, 2013, and 2014. These will now appear in the **Layer List** and on the map.
- C. Use the **Identify** widget to identify the exact year of the Rabbit Creek and Bannock fires. Click the applicable Fire Perimeter layers on and off to compare the landscape and fuel models underneath. In this example we see they are reflective of these fires.



Follow this same process with the Historic Fuel Treatment Polygons layer as well.

After doing an assessment of all the landscape characteristics (Elevation, Slope, Aspect, Canopy Cover, Stand Height, Canopy Base Height and Canopy Bulk Density) we determine that the Landfire 2014 data in this landscape is reflective of existing conditions, including previous fires. If there had been a more recent disturbance since this 2014 data was produced, such as a fire or fuels treatment that you would want to represent on this landscape, 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. (More information on Landscape Editing is available via the [Landscape Editing Topic](#) in Help Center).

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

Summarizing the Landscape

Creating a Landscape Summary report will run fire behavior under 97th percentile weather conditions, make the outputs available in Map Studio, and summarize behavior and landscape features in a downloadable report with tables and charts. It will also create a model output layer that can be viewed in Map Studio. To create these:

- A. Click on **Planning Cycle** in the top navigation.
- B. The cycle opens on the **Landscape Evaluation** stage by default, from there click the **Landscape Summary** task.

The screenshot shows the IFTDSS interface with the 'Cycle' tab highlighted by a red box. The main content area is titled 'LANDSCAPE EVALUATION'. On the left, there is a circular diagram divided into six segments: 'Landscape Evaluation' (top), 'Strategic Planning' (top-right), 'Implementation Planning' (bottom-right), 'Monitoring' (bottom-left), 'Reporting' (top-left), and 'Map Studio' (center). To the right of the diagram are three boxes labeled A, B, and C. Box A is the 'LANDSCAPE EVALUATION' title. Box B contains an icon of a green tree and the text 'LANDSCAPE SUMMARY Generate landscape summary report'. Box C contains an icon of a pencil and the text 'LANDSCAPE EDIT Edit/correct landscape data'. Box D contains an icon of a fire and the text 'LANDSCAPE FIRE BEHAVIOR Calculate landscape fire behavior'.

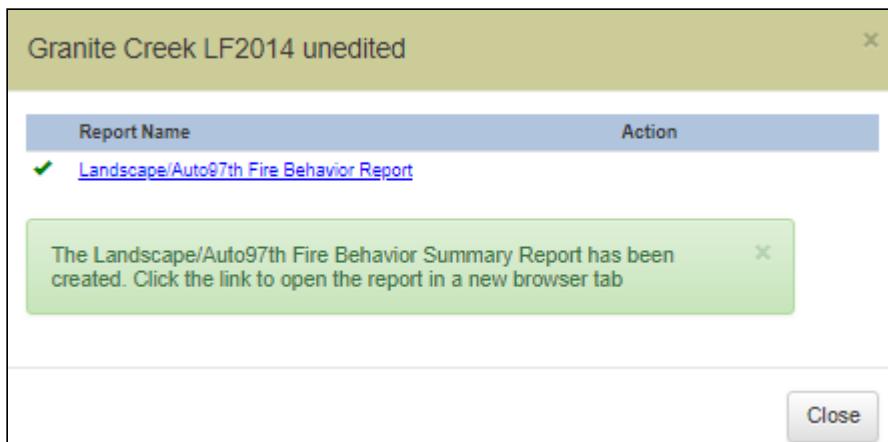
C. In **Landscape Summary**, click the drop-down menu next to **Select Landscapes**. If the newly created landscape didn't appear in the drop down, use the **Refresh** button after giving the landscape a short time to process. The landscape appears with a green check next to it (which indicates it has downloaded completely to your IFTDSS account). 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 Area of Interest blank in order to produce a report for the entire landscape.

D. Click **Request a Report**.

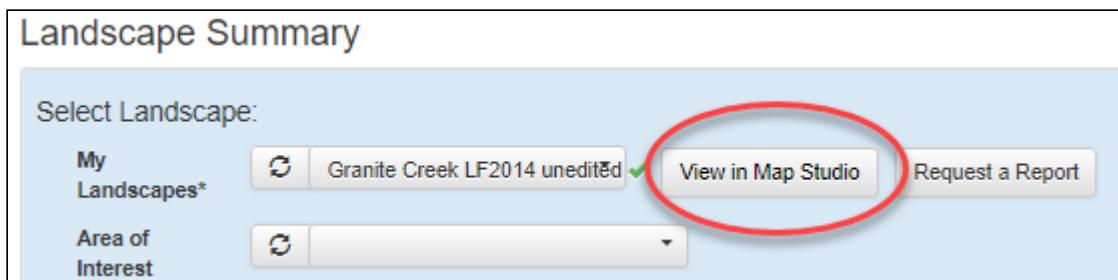
E. Confirm your select by clicking **Create Report** in the box that appears. The report will begin processing and may take a few moments.

The screenshot shows the 'Landscape Summary' page. A red box labeled C highlights the 'Select Landscape:' section, which includes a dropdown menu for 'My Landscapes*' containing 'Granite Creek LF2014 unedited' with a green checkmark, and a dropdown menu for 'Area of Interest'. A red box labeled D highlights the 'Request a Report' button. A modal window labeled E is open, showing the report details: 'Report Name: Granite Creek LF2014 unedited' and 'Location: Landscape/Auto97th Fire Behavior Report'. The 'Create Report' button is circled with a red oval.

To make sure the report is complete click the **Refresh** button that appears where the **Create Report** button once was. When complete, a green checkmark will appear next to the report name, and the name will become a hyperlink.



F. For this example we are going to view the fire behavior aspect of the report in Map Studio so it can be viewed with the landscape features, so close the report box and click the **View in Map Studio** button. The report, and Map Studio outputs, can be viewed anytime later by accessing them in **My Workspace**, they are saved in the same folder as the landscape they describe (in this case your Granite Creek project folder).

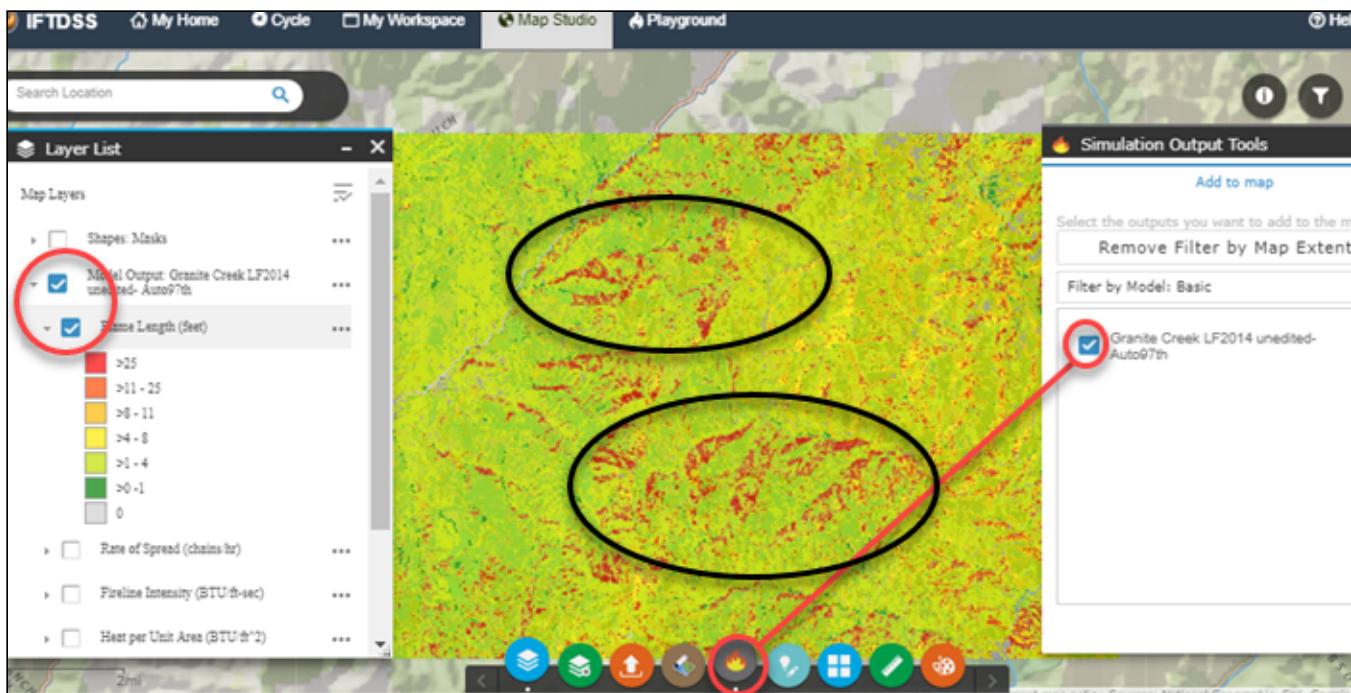


Comparing Landscape Features and Model Outputs with the Swipe widget

After clicking **View in Map Studio**, the fire behavior model layer will automatically open. For future use, you can remove that modeling layer, or add other modeling layers, by clicking the **Simulation Output Tools** 🌡️ widget on the bottom of the screen.

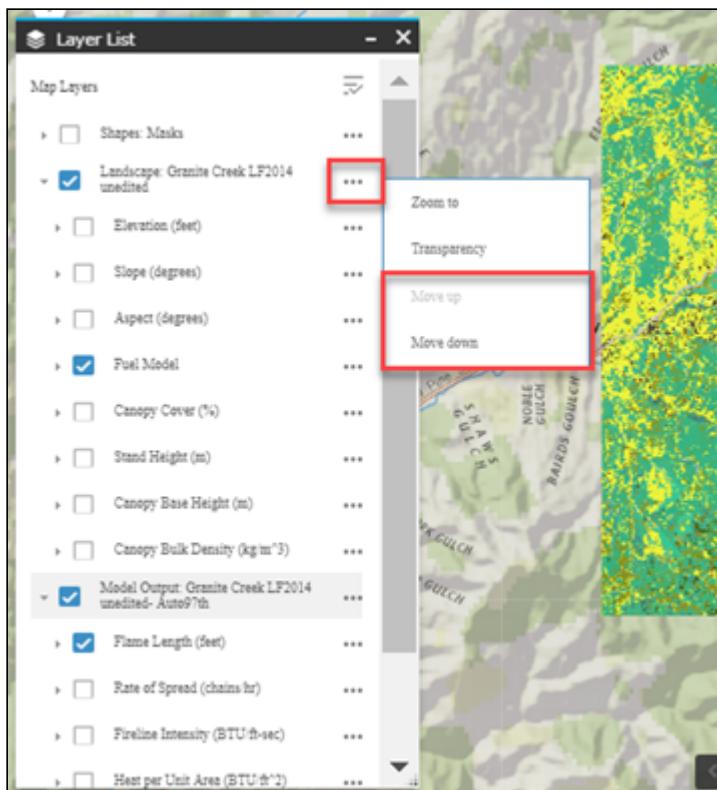
- If the layer did not automatically open, click the **Simulation Output Tools** 🌡️ widget on the bottom of the screen.
- Ensure the box next to “Granite Creek LF2014 unedited-Auto97th” is checked, this layer open on the map and be visible in **Layer List**. Check the appropriate boxes in **Layer List** to view Flame Lengths and the corresponding legend as displayed below.

Zoom into an orange/red area where you can see concentrated areas high Flame Lengths projected by the summary model. Next you'll look at the fuel models and topography for that area of more intense fire behavior.



C. To compare these model outputs with your landscape, add the Granite Creek LF2014 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 LF2014 unedited". Use the dropdown arrows and checkboxes in **Layer List** display only the landscape Fuel Model layer and the Model output Flame length layer.

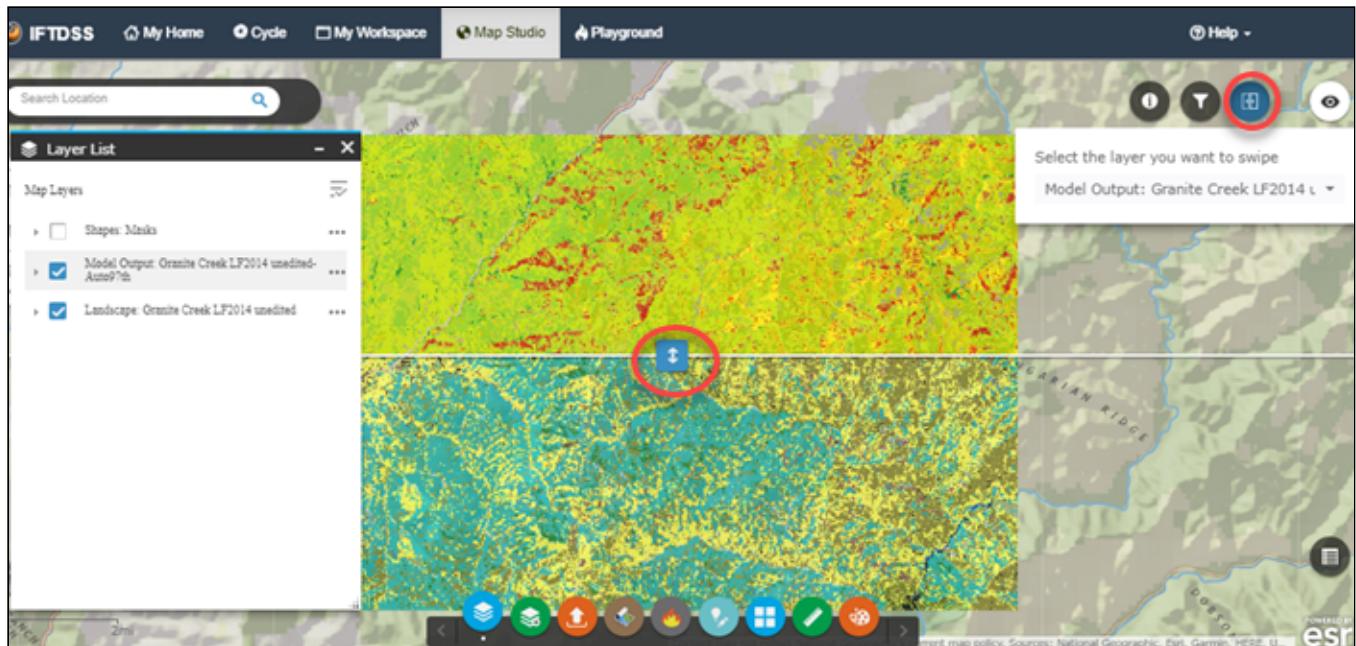
To move a layer group, such as Landscape, up or down in Layer List, click the More Options button to the right of the layer and choose "Move up" or "Move down".



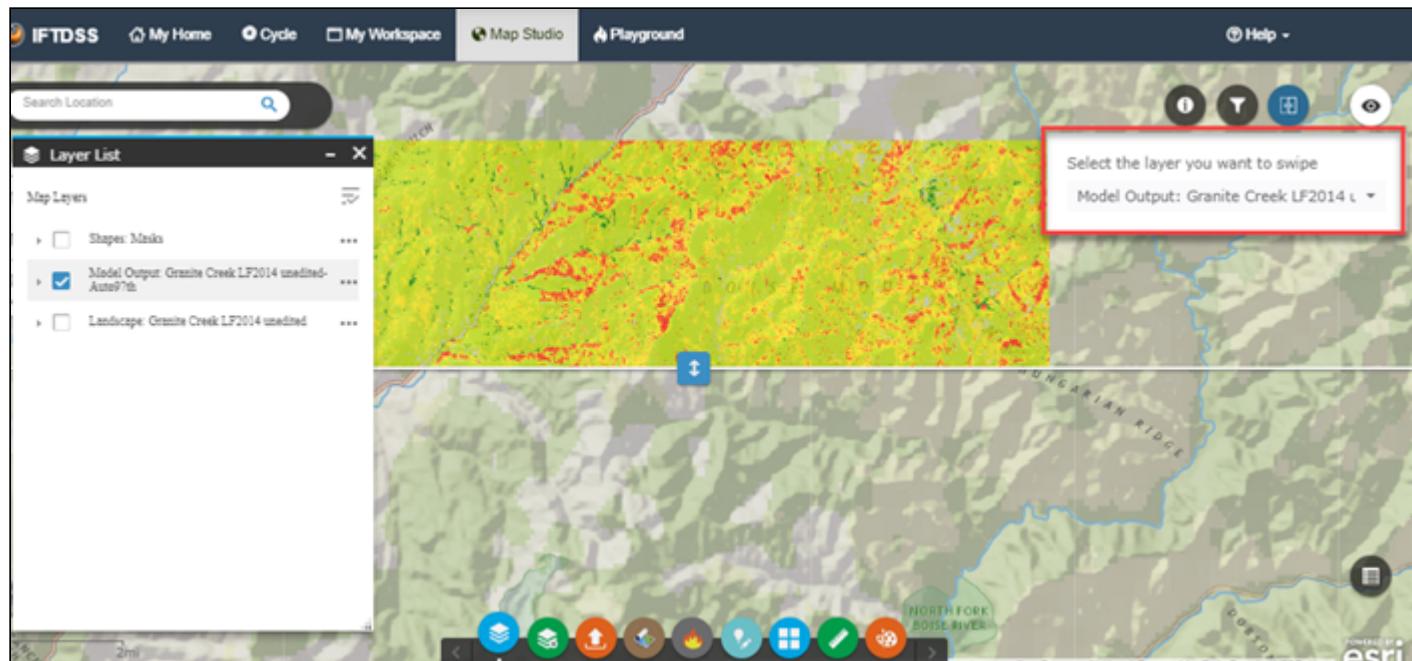
Next you'll compare the two using Swipe:

A. Click the **Swipe**  widget in the top right of Map Studio.

B. Next, specify the layers to swipe. By default, the first layer in Layer List will be the one displayed in the Swipe box, and will appear in the top portion of the map, the next visible layer in Layer List will be the layer displayed under it. In the example below, "Model Output: Granite Creek LF2014 unedited – Auto97th" is displayed on the top, and the Landscape layer is displayed on the bottom. Slide the bar in the middle of the screen up and down. Notice that the areas with high flame lengths correspond to areas of Fuel Model 188 (TL8) with small patches 165 (TU5).



Next you'll want to view the topography to see how it corresponds to the areas displaying more intense fire behavior. Uncheck the boxes in the **Layer List** then re-check the "Granite Creek LF2014 unedited – Auto97th" layer. This will display only that behavior layer, and allow you to see the topography underneath. If this does not occur on your map, move your mouse up to the swipe box and make sure the Model Output layer is selected (For more about the Swipe widget, see the [Swipe widget Help Topic](#)).



As you swipe up and down you'll notice all the areas displaying more intense fire behavior are west or northwest facing slopes. Wrapping up this analysis by repeating this process in the northern part of the landscape, you notice there

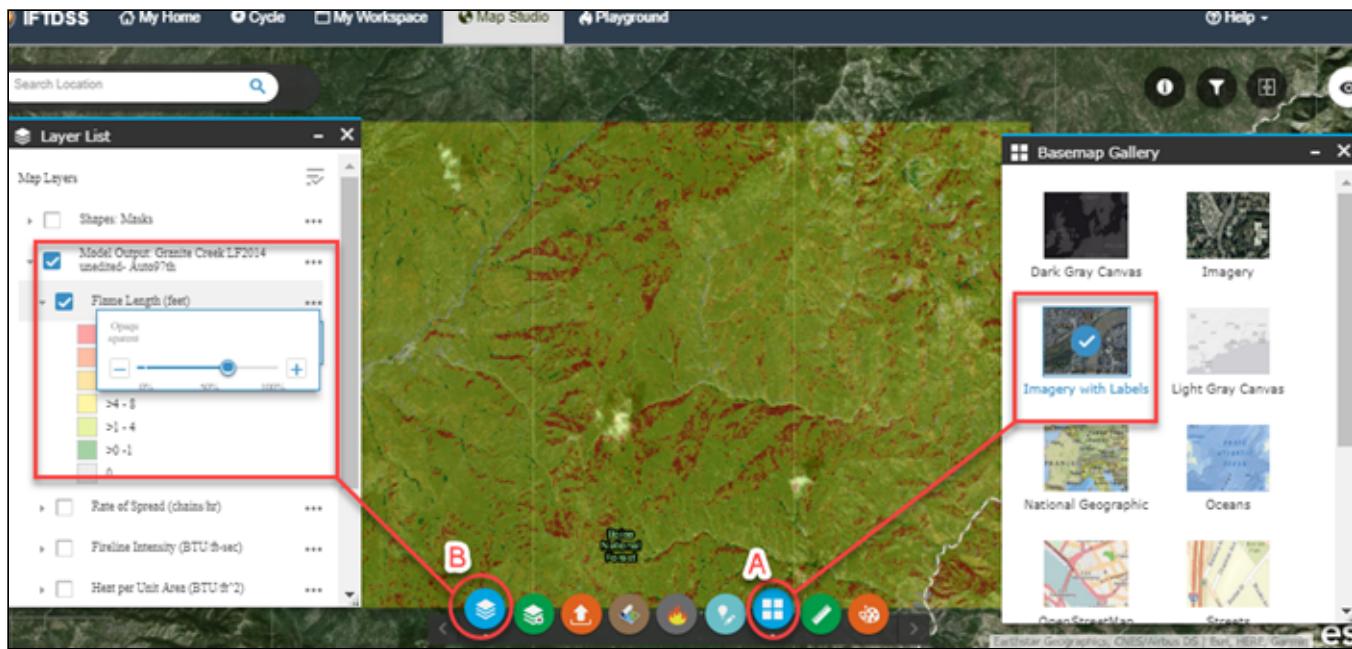
appears to be several areas that would produce more intense fire behavior. Also compare other aspects of fire behavior, such as Rate of Spread and Crown Fire Activity.

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

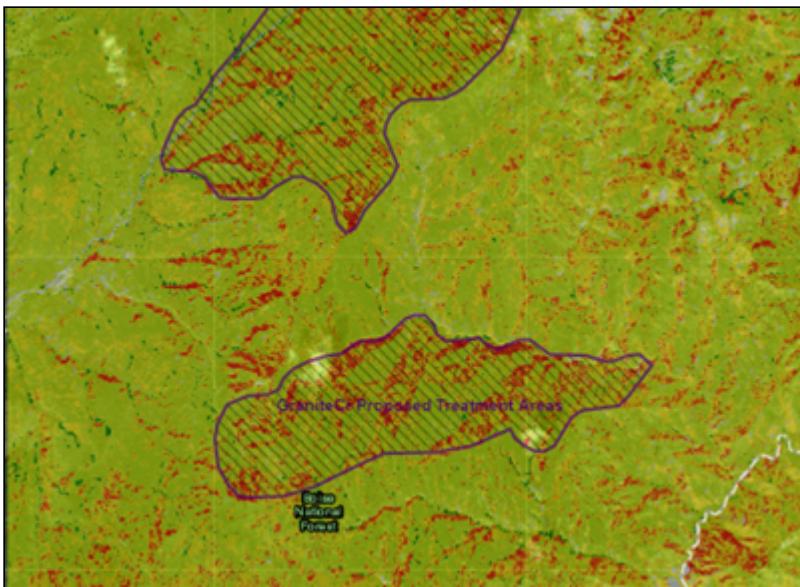
Creating Areas of Interest

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

- If you have not done so already, change the **Basemap Gallery** layer to “Imagery with Labels” so you can see landscape imagery.
- Then set up the **Layer List** 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 Area of Interest, or treatment area.



- Select the **Create/Edit Shapes** (blue circle icon) widget at the bottom of the screen and ensure **Polygons** is selected in the drop-down box in **Create/Edit Shapes**.
- Next you will create two shapes similar to those shown below (they need not match exactly). Select **Freehand Polygon** (square icon with a cross) option, and draw a shape around one of the areas of significant fire behavior.

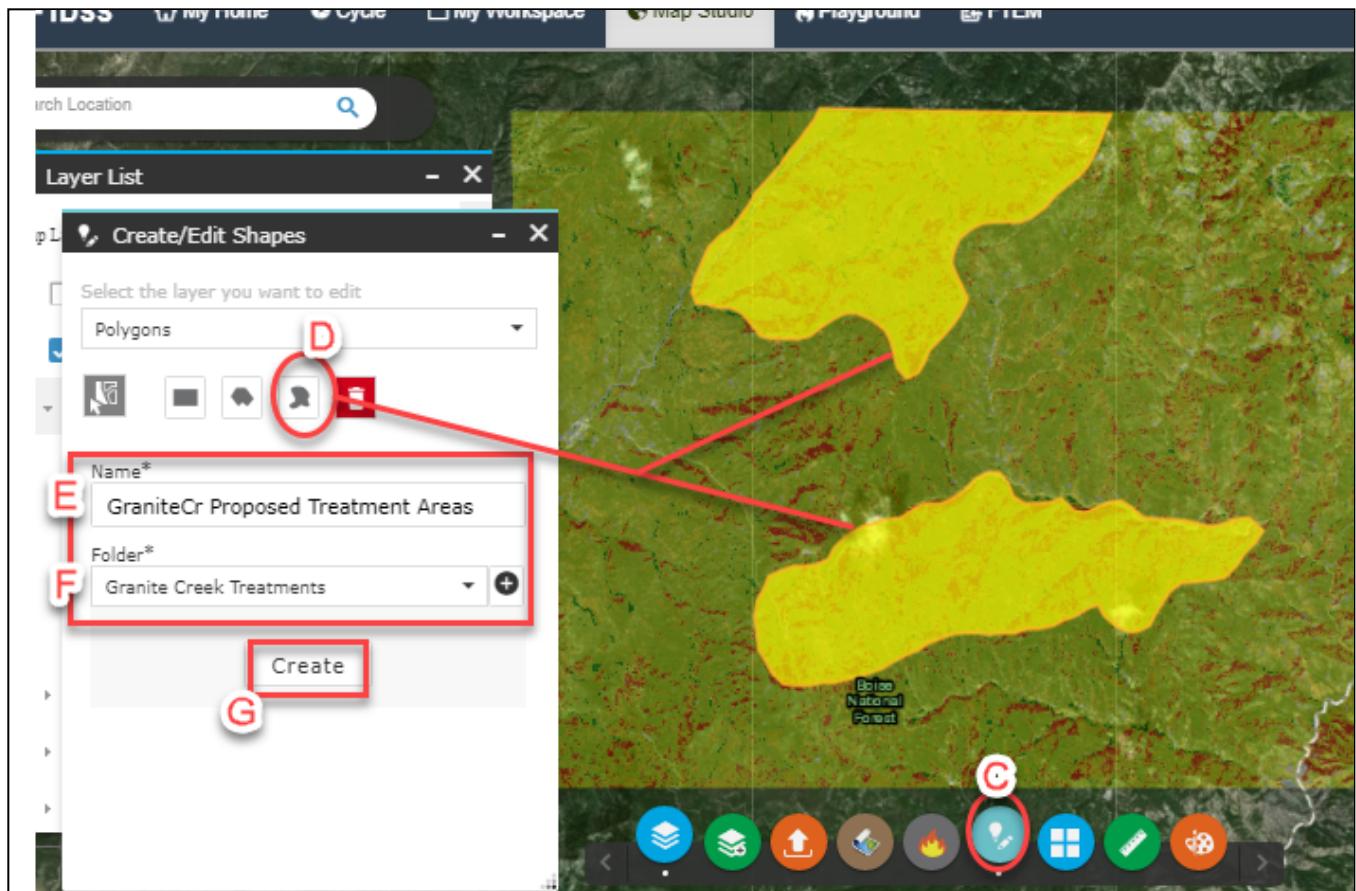


Next, select **Freehand Polygon** option again and draw a second a shape around the second area that exhibited significant fire behavior. You'll concentrate on these areas for developing and comparing treatments to meet the objectives of reducing the fire hazard in this area, and returning low intensity fire to this landscape.

E. Name this "Granite Creek Proposed Treatment Areas".

F. Select the "Granite Creek Treatments" folder. This will ensure the Area of Interest is filed in the same location in **My Workspace** as all the other Granite Creek project files.

G. Click **Create**. These two areas will now be saved as a single shape and available in the **Layer List** in Map Studio, as well as in your "Granite Creek Treatments" folder in **My Workspace**.



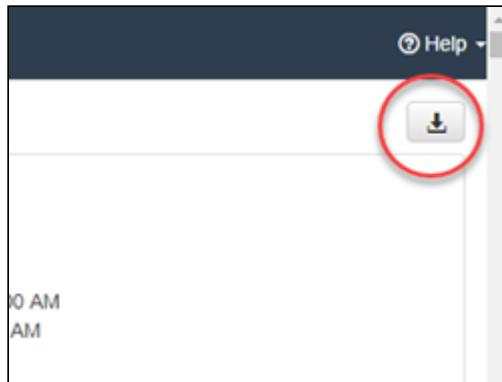
Reviewing the Landscape Summary Report

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. Because the Landscape was assigned to the Granite Creek folder when you first created it, the model output and Summary Report will also be stored there by default. Select the "Granite Creek Treatments" folder from the panel on the left of the screen. As you navigate you'll notice the information in the right-hand panel changes too, updating as you move through different screens.
- C. Select the "Granite Creek LF2012 unedited - Auto97th" report file and click the **View Summary** button. The report will open in a new browser tab.

Name	Type	Owner	Created
GraniteCr Proposed Treatment Areas	Shape		Apr 11, 2018 9:40:48 P
Granite Creek LF2014 unedited - Auto97th	Report		Apr 11, 2018 8:05:20 P
View Summary			
Granite Creek LF2014 unedited- Auto97th	Model Output		Apr 11, 2018 8:05:20 P
Granite Creek LF2014 unedited	Landscape		Apr 11, 2018 7:33:43 P

- D. In the top right of the report, click the **Download**  button to save a copy to your local computer, you'll refer to this PDF again 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 (upper left corner), 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, 34% of this landscape is attributed to the TL8 fuel model.

Fuel Model (FBFM)

Fuel Model Data Summary within "Granite Creek LF2014 unedited" Landscape

Source Landscape Name: Granite Creek LF2014 unedited
Landfire Version: LANDFIRE, 2014
Source Landscape Acres: 58,701
Model Name: Granite Creek LF2014 unedited-Auto97th
Distribution under 1% not shown

Fuel Model	Pixel Count (freq)	Acres in LCP	Percent in LCP
NB1 (91)	429	95	0
NB8 (98)	27	6	0
NB9 (99)	4,055	902	2
GR1 (101)	226	50	0
GR2 (102)	80,751	17,959	31
GS1 (121)	1,078	240	0
GS2 (122)	62,961	14,002	24
SH2 (142)	943	210	0
		1,276	2
		735	1

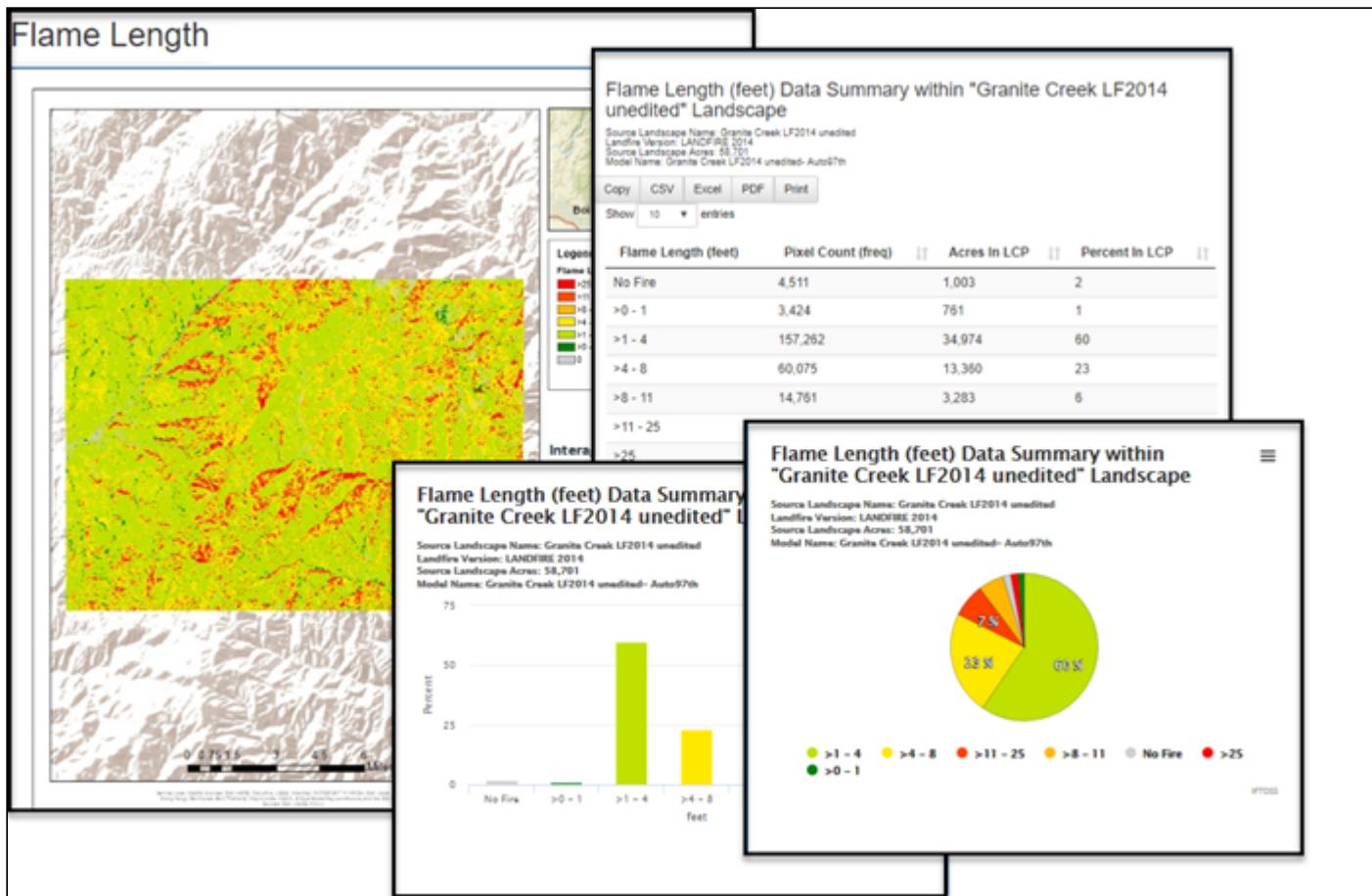
Previous **1** Next

Fuel Model Data Summary within "Granite Creek LF2014 unedited" Landscape

Source Landscape Name: Granite Creek LF2014 unedited
Landfire Version: LANDFIRE, 2014
Source Landscape Acres: 58,701
Model Name: Granite Creek LF2014 unedited-Auto97th

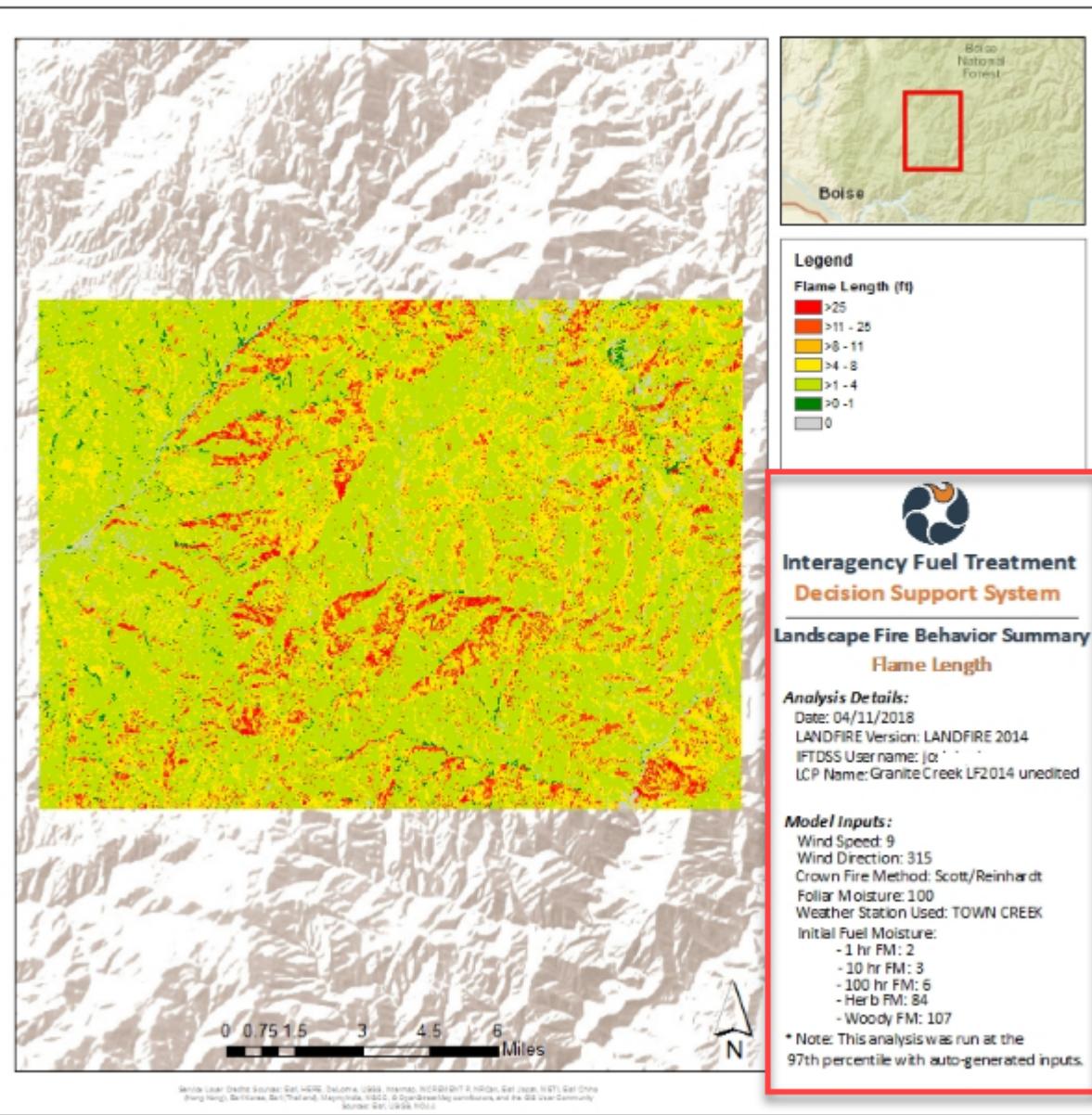
Legend: NB1, NB8, NB9, GR1, GR2, GS1, GS2, SH1, SH2, TU1, TU5, TL3, TL6, TL8, other

Take a good look at the report in its entirety, including the Flame length outputs:



These graphs indicate that, given 97th percentile weather and fuel moisture conditions, a little over half of this landscape will experience Flame Lengths of up to four feet, while nearly another third will experience Flame Lengths between four and eight feet. The specific areas on this landscape where more intense, “problem” fire behavior is seen, is where our treatments are focused.

Flame Length



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**  button to save this report as a pdf on your local machine.

Each chart also has a download button to right of it so it may be downloaded individually for use in your own documents. Tables have download buttons under the table descriptions.

Fuel Model Data Summary within "Granite Creek LF2014 unedited" Landscape

Source Landscape Name: Granite Creek LF2014 unedited
Landscape Version: LANDFIRE 2014
Source Landscape Acres: 58,791
Model Name: Granite Creek LF2014 unedited-AutoDFA

Canopy Cover (percent) Data Summary within "Granite Creek LF2014 unedited" Landscape

Source Landscape Name: Granite Creek LF2014 unedited
Landscape Version: LANDFIRE 2014
Source Landscape Acres: 58,791
Model Name: Granite Creek LF2014 unedited-AutoDFA

Canopy Cover (percent)	Pixel Count (freq)	Acres In LCP	Percent In LCP
0 (non-forested)	92,731	20,623	35
>10 - 20	20,123	4,475	8
>20 - 30	38,315	8,521	15
>30 - 40	80,555	17,915	31
>40 - 50	25,571	5,687	10
>50 - 60	5,405	1,202	2
>60 - 70	1,198	266	0
>70 - 80	50	11	0

Showing 1 to 8 of 8 entries

Next, it's 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 fuels treatment alternatives so you can determine how changes in the fuels characteristics affect fire behavior outputs.

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

IFTDSS My Home Cycle My Workspace Map Studio Playground

My Workspace / Granite Creek Treatments / Strategic Planning

STRATEGIC PLANNING

Reporting Landscape Evaluation Monitoring Implementation Planning Strategic Planning

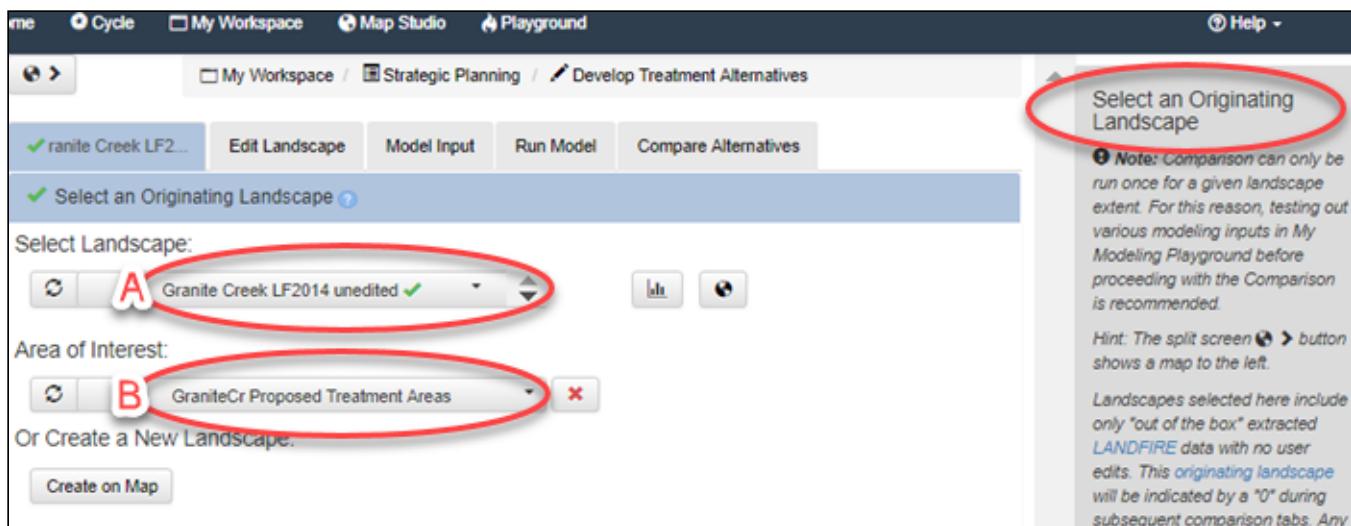
DEVELOP TREATMENT ALTERNATIVES Develop treatment alternatives and view comparative summaries

QUANTITATIVE RISK Uses models to quantify treatment's impact on risk

The Develop Treatment Alternatives screen contains 5 tabs, or steps. You'll proceed through each one using the steps below.

Pick a landscape and area of interest

- First, select the "Originating Landscape" (Granite Creek LF2012 unedited). The Originating landscape sets the landscape extent for the rest of the tasks. 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.
- Select the Area of Interest created earlier in Map Studio (Granite Creek Proposed Treatment Areas). This will constrain our 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 has some good 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 really helpful information.

Edit the landscape to simulate treatment scenarios

Next, move to the **Edit Landscape** tab, where you'll select a Default Fuels Treatment rule, and apply it to the Area of Interest to simulate a thin and pile burn. This will create a version of your landscape with edits applied to your areas of interest. Later, you'll see how this proposed treatment affects fire behavior. To create the edited landscape:

- Select the "Granite Creek LF2014 unedited" 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.
- Click **Add Default Fuels Treatment/Disturbance Edit Rule** to display editing options.
- Click **Thin: Slash Removed**, then select the "Light Thinning; Pile Burning" option.
- If you hover your mouse over the "Light Thinning; Pile Burning" it will give you the details on what the rule represents.
- Choose the "Light Thinning: Pile Burning" option
- Select 1 year since disturbance
- Select the "Granite Creek Proposed Treatment Areas" mask to apply the rule to
- Click the **Add to Rules** button.

A Starting Landscape* Granite Creek LF2014 unedited ✓

B Select Treatment / Disturbance Type*

C Light Thinning; Pile Burning

D 1 Year

E GraniteCr Proposed Treatment Areas

F Add to Rules Cancel

This rule will mimic thinning the Area of Interest to about 80% present density by removing understory up to 8" DBH, with subsequent pile burning of thinned material. This information appears if you hover over the "Light Thinning: Pile Burning" option described in step C above. Alternatively, the description of each default rule can be read in the [Landscape Editing - Default Fuel Treatment and Disturbance Topic](#) of Help Center.

H. Your rule will be displayed at the top of the screen along with a green confirmation box. Leave this rule as-is, but know that if you had made a mistake and needed to discard the rule, it could be deleted using the button shown to the right of the rule.

H Starting Landscape* Granite Creek LF2014 unedited ✓

I Add Default Fuels Treatment Edit Rule Add User Created Edit Rule

Order	Mask	Landscape Edit Rule	
1	GraniteCr Proposed Treatment Areas	Thin from below: Fuel removal, Light Thinning; Pile Burning for 1-year post-treatment	

You have successfully added and saved a new rule.

Later, you'll also mimic a broadcast burn after the thin and pile. While you could create a second rule that would be applied after the first (See the [Rule Ordering Consideration help topic](#) for more details on these), you'll apply one at a time so its easier to track the results of the rule on the landscape. It's always a good idea to assess your landscape after editing to ensure it's been applied correctly and makes sense.

- I. To finalize and create your edited landscape, scroll to the bottom of the editing page, input a landscape name that is representative of the edits (GC14_Lt_Thn_Pilebrn_1yr), and click **Save New Landscape**.



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

Model Input

A Wind speed (mph)* 9 Wind Direction (0 from north)* 315

B Crown Fire Inputs

Crown Fire Method* Scott/Reinhardt Foliar Moisture Content* 100

C Initial Fuel Moisture

Model	1hr FM	10hr FM	100hr FM	Herb FM	Woody FM
default	2	3	6	84	107

+ add row

Save Inputs

Run Model

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.

Run Models

Landscape	Run Name	Run Status
Granite Creek LF2014 unedited	Granite Creek LF2014 unedited	
GC12_Lt_Thn_PileRx_1yr	GC14_Lt_Thn_Pilebrn_1yr	

Run Mode

Run Model

- Give the models a couple minutes to run. Hit the refresh button to the right of "Run Status" to see the model status, until both are Completed.

Model run 'GC14_Lt_Thn_Pilebrn_1yr' was successfully requested.

Landscape	Run Name	Run Status
Granite Creek LF2014 unedited	Granite Creek LF2014 unedited	Completed
GC14_Lt_Thn_Pilebrn_1yr	GC14_Lt_Thn_Pilebrn_1yr	Running

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:

- 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 our treated landscape (1) on our original landscape (2). For example, if our 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.

- Now you'll want to view comparison outputs on the map and as a report. First, click the **Compare in Summary Report** button so the reports can begin processing.
- Click both **Create Report** buttons so they can begin processing.

The screenshot shows the 'Compare Alternatives' tab selected in the top navigation bar. In the 'Landscape' section, two landscapes are listed: 'Granite Creek LF2014 unedited' (numbered 2) and 'GC14_Lt_Thn_Pilebrn_1yr' (numbered 1). A red box labeled 'A' highlights the 'Compare on Map' button. A red box labeled 'B' highlights the 'Compare in Summary Report' button, which is currently active. A red box labeled 'C' highlights the 'Create Report' buttons for both landscapes in the 'Treatment Alternatives Summary Compare Report' dialog box.

- Next click the **Compare on Map** button to view results on the map. Wait for the map to appear in splitscreen mode, then click **Compare on Map** once more, and give the caparison layers a few seconds to download.

Landscape

Model Run

Granite Creek LF2014 unedited

GC14_Lt_Thn_Pilebrn_1yr

Completed

Completed

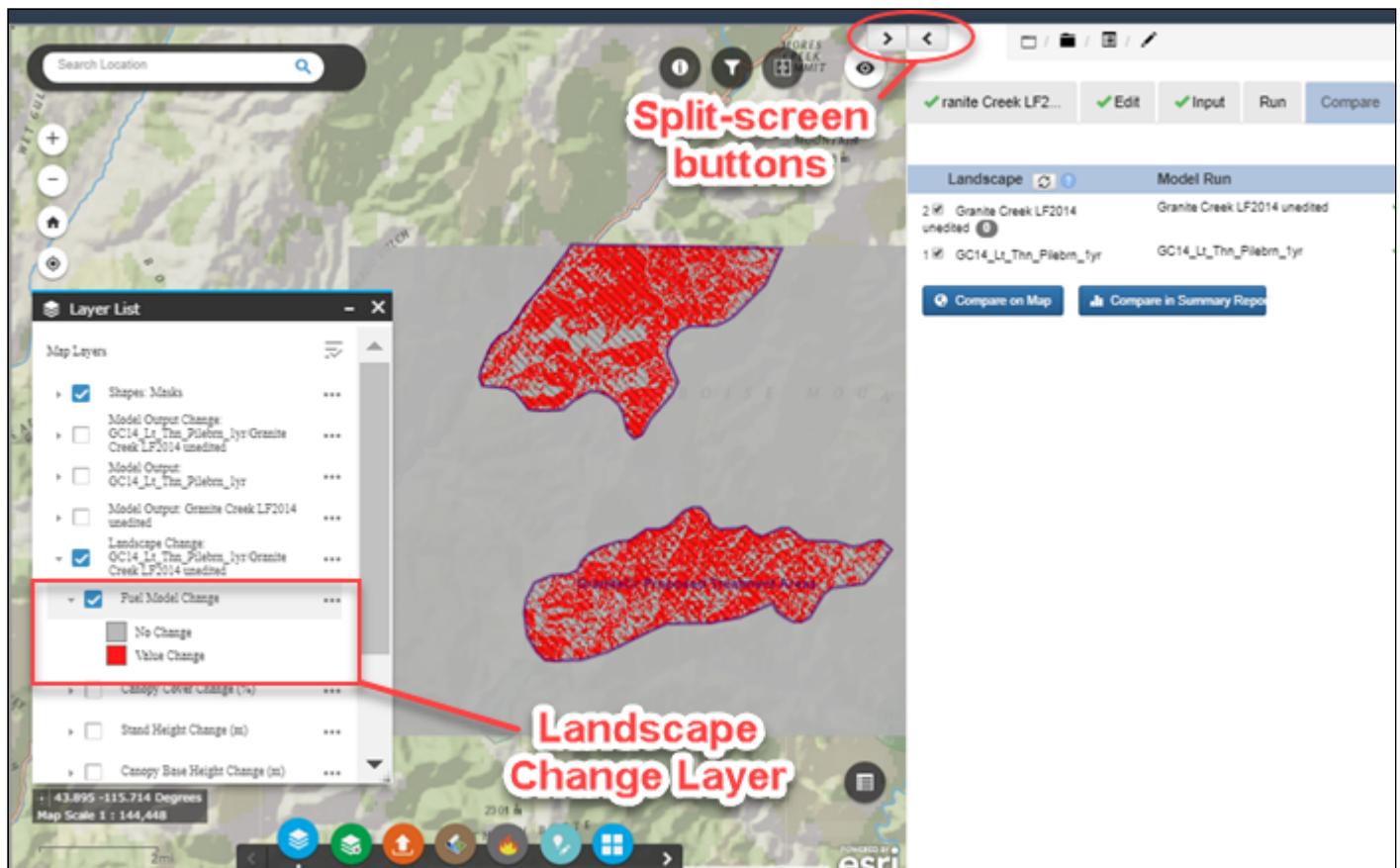
Compare on Map

Compare in Summary Report

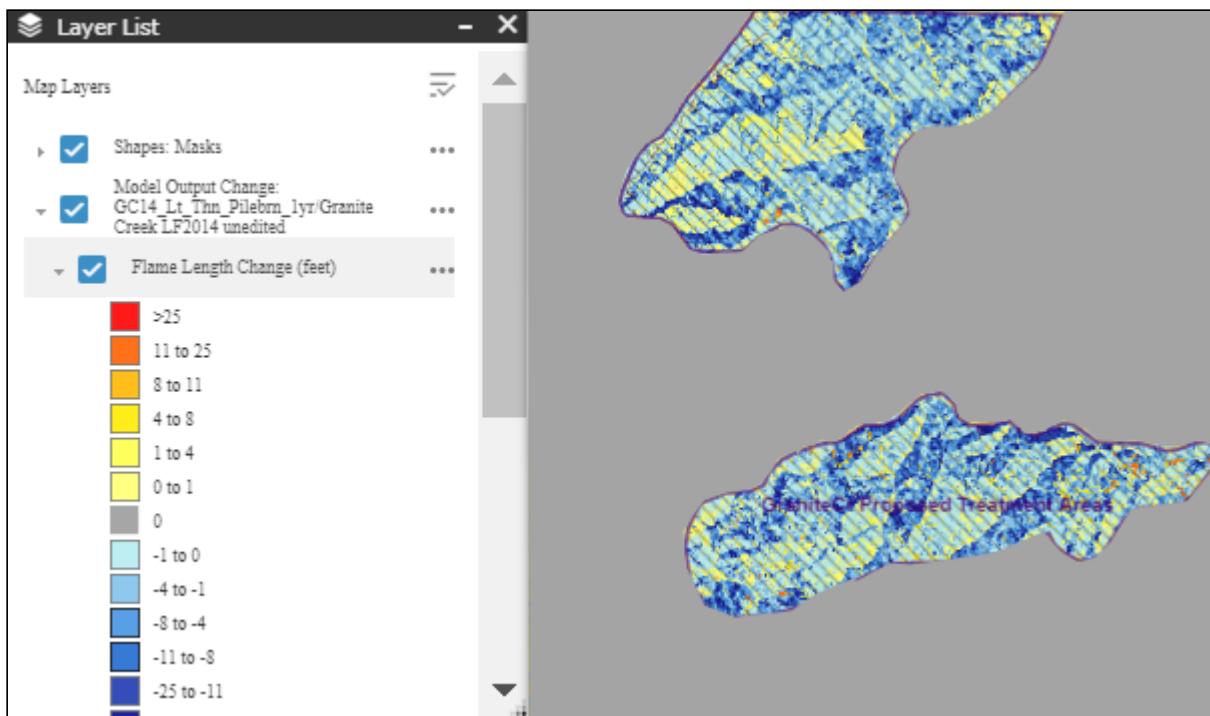
Comparing the Alternatives

After clicking **Compare on Map**, the map appears in split screen mode. This feature 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.

Initially you'll see a simple landscape change map, indicating which pixels experienced a Fuel Model change post-treatment.



To view the change in Flame Length after the treatment, open **Layer List** and check the box next to: "Model Output Change: GC14_Lt_Thn_Pilebrn_1yr/Granite Creek LF2014 unedited". This layer shows the difference between post-treatment and pre-treatment Flame Lengths. With a glance you can see that all the dark blue showing on those West/Northwest facing slopes that had initially shown very high flame lengths, are now indicating significantly decreased flame lengths and fire intensity.



To get back to these maps later, you can either access them in your project folder in **My Workspace**, or select this landscape 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 our project folder in **My Workspace**, or click the button again and click on the links displayed in the pop-up box. In this case, go to **My Workspace** and first select "GC14_Lt_Thn_Pilebrn_1yr/Granite Creek LF2014 unedited - compareLCP...", you may have to hover over the shortened name to display the full name. Once this is selected, click **View Summary**.

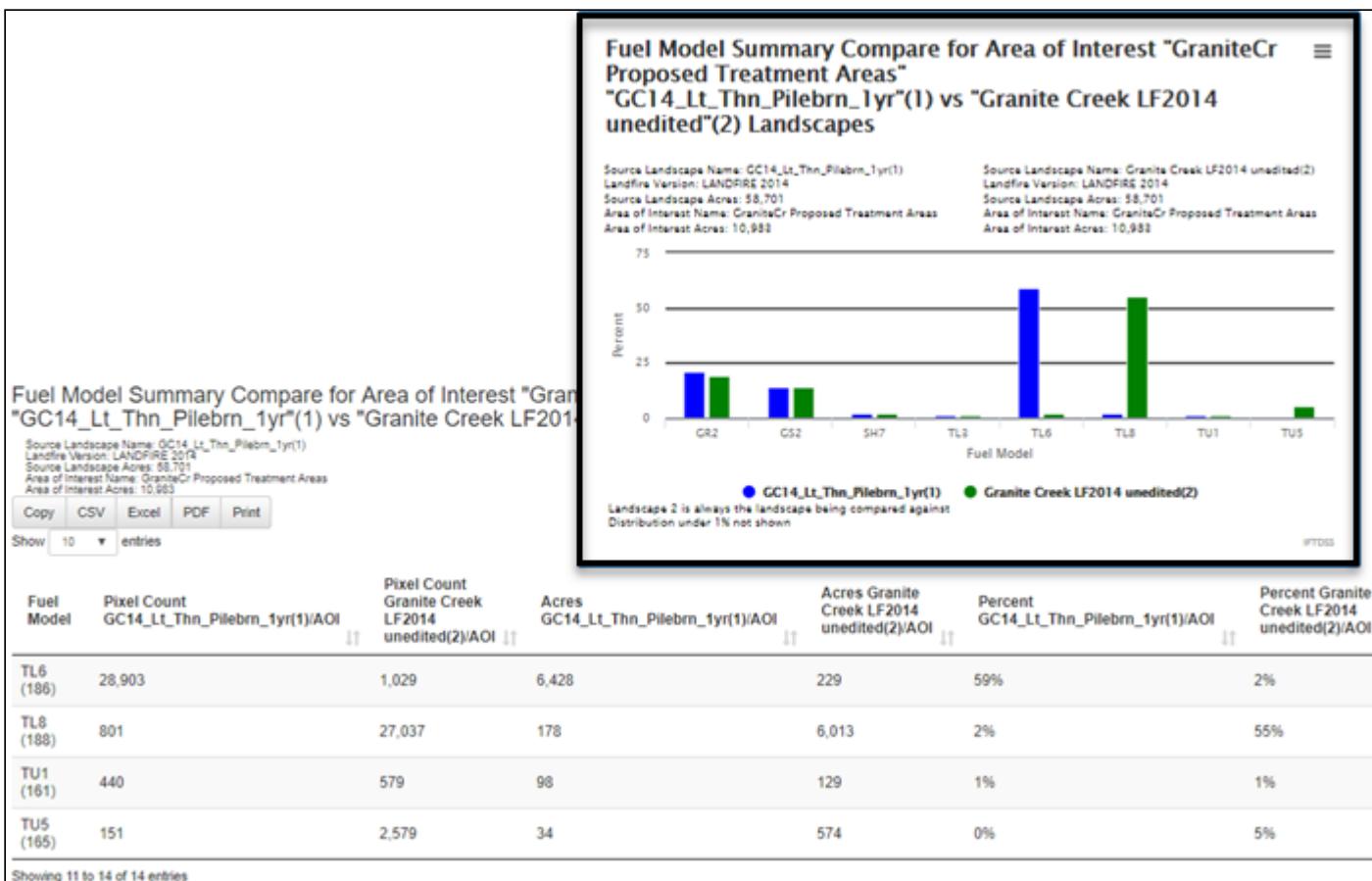
The figure is a screenshot of the IFTDSS software's navigation bar and content area. The navigation bar includes links for IFTDSS, My Home, Cycle, My Workspace, Map Studio, and Playground. The content area shows a 'Display' sidebar with options like All, Report, Model Output, Landscape, Model Input, and Shape. Below this is a 'Folders' sidebar with items like Granite Creek Treatm (selected), vanmeter, and LittleSnowy. The main content area shows a table of treatment reports:

Name	Type
GC14_Lt_Thn_Pilebrn_1yr/Granite Creek LF2014 unedited - comp	Report
View Summary	
GC14_Lt_Thn_Pilebrn_1yr/Granite Creek LF2014 unedited - comp	Report
GC14_Lt_Thn_Pilebrn_1yr	Model Output
GC14_Lt_Thn_Pilebrn_1yr	Landscape
Granite Creek LF2014 unedited	Model Output

In the first bar graph, note the acreage for the Area of Interest is displayed. This is a quick way to confirm the Develop Treatment Alternative task and resulting reports were actually run to quantify only the area of interest, not the entire landscape.

Review the pre- and post-treatment results for each landscape 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 Fuel Model bar graph we can see that green corresponds to pre-treatment fuel models in the treatment area, while blue corresponds to post-treatment. It appears that most of the TL8 acres were changed to TL6 post-treatment. Looking at the tabular data below, we can see that in fact, 59% of the treatment area is now Fuel Model TL6 following this treatment.



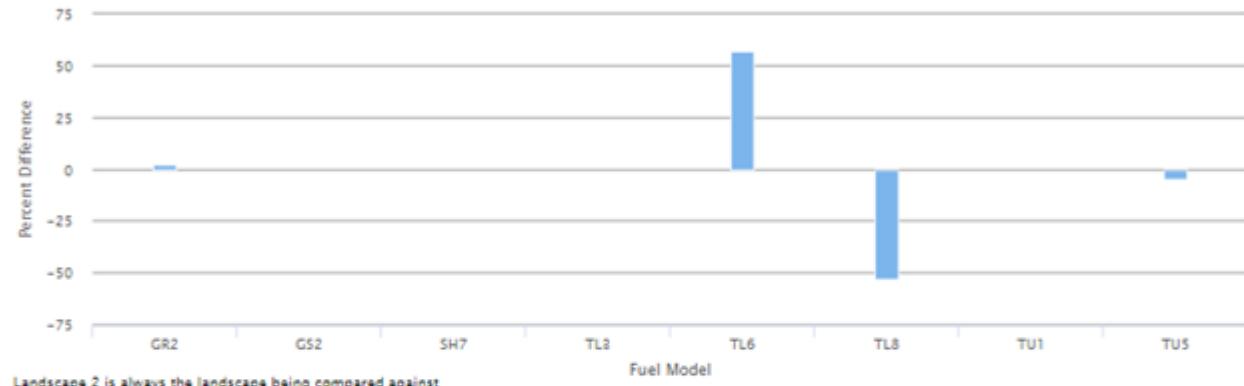
The Fuel Model Percent Difference graph and pie charts tell the same story.

Fuel Model Percent Difference for Area of Interest "GraniteCr Proposed Treatment Areas"

"GC14_Lt_Thn_Pilebrn_1yr"(1) vs "Granite Creek LF2014 unedited"(2) Landscapes

Source Landscape Name: GC14_Lt_Thn_Pilebrn_1yr(1)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

Source Landscape Name: Granite Creek LF2014 unedited(2)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

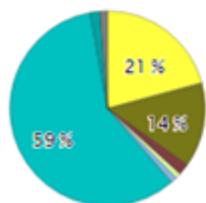


Landscape 2 is always the landscape being compared against
 GR = Granular, GS = Granular Surface, SH = Surface, TU = Turbulent, TL = Flame Length

IFTDSS

Fuel Model Summary for Area of Interest "GraniteCr Proposed Treatment Areas" within "GC14_Lt_Thn_Pilebrn_1yr(1)" Landscape

Source Landscape Name: GC14_Lt_Thn_Pilebrn_1yr(1)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

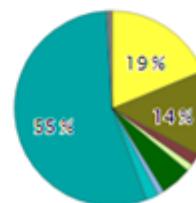


Legend: GR2, GS2, SH7, TU1, TL3, TL6, TL8, other

Landscape 2 is always the landscape being compared against

Fuel Model Summary for Area of Interest "GraniteCr Proposed Treatment Areas" within "Granite Creek LF2014 unedited(2)" Landscape

Source Landscape Name: Granite Creek LF2014 unedited(2)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983



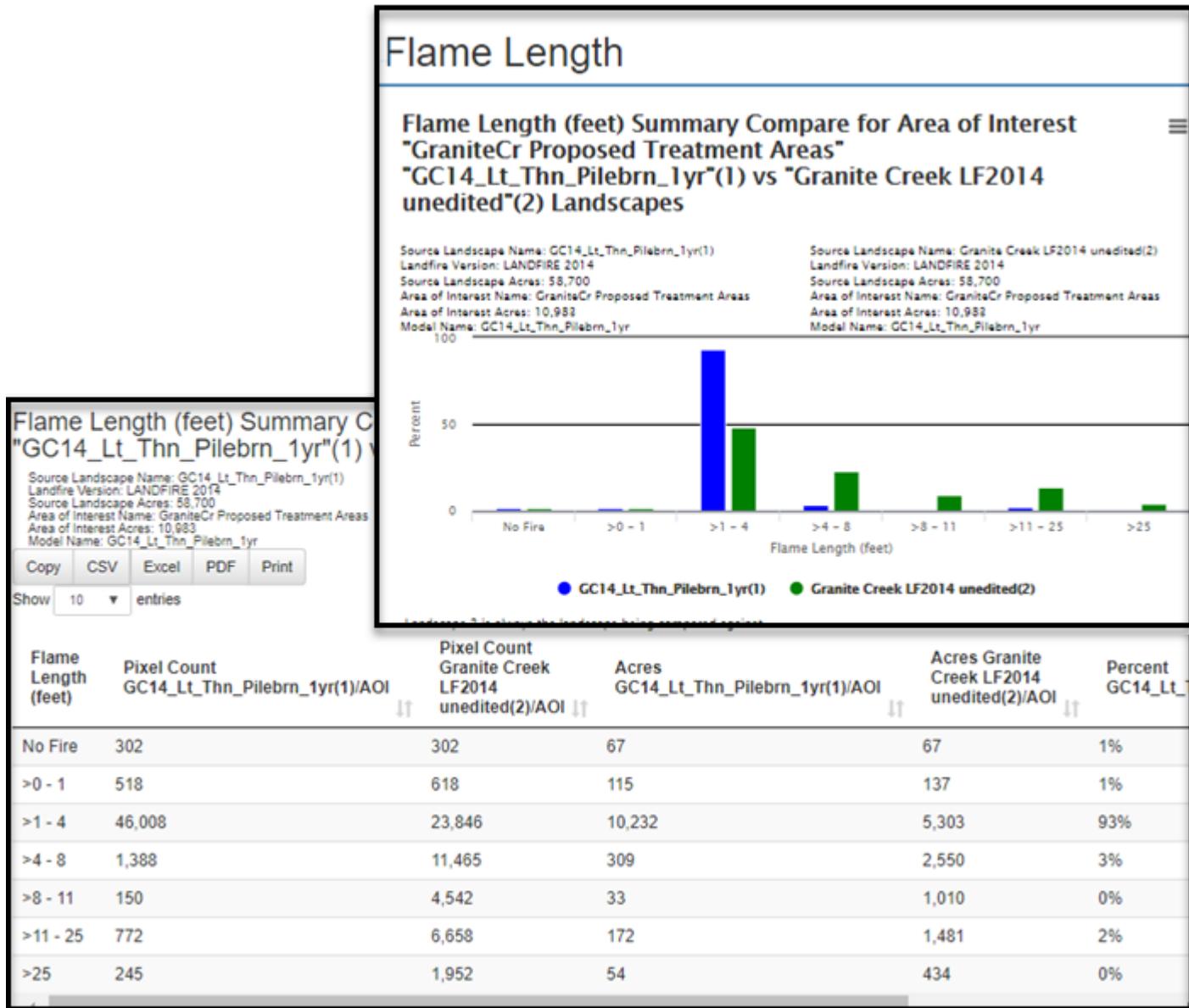
Legend: GR2, GS2, SH7, TU1, TL3, TL6, TL8, other

Landscape 2 is always the landscape being compared against

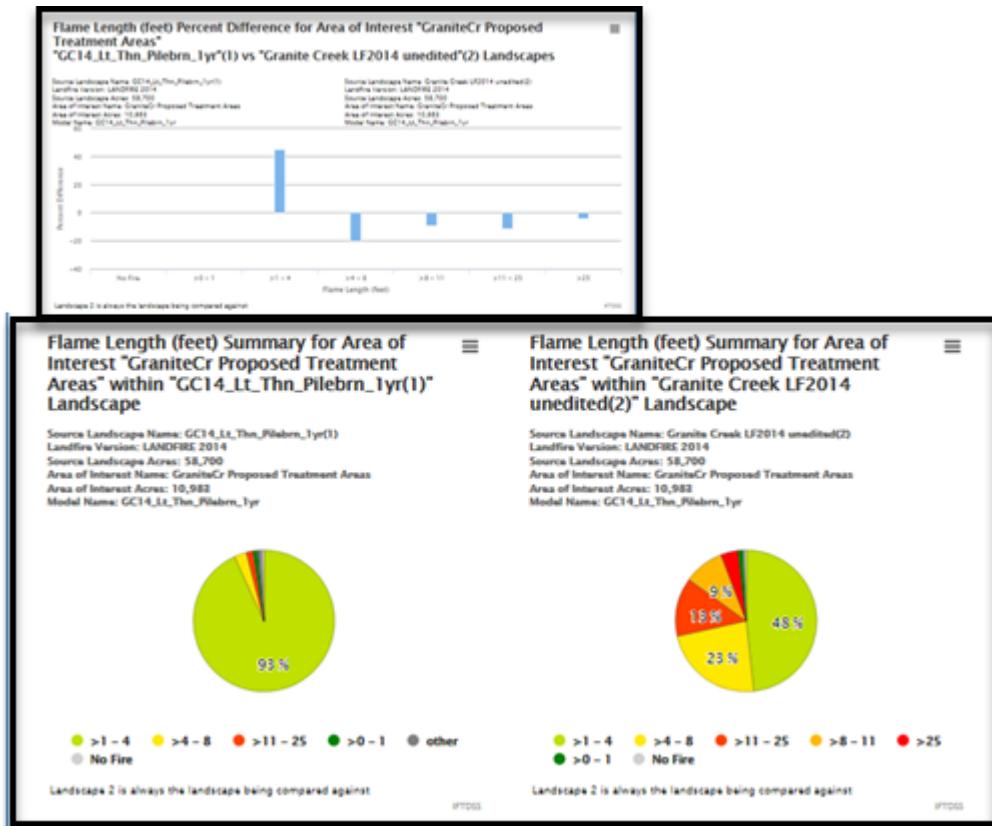
IFTDSS

Next, go to **My Workspace** and navigate to the Fire Behavior (Model) Compare Report, "GC14_Lt_Thn_Pilebrn_1yr/Granite Creek LF2014 unedited - compare model...", and click **View Report**.

As in the landscape Compare Report, 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. The table to the right quantitatively supports this, clearly showing the acres shifting toward the lower flame length bins, post-treatment.



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.

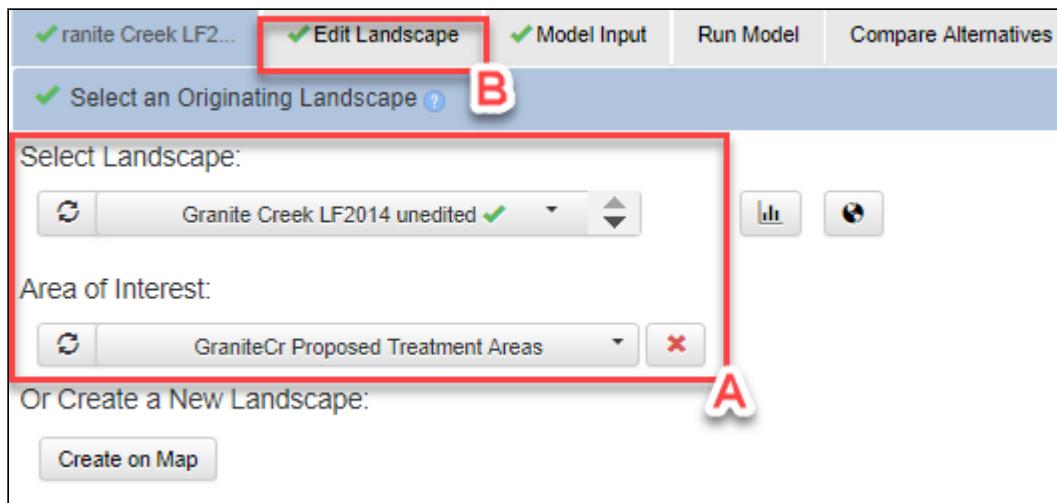


Scroll through the rest of the Fire Behavior Compare Summary Report to view the rest of fire behavior characteristics.

Adding an Additional Treatment to Treatment Alternatives

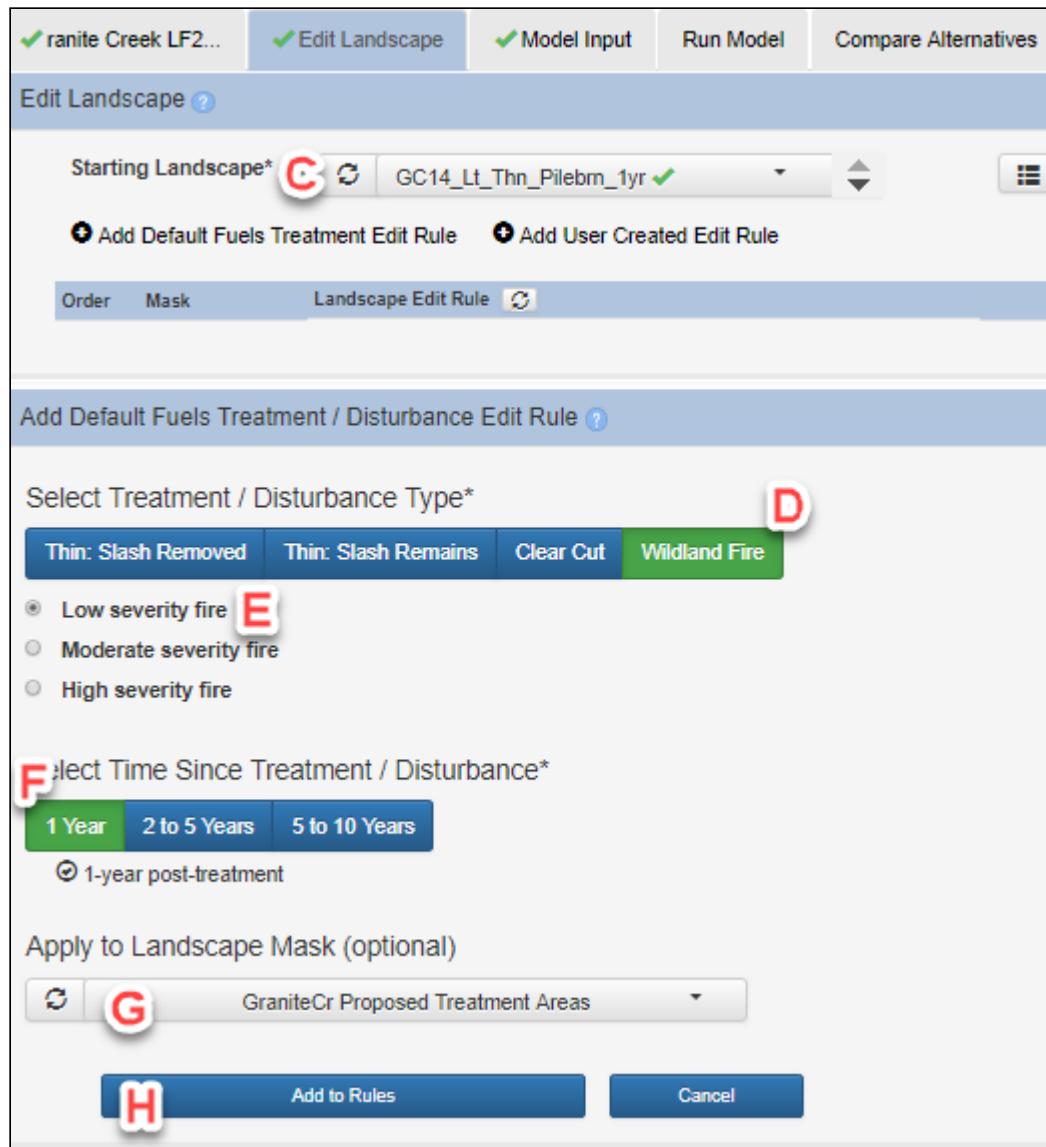
Lets look at the effects of applying a subsequent broadcast burn after the light thinning/pile burning. One of our objectives is to re-introduce low intensity fire in this area and it's an important step in treating this landscape. Additionally, we can see how this follow-up treatment will affect modeled fire behavior:

- Navigate to the Develop Treatment Alternatives workflow again and select the same Originating Landscape and Area of Interest.
- Navigate to the **Edit Landscape** tab.



- This time, choose the landscape with our earlier edits as the Starting Landscape: "GC14_Lt_Thn_Pilebrn_1yr".
- Select the **Wildfire** Default Rule and

- E. specify **Low severity fire**. As before, you can hover over this text or consult the [help topic](#) page for the detailed explanation of the rule.
- F. Select a treatment time of 1 Year.
- G. Apply this rule to our "Granite Creek Proposed Treatment Areas" mask.
- H. Then click **Add to Rules**.



- I. After the rule has been added, give the landscape a detailed name (GC14_Lt_Thn_Pilebrn_1yr_Rx_1yr) and click **Save New Landscape**.

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 the **Run Model** button.

Landscape Run Name Run Status

Landscape	Run Name	Run Status
Granite Creek LF2014 unedited	Granite Creek LF2014 unedited	Completed
GC14廖Thn_Pilebrn_1yr	GC14廖Thn_Pilebrn_1yr	Completed
GC14廖Thn_Pilebrn_1yr_Rx_1y	GC14廖Thn_Pilebrn_1yr_Rx_1y	

Run Model

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

Compare the original landscape with this new one by selecting:

- "GC14廖Thn_Pilebrn_1yr_Rx_1y" as landscape "1".
- Select "Granite Creek LF2014 unedited" as landscape "2".
- Next, click **Compare in Summary Report** and initiate those reports.
- Click **Compare on map**, to get a map view of your changes.

Landscape

- B 2 Granite Creek LF2014 unedited
- A 1 GC14廖Thn_Pilebrn_1yr

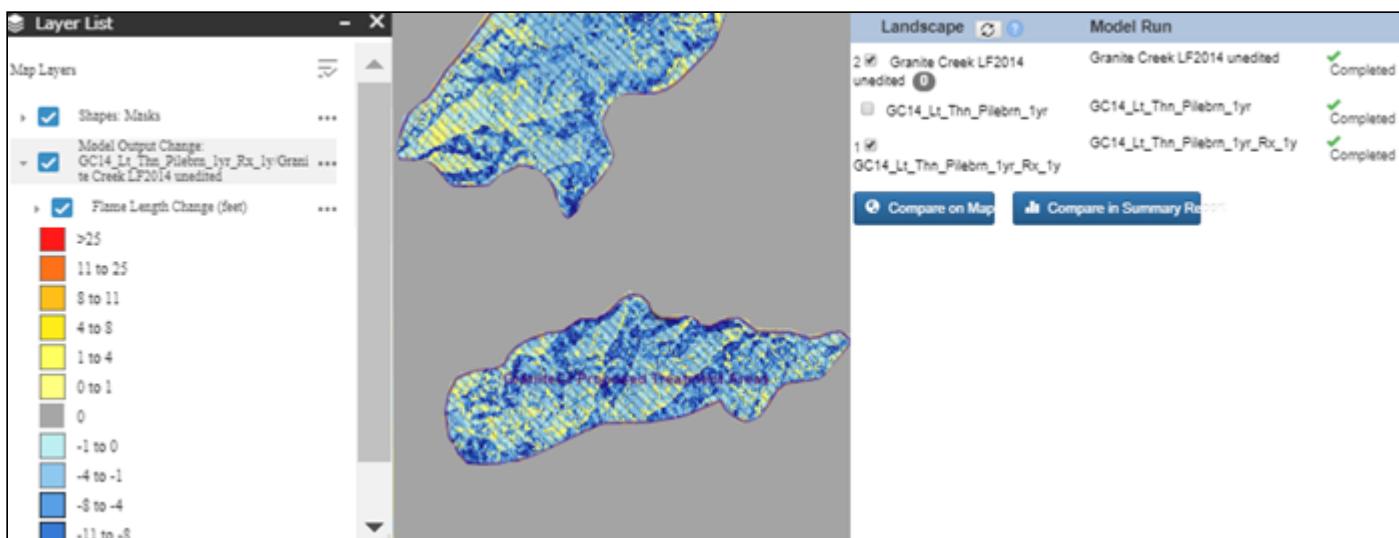
Model Run

Model Run	Status
Granite Creek LF2014 unedited	Completed
GC14廖Thn_Pilebrn_1yr	Completed
GC14廖Thn_Pilebrn_1yr_Rx_1y	Completed

D Compare on Map **C** Compare in Summary Report

Comparing Added Treatments

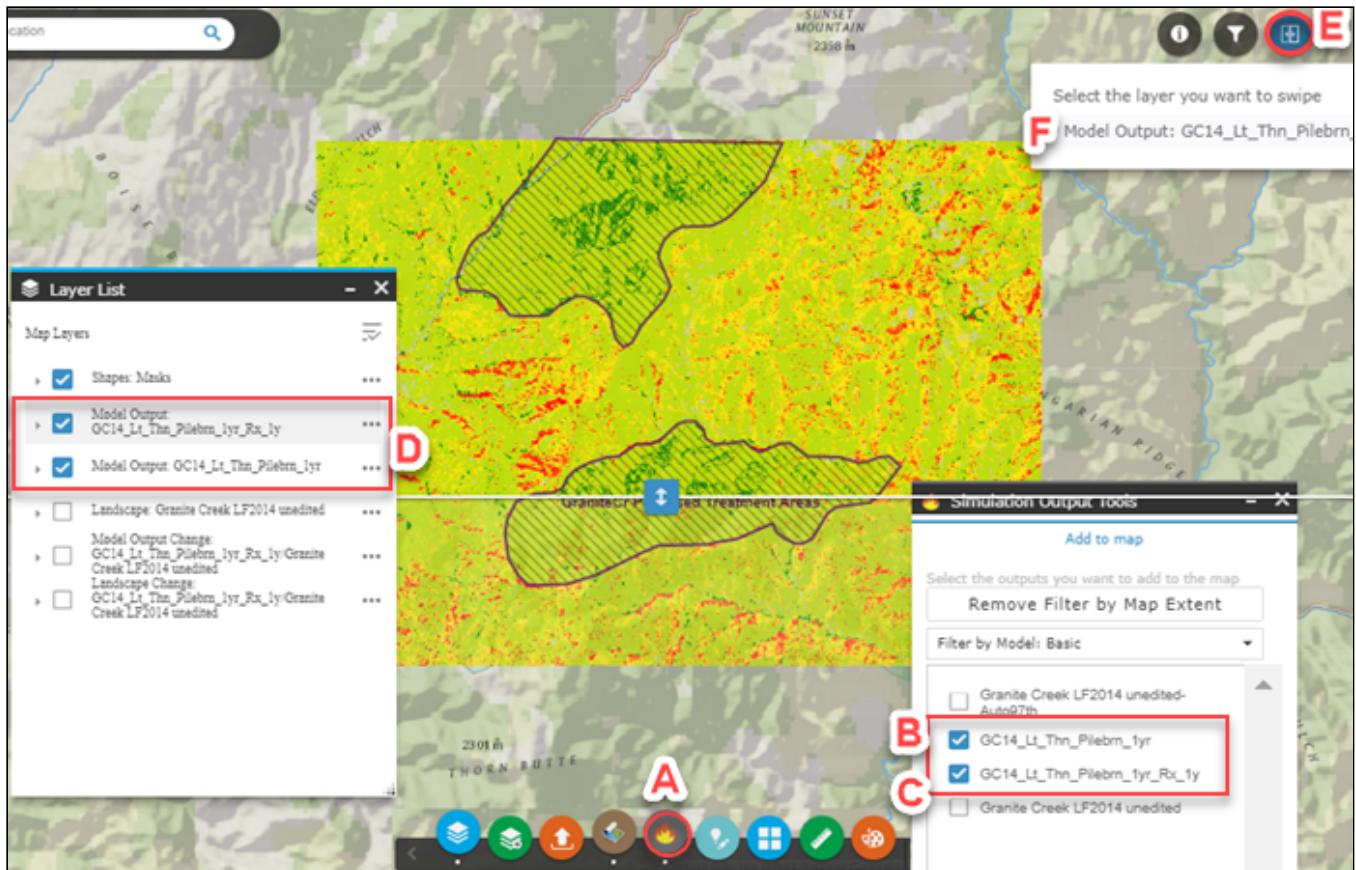
Like before, select the model change layer to evaluate flame length reduction. Though you're curious about these changes to fire behavior and fuel models, this is only a comparison of the original untreated landscape with this new treated landscape. What you'll really want to know is how much of an affect this added treatment of low severity wildfire, or a broadcast burn, will have compared to just the light thinning and pile burn applied earlier. You'll need to compare the first treatment to the second one to answer this.



Swipe between layers

To best compare these “treatments” (default disturbance edits) on the landscape, first use the **Swipe widget**:

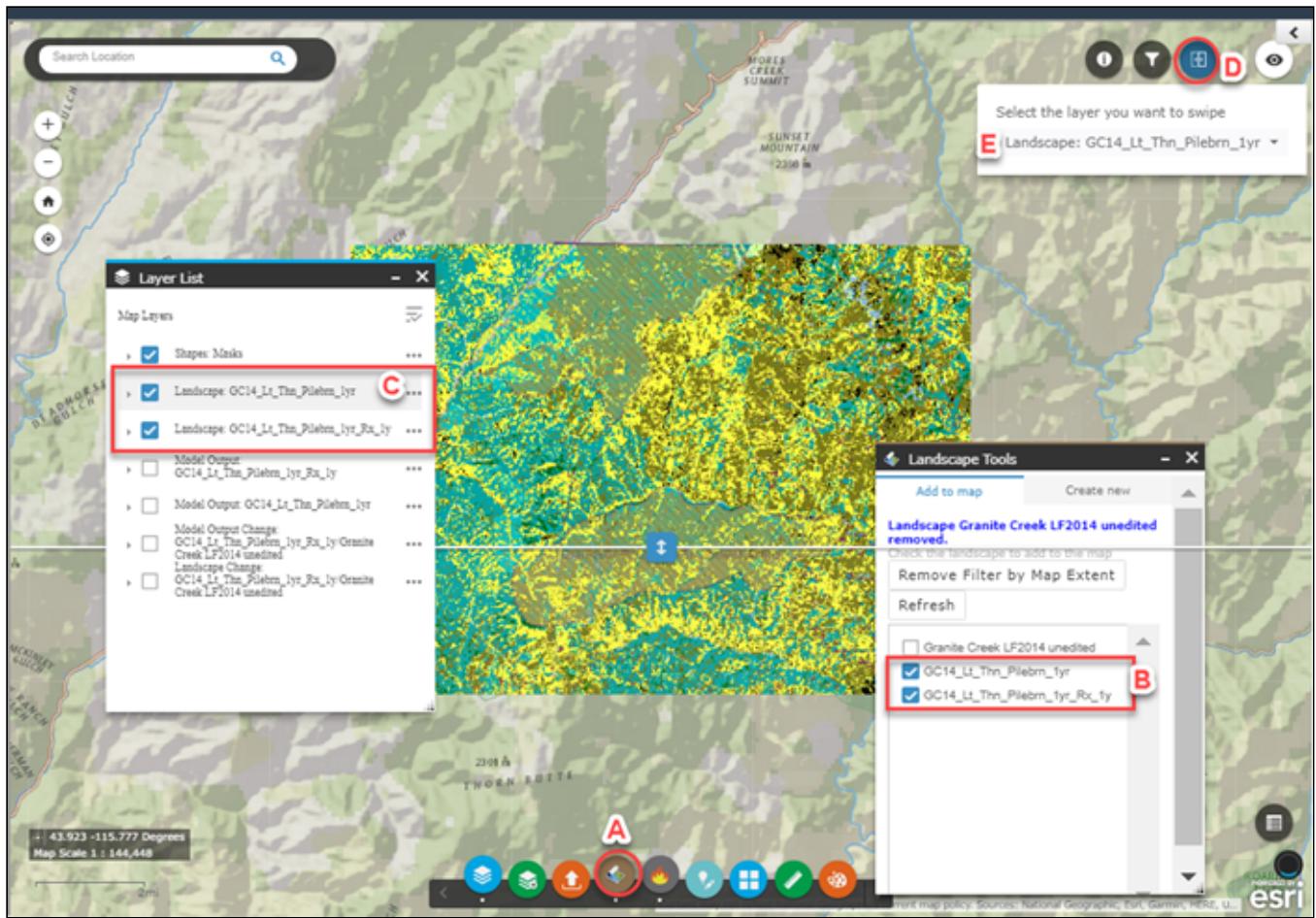
- Click on **Simulation Output Tools** and check the boxes next to:
- "GC12_Lt_Thn_PileRx_1yr" the first treatment of thinning and pile burning.
- "GC12_Lt_Thn_PileRx_1yr_Rx_1Yr" the second treatment which follows the thin with a low severity burn.
- Make sure these layers are displayed just under "shapes" toward the top of the **Layer List**. In this example the first three layers in Layer List are "Shapes", "Model Output: GC14_Lt_Thnpilebrn_1yr_Rx_1y", followed by "Model Output: GC14_Lt_Thnpilebrn_1y".
- Click the **Swipe**  **widget**.
- You can control the layers that appear in the **Swipe widget** using the box in the top right of the map that appears once the **Swipe widget** is clicked. The layer selected in this box will be the layer that appears in the top half of the slider, and hidden on the bottom half. In this example "Model Ouptut: GC14_Lt_Thn_Pilebrn_1yr_Rx_1y" is selected in the Swipe box.



G. Swipe between the layers and compare: In this example the light thin and pile burn is shown as the top swipe layer, followed by light thin, pile burn, and low severity wildfire (broadcast burn). Sliding back and forth and looking at the legend indicates that Flame Lengths were in fact reduced by several feet in some areas with just the addition of the Low Severity Wildfire! Next you'll want to see how the Fuel Models have changed with the addition of the Low Severity Wildfire.

Set the **Layer List** up again, this time opening

- Landscape Tools**
- Select the two treatment layers
- Make sure these layers appear on the **Layer List**
- Click the **Swipe** widget
- Set the layers to swipe.



We can see from comparing these two edited landscapes, as well as the Landscape Change Map earlier, that there was a significant shift in Fuel Model between the thinning/pile burn treatment, and the addition of the low severity wildfire.

Review summary reports

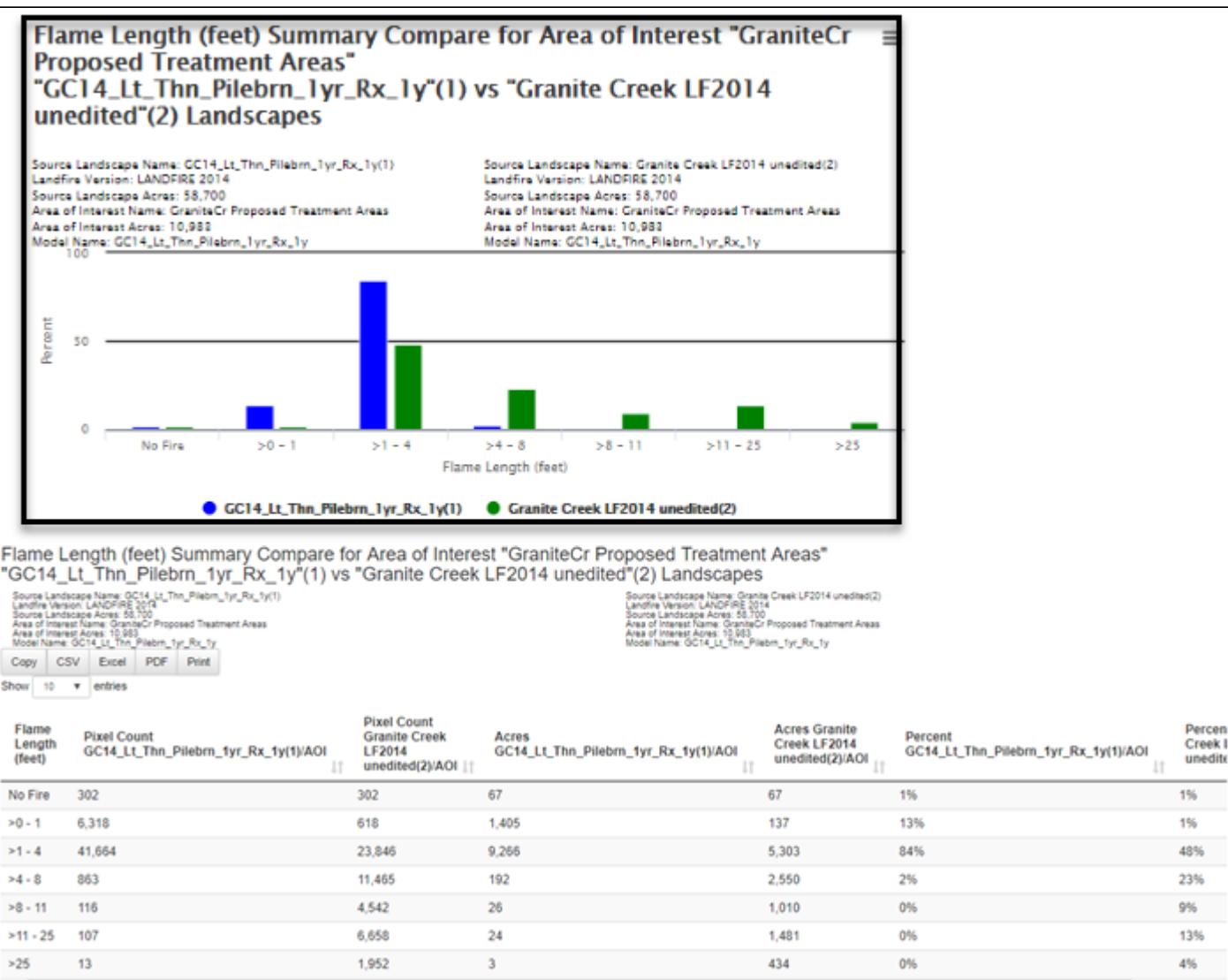
Next, open the **Compare Summary Reports** to get the full picture and make a more informed decision about what treatments should be applied to achieve the preliminary objectives.

Navigate to **My Workspace** and open the Fire Behavior Summary Compare Report.

The Fire Behavior Compare Reports for a modeled Light Thin/Pile Burn/Low Severity Broadcast Burn treatment show even more of a difference in pre and post-treatment fire behavior.

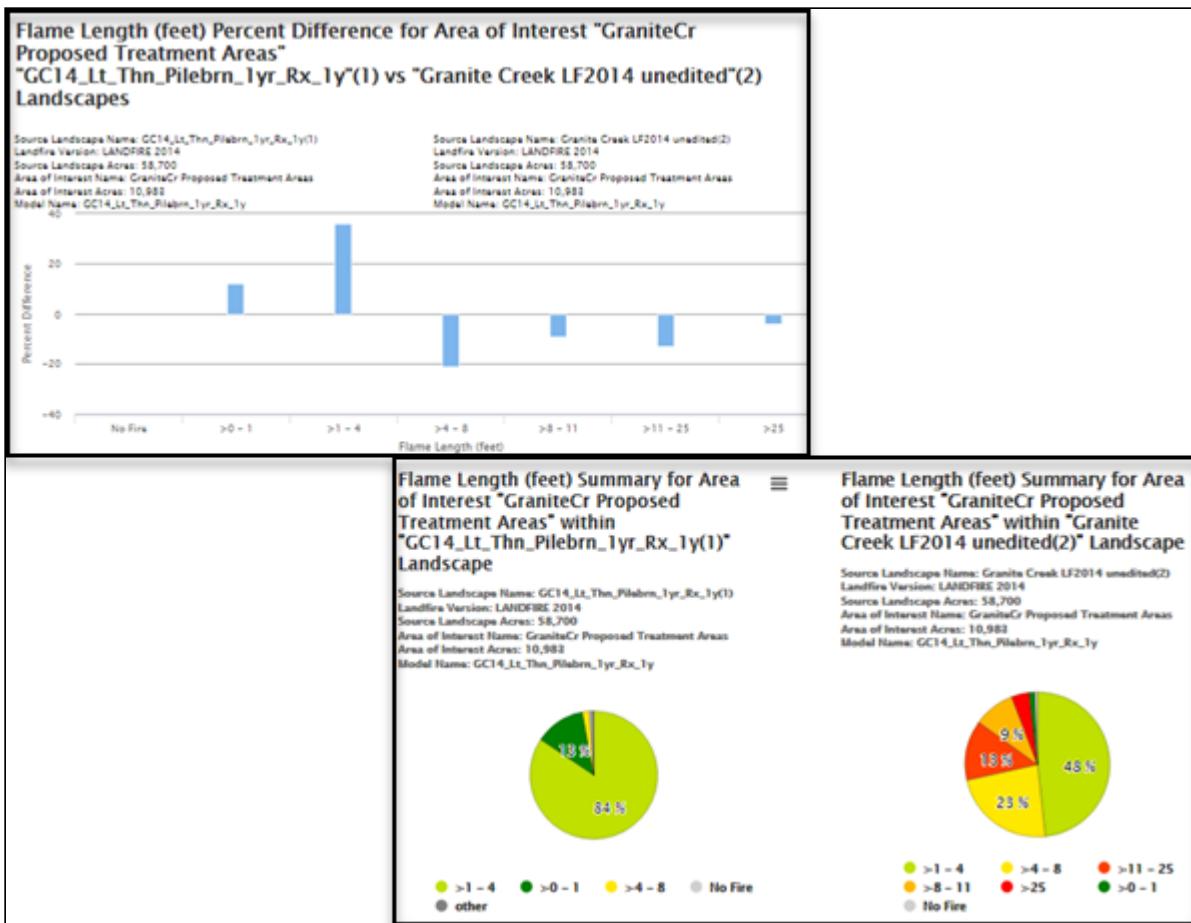
The Flame Length Bar Chart shows a large increase in the post-treatment acreage for lower Flame Length bins and no post-treatment acres in the higher Flame Length bins.

The table indicates the pre-treatment percentage of pixels in the >0-1 foot Flame Length bin is 1%, while post-treatment the percentage went up to 13%. Conversely, the percentage of post-treatment pixels in the 3 highest Flame Length bins is 0, indicating a significant decrease in Flame Lengths post-treatment, across the treatment area.



The Percent Difference Graph for Flame Lengths demonstrates the shift toward lower Flame Lengths post-treatment. You can see the significant positive percent difference in the >0-1 and >1-4 foot bins, 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 shift to significantly lower flame lengths in the post-treatment chart.



Scroll through the rest of the fire behavior model outputs in the report. Their story is the same, significantly reduced Rates of Spread, as well as almost no Crown Fire Activity post-treatment.

Next, navigate back to **My Workspace** and open the Landscape Compare Summary Report.

The Landscape Compare Reports for a modeled Light Thin/Pile Burn/Low Severity Broadcast Burn treatment show quite a change in Fuel Model pre- vs. post-treatment.

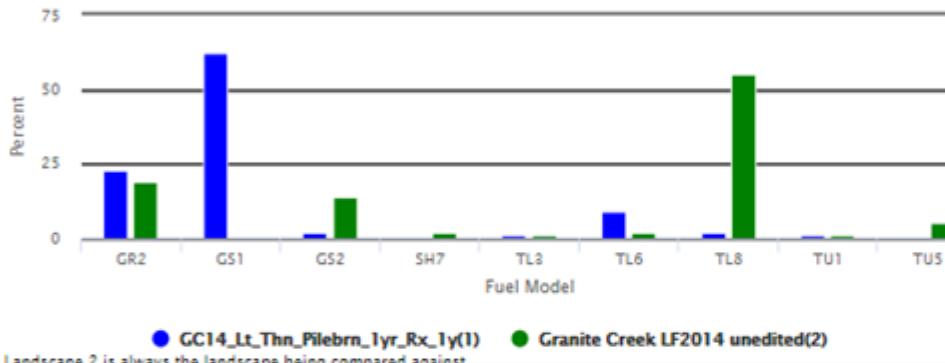
From the compare bar graph, we can tell that a significant portion of the TL8 Fuel Model (Long-Needle Litter) has shifted to the GR2 (Low Load, Dry Climate Grass) and GS1 (Low Load, Dry Climate Grass-Shrub) Fuel Models, 1 year post-treatment. The table to the right confirms this quantitatively, indicating that 55% of the treatment area was comprised of a TL8 Fuel Model pre-treatment, while just 2% of the treatment area was a TL8 Fuel Model post-treatment. Conversely, none of the treatment area contained the GS1 Fuel Model pre-treatment, while post-treatment over 60% of the treatment area was comprised of Fuel Model GS1.

Fuel Model (FBFM)

Fuel Model Summary Compare for Area of Interest "GraniteCr Proposed Treatment Areas" "GC14_Lt_Thn_Pilebrn_1yr_Rx_1y"(1) vs "Granite Creek LF2014 unedited"(2) Landscapes

Source Landscape Name: GC14_Lt_Thn_Pilebrn_1yr_Rx_1y(1)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

Source Landscape Name: Granite Creek LF2014 unedited(2)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983



Fuel Model Summary Compare for Area of Interest "GraniteCr Proposed Treatment Areas" "GC14_Lt_Thn_Pilebrn_1yr_Rx_1y"(1) vs "Granite Creek LF2014 unedited"(2) Landscapes

Source Landscape Name: GC14_Lt_Thn_Pilebrn_1yr_Rx_1y(1)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

Source Landscape Name: Granite Creek LF2014 unedited(2)
 Landfire Version: LANDFIRE 2014
 Source Landscape Acres: 58,701
 Area of Interest Name: GraniteCr Proposed Treatment Areas
 Area of Interest Acres: 10,983

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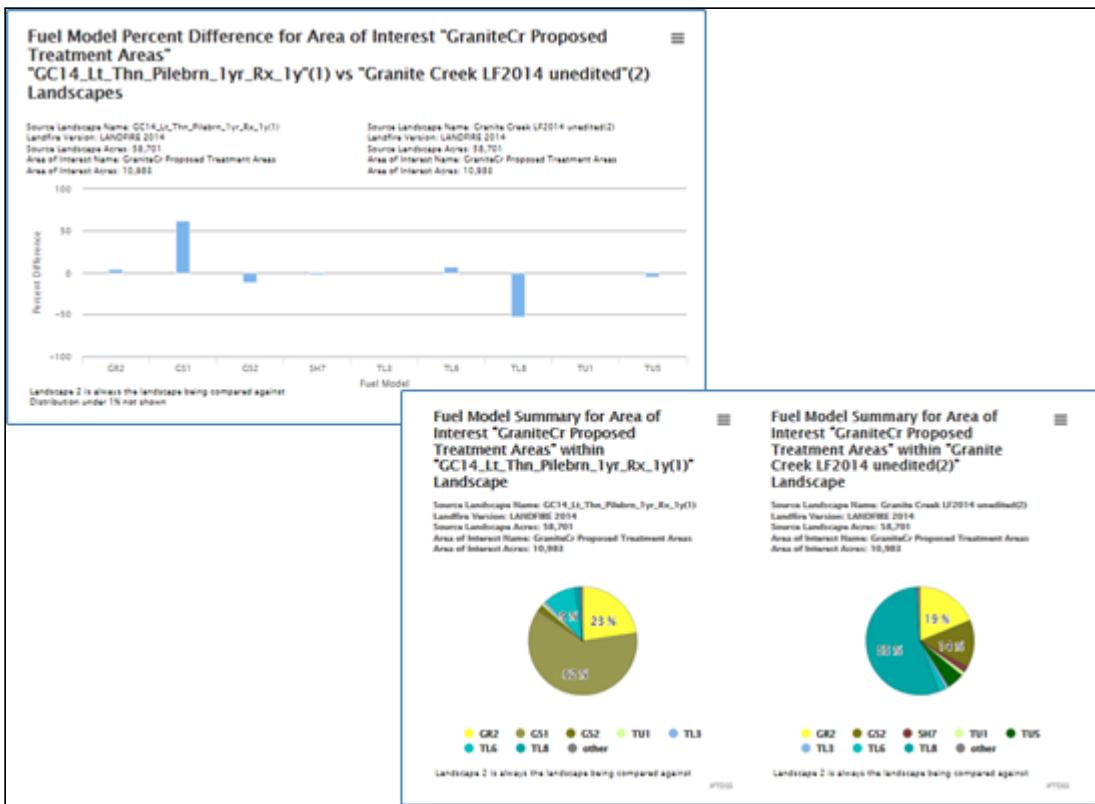
Show 10 entries

Fuel Model	Pixel Count GC14_Lt_Thn_Pilebrn_1yr_Rx_1y(1)/AOI	Pixel Count Granite Creek LF2014 unedited(2)/AOI	Acres GC14_Lt_Thn_Pilebrn_1yr_Rx_1y(1)/AOI	Acres Granite Creek LF2014 unedited(2)/AOI	Percent GC14_Lt_Thn_Pilebrn_1yr_Rx_1y(1)/AOI	Percent Creek unedit
GR1 (91)	0	41	0	9	0%	0%
GR2 (102)	11,194	9,264	2,489	2,060	23%	19%
GS1 (121)	30,510	104	6,785	23	62%	0%
GS2 (122)	990	6,973	220	1,551	2%	14%
NB1 (91)	166	166	37	37	0%	0%
NB9 (99)	136	136	30	30	0%	0%
SH2 (142)	1	17	0	4	0%	0%
SH7 (147)	14	947	3	211	0%	2%
TL2 (182)	2	2	0	0	0%	0%
TL3 (183)	481	509	107	113	1%	1%

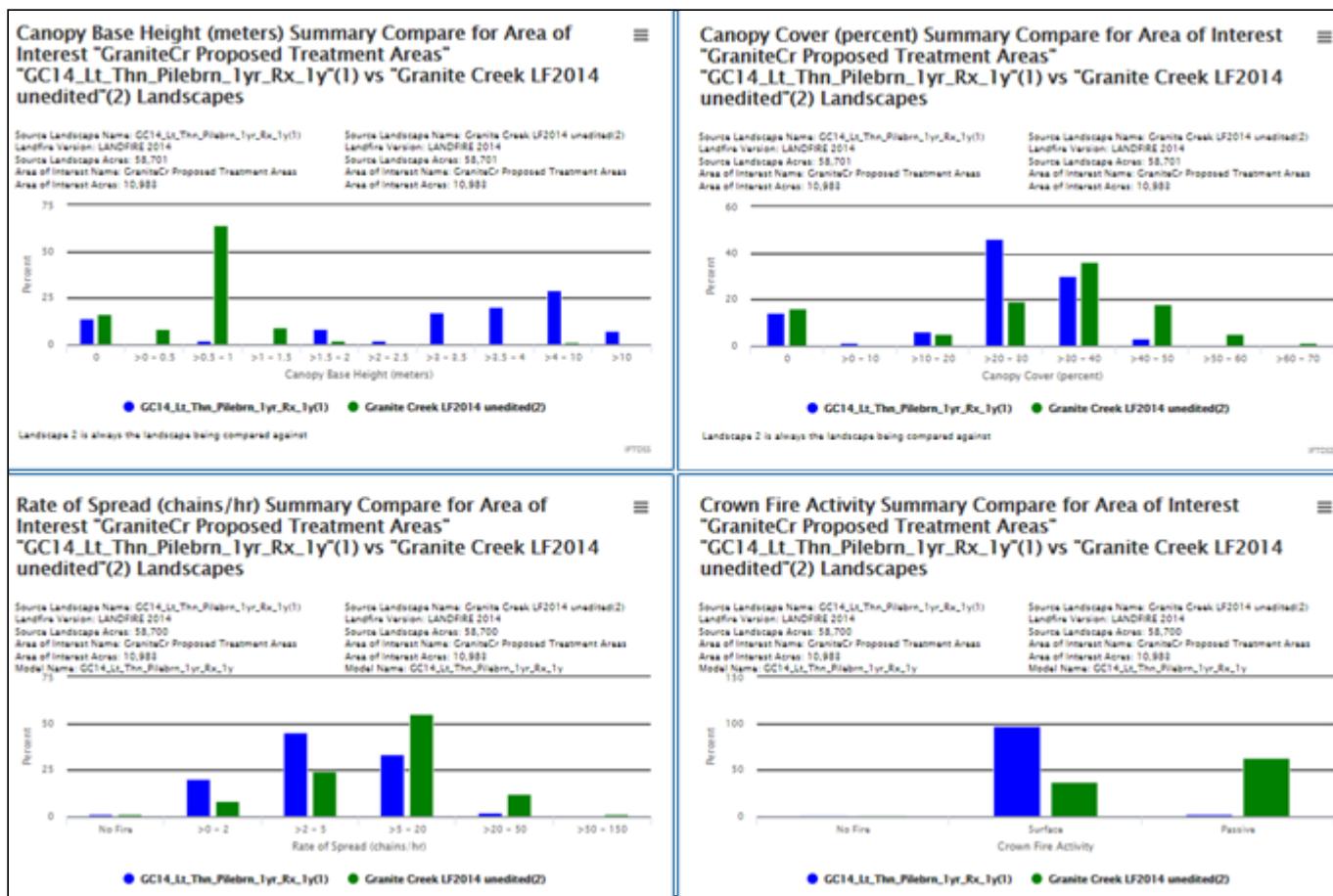
Showing 1 to 10 of 14 entries

The Percent Difference chart reflects the shift in Fuel Model displayed by the Bar Graph and table above, clearly showing the drop in the TL8 Fuel Model, as well as the increase in the GS1 Fuel Model post-treatment.

The Pie Charts visually display these changes in Fuel Model as well.



Review the rest of the Landscape Compare Summary Report and note the changes in the various landscape characteristics. Pay particular attention to the increase in Canopy Base Height, as well as the decrease in Canopy Cover, post-treatment. This coincides with the information we see in the rest of the report, and reiterates the fact that this series of treatments will help achieve the stated objectives, which were to: reduce surface fuel loading and the overall horizontal and vertical fuelbed continuity in order to reduce the fire hazard to adjacent private land and the community of Idaho City; and return low intensity fire to fire adapted vegetation communities.



Conclusion

We 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 will achieve our 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 will demonstrate how these proposed treatments will 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.