# Developing Treatment Alternatives - Colville National Forest Example

Management Scenario

You are a Fuels Planner on the Colville National Forest, about 47 miles northeast of Spokane, WA. In this scenario, you will use IFTDSS to plan hazardous fuels reduction projects within three main watersheds within a proposed Collaborative Forest Landscape Restoration Program (CFLRP) project area.
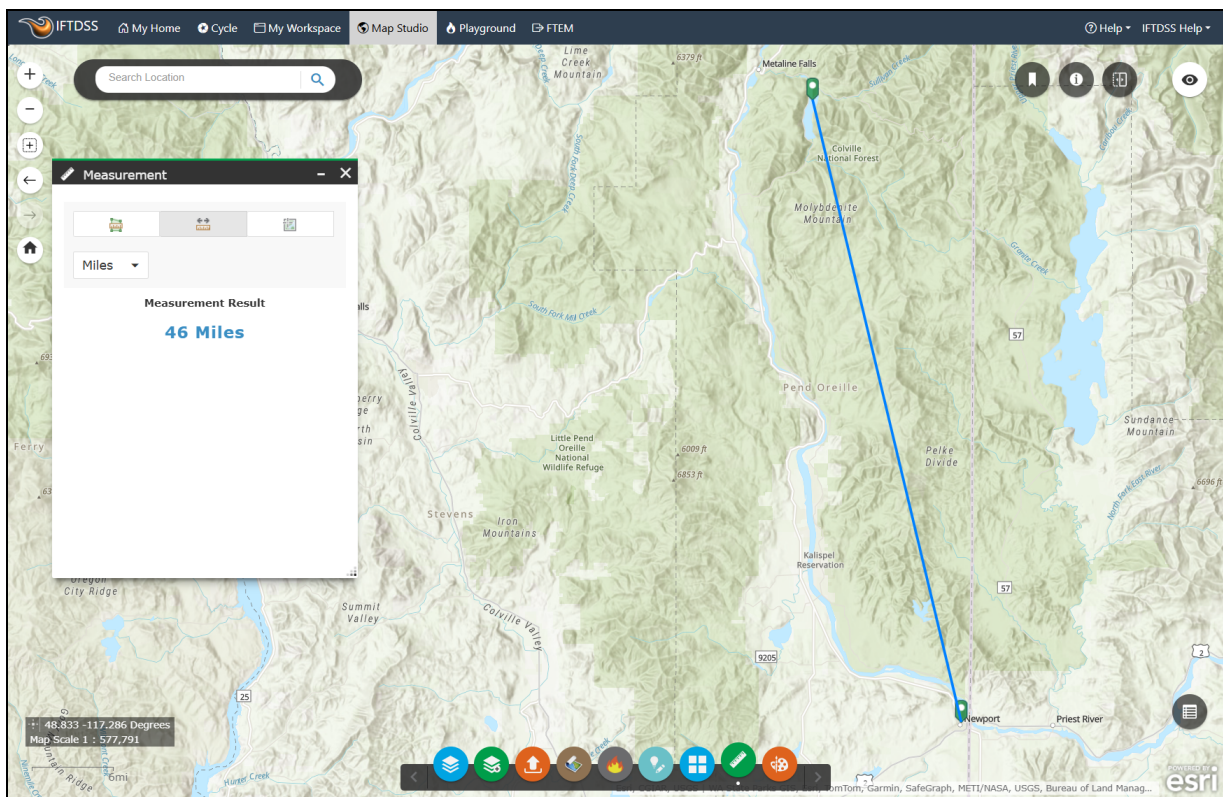
The new Colville National Forest Plan has just been released and includes some new direction that allows certain fuels reduction treatments within Inventoried Roadless Areas (IRAs) and the use of wildfire for re-source benefit in certain circumstances. Based on the new Forest Plan Dir-

ection, you see a need for some sort of fuels reduction treatments in the Sullivan, Slate, and Salmo Watersheds of the northeastern portion of the proposed CFLRP project area.

Based on Forest Plan direction and the CFLRP proposal guidelines, our objectives are to:

- Recommend hazardous fuels treatments that can occur through this project to: Reduce the risk of uncharacteristic wildfire and/or re-establish or maintain low-severity fire regimes; reduce surface fuel loading and the overall horizontal and vertical fuel bed continuity to reduce the fire hazard to adjacent private, Tribal, and State land; and 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
- Describe why the treatment acres were chosen. Why here? Why now? What risk assessment did you use to identify these areas, e.g. wildfire hazard potential map or regional risk assessment, forest-wide risk assessment, etc.
- Demonstrate the need for treatment, both quantitatively and spatially, to members of your district interdisciplinary (ID) team.

You will use IFTDSS to plan a treatment around these objectives.


Sullivan Lake. Photo courtesy of Daniel Brown, USFS, Colville National Forest.

Section 1- Previewing and Creating a Landscape using Map Studio

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 widget** 🔲 to choose a more detailed base layer.

D. Select "Imagery Hybrid" or a similar imagery option.
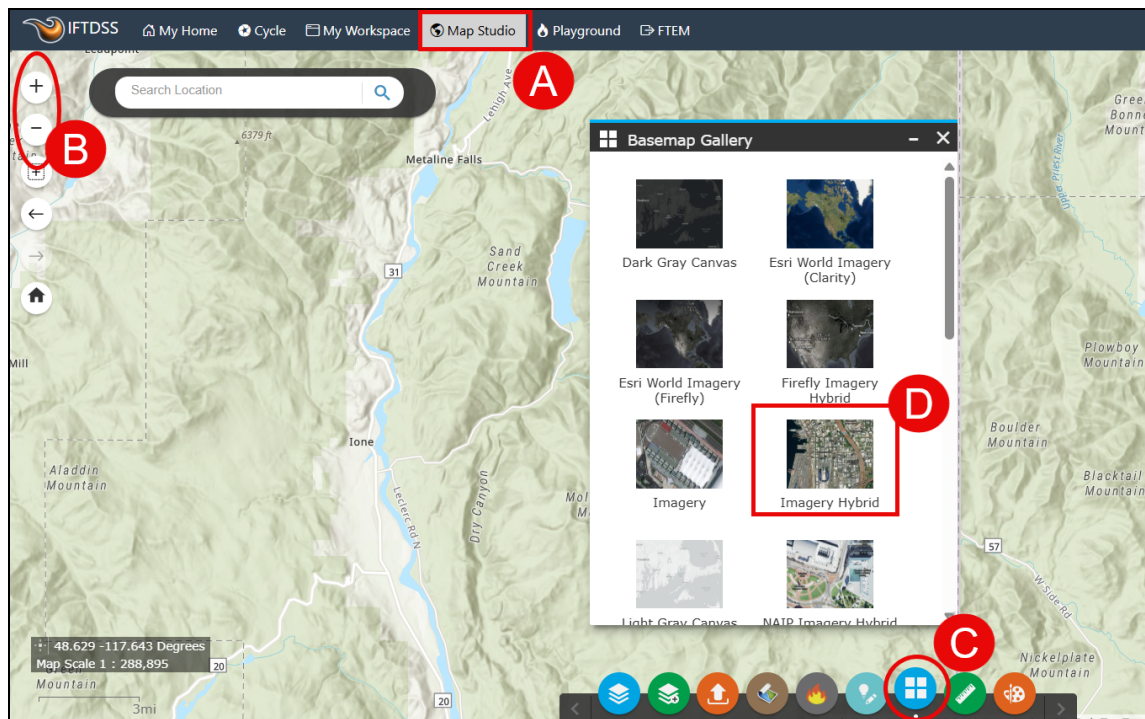
Create the Landscape

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: -117.0336
    - West: -117.3879
    - North: 48.9928
    - South: 48.4692

D. Select the version of LANDFIRE data you're using, 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 "North Selkirk CFLRP LF23 UnEd". Include the name, LANDFIRE version, and it's 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 "Selkirk Fuels Project".

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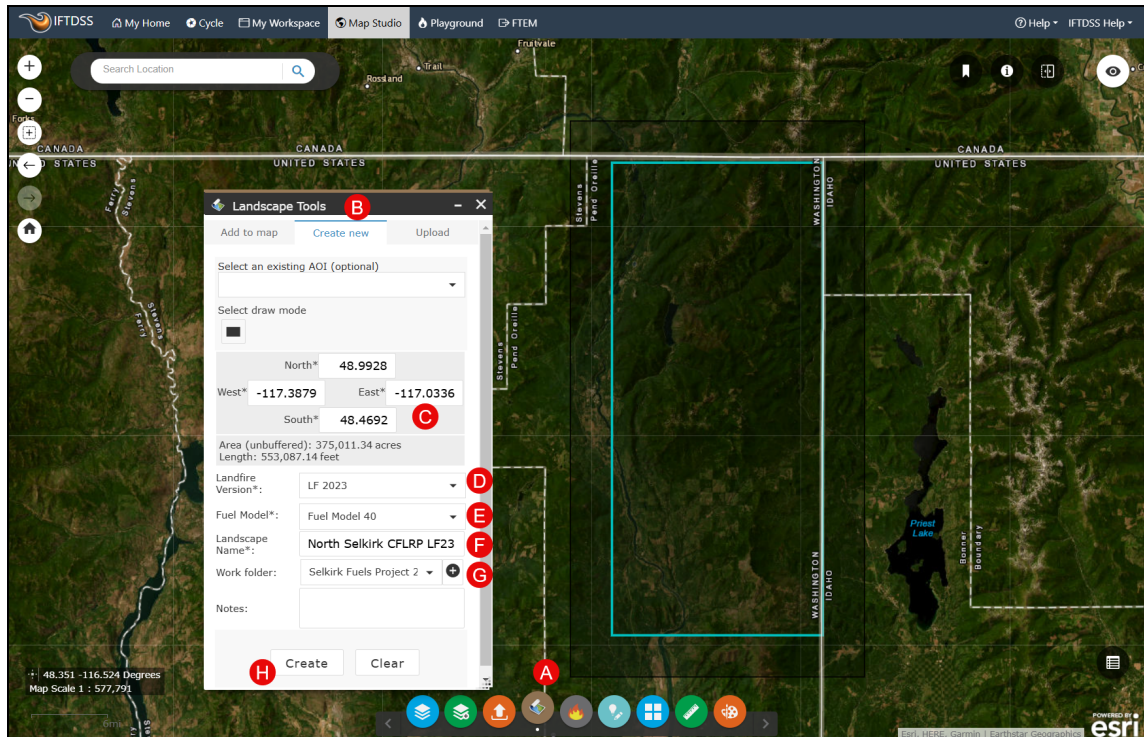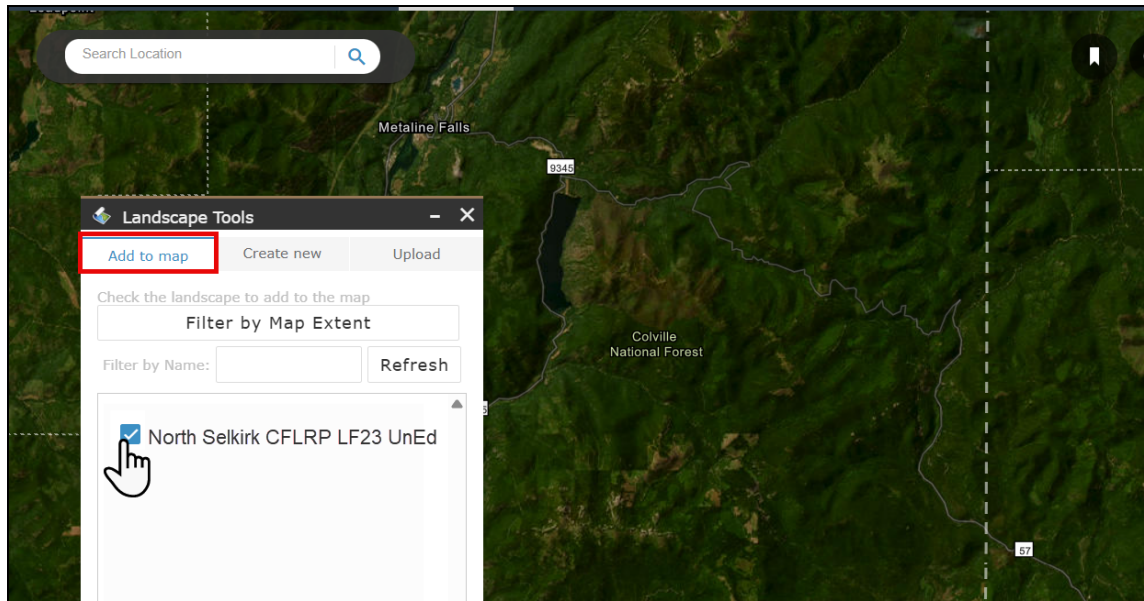

Section 2- Summarize and Assess the Landscape

## Displaying and Assessing the Landscape

Start assessing the landscape in Map Studio:

A. Use 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 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 check and uncheck the landscape layers to view. 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 box is checked.

C. View the legend for each layer by 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 to view (North Selkirk CFLRP LF23 UnEd), then click on the landscape in an area you'd like to know more about. The Identify dialogue populates with the landscape information for this pixel. For example, by clicking you can see that the dark green pixels on the map correspond to areas of Fuel Model 165 (TU5). 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 the **Layer List widget**.
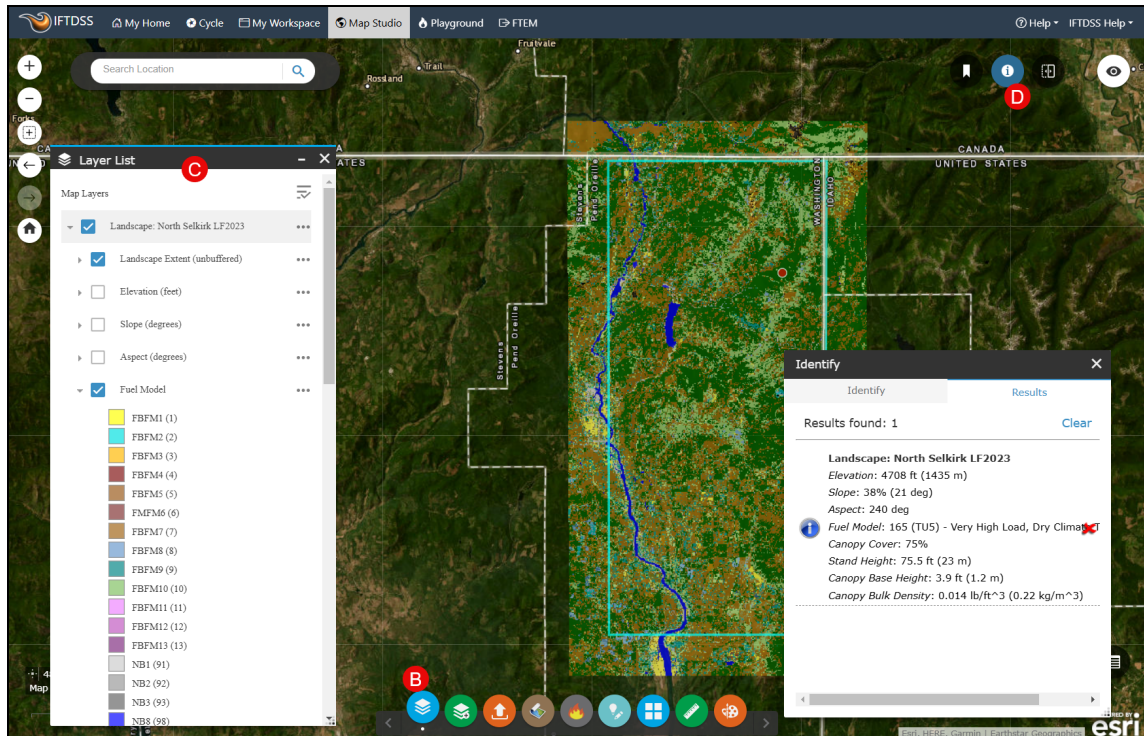
Adjust Transparency

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 menu 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.
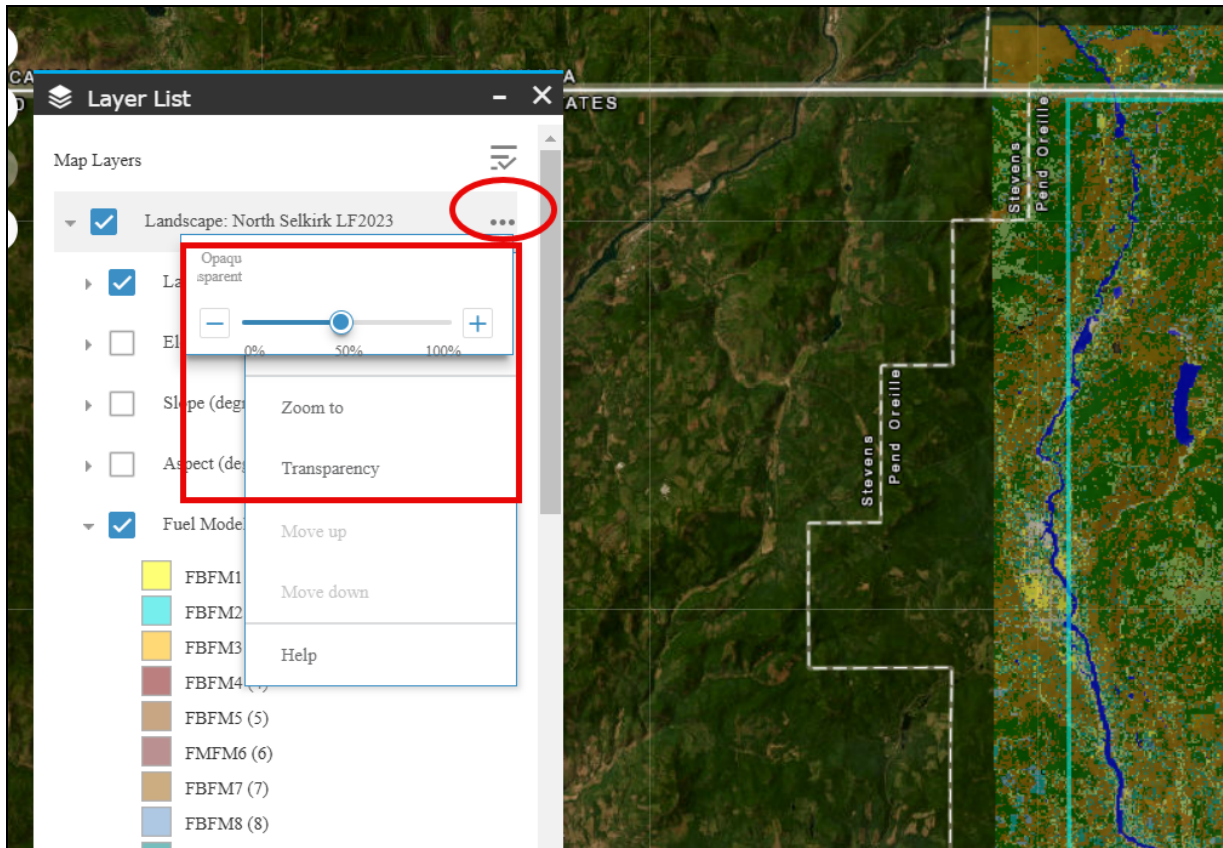
Adding Reference Layers

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

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 - Historic Fuels Treatments" and select historic fuel Treatments from 2020 to the present. Next, expand the drop-down for "Disturbance History-Historic Wildfire Perimeters", and select the perimeters for years 2020 through "Fire Perimeters Year to Date." These appear in the **Layer List widget** and on the map.

C. Use the **Identify widget** to identify the exact year of some of the fires in the historic wildfires perimeters layers. Click the applicable Fire Perimeter layers on and off to compare the landscape and fuel models underneath. In this example, you see they are reflective of these fires.
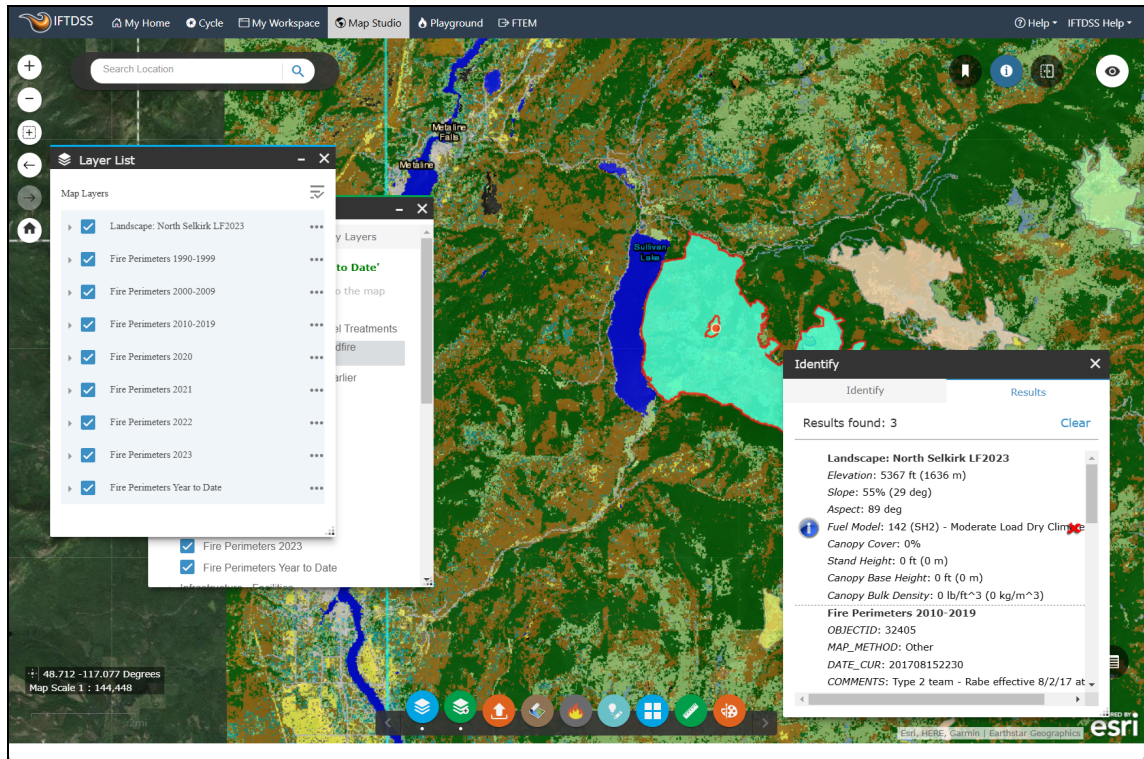
Follow this same process with the Historic Fuel Treatment Polygons layer as well.

After doing an assessment of all the landscape characteristics (Elevation, Slope, Aspect, Canopy Cover, Stand Height, Canopy Base Height and Canopy Bulk Density), you determine that the LANDFIRE 2023 data in this landscape reflects existing conditions, including previous fires. If there had been a more recent disturbance since this 2023 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.

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

Summarizing the Landscape

Creating an Automatic 97th Percentile Landscape Fire Behavior (Auto97th) Report, makes the outputs available in Map Studio and summarizes behavior and landscape features in a down-loadable report with tables and charts. It also creates 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.
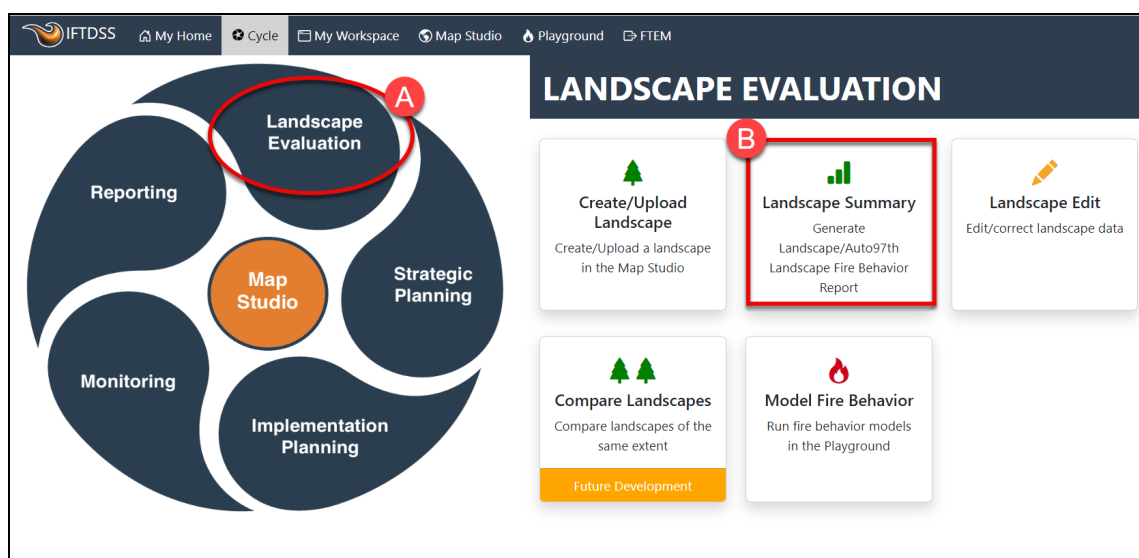
C. In **Landscape Summary**, click the drop-down menu next to **Select Landscapes**. If the newly created landscape doesn't appear in the drop-down, use the **Refresh** button after giving the landscape a short time to process. The landscape appears with a green check next to it (which indicates it has downloaded completely to your IFTDSS account).

D. Click **Create Report**.

E. 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. Click **Create Report** in the bottom right of the box. The report begins processing and may take a few minutes.
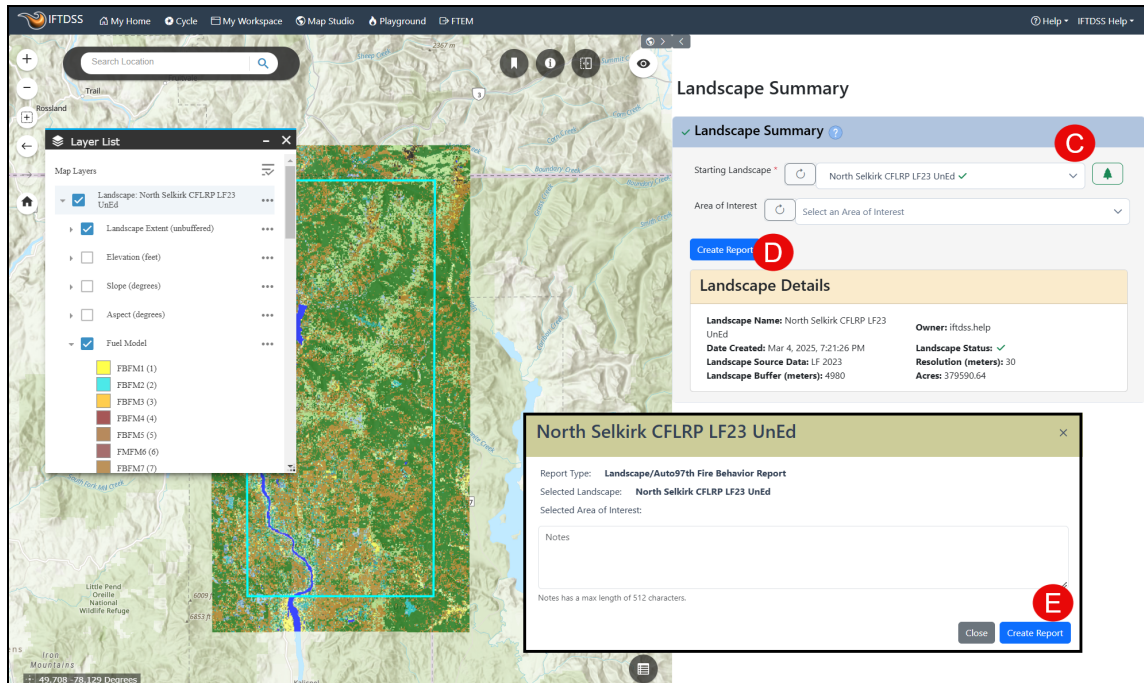
F. Navigate to **My Workspace**. Notice a landscape fire behavior (Basic) model has completed, as has a report. Right-click the model output and select **View on Map**.
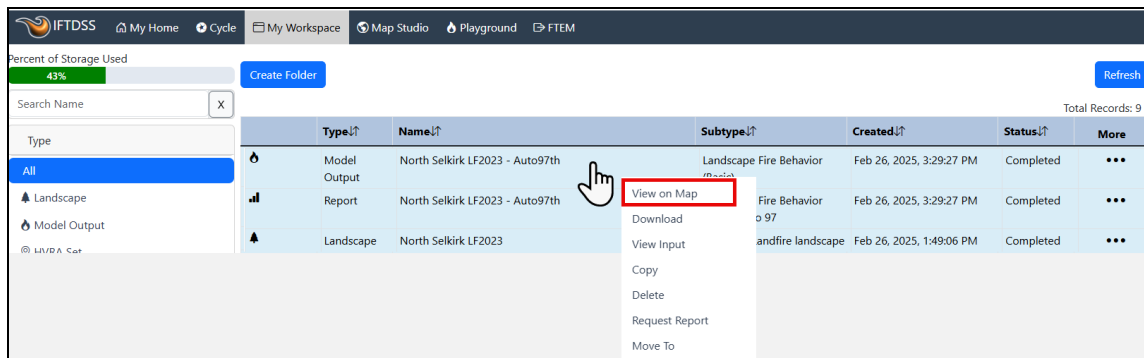

Comparing Landscape Features and Model Outputs with the Swipe Widget

After clicking **View in Map Studio**, the fire behavior model layer will automatically open. For future use, you can remove or add other modeling layer to Map Studio by clicking the **Sim-**

ulation Output Tools⬤ widget on the bottom of the screen and checking or unchecking the boxes next to each modeling output.

    A. If the layer did not automatically open, click the **Simulation Output Tools**⬤ widget on the bottom of the screen.

    B. Ensure the box next to "North Selkirk CFLRP LF23 UnEd - Auto97th" is checked so this layer opens on the map and is 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 model. Next, you'll look at the fuel models and topography for the area of more intense fire behavior.
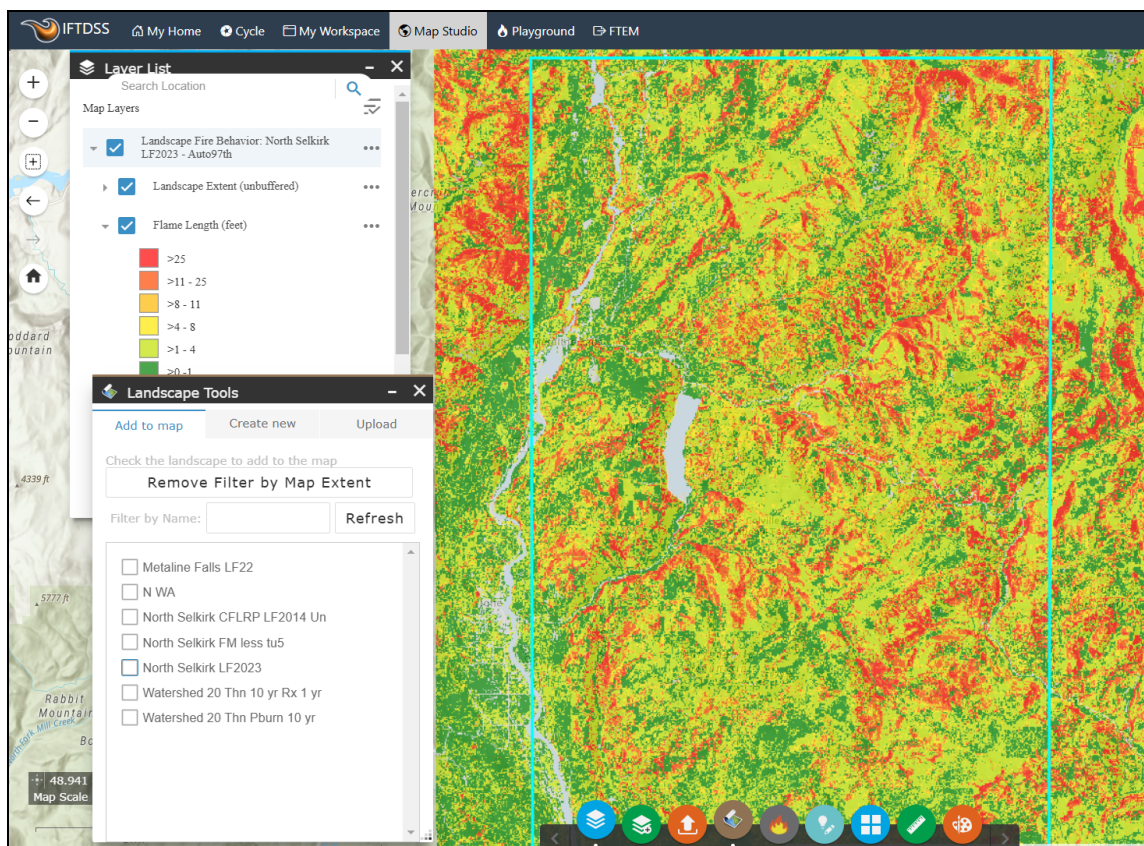

    C. To compare these model outputs with your landscape, add the North Selkirk CFLRP LF23 UnEd landscape back to Map Studio by opening the **Landscape Tools**⬤ widget , clicking the **Add to Map** tab and using the checkbox to add the "North Selkirk CFLRP

LF23 UnEd". Use the drop-down arrows and check-boxes in **Layer List** to display only the landscape Fuel Model layer and the Model output Flame length layer.

> **Tip:** 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 the Layer List will be the layer displayed under it. In the example below, "Model Output: North Selkirk CFLRP LF23 UnEd - 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 the areas with high flame lengths correspond to areas of Fuel Model 165 (TU5) with small patches of 122 (GS2).
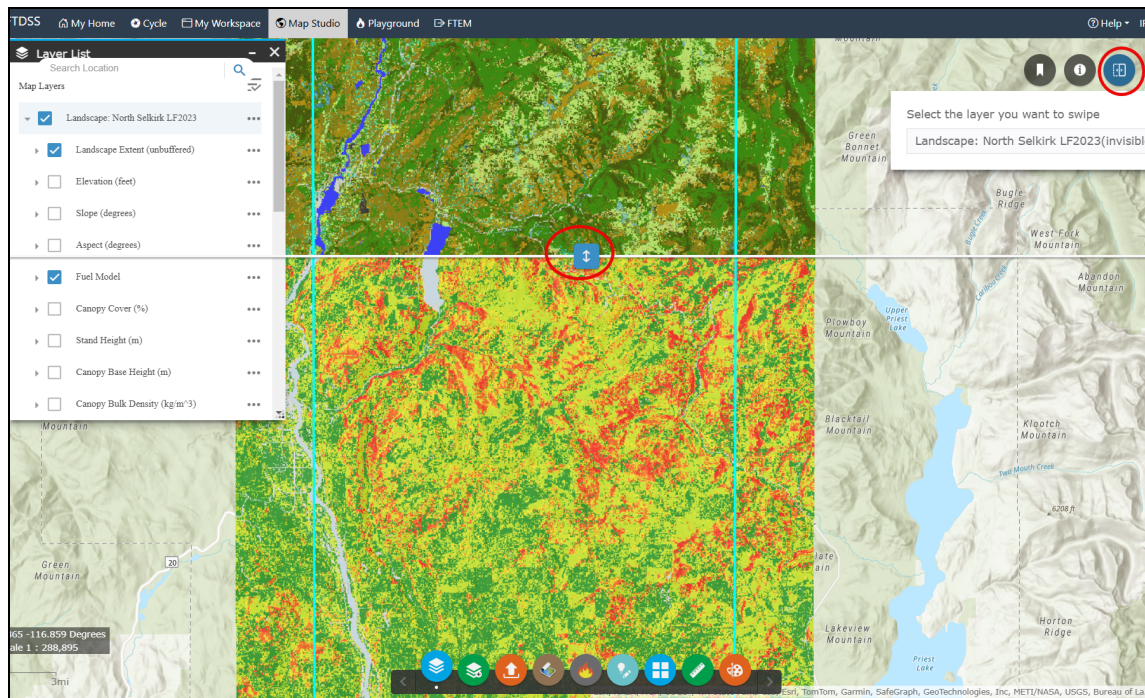
Next, you'll want to view the topography to see how it corresponds to the areas displaying more intense fire behavior. Uncheck the boxes in the Layer List then re-check the "North Selkirk CFLRP LF23 UnEd - Auto97th" layer. This will display only that behavior layer, and allow you to

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 (See Swipe widget topic for more detail).
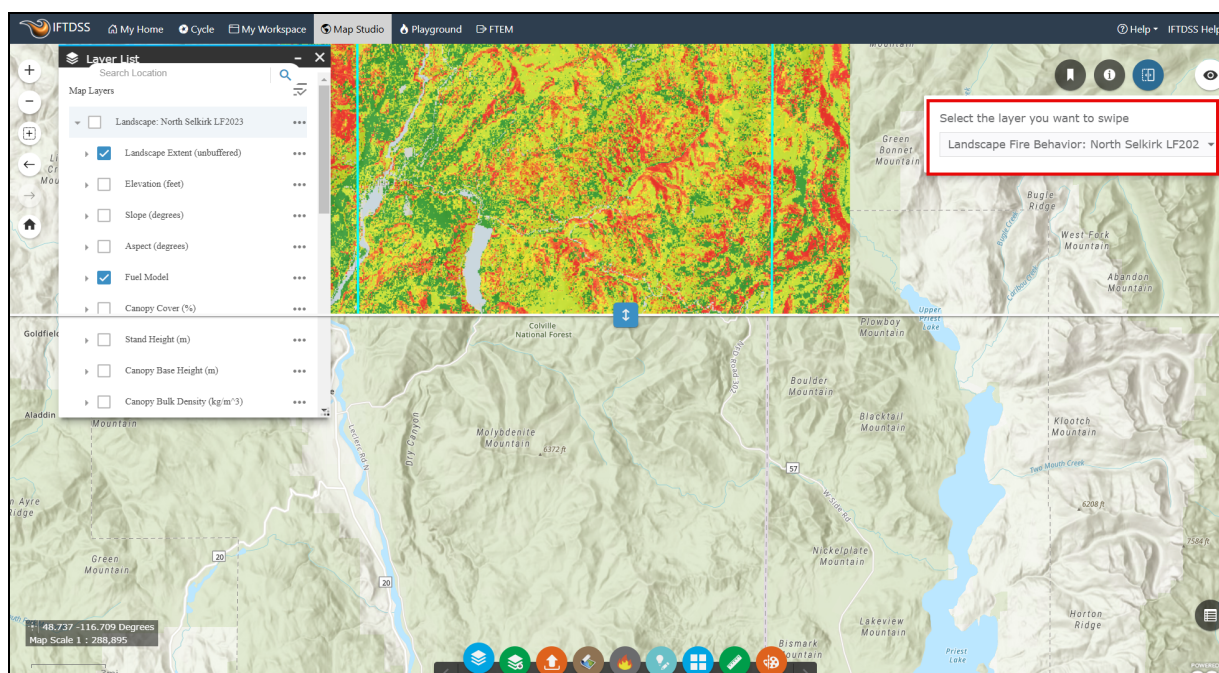
As you swipe up and down, you will notice all the areas displaying more intense fire behavior are south, southeast, and southwest facing slopes. Wrapping up this analysis by repeating this process in the northern part of the landscape, you notice there appears to be several areas that would produce more 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.

Section 3– 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 area on which you'd like to focus:

A. If you have not done so already, use the **Basemap Gallery widget** to change the basemap to an imagery layer such as "Imagery Hybrid" so you can see the landscape imagery.

B. 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 AOI, or treatment area.
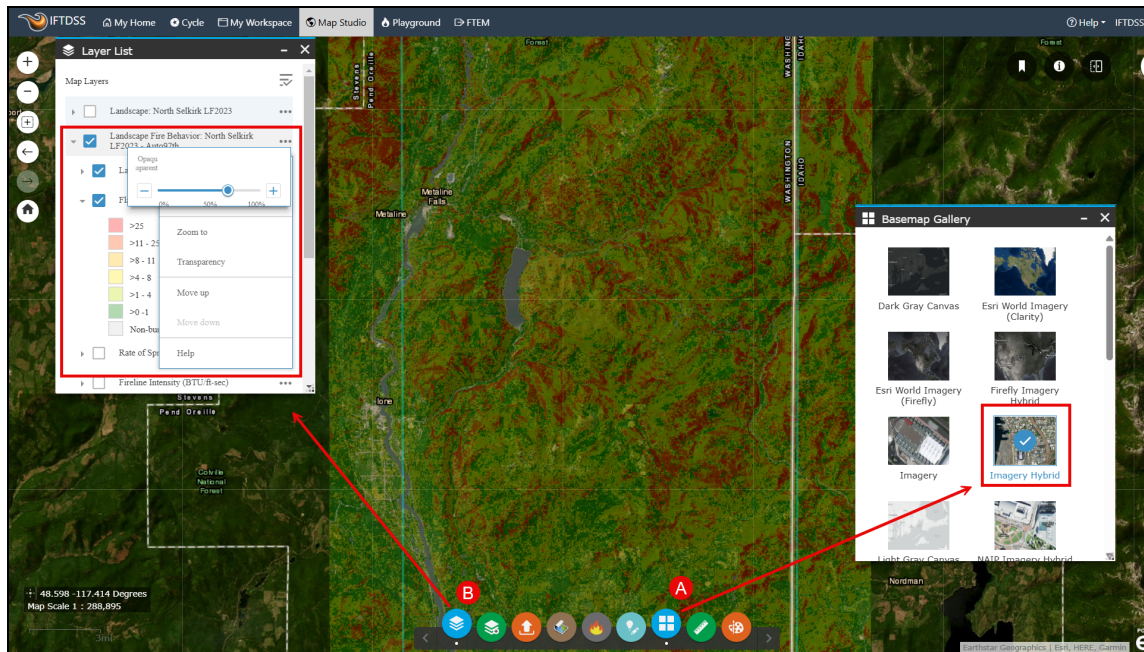
C. Select the **Create/Edit Shapes widget** at the bottom of the screen and ensure "Polygons" is selected in the drop-down box.

D. Next you will create two shapes similar to those shown below (they need not match exactly). Select the **Freehand Polygon** option and draw a shape around one of the areas of significant fire behavior. Select the Freehand Polygon option again and draw a second 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.
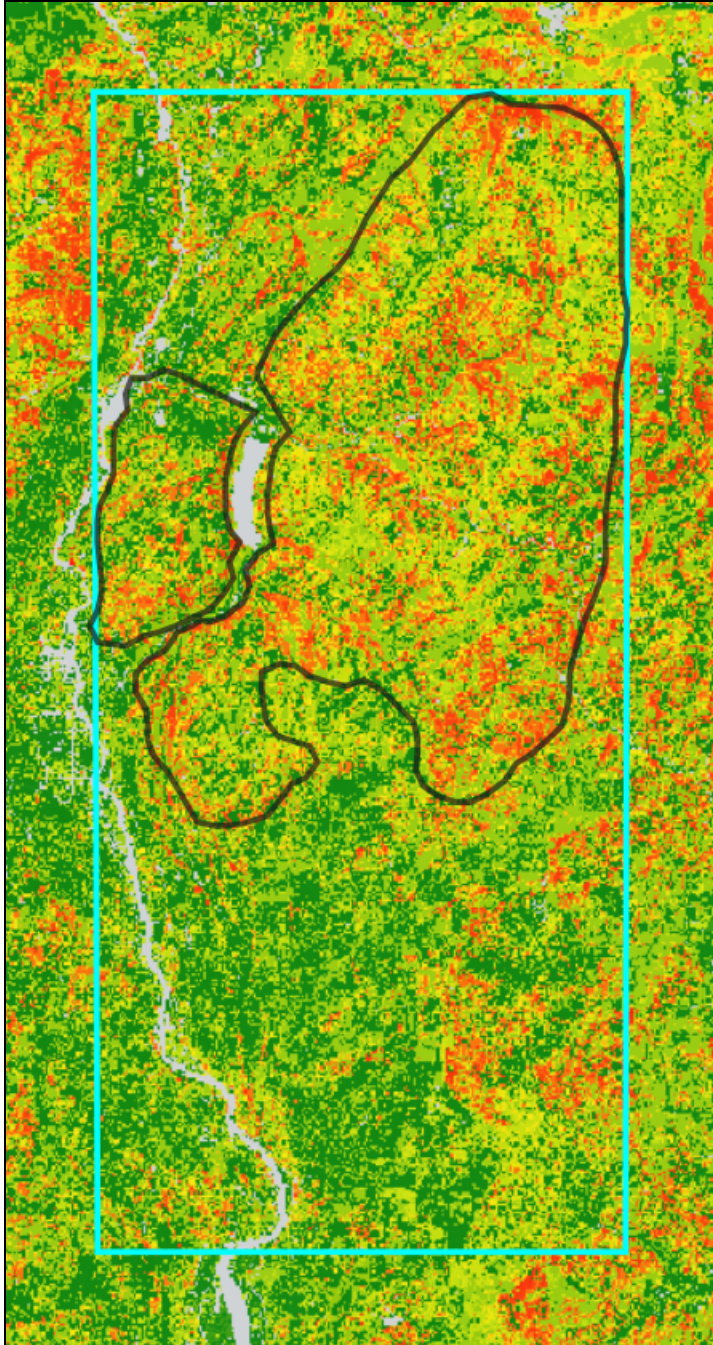
E. Name this "Watershed Proposed Treatment Areas".

F. Select the "Selkirk Fuels Project" folder. This will ensure that AOI is filed in the same location in **My Workspace** as all the other Selkirk Fuels Project files.

G. Click **Create**. These three areas are now saved as a single shape and available in the **Layer List** in Map Studio, as well as in your "Selkirk Fuels Project" folder in **My Workspace**.
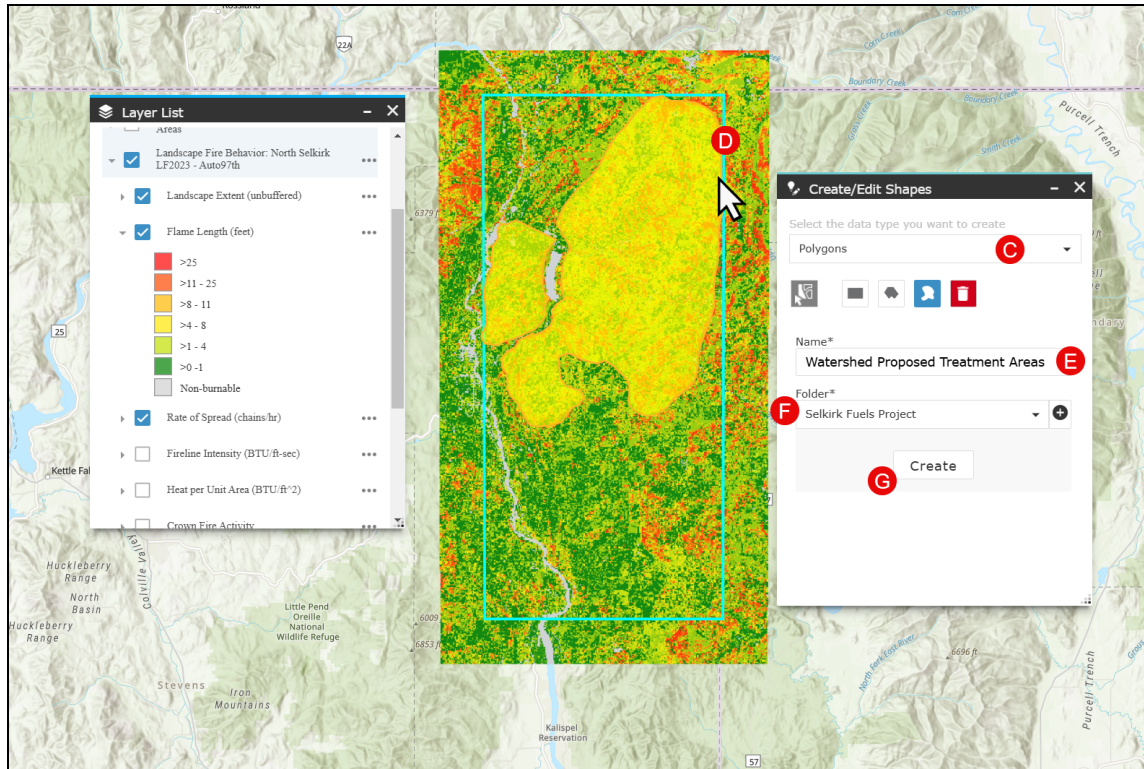
Section 4– Reviewing the Auto97th Report

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. Because the Landscape was assigned to the Selkirk Fuels Project folder when you first created it, the model output summary report will also be stored there by default. Select the "Selkirk Fuels Project" 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. Right click on the "North Selkirk CFLRP LF23 UnEd—Auto97th" report file and click the **View Summary** button. The report will open in a new browser tab.
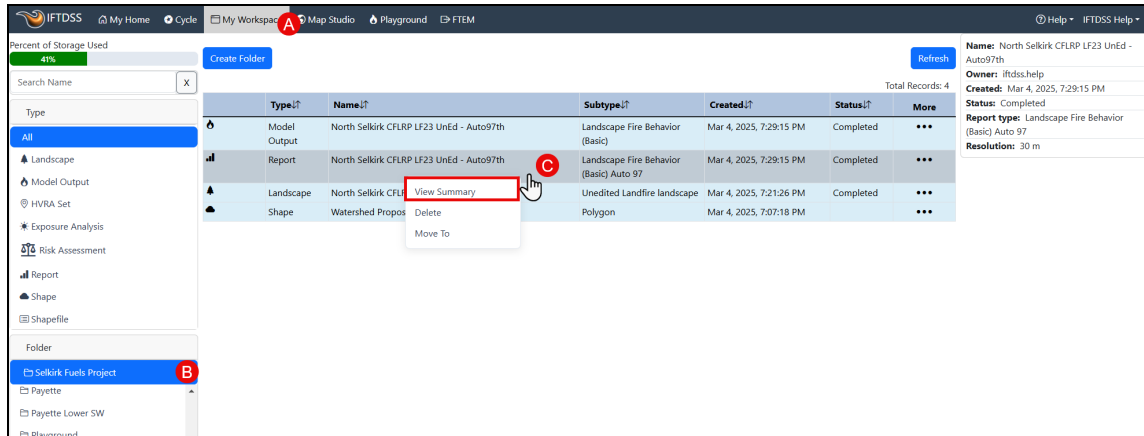
D. In the top right of the report, click the **Download** button to save a copy to your local computer, you'll refer to this PDF again later in this tutorial.

All of the Landscape characteristics and Fire Behavior outputs you viewed in Map Studio are quantitatively displayed in severa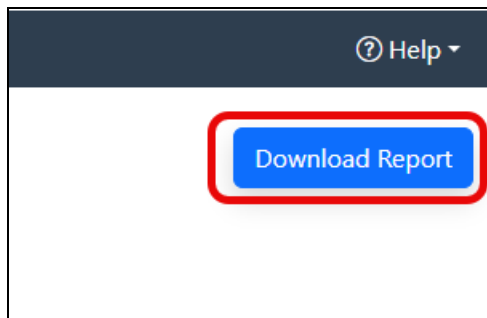l different formats in this report. You'll find a lot of value in these reports because they break each component (Canopy Cover, Canopy Base Height, Rate of Spread, etc.) down in a way that makes it even easier, after viewing the spatial data, to assess the landscape and 97th percentile modeled fire behavior. For example, in viewing the Fuel Model map (upper left corner), you can see that there is a lot of Fuel Model TU5 on the landscape, but it's not until you take a look at the graphs that you can really assess that, in fact 41% of this landscape is attributed to the TU5 fuel model.
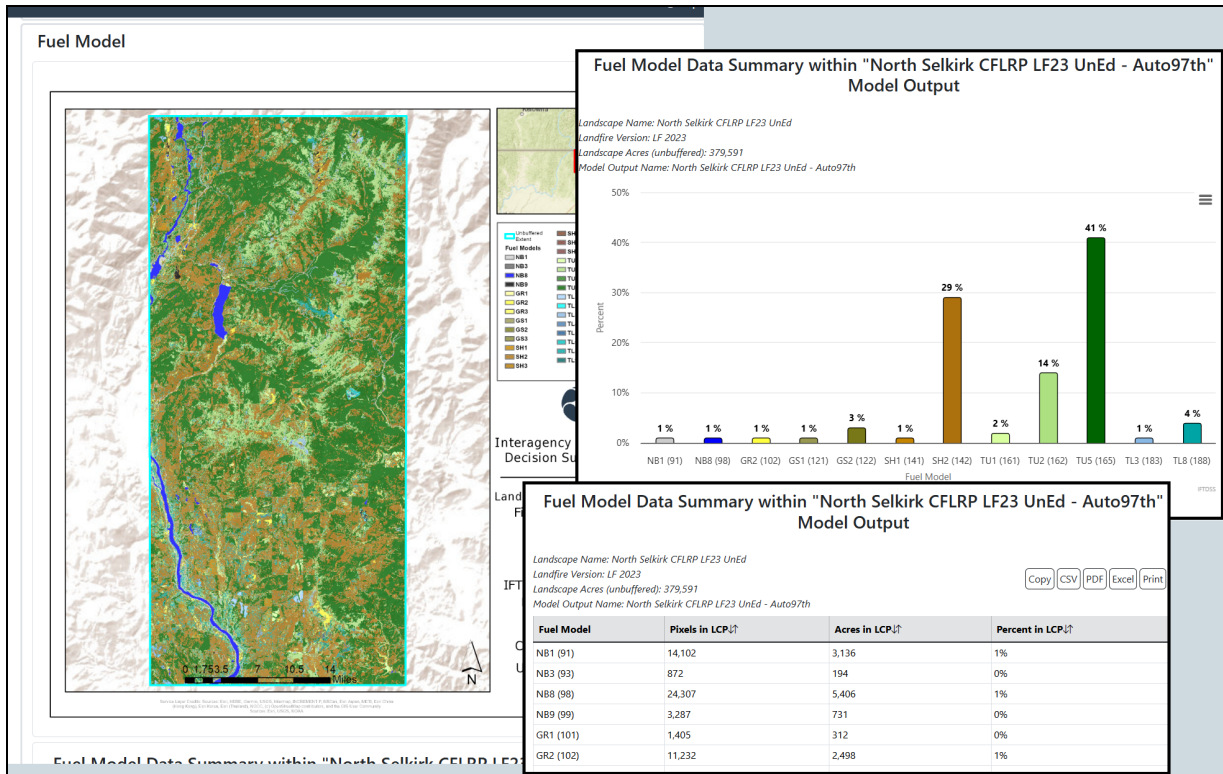
Take a good look at the report in it's entirety, including the Flame length outputs:

Flame Length
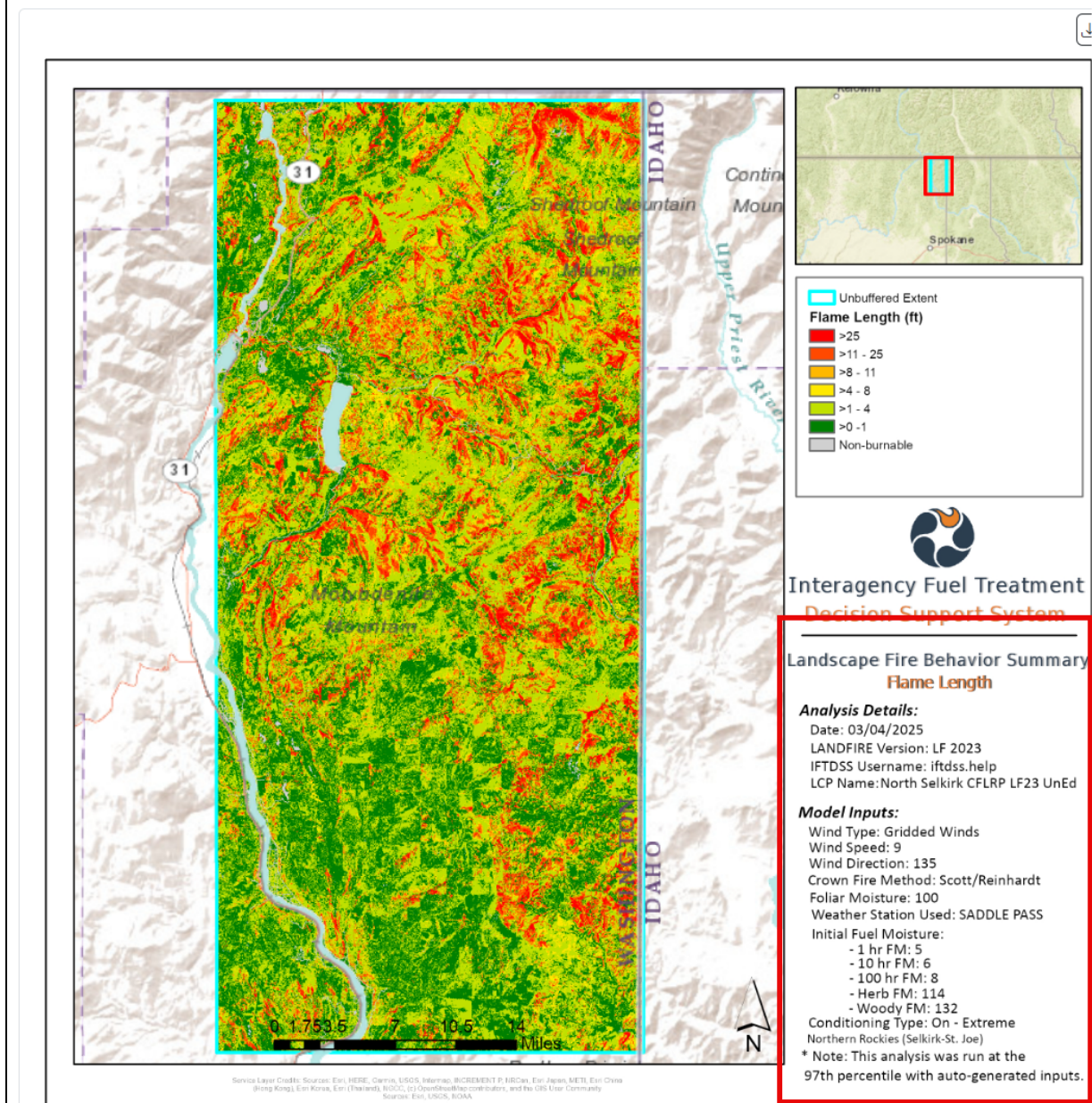
Notice the Auto97th Fire Behavior section of the report has recorded the 97th percentile weather and fuel moisture inputs used to run the fire behavior model. You'll want to use these values when you re-run the fire behavior model a little later in this tutorial. If you have not

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 the right so it may be downloaded individually for use in your own documents. Tables have download buttons under the table descriptions.

Flame Length (feet) Data Summary within "North Selkirk CFLRP LF23 UnEd - Auto97th" Model Output

Landscape Name: North Selkirk CFLRP LF23 UnEd
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,591
Model Output Name: North Selkirk CFLRP LF23 UnEd - Auto97th

Copy CSV PDF Excel Print

Flame Length (feet)	Pixels in LCP⇅	Acres in LCP⇅	Percent in LCP⇅
Non-burnable	42,568	9,467	2%
>0 - 1	519,064	115,437	30%
>1 - 4	634,273	141,059	37%
>4 - 8	165,140	36,726	10%
>8 - 11	80,986	18,011	5%
>11 - 25	187,902	41,788	11%
>25	76,899	17,102	5%

Next, it's time to develop some treatment alternatives.

Section 5– Developing Treatment Alternatives

Starting the Develop Treatment Alternatives Task

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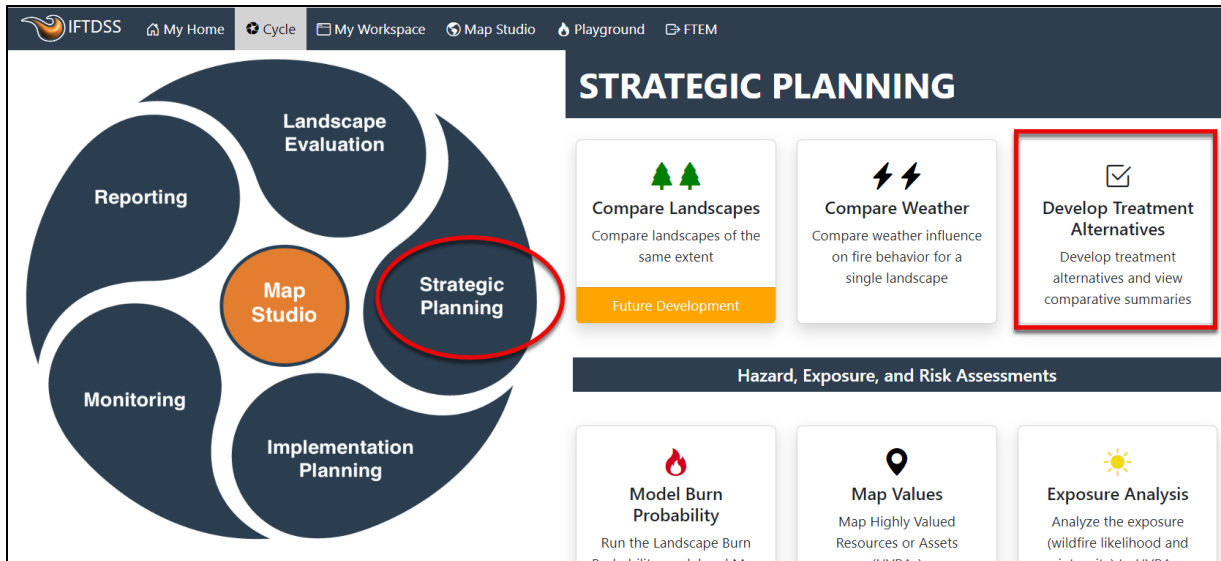
The Develop Treatment Alternatives screen contains five tabs, or steps. You'll proceed through each one using the steps below.

Pick a landscape and area of interest

A. Select the "Originating Landscape" (North Selkirk CFLRP LF23 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 unedited 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 (Watershed 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.

Edit the landscape to simulate treatment scenarios

Next, move to the **Edit Landscape** tab where you'll create and apply a set of edit rules to the AOI to simulate a thin and pile burn. Later you will see how this proposed treatment affects fire behavior.

If you are new to editing landscapes we recommend you watch the following webinar to better understand how fuel model changes and fire behavior are related.

Utilize the Compare Fuel Model Spreadsheet to understand the differences in fire behavior (flame length, rates of spread, etc.) between fuels models. It is important to understand how each rule that you will write changes the fire behavior.
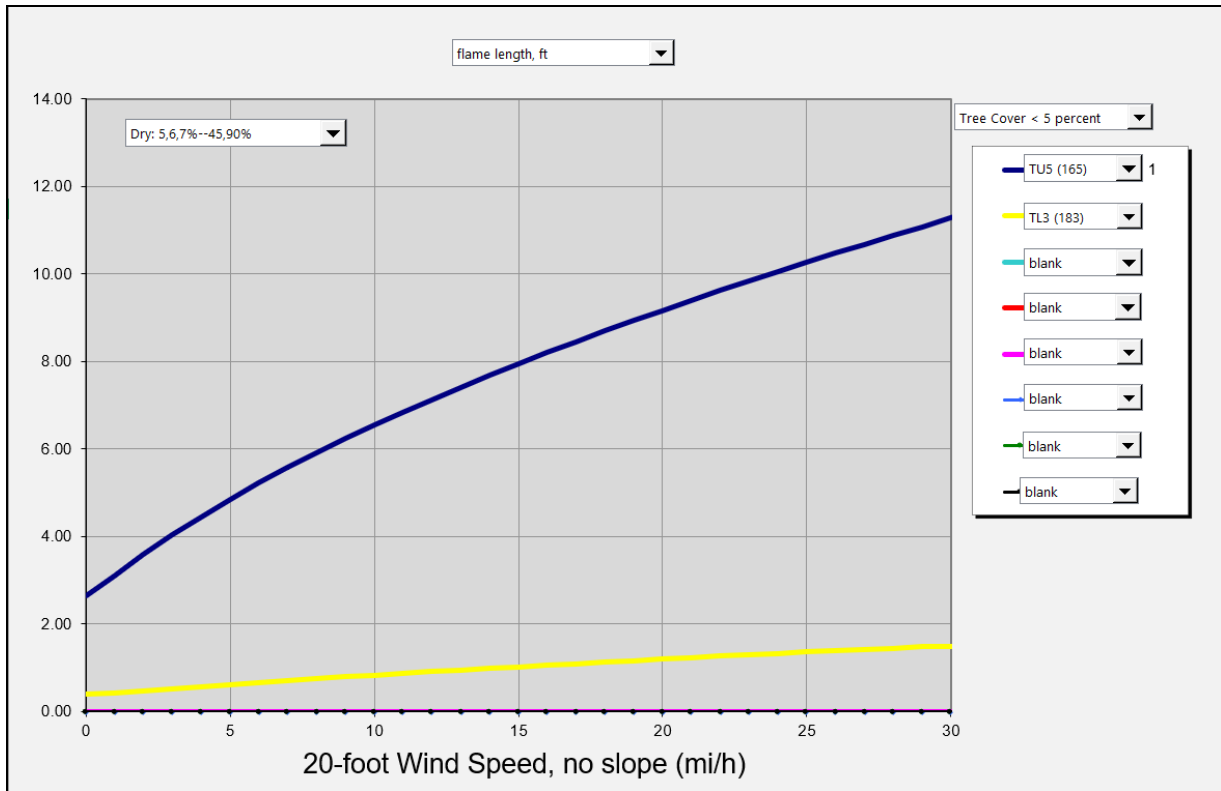
Changing fuel models DOES NOT also change the canopy characteristics, these require separate rules. Changing the canopy characteristics influences the crown fire potential, factors like spotting and torching, which we are often trying to mitigate when we do a fuels management project.

Now that you have had a chance to review some of the principles of modifying fuels models to reflect fire behavior continue with the exercise.

To create the edited landscape:

A. Select the "North Selkirk CFLRP LF23 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. Select **Add User Created Edit Rule** to display editing options.

C. Apply the following edit rules to create a new landscape named "N Selkirk Thin Pile Burn 10yr." These rules will represent the area approximately 10 years after a light thin and

pile burn treatment have been applied to the proposed treatment areas.

Landscape edit rules one through three.

Order	Mask	Landscape Edit Rule	Explanation
1	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to 165) Change (Fuel Model set to 183)	Changing fuel models to produce an overall reduction in all <u>surface</u> fire behavior categories.
2	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to 142) Change (Fuel Model set to 122)	
3	Watershed Proposed Treatment Areas	Where (Canopy Base Height is greater than 0 meters) Change (Canopy Base Height clamp to a minimum 3 meters)	Reduces crown fire activity by raising canopy base heights, making it more difficult for fire to transition from the surface to the canopy.

D. For the first rule start by setting the attributes to change:

- Attribute: Fuel Model

- Operator: Is equal to

- Value: 165 (TU5) Very High Load...

Next select the attributes to change these to:

- Attribute: Fuel Model: Fuel Model

- Modifier: Set to

- Value: 183 (TL3) Moderate Load Conifer Litter...

Apply these rules to Watershed Proposed Treatment Areas then click **Add to Rules**.

E. You'll notice this rule is now listed at the top of the page.

F. Continue this process for the five remaining rules.

Order	Mask	Landscape Edit Rule
1	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to 165) Change (Fuel Model set to 183)
2	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to 142) Change (Fuel Model set to 122)
3	Watershed Proposed Treatment Areas	Where (Canopy Base Height is greater than 0 meters) Change (Canopy Base Height clamp to a minimum 3 meters)

G. 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 (N Selkirk Thin Pile Burn 10yr), and click **Save New Landscape**.

H. 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 the Crown fire output map, values will be displayed in the bottom right o f the map box. If you did not save a PDF, 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, based on the Auto97th report run earlier:

- Generate Gridded Winds left selected
- Wind Speed: 9
- Wind Direction: 135
- Crown Fire Inputs: Scott/Reinhardt selected and a foliar moisture percent of 100
- Initial fuel moistures of 5, 6, 8, and 114 and 132 for herb, and woody fuel moistures, respectively.

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.

B. For Fuel Moisture Conditioning, select "Condition (Select Classified Weather Stream)." This matches the conditioning indicated in the Auto97th PDF.

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

Running Fire Behavior

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

A. Examine the names next to each o f the landscapes. If you wanted, you could rename them here, but leave them as-is for this tutorial.

B. Click **Run Model** next to each landscape.
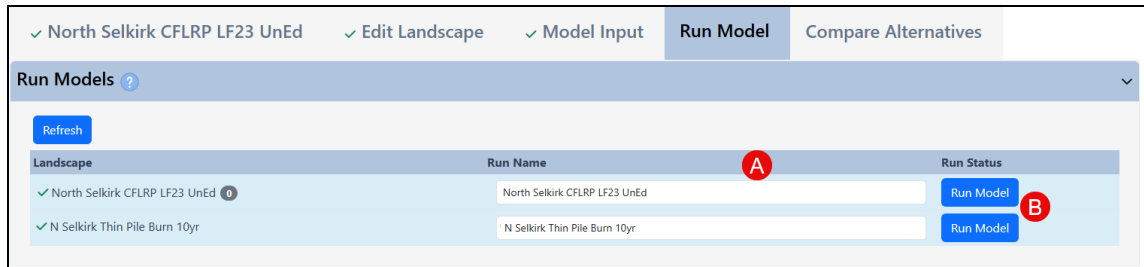
C. Give the models a couple minutes to run. Hit the refresh button to the right of "Run Status" to see the model status, until both are completed.
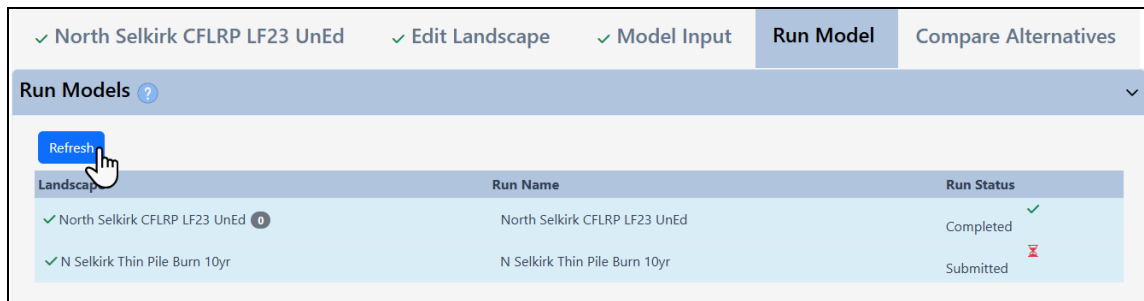
Next, move to the **Compare Alternatives** tab.

Compare Alternatives

Once on the **Compare Alternatives** tab, you'll select each landscape you want to compare. The 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.
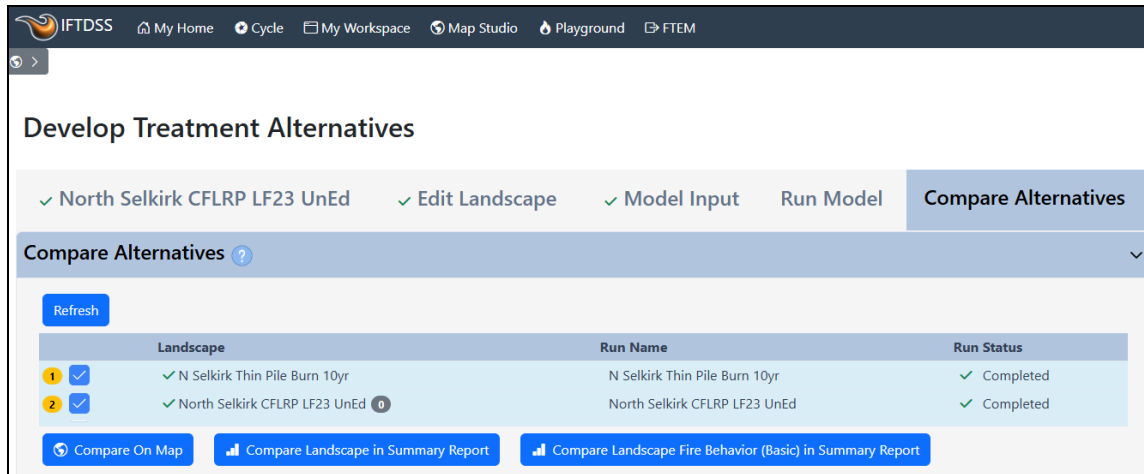
B. Now you'll want to view comparison outputs on the map and as a report. Click the button **Compare Landscape Fire Behavior Basic in Summary Report**. In the box that appears, click the **Create Report** button. While the report is building, close the dialogue box using the X in the top right.

C. Repeat this same step for the Landscape Summary Report, closing the dialogue box while the report builds.

D. Next, click the **Compare on Map** button to view results on the map and give the comparison layers a few seconds to download.

Section 6 – Comparing and Adding Treatment Alternatives

Comparing the Alternatives

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.

For example in the Layer List, turn on "Landscape Fire Behavior Change: N Selkirk Thin Pile Burn 10yr /North Selkirk CFLRP LF23 UnEd." Next turn on Flame Length Change (ft). 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 South/North Facing slopes that had initially shown very high flame lengths, are now indicating significantly decreased flame lengths and fire intensity.
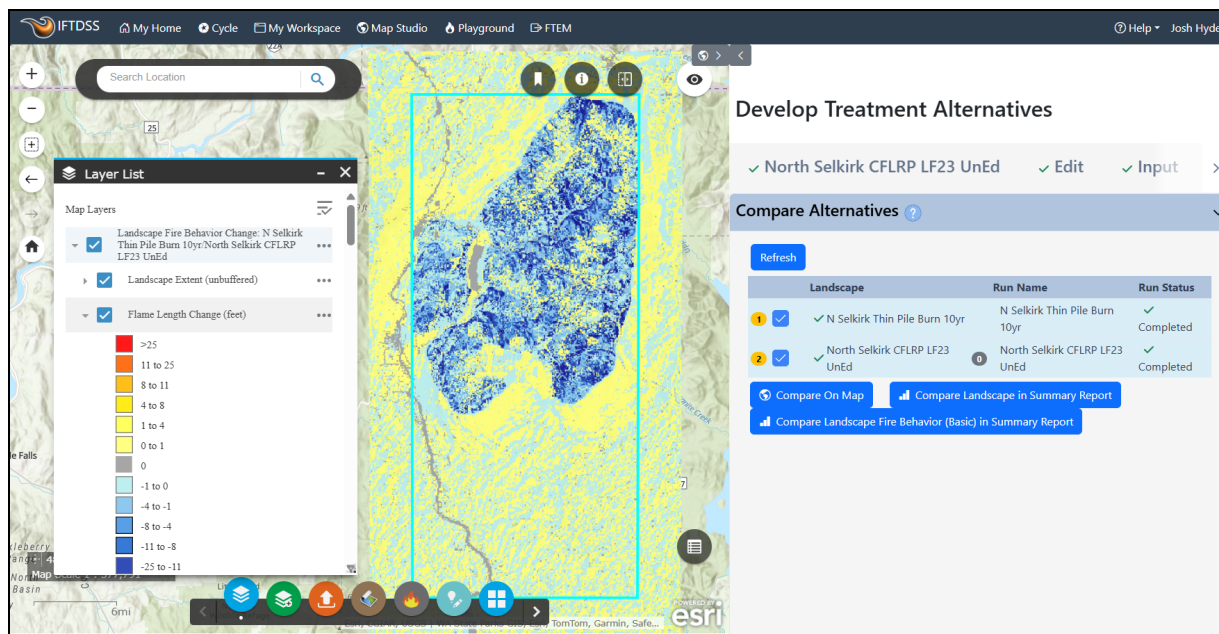
Tip: The change map is generated on the fly. To access the map later you can select the landscape in the Develop Treatment Alternatives task, and click through each tab to get back to this point.

Turning off the Landscape Fire Behavior Change layer and turn on the Landscape Change layer and check the box next to "Fuel Model Change." You can see a basic change map showing pixels in which the fuel model has changed.

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

Go to **My Workspace**, locate "N Selkirk Thin Pile Burn 10yr /North Selkirk CFLRP LF23 UEd - compare model," right click the file and select **View Report** to open the comparison report.

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

Each fire behavior feature has a section of the report, starting with Flame Length. Note the side by side bar chart for flame lengths where green correlates with pre-treatment behavior, 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. Scrolling further down you'll find these results in a table format as well, clearly showing the acres shifting toward the lower flame length bins, post-treatment.
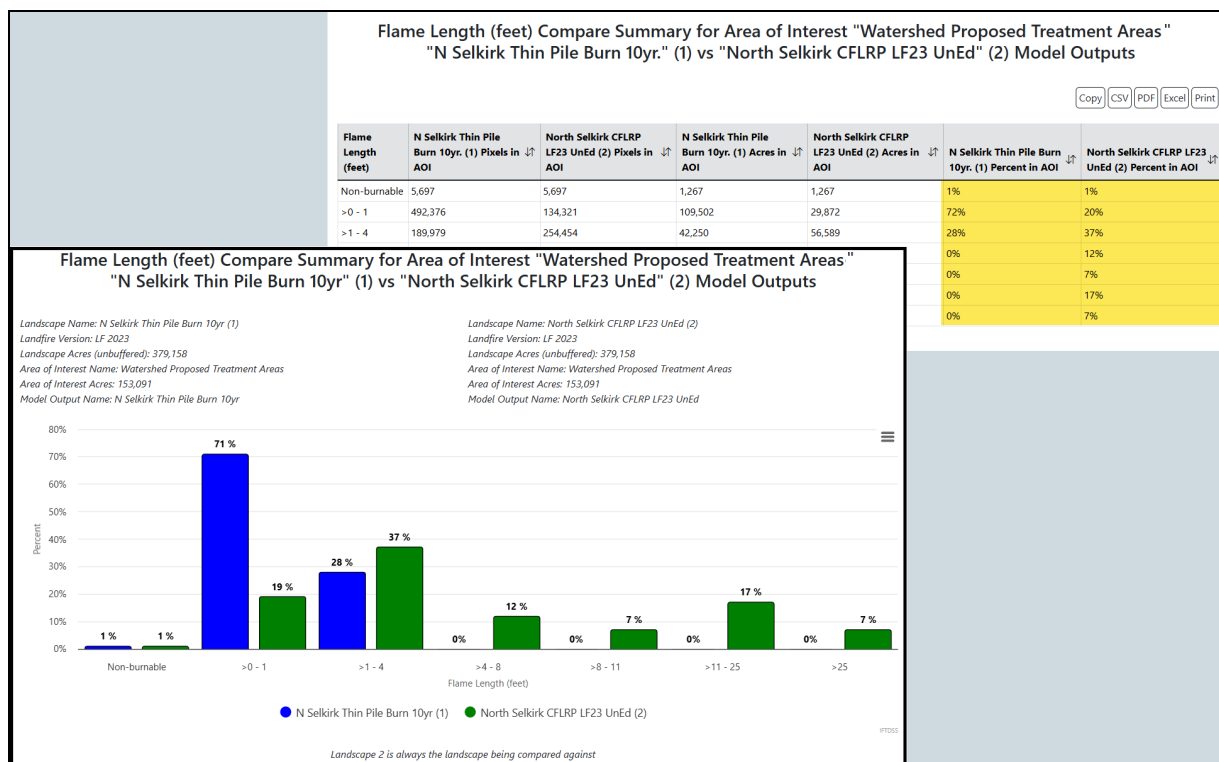
The Percent Difference Graph for Flame Lengths demonstrates the shift towards lower Flame Lengths post-treatment. You can see the positive percent difference in the 0-1 foot bin, while the bins correlating to higher Flame Lengths indicate a drop in the percent difference. The pie charts tell the same story, plainly showing the smaller sections of red/orange/yellow in the post-treatment chart.

Flame Length Percent Difference for Area of Interest "Watershed Proposed Treatment Areas "
"N Selkirk Thin Pile Burn 10yr." (1) vs "North Selkirk CFLRP LF23 UnEd" (2) Model Outputs

Landscape Name: N Selkirk Thin Pile Burn 10yr. (1)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,591
Area of Interest Name: Watershed Proposed Treatment Areas
Area of Interest Acres: 153,089
Model Output Name: N Selkirk Thin Pile Burn 10yr.

Landscape Name: North Selkirk CFLRP LF23 UnEd (2)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,591
Area of Interest Name: Watershed Proposed Treatment Areas
Area of Interest Acres: 153,089
Model Output Name: North Selkirk CFLRP LF23 UnEd

Landscape 2 is always the landscape being compared against

Crown Fire Activity for Area of Interest "Watershed Proposed Treatment Areas"
"N Selkirk Thin Pile Burn 10yr." (1) vs "North Selkirk CFLRP LF23 UnEd" (2) Model Outputs

Landscape Name: N Selkirk Thin Pile Burn 10yr. (1)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,591
Area of Interest Name: Watershed Proposed Treatment Areas
Area of Interest Acres: 153,089
Model Output Name: N Selkirk Thin Pile Burn 10yr.

0 %   1 %

99 %

● Non-burnable   ● Surface   ● other

Landscape 2 is always the landscape being compared against

iFTDSS

Crown Fire Activity for Area of Interest "Watershed Proposed Treatment Areas"
"N Selkirk Thin Pile Burn 10yr." (1) vs "North Selkirk CFLRP LF23 UnEd" (2) Model Outputs

Landscape Name: North Selkirk CFLRP LF23 UnEd (2)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,591
Area of Interest Name: Watershed Proposed Treatment Areas
Area of Interest Acres: 153,089
Model Output Name: North Selkirk CFLRP LF23 UnEd

0 %   1 %

47 %   52 %

● Non-burnable   ● Surface   ● Passive   ● other

Landscape 2 is always the landscape being compared against

iFTDSS

Scroll through the rest of the summary report to view the other fire behavior characteristics, such as the reduction in modeled crown fire activity following the treatment.

Tip: Note the values in your report may vary slightly from the ones we're about display. This is because the area of interest you drew at the beginning at this tutorial won't exactly match the one we drew here.

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. In this treatment, the tree and canopy features will remain unchanged, and we'll focus on a fuel model change to represent conditions following a low intensity prescribed fire in which the moderate grass/shrub areas have been reduced.

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: "N Selkirk Thin Pile Burn 10yr."

D. Create a rule that will represent the landscape post prescribed broadcast burn that will change moderate grass and timber fuel models lighter grass and timber fuel models:

Landscape edit rules.

Order	Mask	Landscape Edit Rule	Explanation
1	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to 122) Change (Fuel Model set to 121)	Changing fuel models to produce an overall reduction in all <u>surface</u> fire behavior categories.
2	Watershed Proposed Treatment Areas	Where (Fuel Model is equal to TU2) Change (Fuel Model set to TU1)	

Apply these rules to Watershed Proposed Treatment Areas then select **Add to Rules**.

E. After the rule is added, give the landscape a detailed name (N Selkirk Broadcast Burn) and click **Save New Landscape**.

Edit Landscape ⓘ

Starting Landscape *

| ↻ | N Selkirk Thin Pile Burn 10yr ✓ | ✕ ∨ | ☰ |

Order	Mask	Landscape Edit Rule	
1	Watershed Proposed Treatment Areas 3	Where (Fuel Model is equal to 122) Change (Fuel Model set to 121)	🗑
2	Watershed Proposed Treatment Areas 3	Where (Fuel Model is equal to 162) Change (Fuel Model set to 161)	🗑

Add Default Fuels Treatment / Disturbance Edit Rule ⓘ

Add User Created Edit Rule ⓘ

Where these conditions exist:

Attribute	Operator	Value	
Select Attribute ∨	Select Operator ∨		🗑

Add Row

Modify the following values:

Attribute	Modifier	Value	
Select Attribute ∨	Select Operator ∨		🗑

Add Row

Apply to Landscape Mask (optional)

| ↻ | Select Landscape Mask ∨ |

Add to Rules   Cancel

Notes ⓘ

Name Edited Landscape ⓘ

N Selkirk Broadcast Burn

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 Run Model. You may need to click the Refresh button next to Landscape if your edited landscape is still being built.

Go to the **Run Model** tab and click **Run Model**. You may need to click the **Refresh** button above the model list if your edited landscape is still being built.
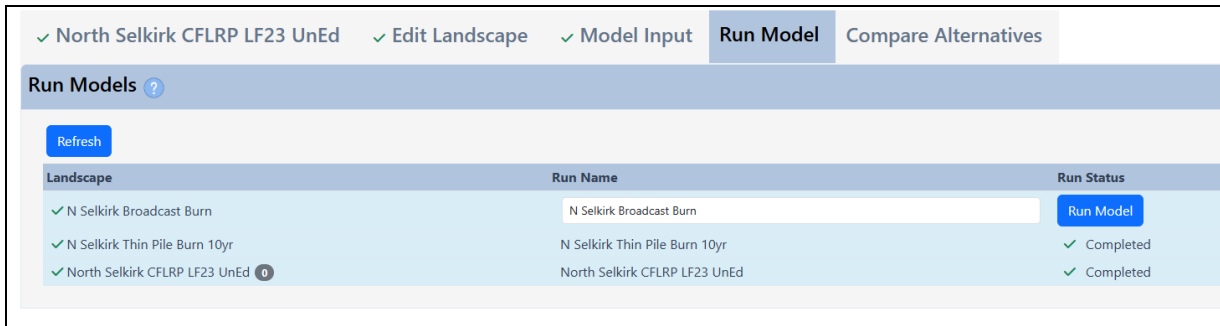
Next, move to the **Compare Alternatives** tab.

Compare the original landscape with this new one by selecting:

A. "N Selkirk Broadcast Burn" as landscape "1".

B. Select "N Selkirk Thin Pile Burn 10yr" as landscape "2".

C. Create a comparison summary report for both landscape and fire behavior results, as you did earlier in this tutorial.

D. Click **Compare on map** to get a map view of your changes.
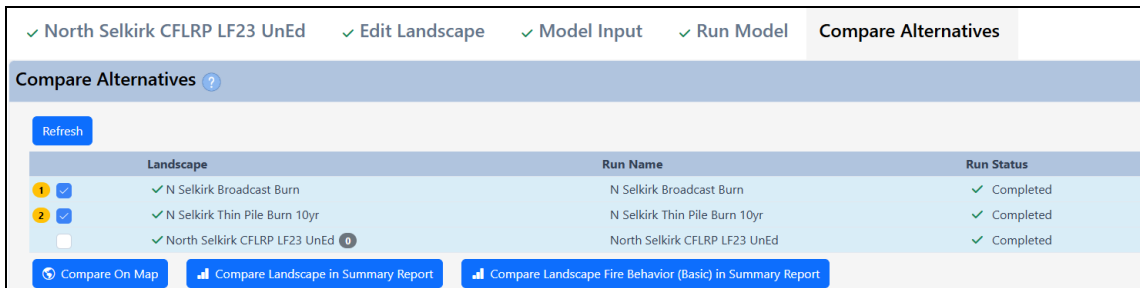
Section 7– Comparing Added Treatments and Concluding

As before, select the model change layer to evaluate flame length reduction. What you'll really want to know is how much of an effect 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.
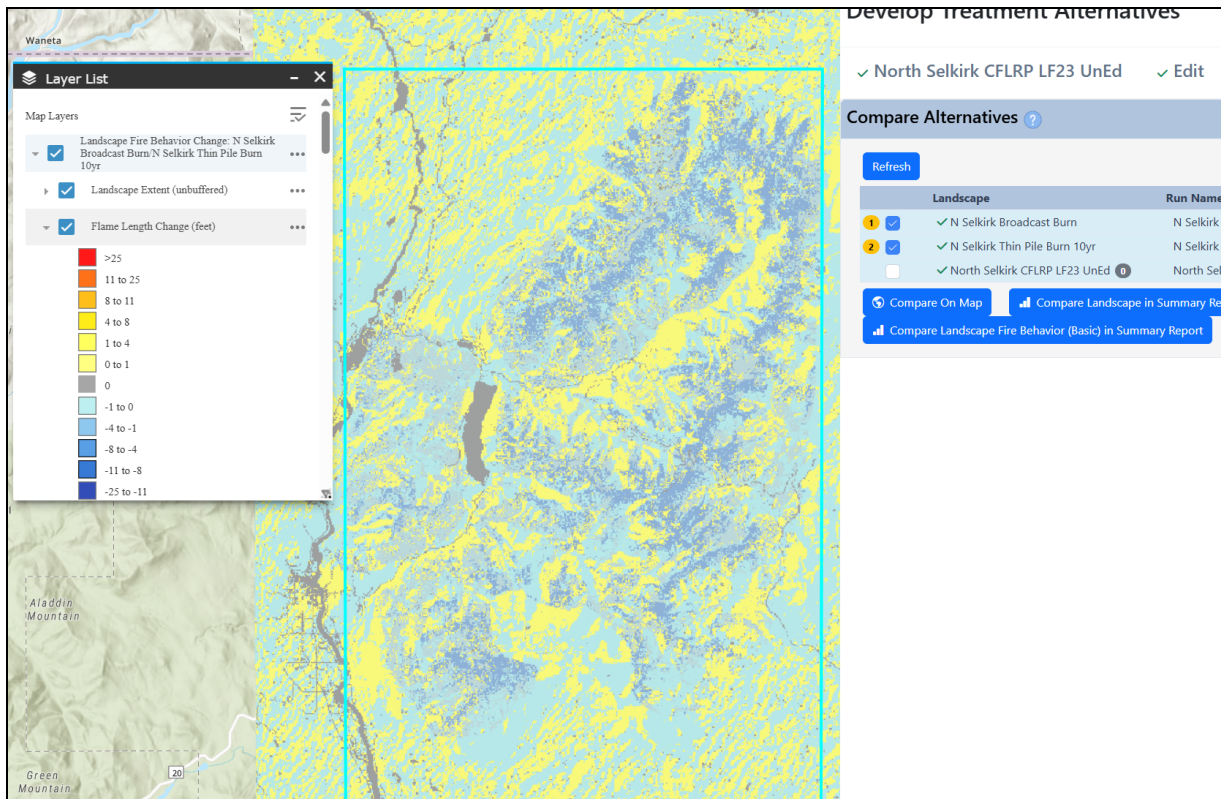
Swipe between layers

In the map view, turn on the fire behavior layers and swipe between them with the he **Swipe widget** ⊕ to better view the fire behavior geospatially for the two treatments:

from the **Layer List widget** 🔵, uncheck the "Landscape Fire Behavior Change" layers, and check the two "Landscape Fire Behavior" layers to turn them on., To compare these treatments on the landscape, first use the **Swipe widget** ⊕:

A. from the **Layer List widget** 🔵, uncheck the "Landscape Fire Behavior Change" layers, and check the two "Landscape Fire Behavior" layers to turn them on.

B. Use the **Swipe widget** ⊕ to toggle between the two layers, checking and unchecking fea-

tures such as flame length and rate of spread.
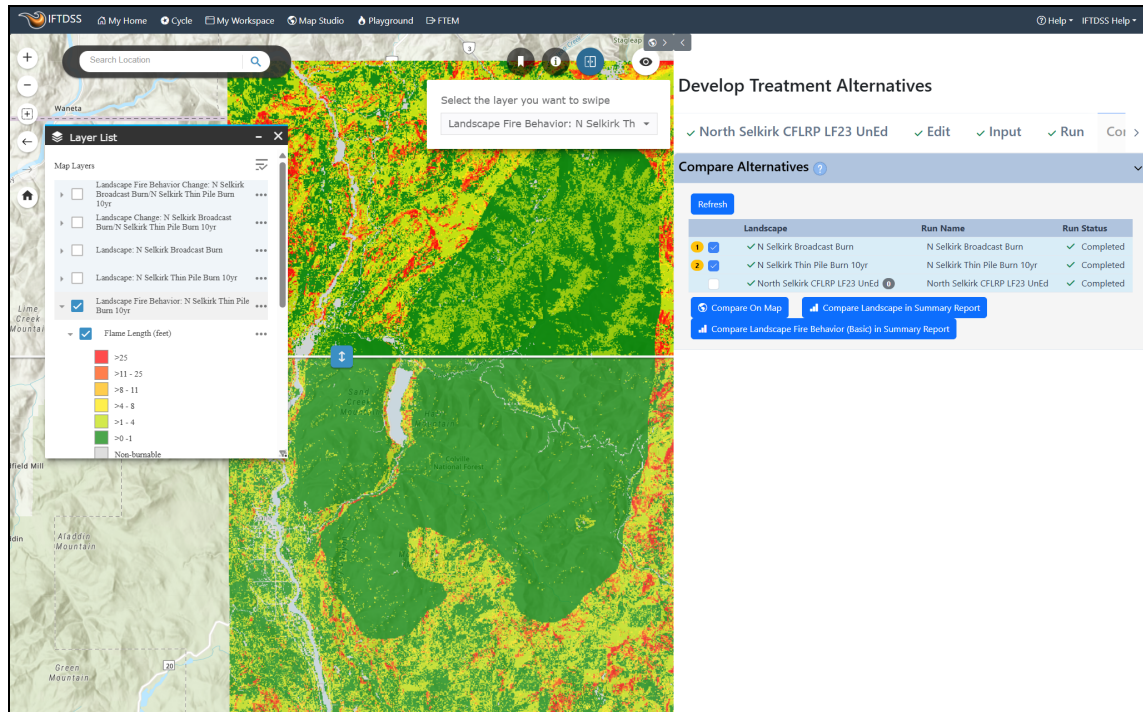
Swipe between the layers and compare: In this example, "N Selkirk Thin Pile Burn 10yr" is shown as the top swipe layer, followed by "N Selkirk Broadcast Burn". Sliding back and forth and looking at the legend indicates that the Flame Lengths were in fact reduced by several feet in some areas with just the addition of the broadcast burn!

Review Summary Reports

Next, open the Landscape Fire Behavior comparison report to get the full picture and make a more informed decision about what treatments should be applied to achieve the preliminary objectives.

In the comparison report, the Flame Length bar chart shows an 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 percentage of pixels in the >0-1 foot Flame Length bin has increased, from 71% for thinning and pile burning alone, to 96% when a broadcast burn was simulated on that thinned and pile burned landscape.

Flame Length (feet) Compare Summary for Area of Interest "Watershed Proposed Treatment Areas 3"
"N Selkirk Broadcast Burn" (1) vs "N Selkirk Thin Pile Burn 10yr" (2) Model Outputs

Landscape Name: N Selkirk Broadcast Burn (1)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,158
Area of Interest Name: Watershed Proposed Treatment Areas 3
Area of Interest Acres: 153,091
Model Output Name: N Selkirk Broadcast Burn

Landscape Name: N Selkirk Thin Pile Burn 10yr (2)
Landfire Version: LF 2023
Landscape Acres (unbuffered): 379,158
Area of Interest Name: Watershed Proposed Treatment Areas 3
Area of Interest Acres: 153,091
Model Output Name: N Selkirk Thin Pile Burn 10yr

Flame Length (feet) Compare Summary for Area of Interest "Watershed Proposed Treatment Areas 3"
"N Selkirk Broadcast Burn" (1) vs "N Selkirk Thin Pile Burn 10yr" (2) Model Outputs

Copy CSV PDF Excel Print

Flame Length (feet)	N Selkirk Broadcast Burn (1) Pixels in AOI	N Selkirk Thin Pile Burn 10yr (2) Pixels in AOI	N Selkirk Broadcast Burn (1) Acres in AOI	N Selkirk Thin Pile Burn 10yr (2) Acres in AOI	N Selkirk Broadcast Burn (1) Percent in AOI	N Selkirk Thin Pile Burn 10yr (2) Percent in AOI
Non-burnable	5,685	5,685	1,264	1,264	1%	1%
>0 - 1	661,397	491,905	147,091	109,397	96%	71%
>1 - 4	21,093	190,468	4,691	42,359	3%	28%
>4 - 8	163	280	36	62	0%	0%
>8 - 11	37	37	8	8	0%	0%
>11 - 25	1	1	0	0	0%	0%
>25	0	0	0	0	0%	0%

Landscape 2 is always the landscape being compared against

Rates of spread show a similar reduction in rates of spread displayed in the bar graph and table, as well as a percent difference graph and pie chart.

Rate of Spread Percent Difference for Area of Interest "Watershed Proposed Treatment Areas 3" "N Selkirk Broadcast Burn" (1) vs "N Selkirk Thin Pile Burn 10yr" (2) Model Outputs

Rate of Spread (chains/hr) for Area of Interest "Watershed Proposed Treatment Areas 3" "N Selkirk Broadcast Burn" (1) vs "N Selkirk Thin Pile Burn 10yr" (2) Model Outputs

Scroll through the rest of the fire behavior model outputs in the report to view fireline intensity and heat per unit results. Their story is the same, with a reduction in fire behavior following the broadcast burn.

These outputs further justify the fact that this series of treatments will help achieve the stated objectives for this North Selkirk study area.

Conclusion

Based on Forest Plan direction and the CFLRP proposal guidelines, the preliminary results of this study show that we are meeting our objectives for the North Selkirk Project Areas, which are to:

- Recommend hazardous fuels treatments that can occur through this project to: Reduce the risk of uncharacteristic wildfire and/or re-establish or maintain low-severity fire regimes; reduce surface fuel loading and the overall horizontal and vertical fuel bed continuity to reduce the fire hazard to adjacent private, Tribal, and State land; and 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.
- Describe why the treatment acres were chosen. Why here? Why now? What risk assessment did you use to identify these areas, e.g. wildfire hazard potential map or regional risk assessment, forest-wide risk assessment, etc.
- Demonstrate the need for treatment, both quantitatively and spatially, to members of your Forest Natural Resources Staff Officer and district interdisciplinary (ID) team.

This study was modeling more extreme fire behavior, given 97th percentile fire weather and fuel moisture conditions used, than the low-intensity/moderate-severity fire the study area typically sees in this portion of the Colville National Forest. This will help to justify future treatments during increasingly dry and hot sea-sons predicted for the future. You have set the foundation for a good report to give to your FLT and, if necessary, can go back and test out different treatment methods, such as a heavier thinning or increased mortality from a more severe broadcast burn.