LANDFIRE Webinar

Maps, Models, and Examples:
Leveraging LANDFIRE's National Datasets

Presented to Lake States Fire Science Network
by Randy Swaty, TNC Ecologist and Megan Sebasky, WI DNR Research Scientist
May 1, 2018

The Nature Conservancy

Agenda

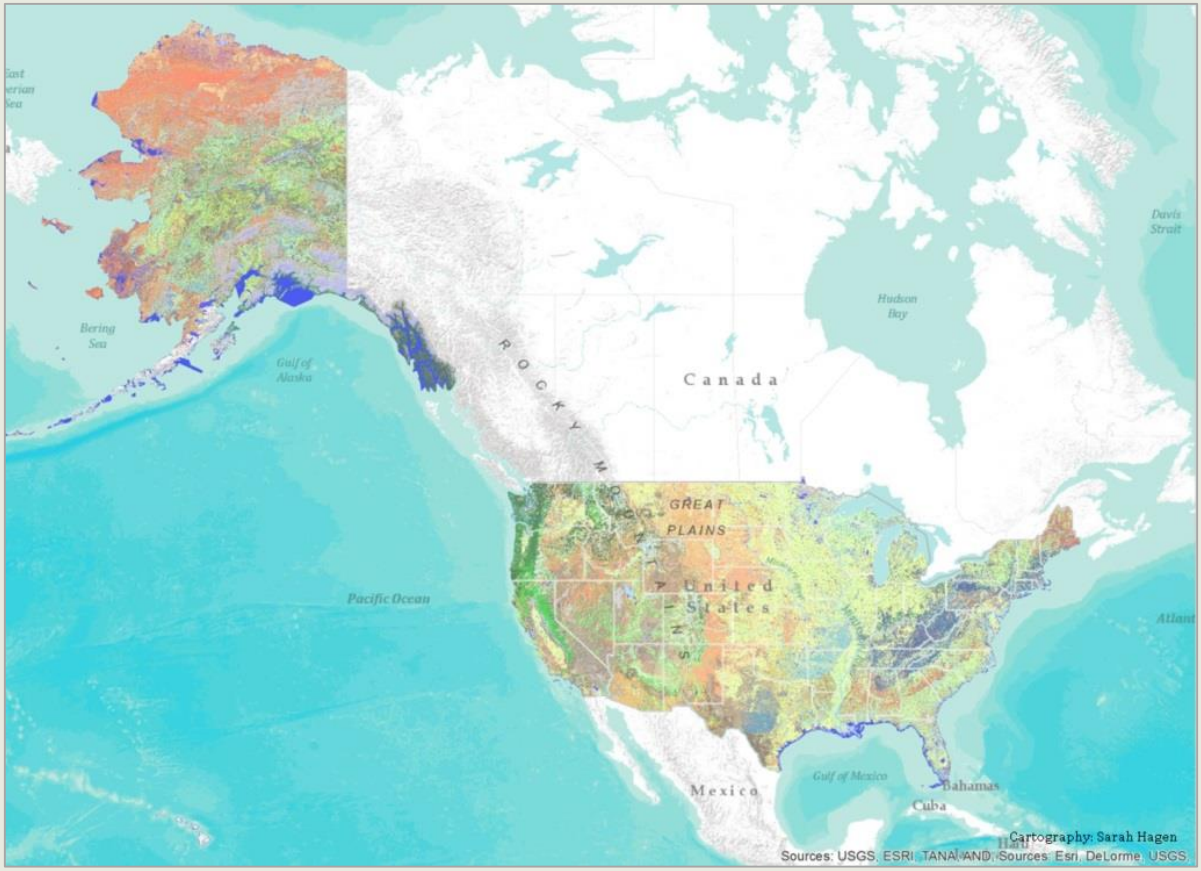
- Intro to LANDFIRE
- LANDFIRE Fuel Mapping 101
- Fuel data modification examples
- Resources
- Questions/discussion

LANDFIRE

An innovative program designed to create and periodically update comprehensive vegetation, fire, and fuel characteristics data using a consistent process for the entire U.S.

LANDFIRE's mission is to provide agency leaders and managers with a common "all-lands" data set of vegetation and wildland fire/fuels information for strategic fire and resource management planning and analysis.

The Nature Conservancy


Bering Sea
Gulf of Alaska
Pacific Ocean
Canada
Hudson Bay
Davis Strait
ROCKY MOUNTAINS
GREAT PLAINS
United States
Mexico
Gulf of Mexico
Bahamas
Cuba
Cartography: Sarah Hagen
Sources: USGS, ESRI, TANA, AND, Sources: Esri, DeLorme, USGS,

Wall-to-Wall

Consistent Methods

Designed with a Purpose

Updated and Improved Over Time

Starter list of LANDFIRE Data Products

2 yr. Cycle

Existing Vegetation:
- Cover, Height, Type
- Biophysical Settings
- Environmental Site Potential

Canopy:
- Height, Bulk Density, Base Height, Cover

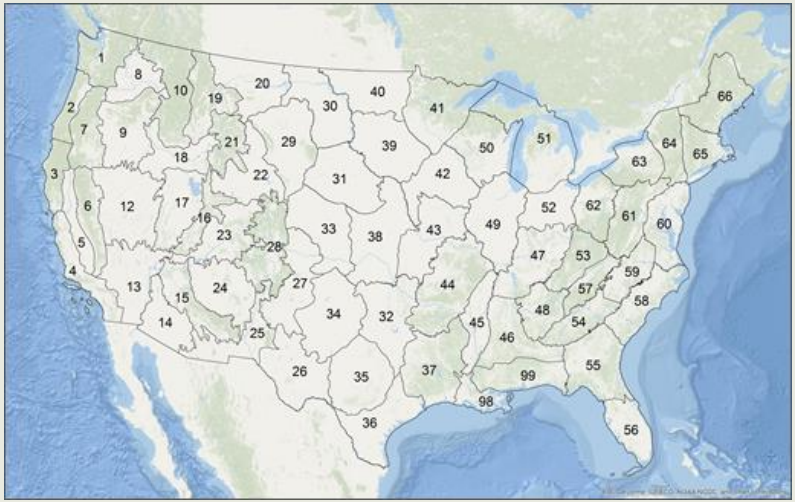
Fire Behavior Fuel Models:
- FBFM13
- FBFM40

- Fire Regime Group
- Mean Fire Interval
- % Low, Mixed, High Severity
- Succession Classes

Fire Behavior Fuel Models are the focus of today

Fire Behavior Fuel Models

- Original: Anderson 13
- Updated: Scott and Burgan 40
- LANDFIRE mapped based on tabular rule sets calibrated to each map zone
- Full database of rule sets is available online: https://landfire.gov/fuel_rulesets_db.php
- To critique rulesets and produce updated FBFM spatial data, use the LANDFIRE Total Fuels Change Tool https://landfire.gov/download_lfdat.php#lftfct



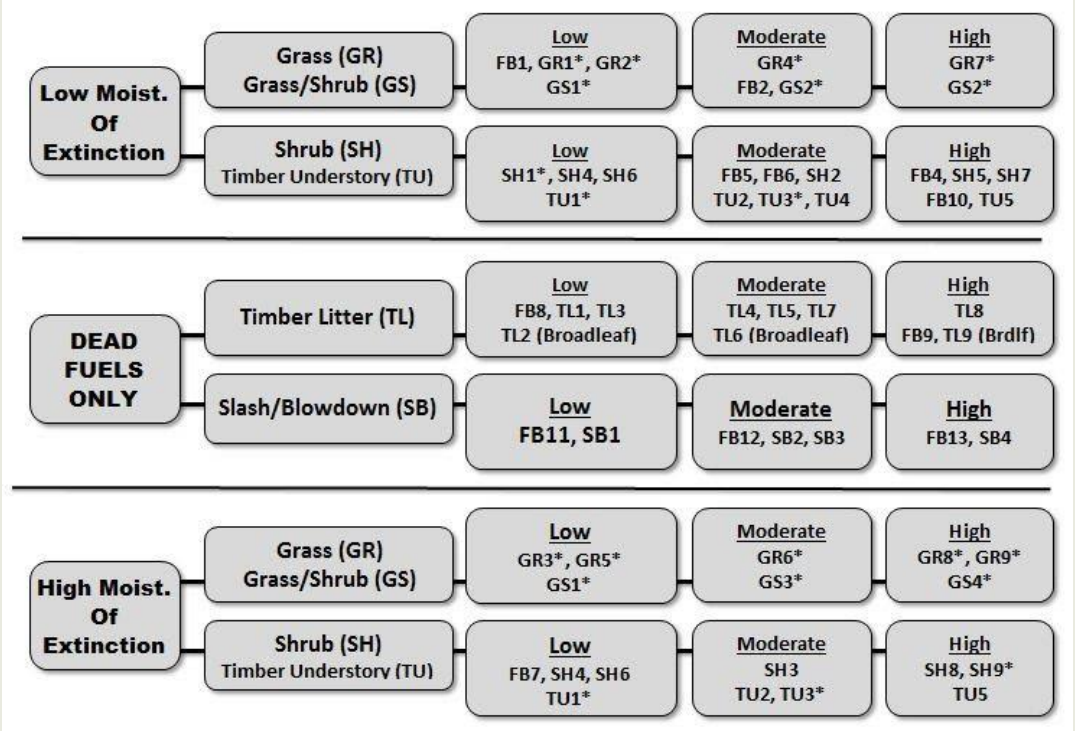
Fuel Model

Anderson, Hal E. 1982. Aids to determining fuel models for estimating fire behavior. USDA Forest Service General Technical Report INT-122. 22 p.

	Description
1	Grass
2	Pine/Grass
3	Tall Grass
4	Tall Chaparral
5	Brush
6	Dormant Brush
7	Rough
8	Hardwood/Lodgepole Pine
9	Mixed Conifer Light
10	Mixed Conifer Medium
11	Light Slash
12	Medium Slash
13	Heavy Slash
14	Plantation/Burned last 15 years
15	Desert
28	Urban
97	Agricultural Lands
98	Water
99	Barren/Rock/Other

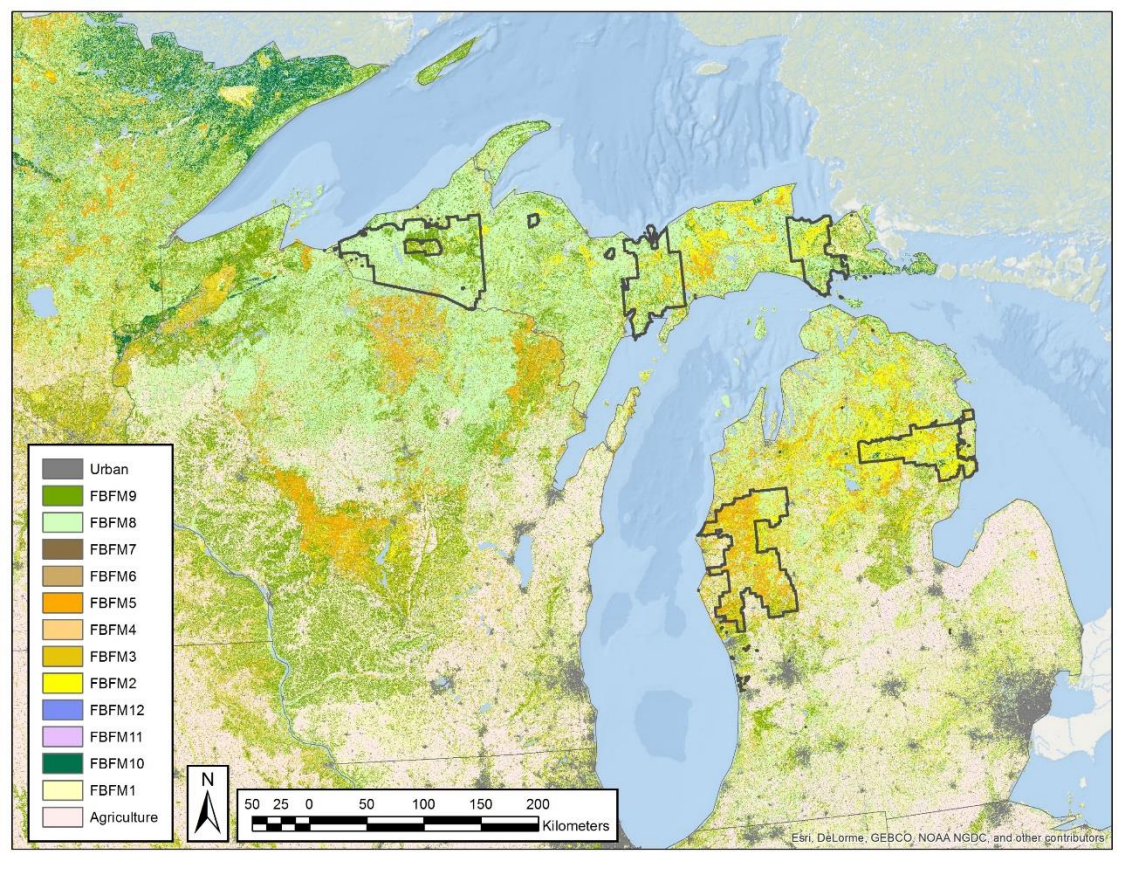
The original 13 (Anderson, 1982) were designed to support analysis of wildfires under peak fire conditions with cured herbaceous fuels.

Scott and Bergan 40 Fire Behavior Fuel Models



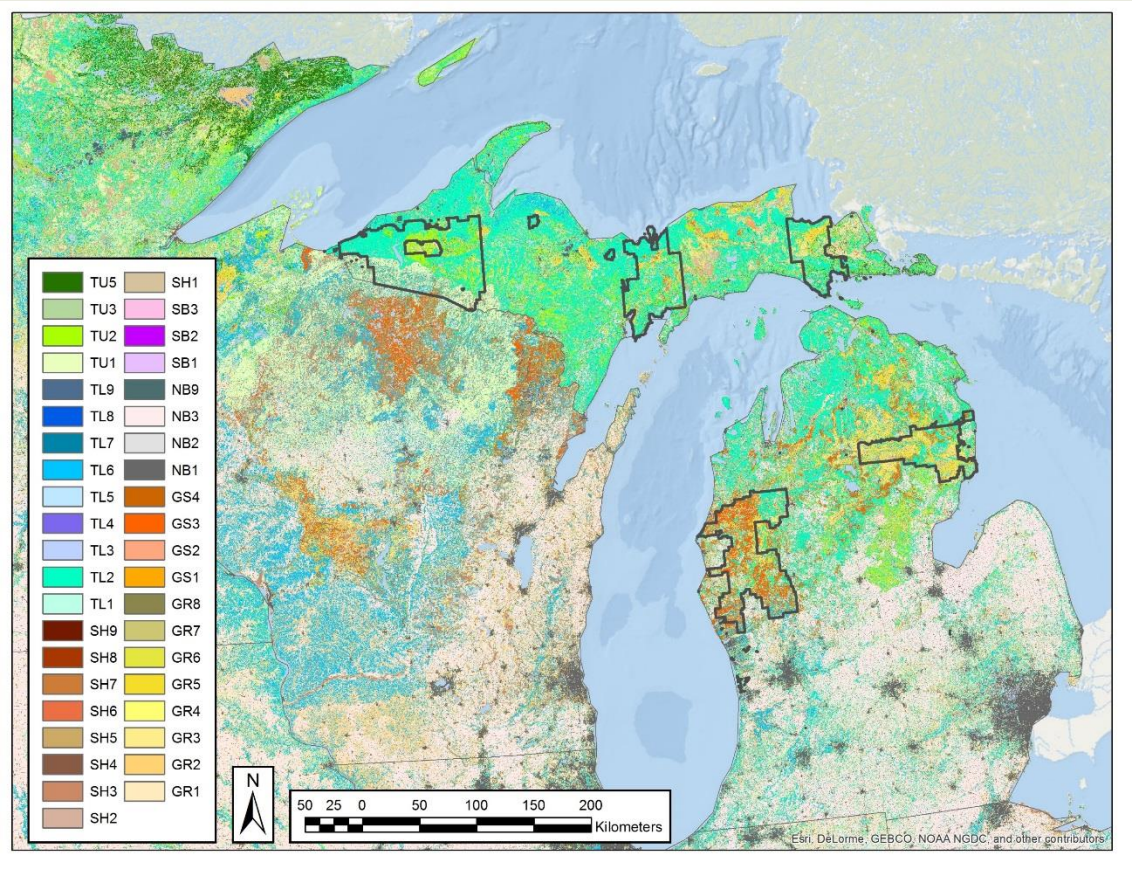
40 Scott and Burgan Fire Behavior Fuel Models - fire behavior fuel model predictions beyond the severe fire season, such as prescribed fire and fire use applications

Fuel models represent fuel bed characteristics



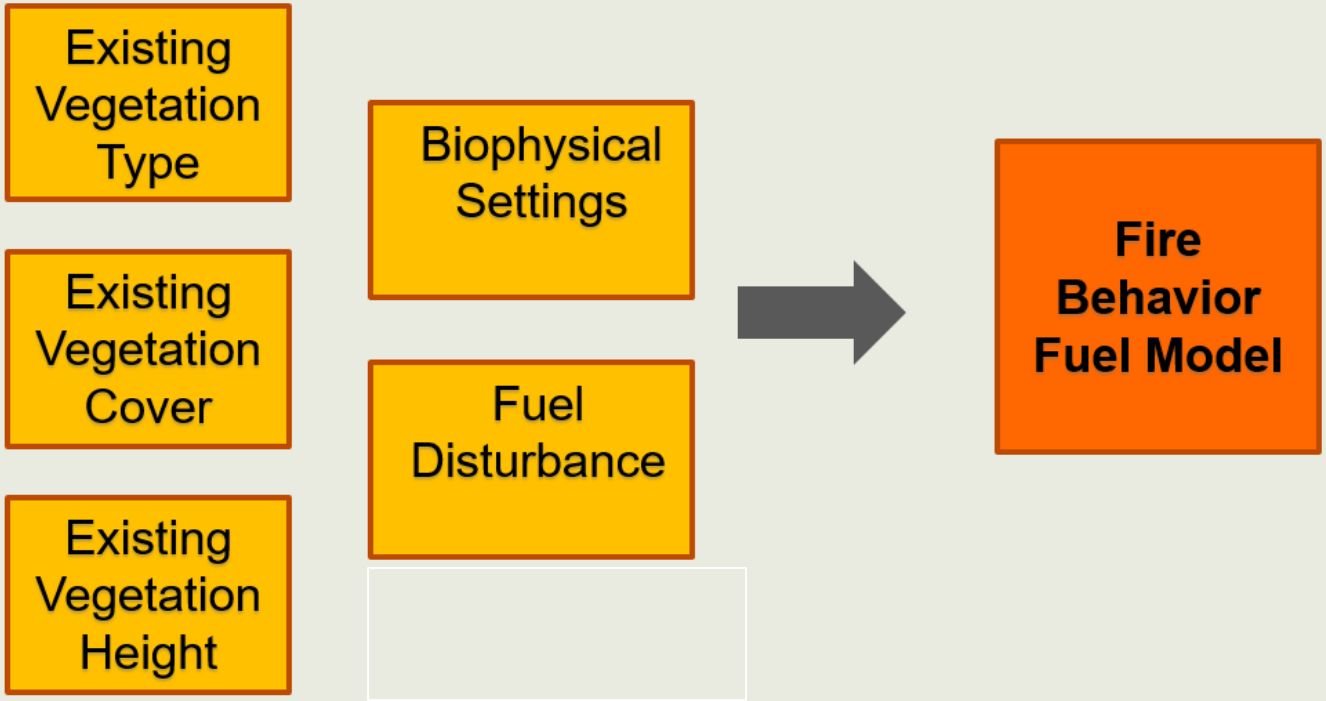
13 Anderson Fire Behavior Fuel Models

Fuel models represent fuel bed characteristics

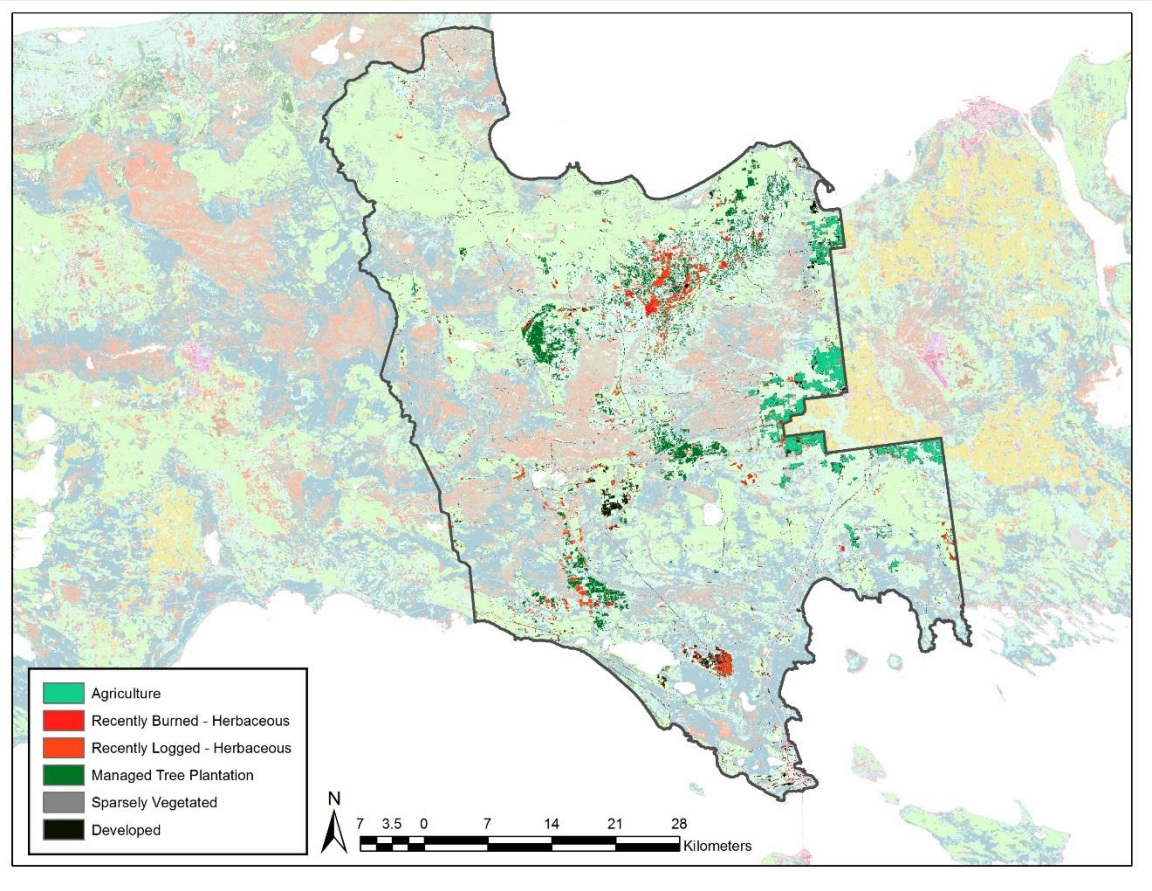


40 Scott and Burgan Fire Behavior Fuel Models

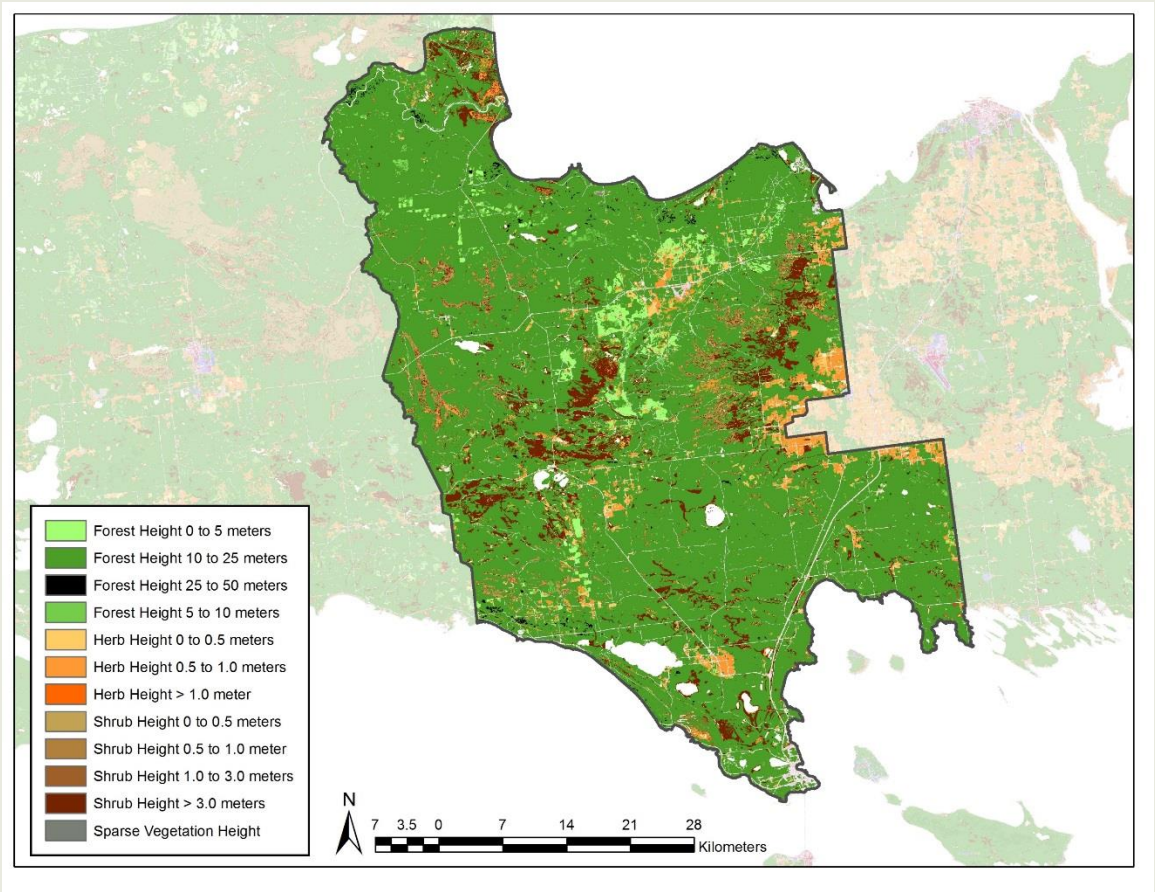
Inputs calibrated to assign fuel label



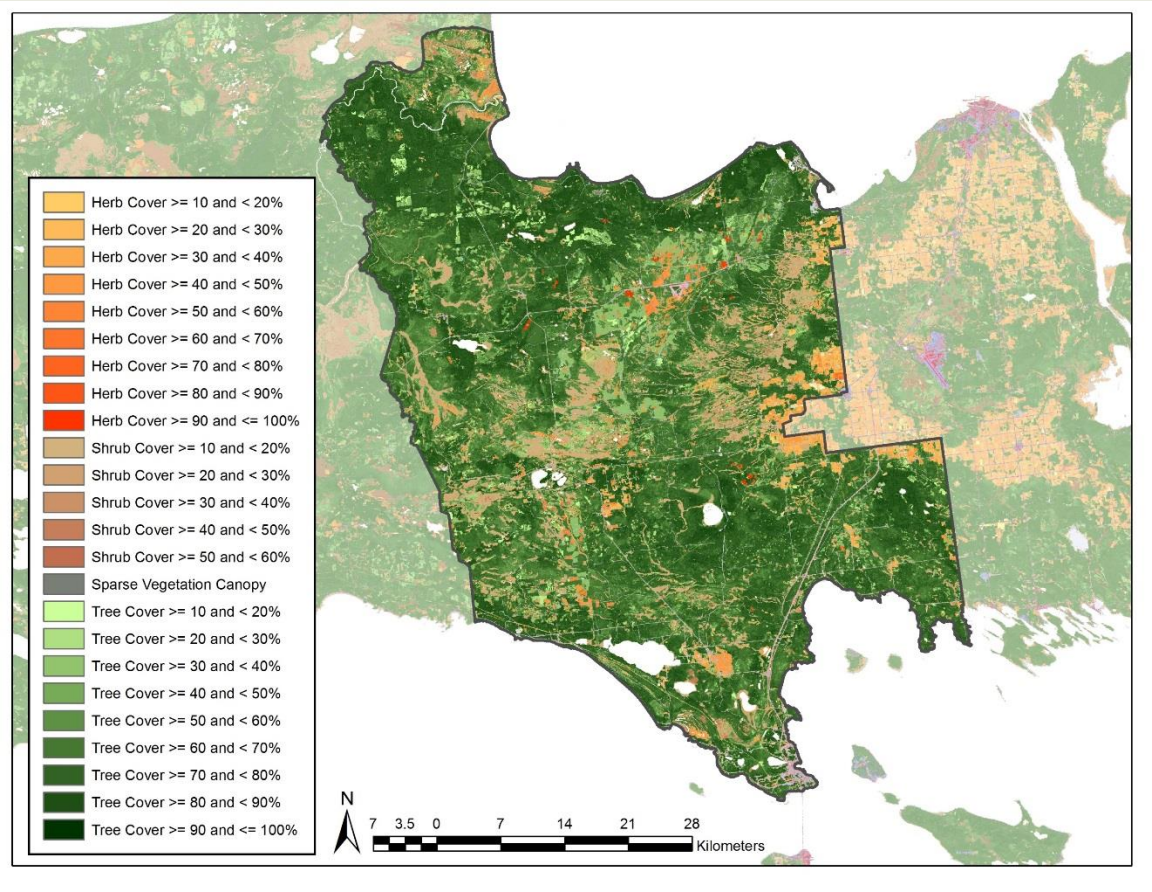
Inputs to Fuel Data - Existing Vegetation Type



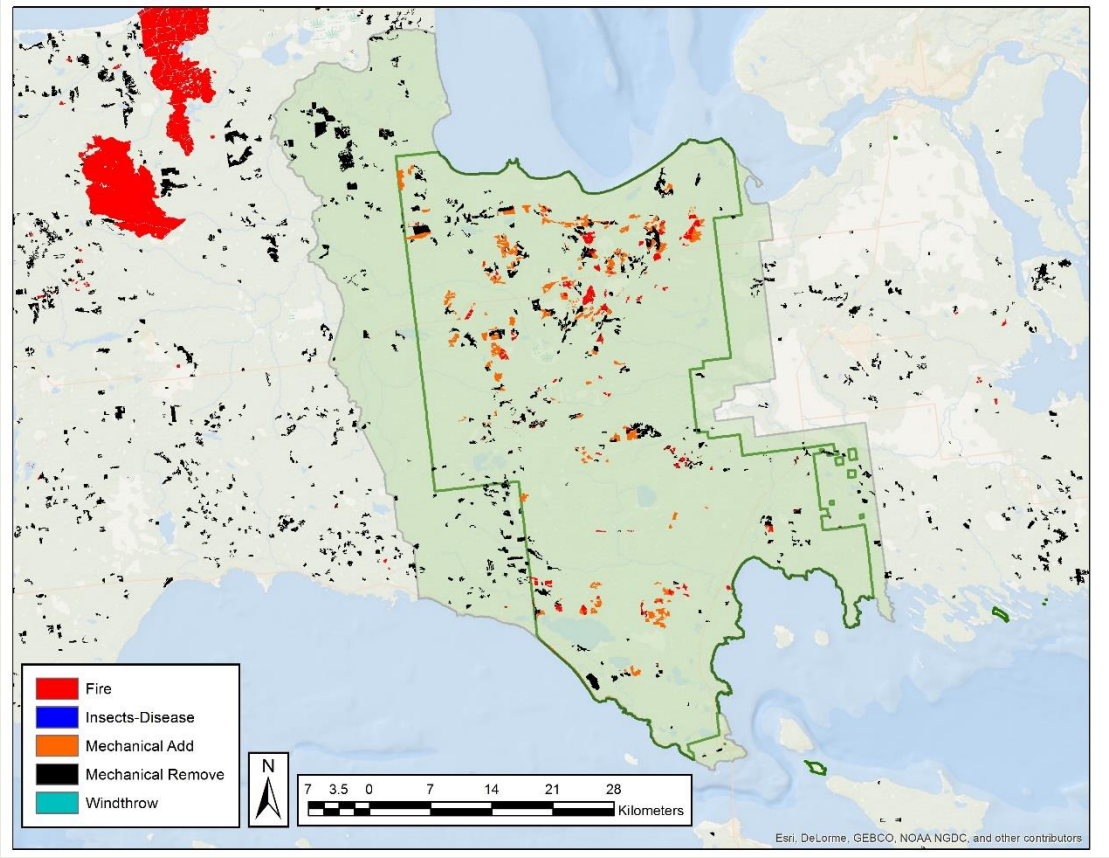
Inputs to Fuel Data - Existing Vegetation Height



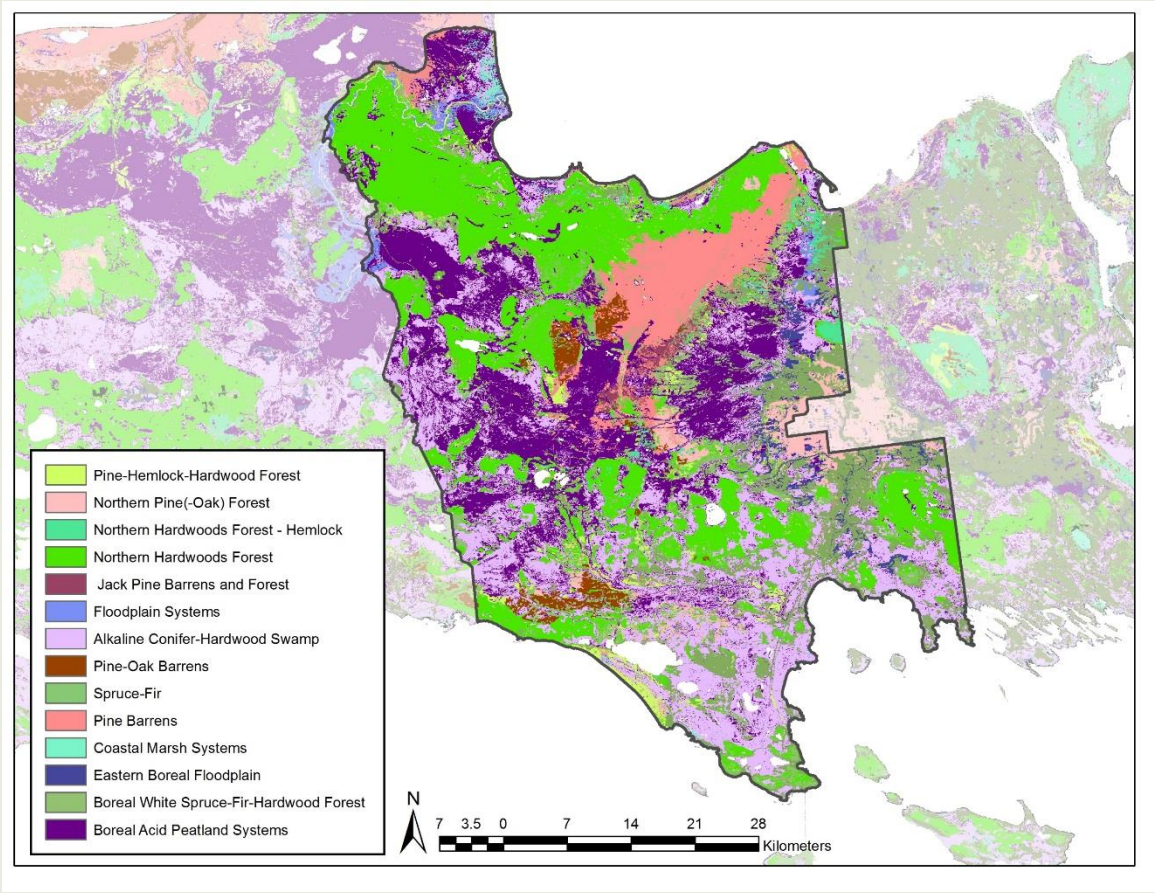
Inputs to fuel data - Existing Vegetation Cover



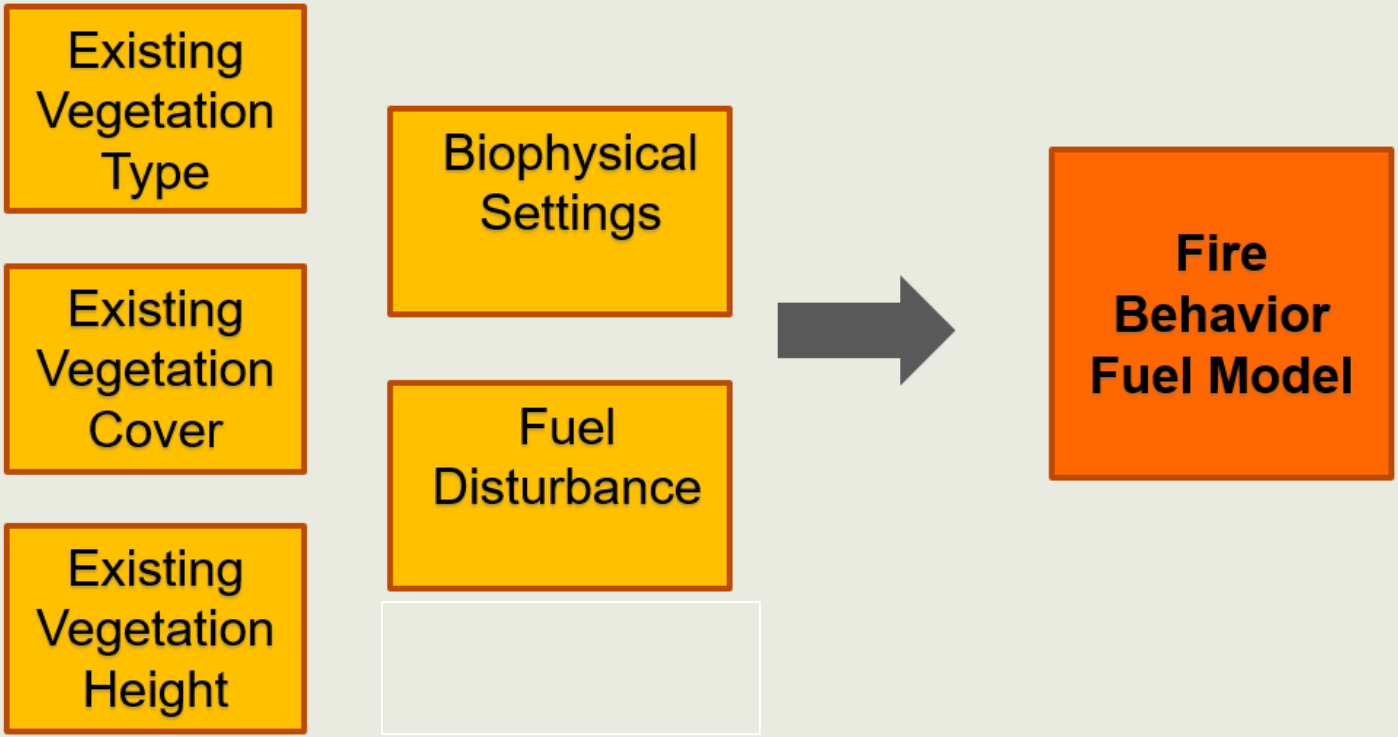
Inputs to Fuel Data – Fuel Disturbance



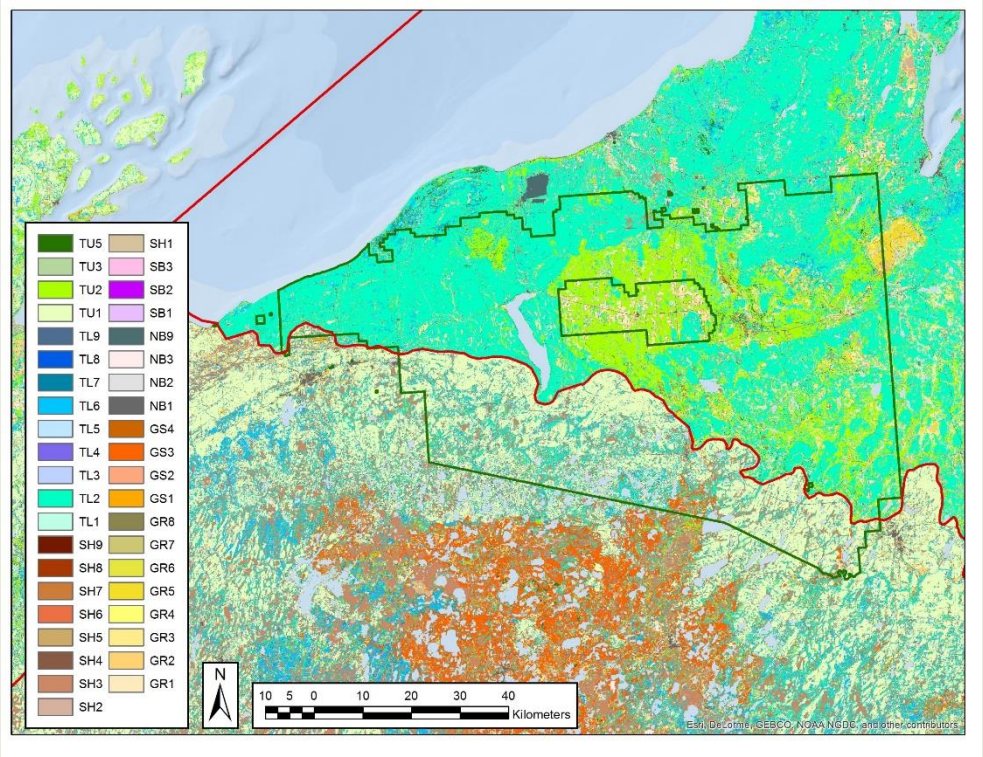
Inputs to Fuel Data - Biophysical Settings (BpS)



An issue with any input or the ruleset can lead to unsatisfactory fuel model data



Red lines denote map zones going through Ottawa NF



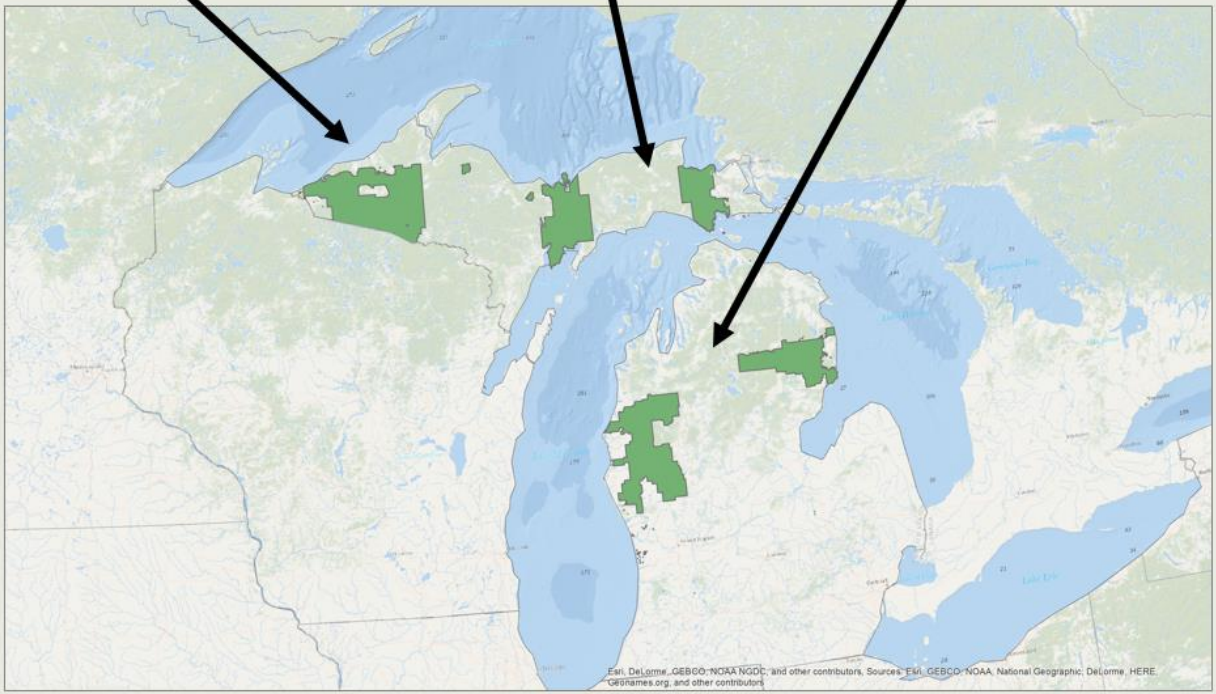
Difference in fuel model data largely driven by ruleset in this case

Preview of three examples

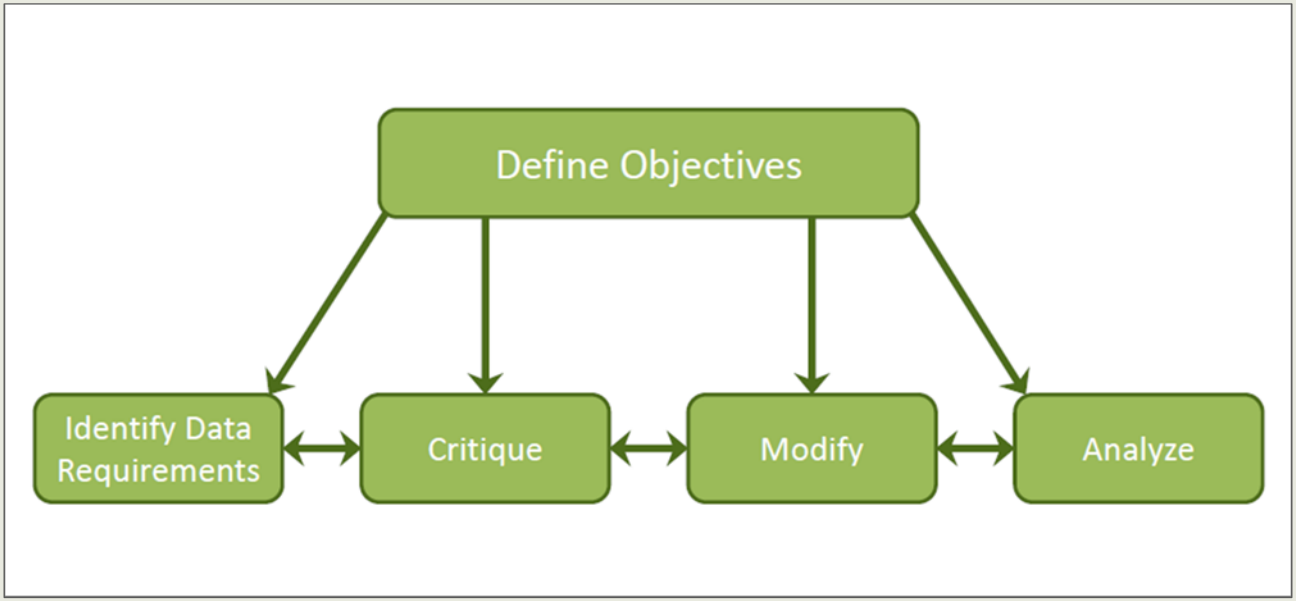
Ottawa N. F.
Preview of work to come!

Hiawatha N. F.
Fuels assessment

Huron-Manistee
Fuels modification



Data critique and modification process



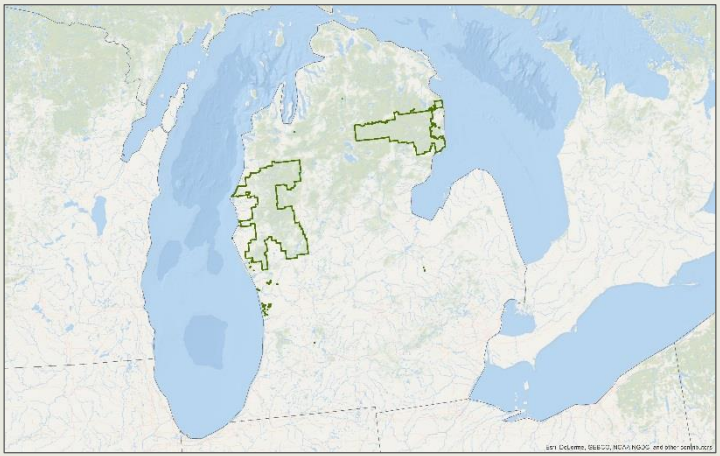
On the Huron-Manistee National Forest

Photo: Persephone Whelan

Huron-Manistee NF critique and modification steps

Summary of Modification Steps:

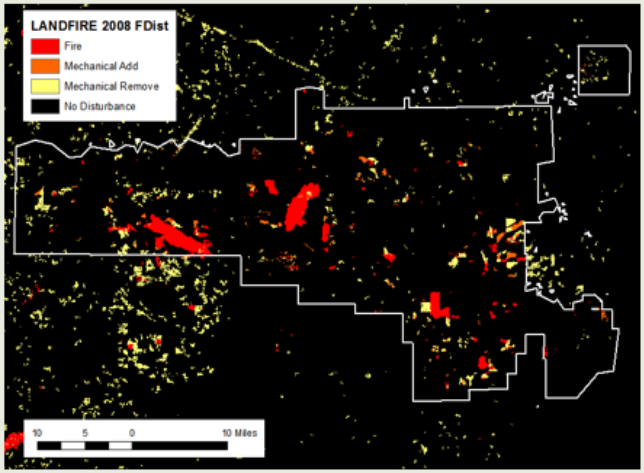
- Updated LANDFIRE disturbance data
- Updated Existing Vegetation Cover to reflect new disturbances.
- Critiqued FBFM mapping rules and made modifications
- Conducted preliminary fire behavior modeling to evaluate data modifications.

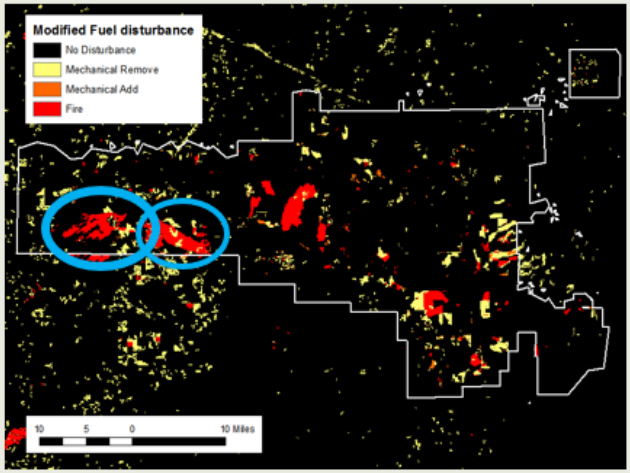


See: Helmbrecht, Donald J. and Kori Blankenship. 2016.

Modifying LANDFIRE Geospatial Data for Local Applications

First update disturbances as needed





Updates to disturbances were applied

Enter the LANDFIRE Total Fuel Change Tool

ArcGIS toolbar that allows users to translate knowledge and data into spatially explicit Fire Behavior Fuel Models

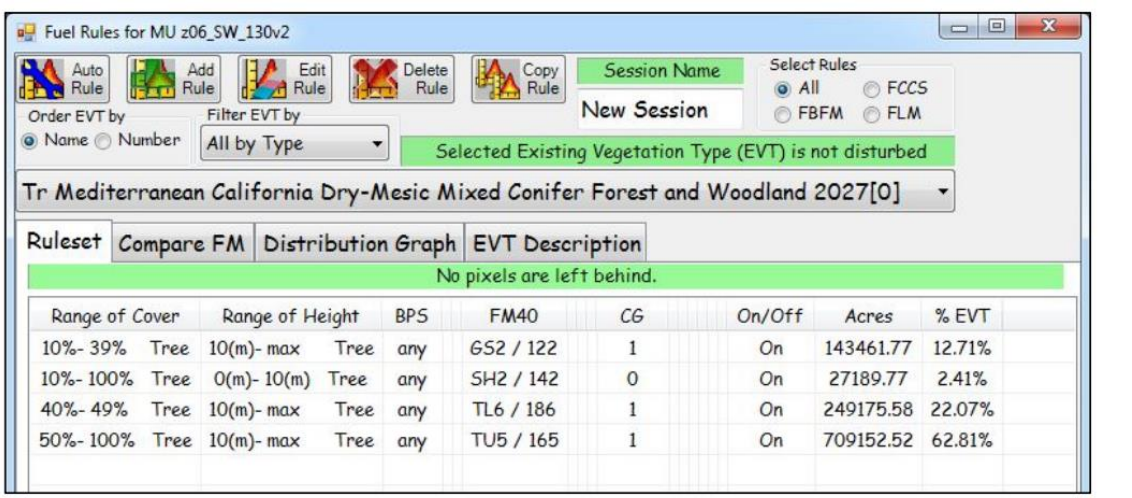


Figure 14. Example LANDFIRE Total Fuel Change Tool (LFTFCT) rule set. The LFTFCT is a custom ArcGIS toolbar that links to the LANDFIRE fuel mapping rules through a Microsoft Access database.

How changes to fuel models were made

Original map zone 51 rules

2407[0] Tr Laurentian Pine Barrens

Ruleset | Compare FM | Distribution Graph | EVT Description

No pixels are left behind.

Range of Cover	Range of Height	BPS	Wild	SClass	FM13	FM40	On/Off	Acres	% EVT
10%- 59% Tree	0(m)- 50(m) Tree	any	any		2	GR3 / 103	On	216797.12	65.07%
60%- 100% Tree	0(m)- 50(m) Tree	any	any		2	GR3 / 103	On	116402.77	34.93%

Edited HMF rules

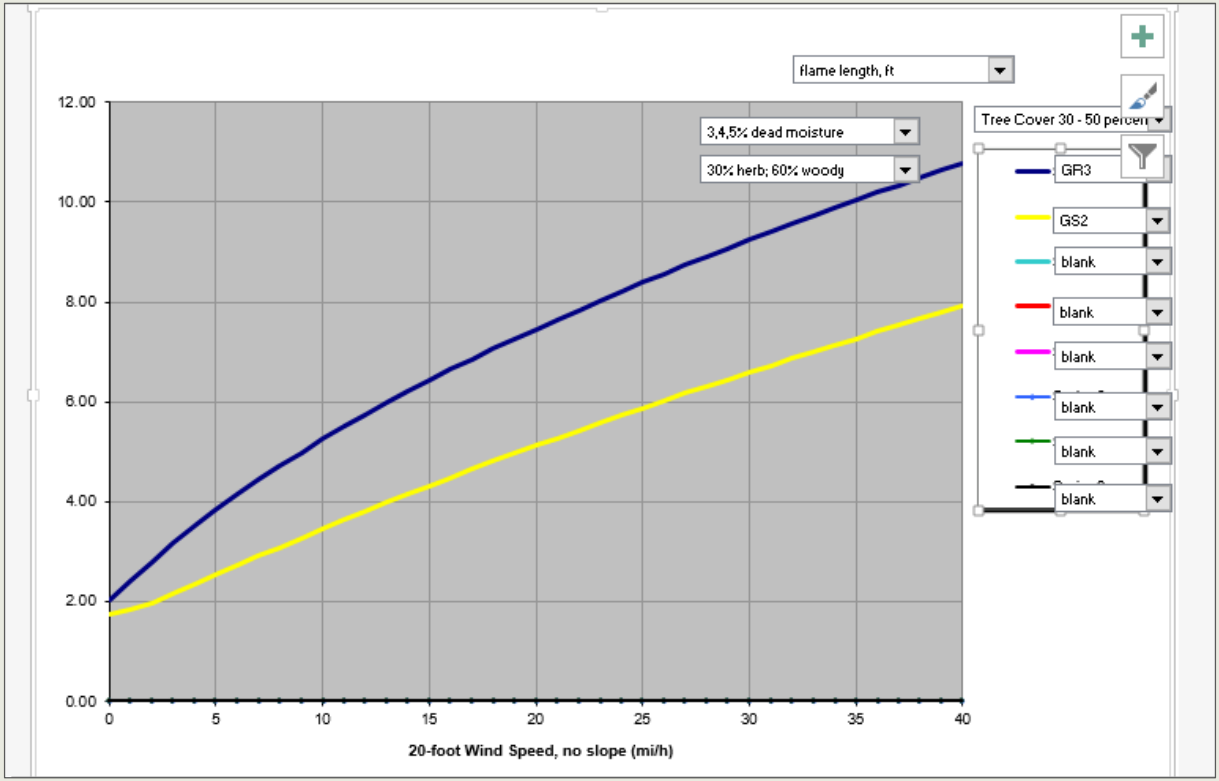
2407[0] Tr Laurentian Pine Barrens

Ruleset | Compare FM | Distribution Graph | EVT Description

No pixels are left behind.

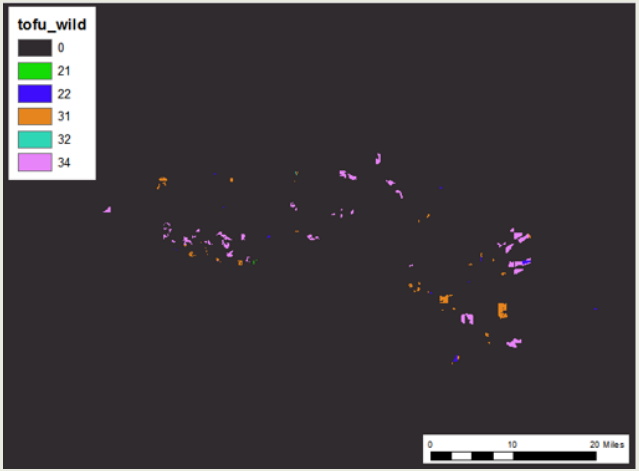
Range of Cover	Range of Height	BPS	Wild	FM13	FM40	On/Off	Acres	% EVT
10%- 39% Tree	0(m)- 50(m) Tree	any	any	2	GR3 / 103	On	53576....	16.08%
40%- 100% Tree	0(m)- 50(m) Tree	any	any	2	GS2 / 122	On	27962...	83.92%

Undisturbed Pine Oak Barrens GR3 to GS2



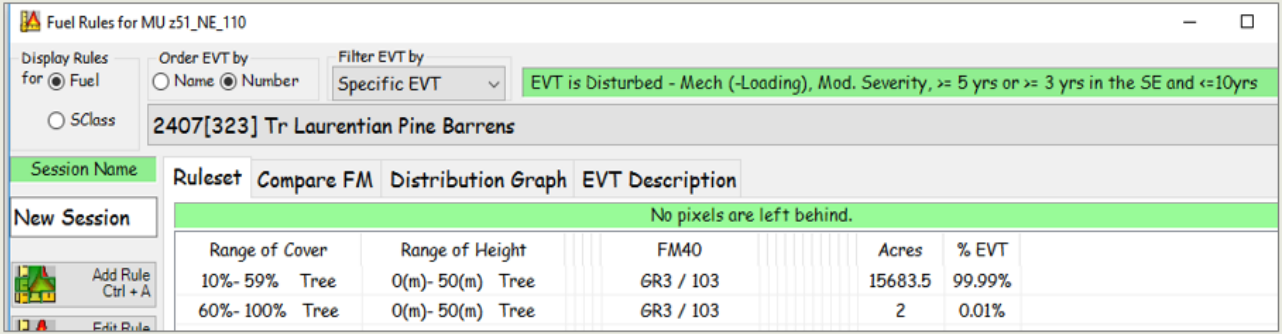
From the “CompareModelsFour” spreadsheet by Pyrologix

WILDCARD: for those days when you just need a little more…

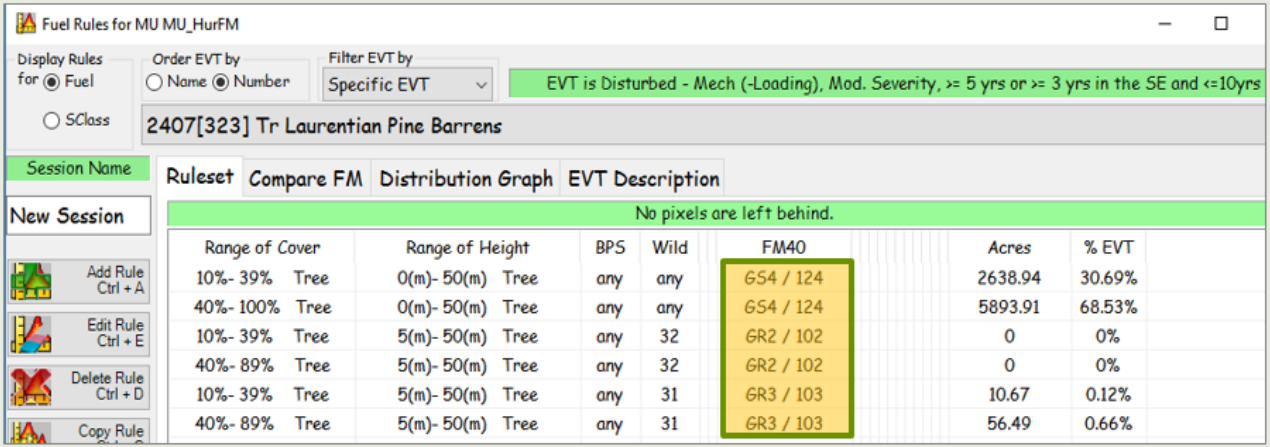


Code	Canopy	Surface	Wildcards	Examples
11	< 25% removed	Remove	0: None	Rx burning
12	25-75% removed			
13	> 75% removed			
21	< 25% removed	Add	0: None 21: Masticate/mow 22: Compact/crush	Fuel break with chipping
22	25-75% removed			
23	> 75% removed			
31	< 25% removed	Remove	0: None 31: Broadcast burn 32: Convert to hardwood 33: Broadcast burn and convert to hardwood 34: Plant	Fuel break with biomass removal chipping Thinning followed by Rx burn
32	25-75% removed			
33	> 75% removed			

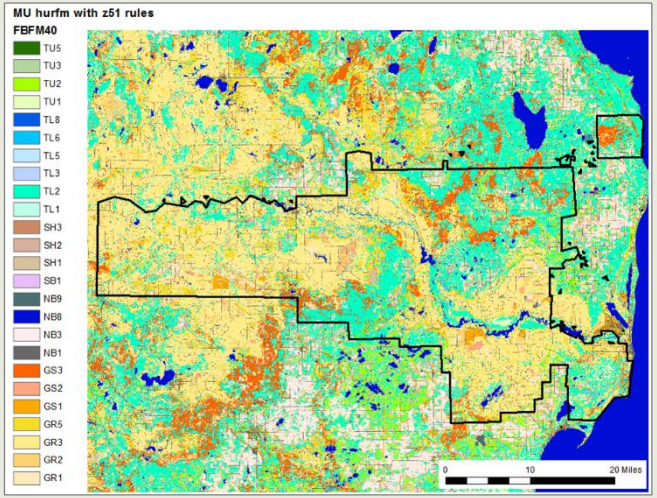
How changes to fuel models were made



Edited the rules for EVT. Adjusted rules based on disturbances…

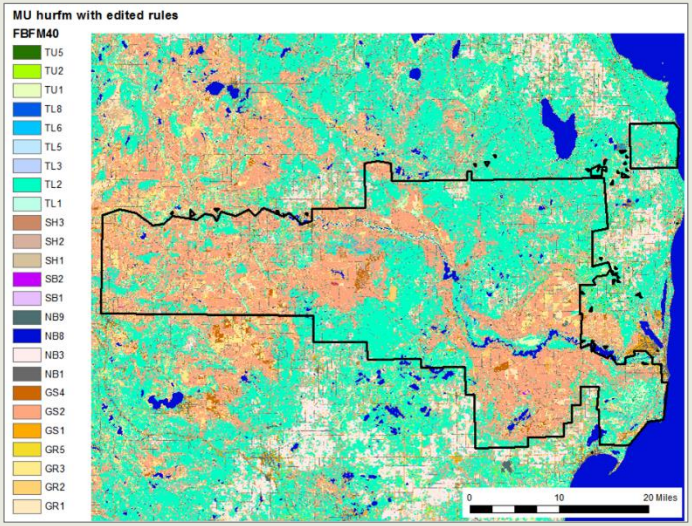


Meaningful changes made to fuel models



Before

After



GR3 to GS2; GS3 to TL2; TU2 to TL2

Huron-Manistee National Forest Summary

- Needed to adjust LANDFIRE Fuels data to help meet management objectives
- Updated input data and fuel rules
- Held fuels calibration workshop, brought in some outside assistance
- Made meaningful adjustments using the LANDFIRE Total Fuels Change Tool

If you want to know more:

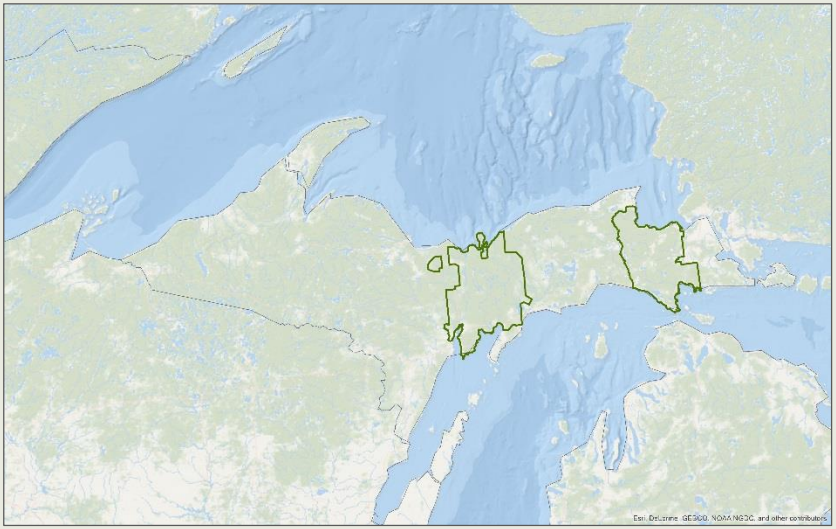
- Megan Sebasky and Persephone Whelan have been super generous in sharing information
- Don Helmbrecht and Kori Blankenship have literally written the guide on modifying LANDFIRE data
- Megan has a Google Group with a post sharing PowerPoint presentations, videos and more

We will be sending out links to all of these resources- we want to help!

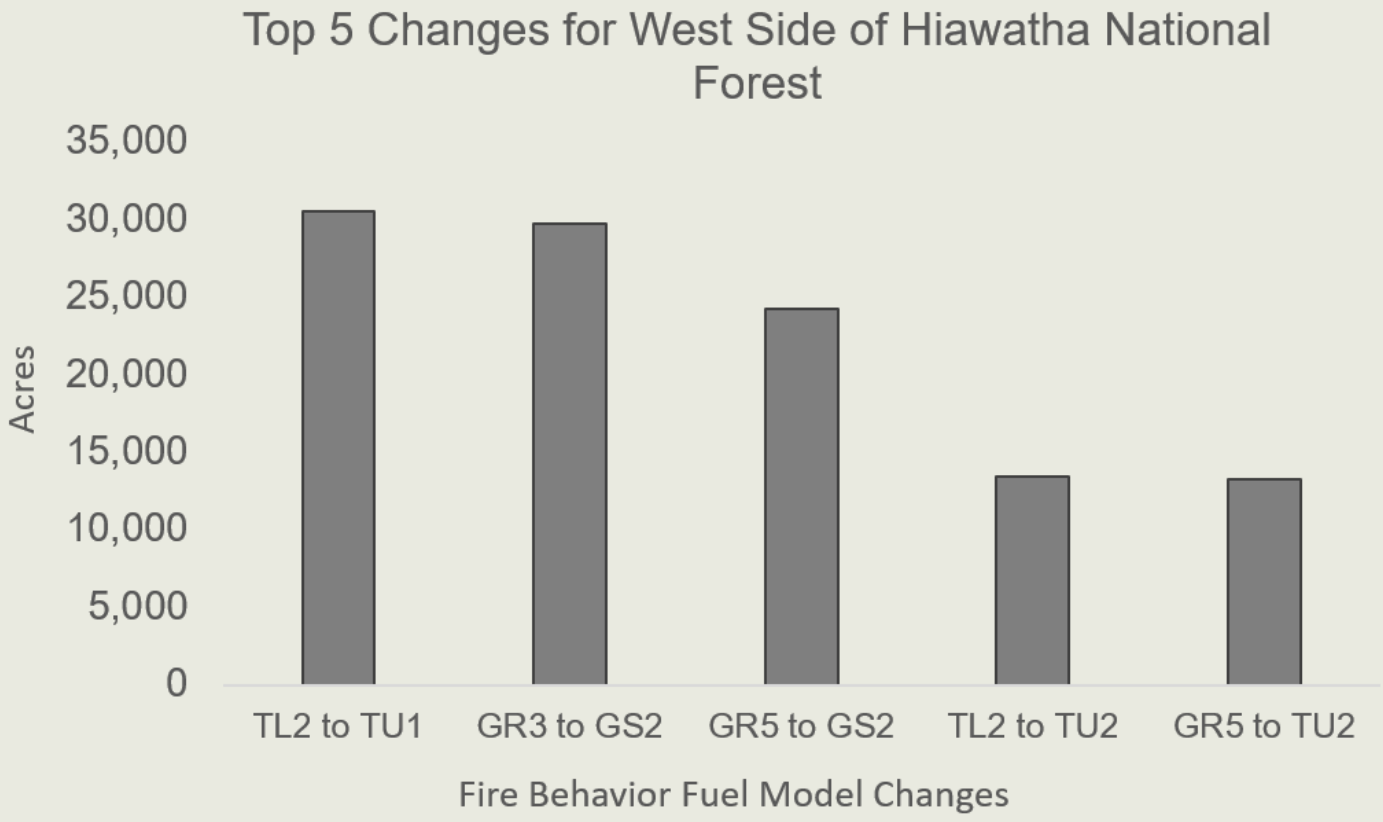
Hiawatha Fuels Assessment

Fuels assessment requires multiple modifications due to objectives:

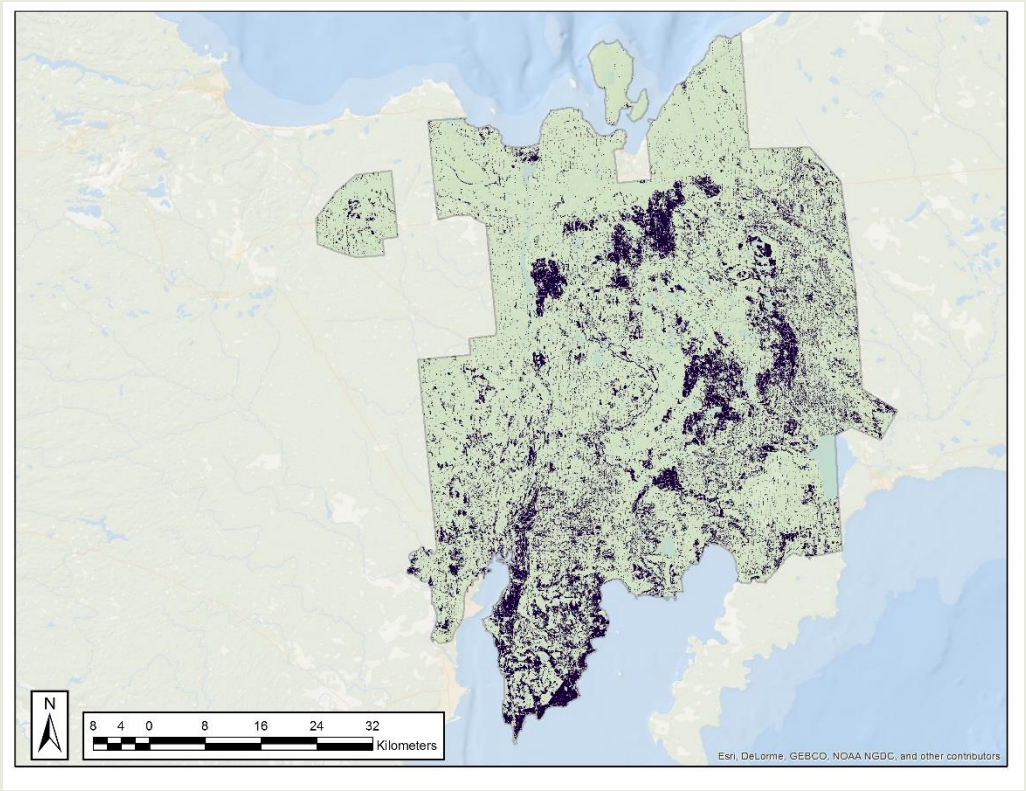
- Modified fuels data
- Modifying Biophysical Settings Data and input models
- Reviewed Existing Vegetation Type, Height and Cover data



Hiawatha Fuels Assessment

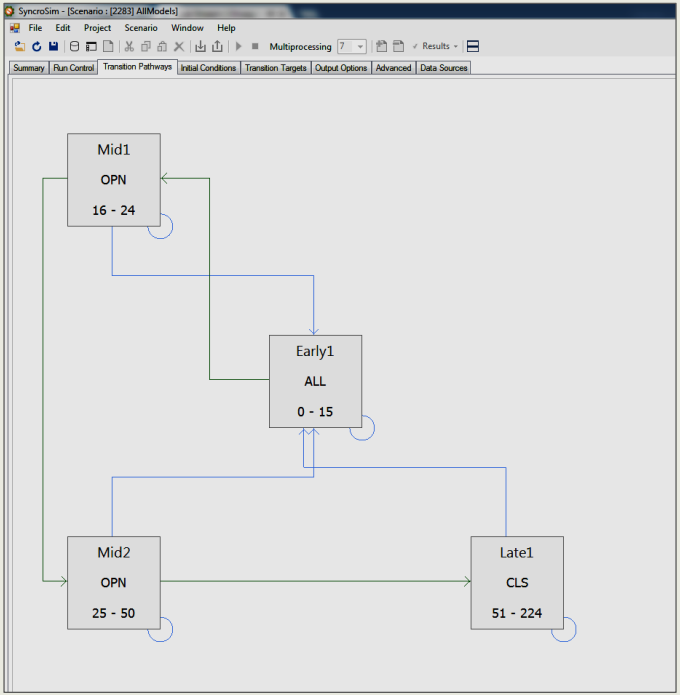


Fuel models changed during assessment



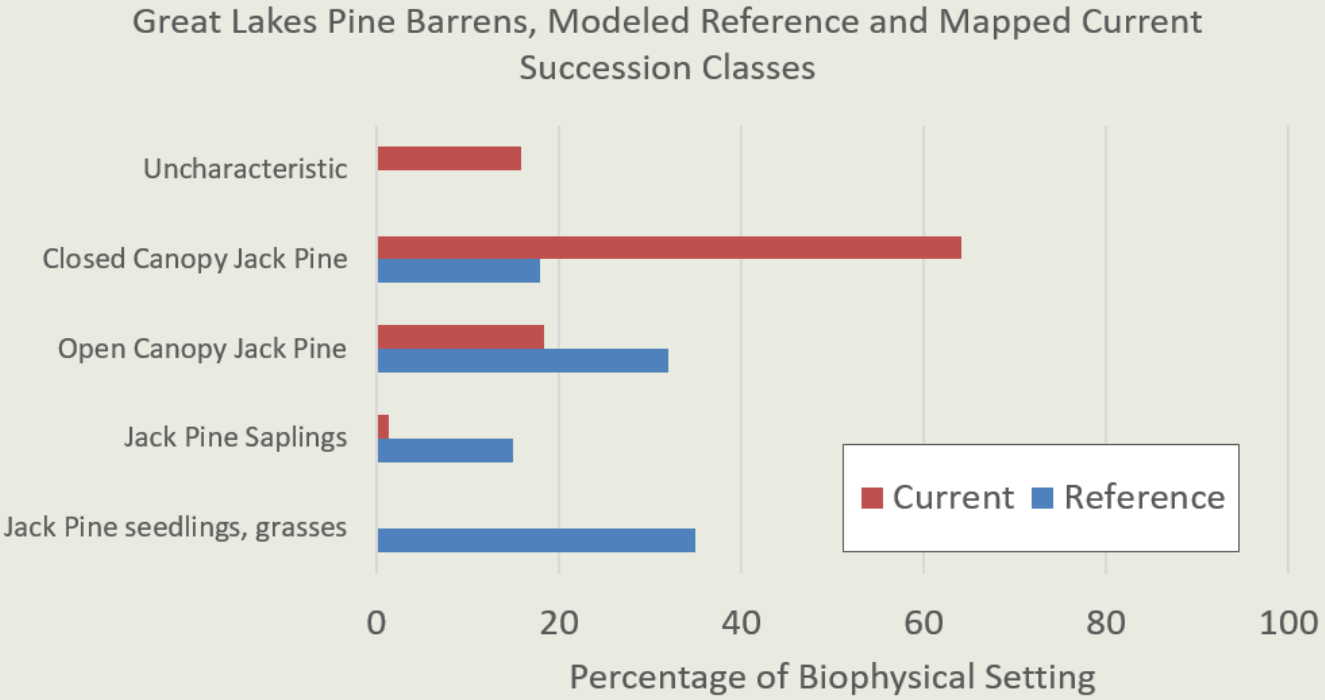
~20% of the west side of the Hiawatha NF changed

Assessment about more than fuels



LANDFIRE uses modeling to estimate “reference” percentages of succession classes

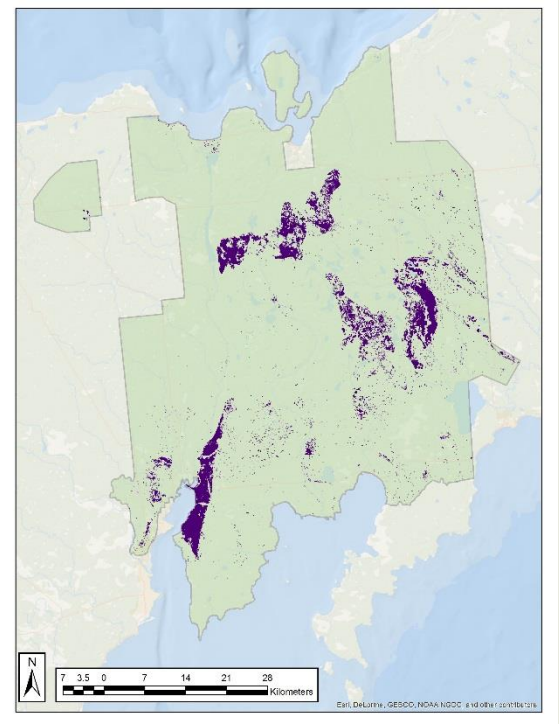
Vegetation Departure Part of the Process



Reviewing Vegetation Departure Inputs

When comparing reference to current:

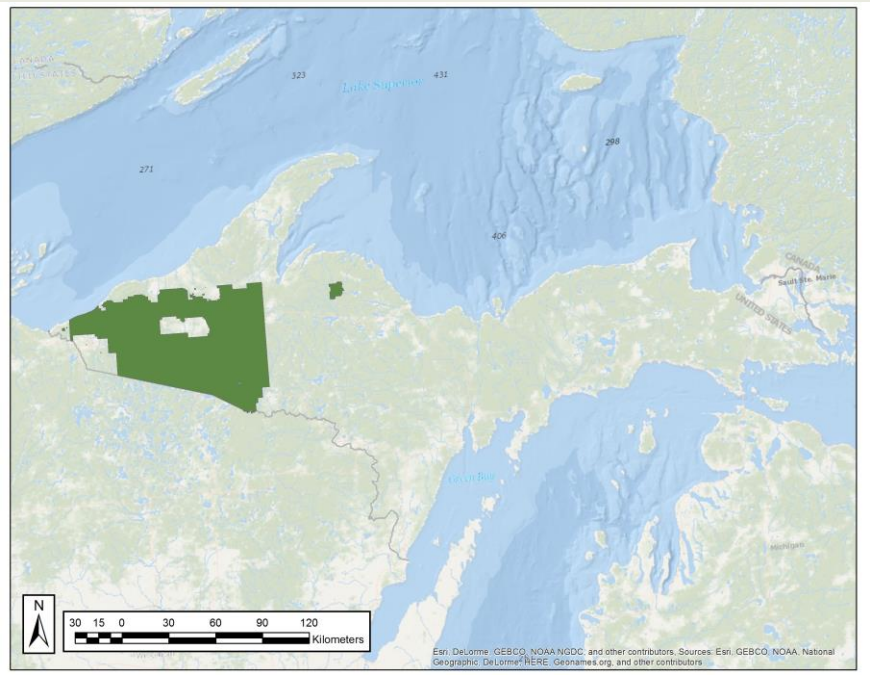
- Hiawatha is refining reference condition models internally and through work with Michigan Technological University and the WI Department of Natural Resources
- Reviewed Existing Vegetation Type, Height and Cover data, which are the inputs to current succession classes
- Need to address the “So what?” question



Hiawatha Fuels Assessment

- The Hiawatha work is in progress
- Multiple stakeholders are participating in process to increase ecological knowledge and improve datasets
- “Rapid Assessment” of Ottawa National Forest fire, fuels and vegetation to begin this summer

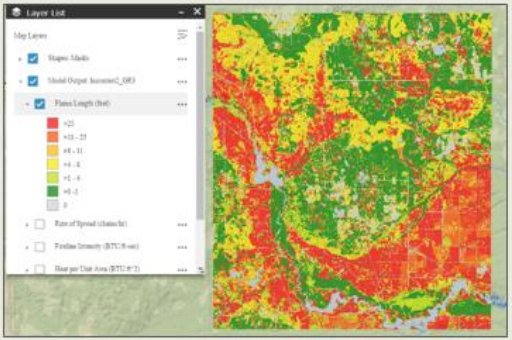
Rapid Assessment of the Ottawa National Forest



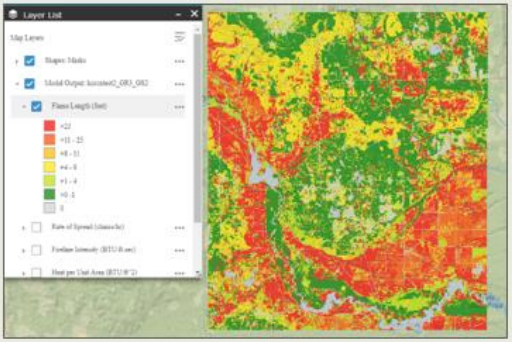
Using base LANDFIRE data we will characterize Vegetation Departure and run FlamMap to assess potential fire behavior

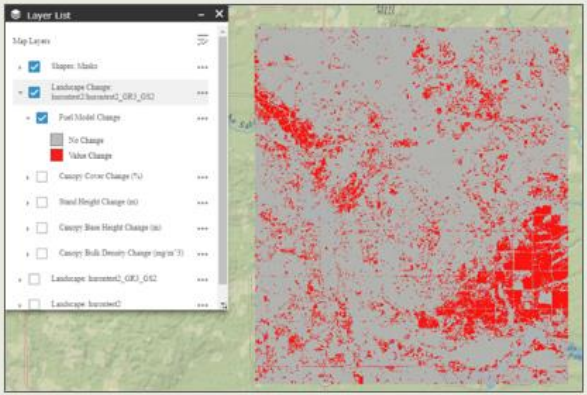
Interagency Fuel Treatment Decision Support System

With GR3



With GS2





Difference in modeled flame length

(made up weather conditions)

Fuels perspective and resources

Adapted from LANDFIRE Business Lead Henry Bastian --

People should view and understand Fire Behavior Fuel Models using FBFM glasses instead of vegetation glasses. Most (far too many) simply look at the pictures in the books and then relate their vegetation to a FBFM. Rather, people should ignore the pictures and focus on the details with the surface and canopy fuels.

- The “compare fuel model” spreadsheets developed by Joe Scott. S-495
- Geospatial Fire Analysis, Interpretation & Application Self Study 2017
- Introduction to the 40 Fire Behavior Fuel Models

Feedback

E-mail: helpdesk@landfire.gov

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