Modifications of initial fire models based on local expertise of TNF specialists.

Translating SPLATs from a theoretical to a real world landscape

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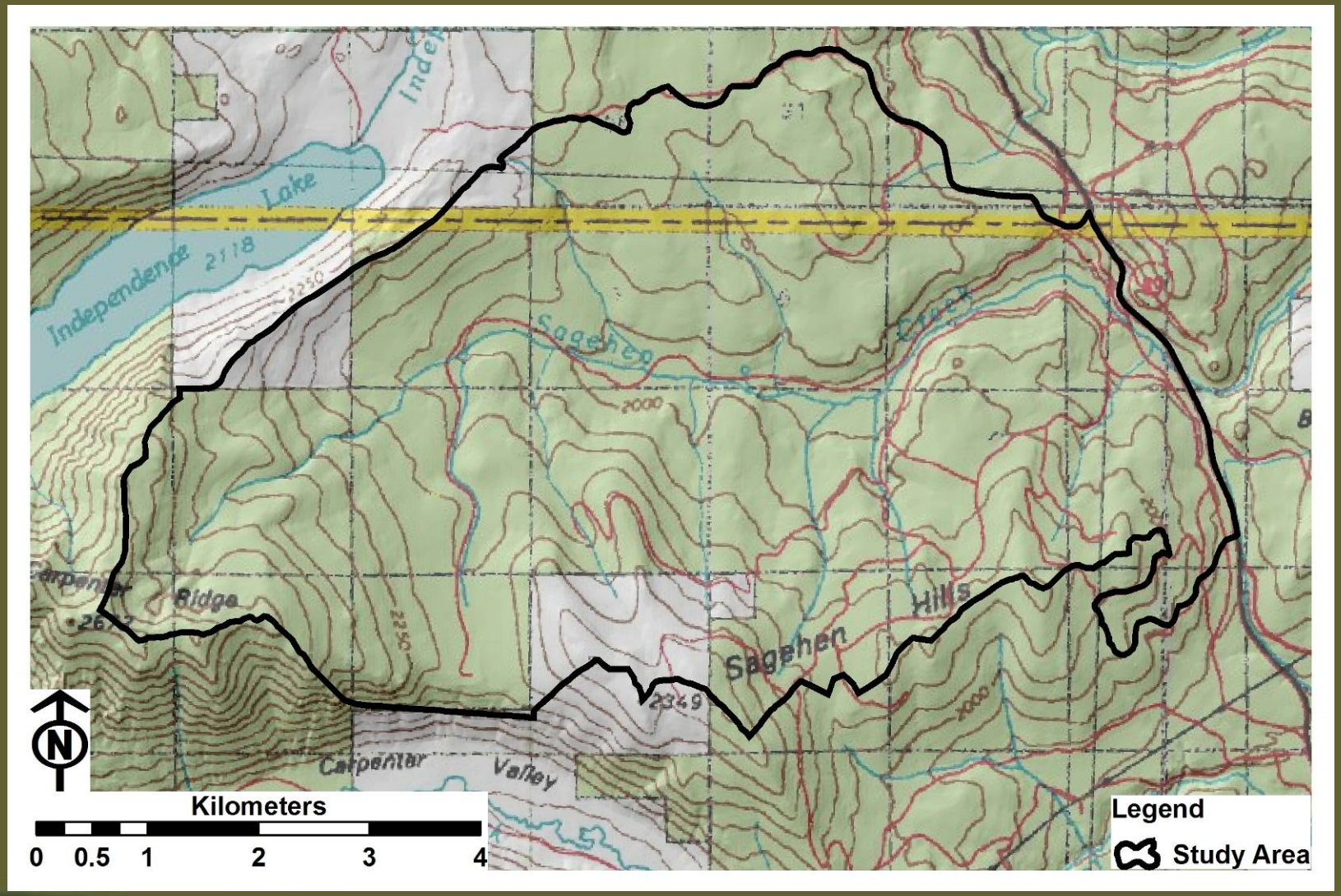
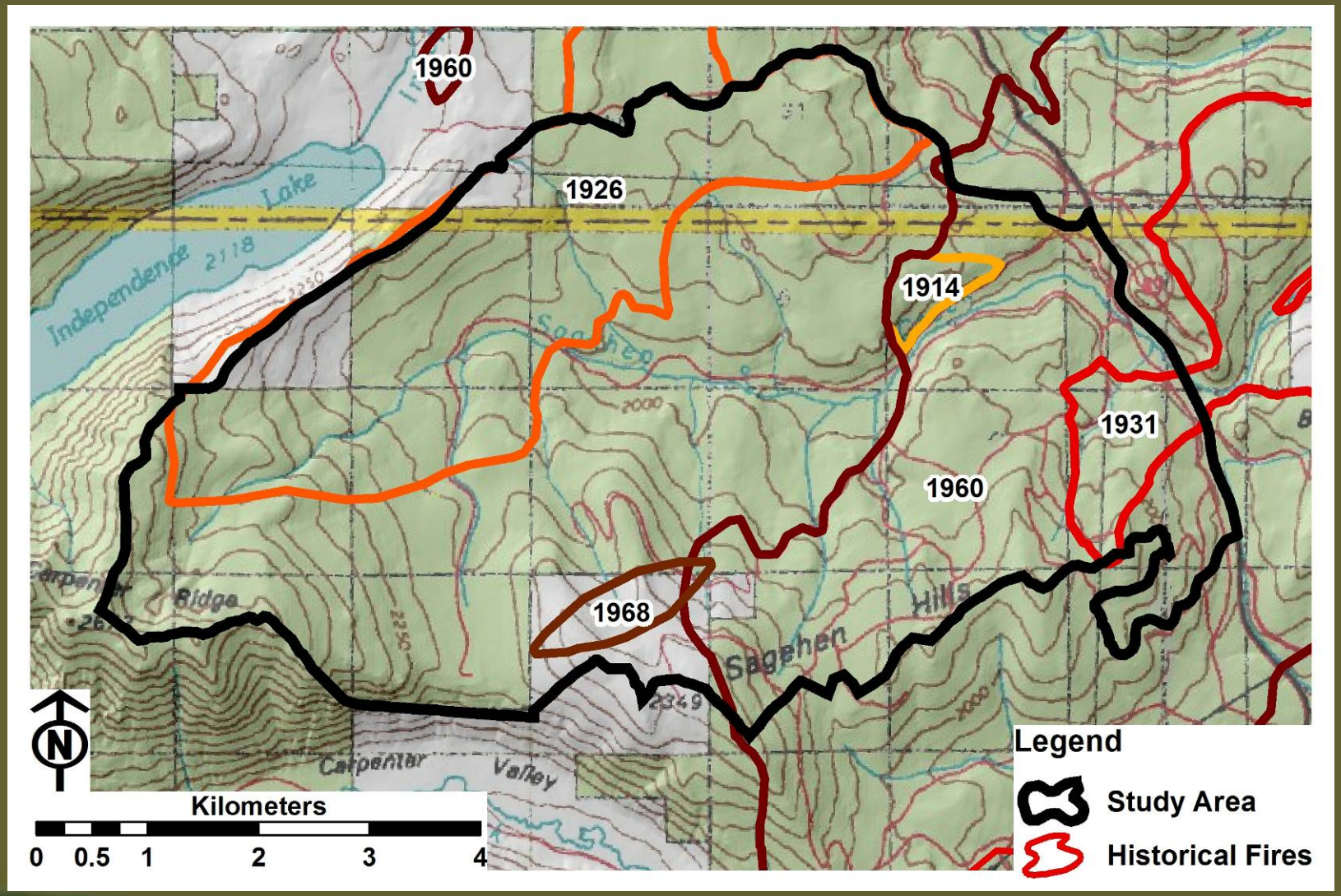
Gary B. Roller

10/30/2006

A) Study Area


Lake
Independence
2118
2250
Sagehen
Creek
2000
Carpenter
Ridge
2250
Sagehen
Hills
2349
2000
Carpenter
Valley
N
Kilometers
0
0.5
1
2
3
4
Legend
Study Area

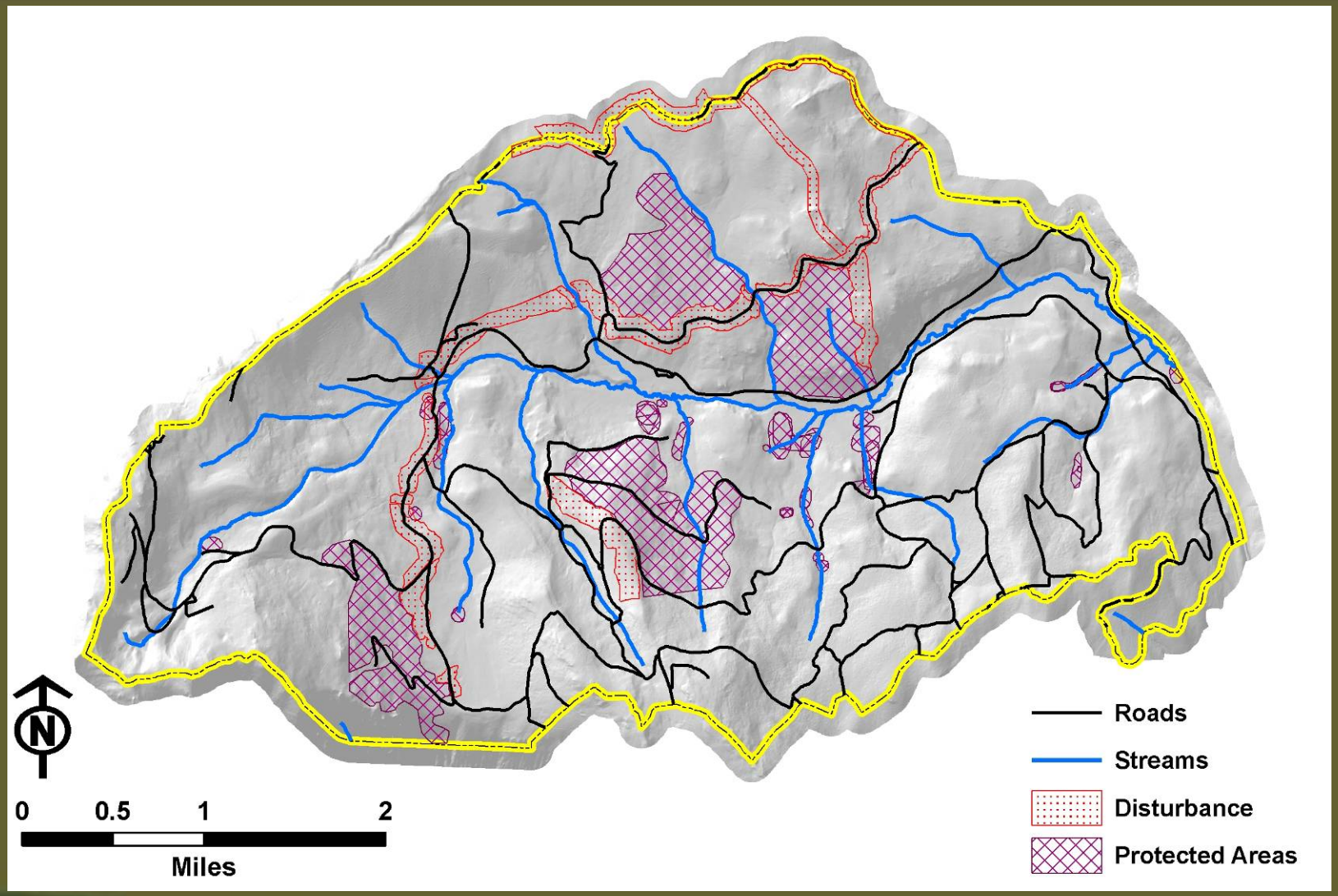
Fire History



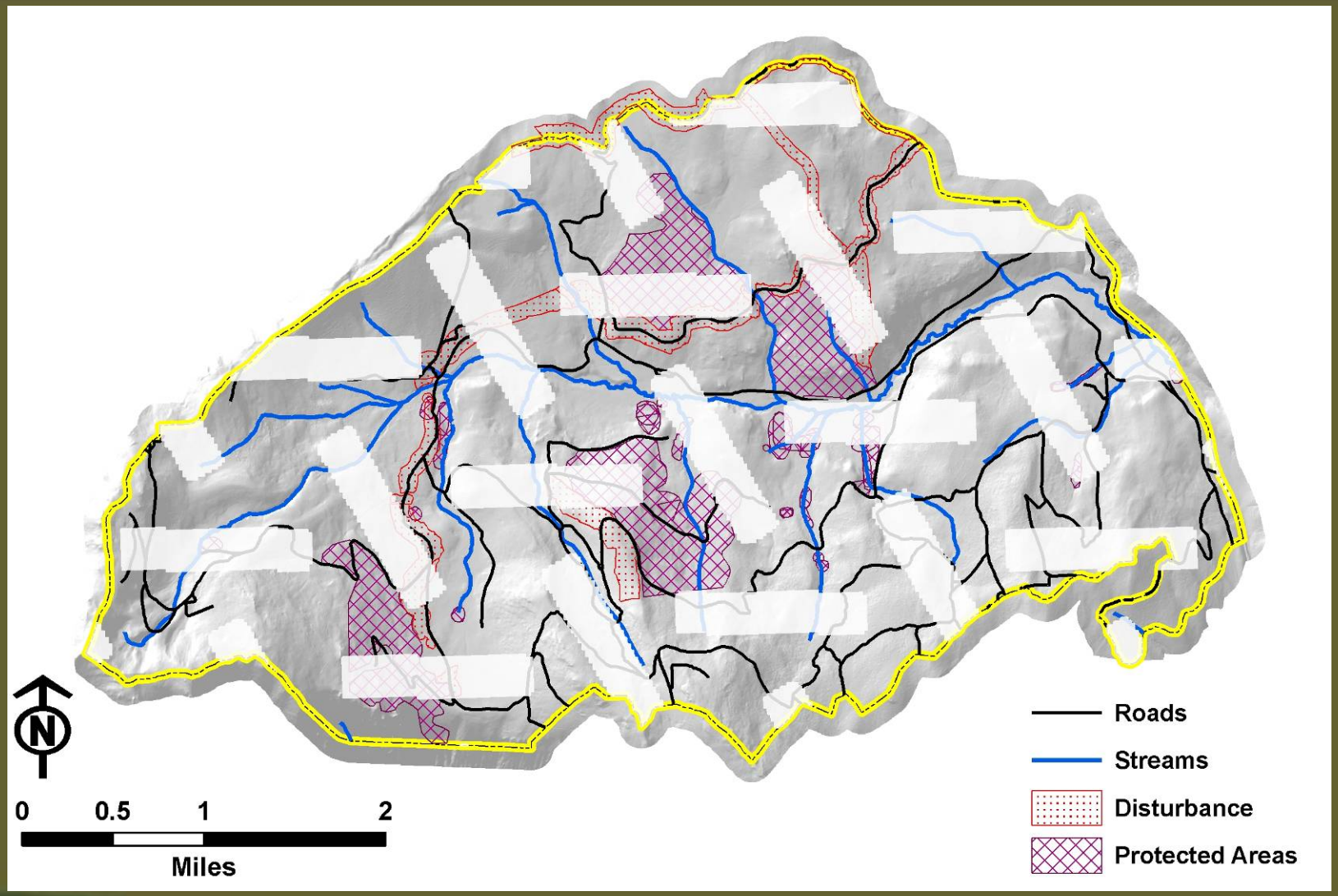
B) Strategically PLaced Area TreatmentS

- SPLATs are blocks of land, ranging from 25 to 195 acres, where the vegetation has been treated to reduce fuel loading.
- The treatment areas are placed so that a spreading fire does not have a clear path of untreated fuels from the bottom of the slope to the ridgetop.
- Local fire managers considered historic fire regimes and the potential for severe wildfires (based on fuel loading, prevailing wind direction, and terrain features) in deciding where to place area treatments.
- The spatial pattern of the treated areas is designed to reduce rates of fire spread and reduces fire intensity at the head of the fire.

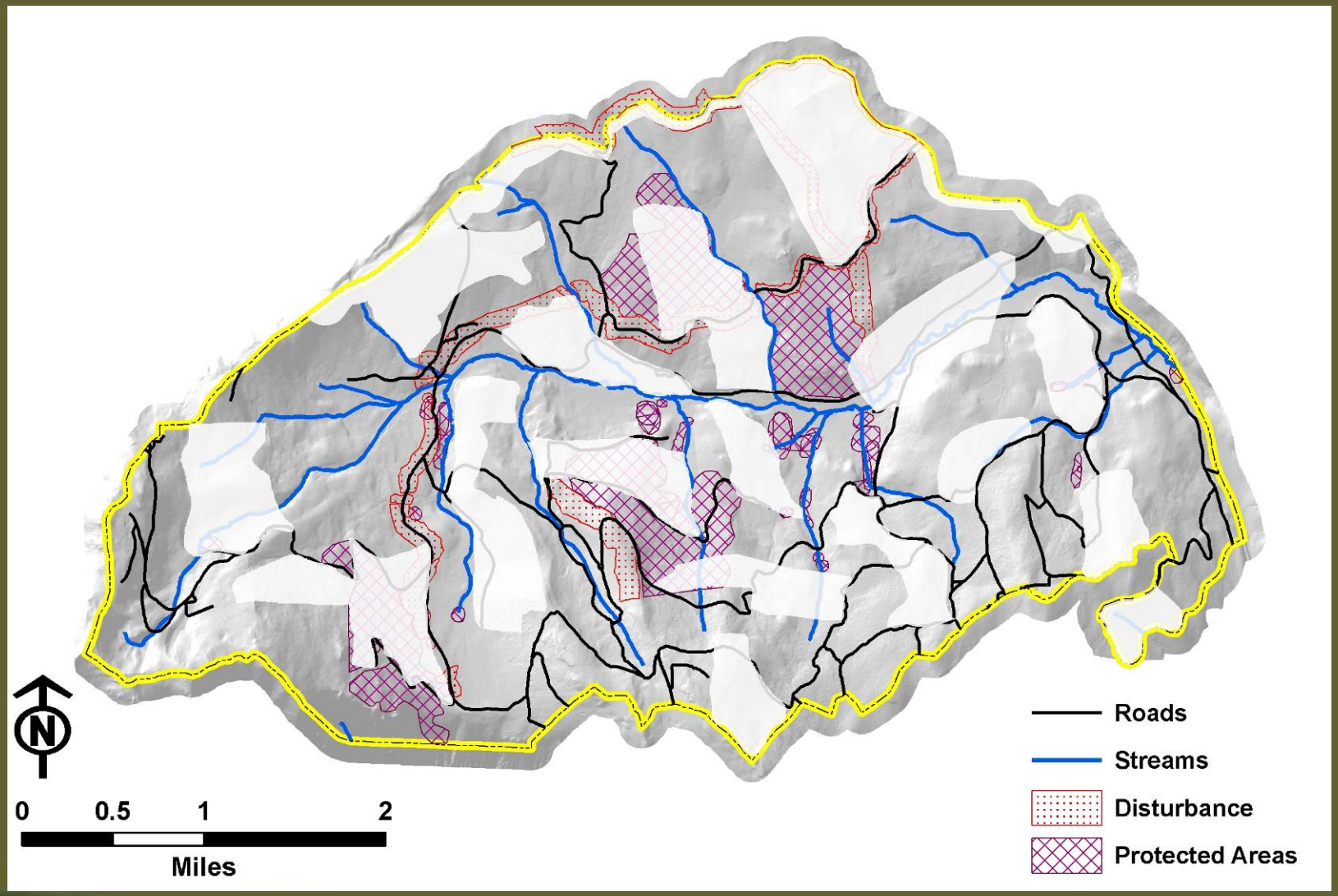
SPLAT: Landscape



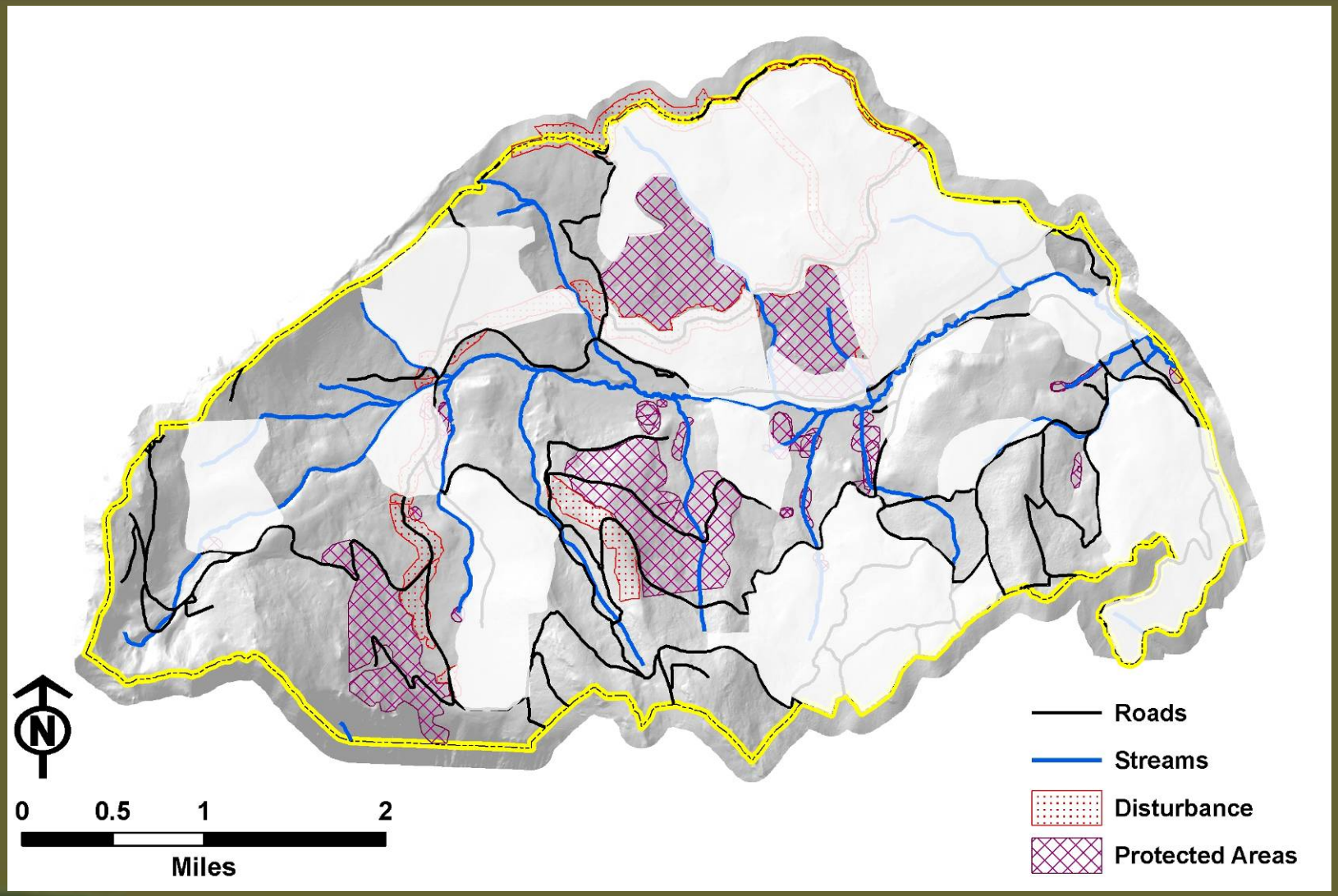
SPLAT: Finney



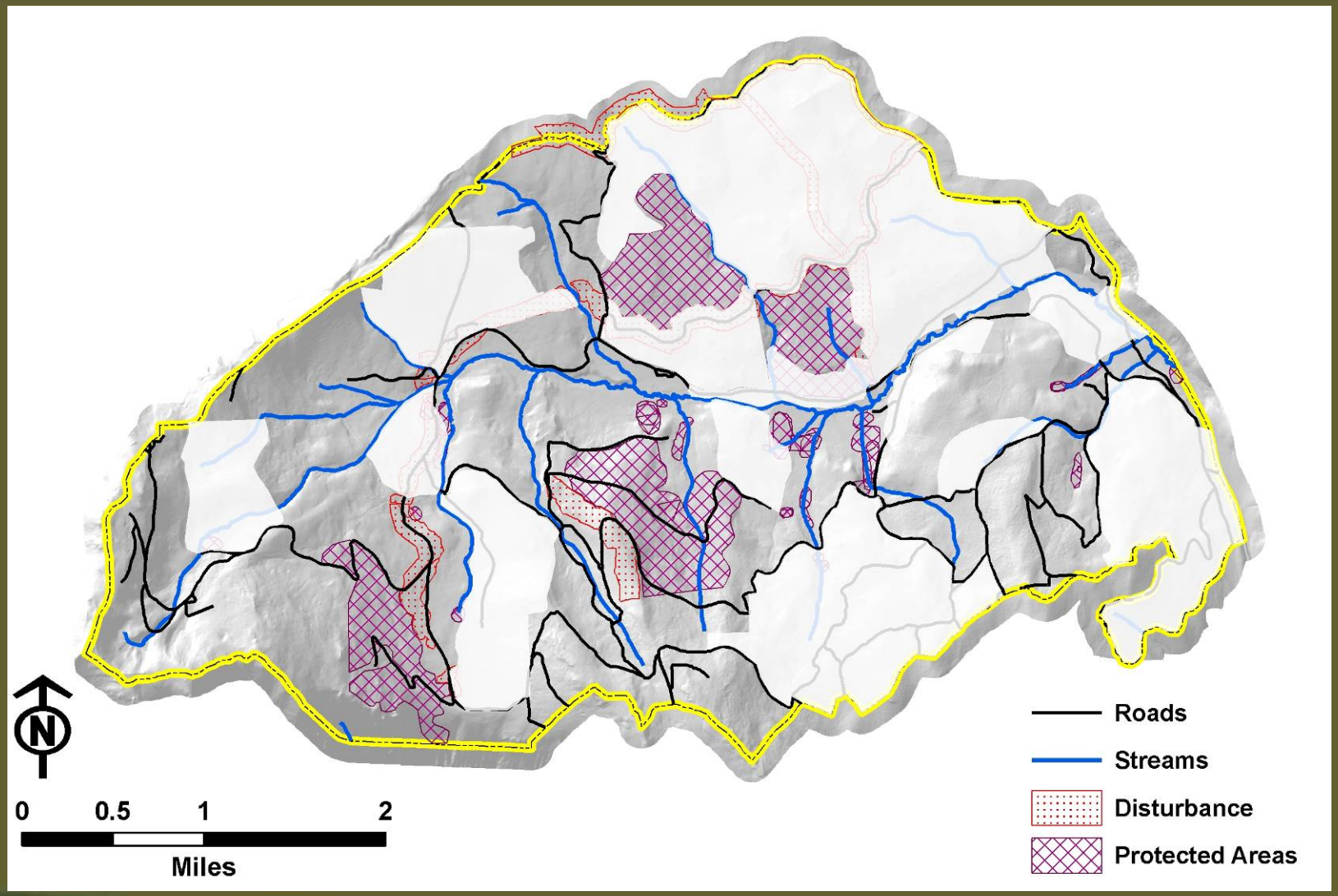
SPLAT: Modification 1



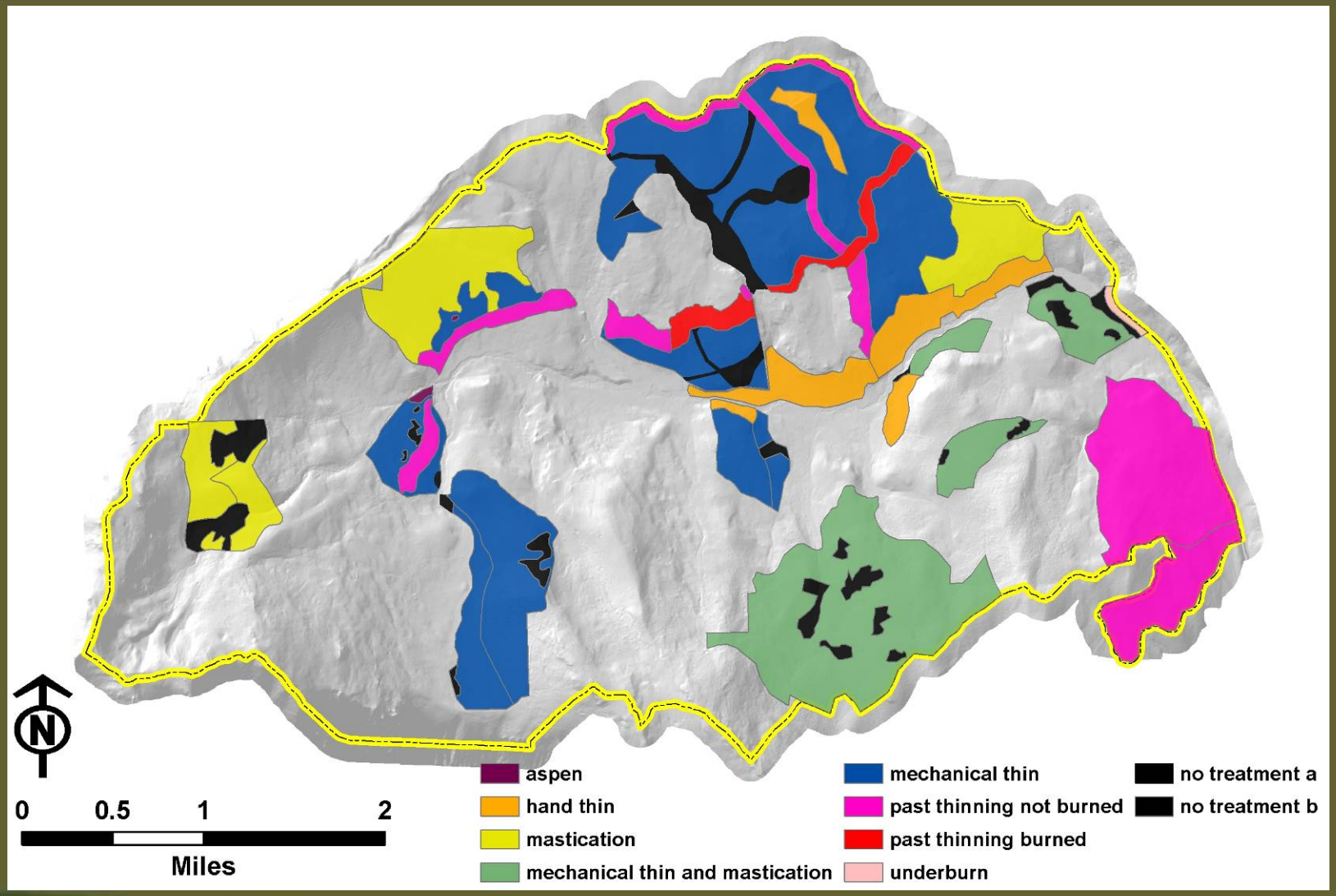
SPLAT: Modification 2



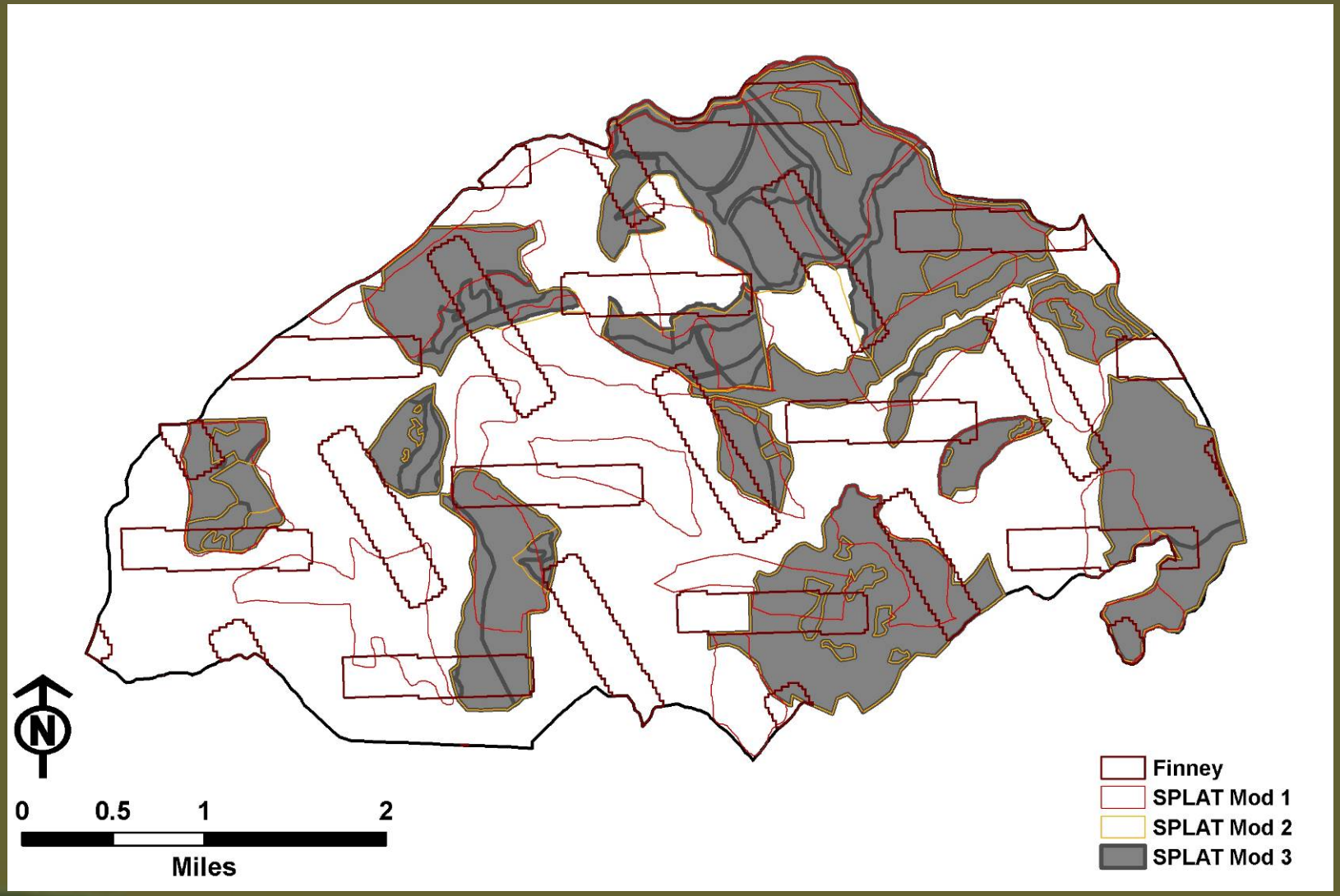
SPLAT: Modification 3



SPLAT: Modification 3 Details



SPLAT: Comparison



B) Fire Modeling

Crown Fire Activity
1 (surface)
2 (torching)
3 (active crown)

Flame Length
(m)

Heat/Unit Area
(kJ/m^2)

Rate of Spread
(m/min)

Landscape File

Custom Fuel Model

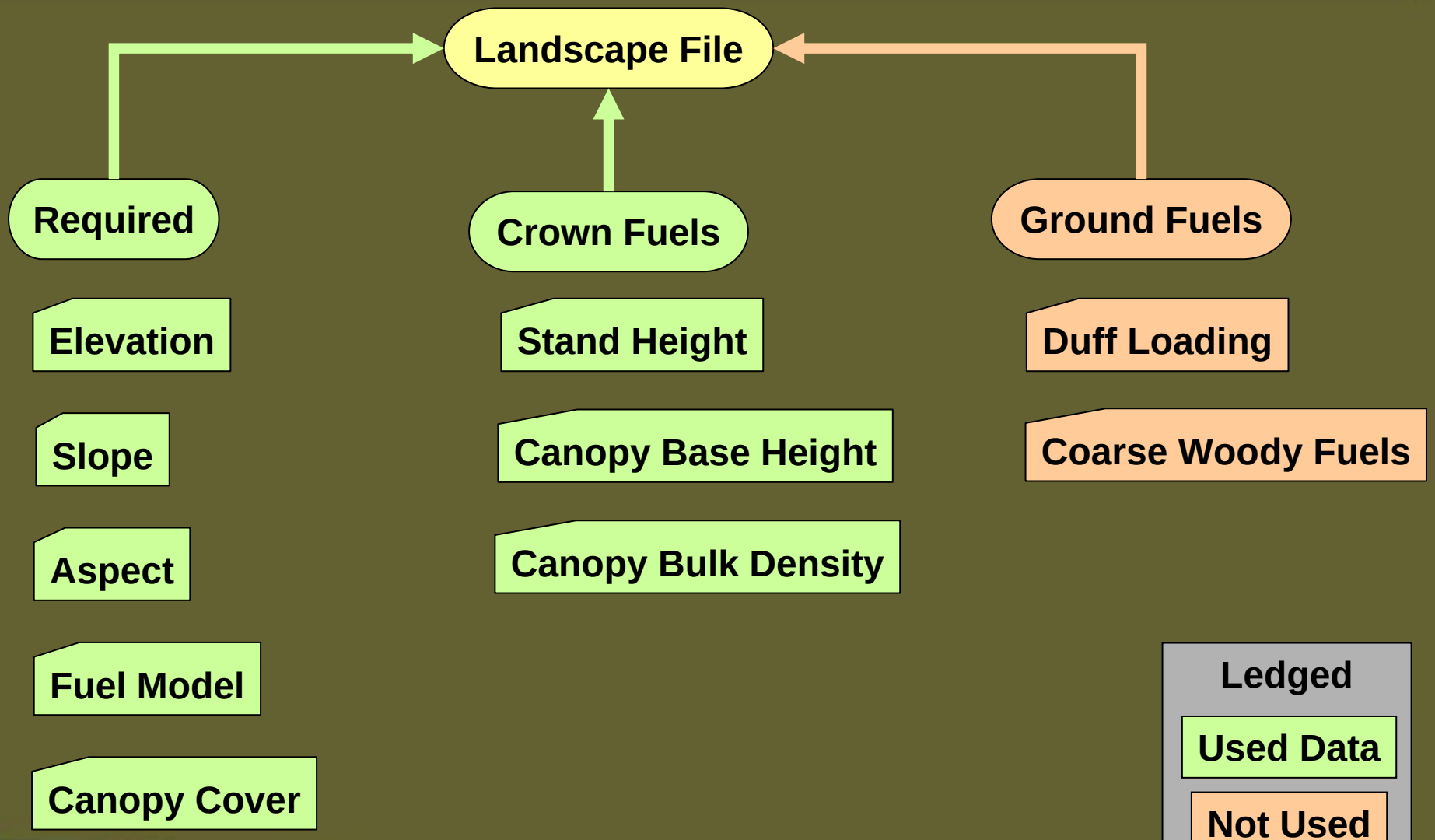
Weather File

Wind File

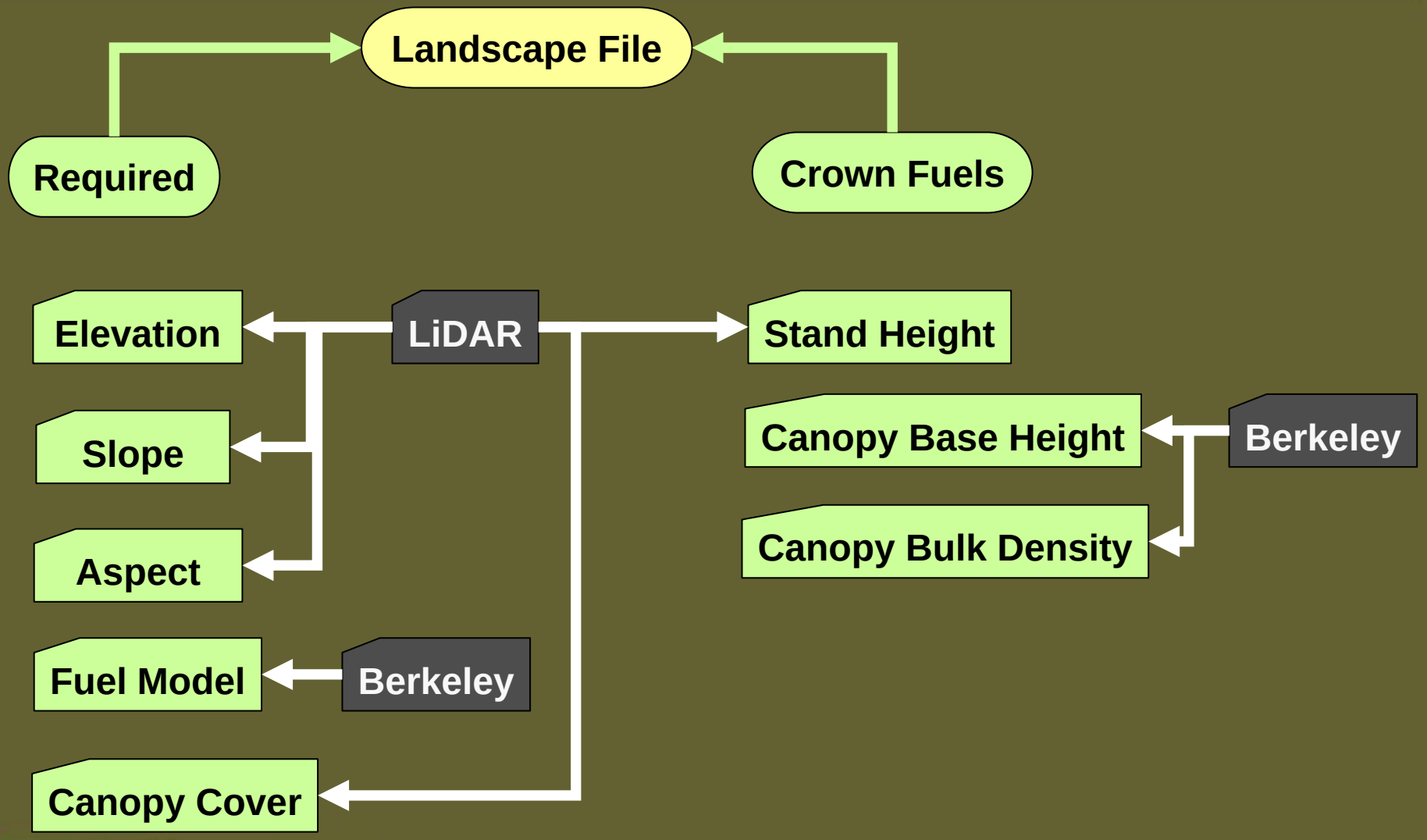
FIELD DATA

RAWS

Input: Landscape File Flowchart



INPUT Data Sources



Landscape (LCP) File Generation

Load Source LCP File | C:\SAGEHEN\4_FlamMap...\SAGEHEN_USF.lcp | Clear Fields | Save as LCP | Help

General

Latitude:	40	Grid Distance Units:	Meters		
Rows:	640	Lower Left X:	-27389	CellSize:	10
Columns:	1043	Lower Left Y:	153952		

Required Themes

	Source	Use LCP	Source Units	Constants	
Elevation:	C:\SAGEHEN\4...\ned_elev_ft.asc	☐	Feet	☐ Constant:	0
Slope:	C:\SAGEHEN\...\ned_slope_p.asc	☐	Percent	☐ Constant:	0
Aspect:	C:\SAGEHEN...\ned_aspect_d.asc	☐	Degrees	☐ Constant:	0
Fuel Model:	C:\SAGEHEN\4_Flam...\fmod.asc	☐	Custom	☐ Constant:	1
Canopy Cover:	C:\SAGEHEN\4_Fl...\cc_sda1.asc	☐	Percent	☐ Constant:	50

Crown Fuels

Include Crown Fuels ☑

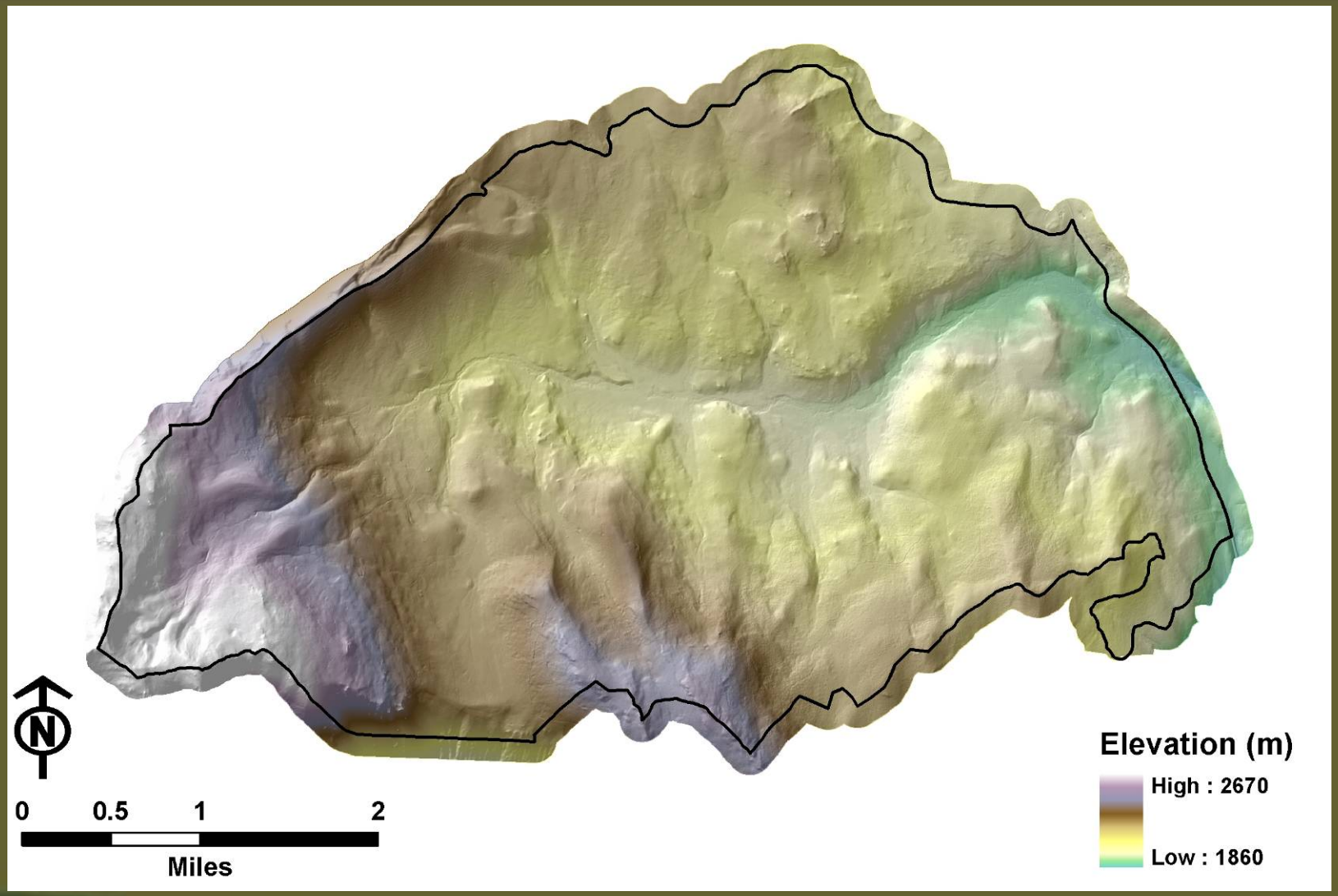
Stand Height:	C:\SAGEHE...\stand_height_m.asc	☐	Meters	☐ Constant:	15
Canopy Base Height:	C:\SAGEHEN\4...\cbh_sda_m.asc	☐	Meters	☐ Constant:	1
Canopy Bulk Density:	C:\SAGEH...\cbd_sda_kg_m3.asc	☐	kg/m3	☐ Constant:	0.2

Ground Fuels

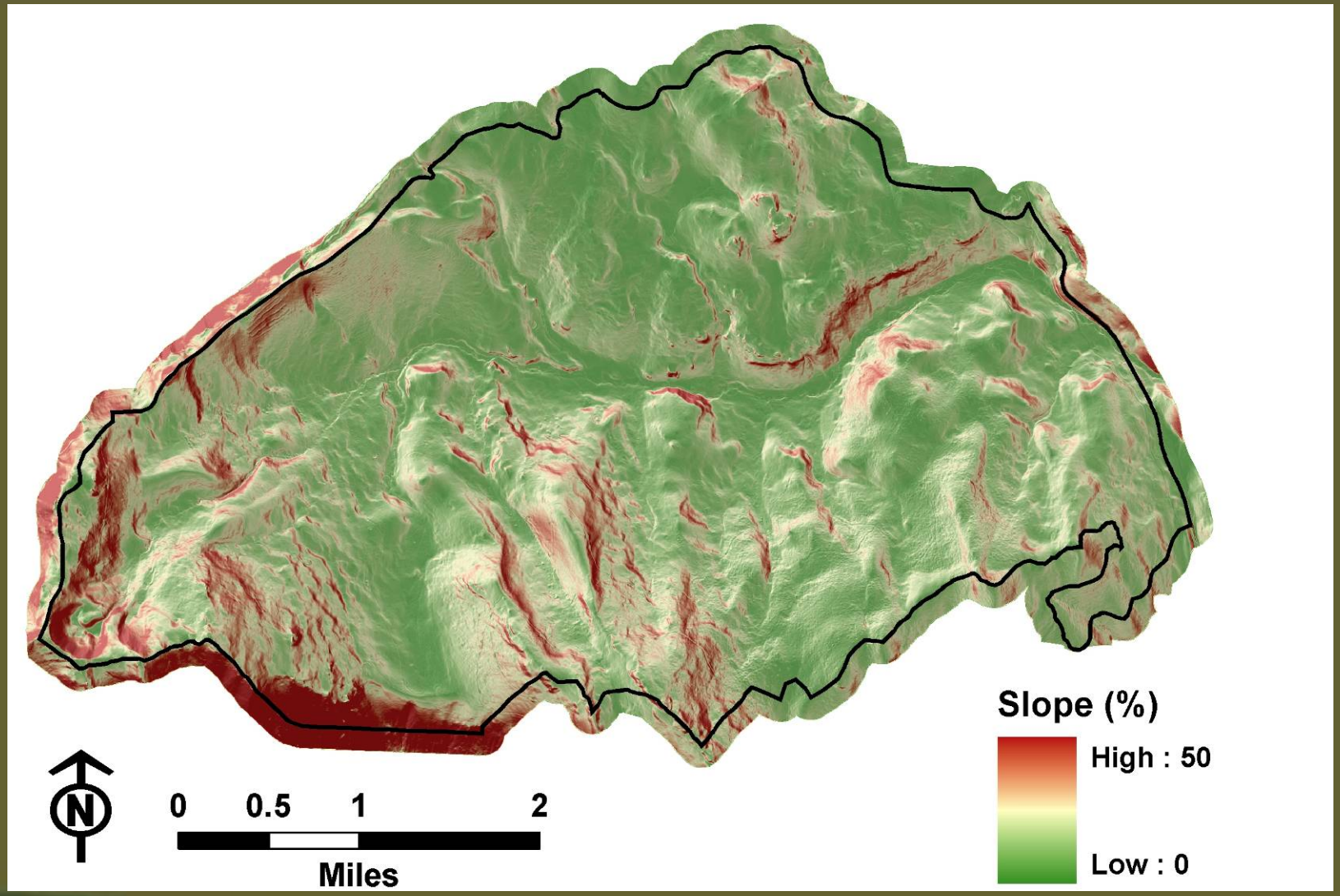
Include Ground Fuels ☐

Duff Loading:	NA	☐	Mg/Ha	☐ Constant:	50
Coarse Woody Fuels:	NA	☐	Class	☐ Constant:	50

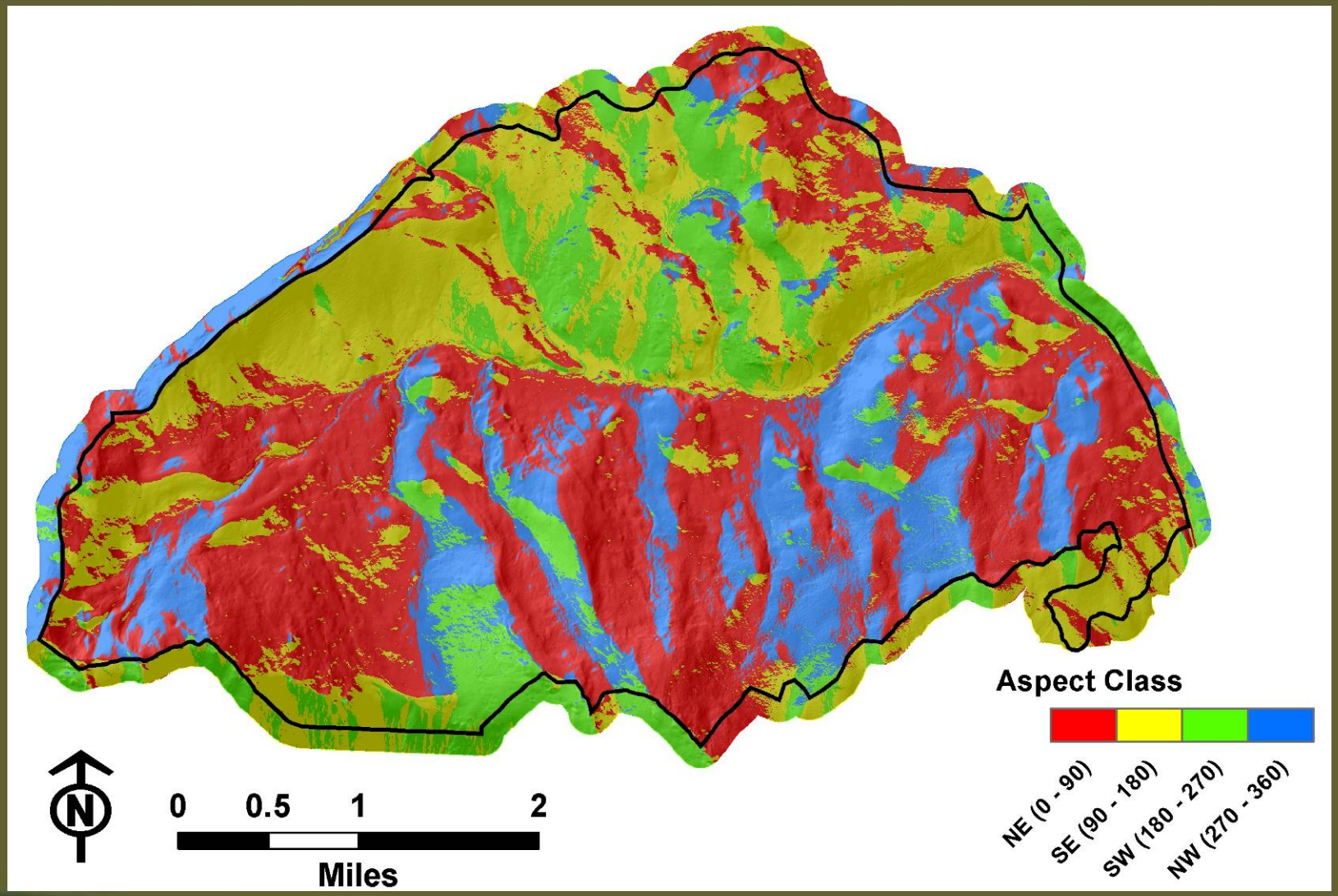
LiDAR: Elevation (meters)



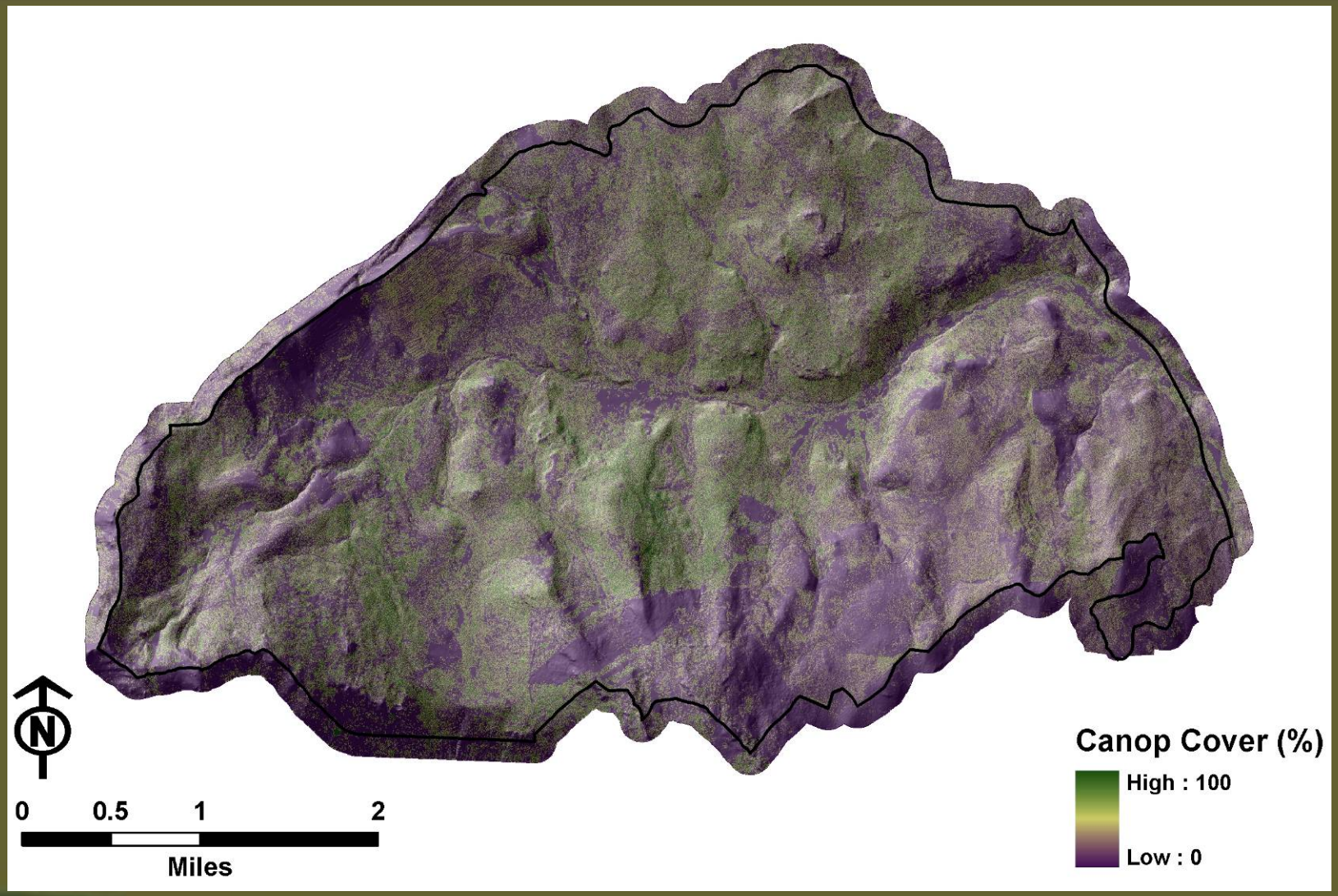
LiDAR: Slope (Percent)



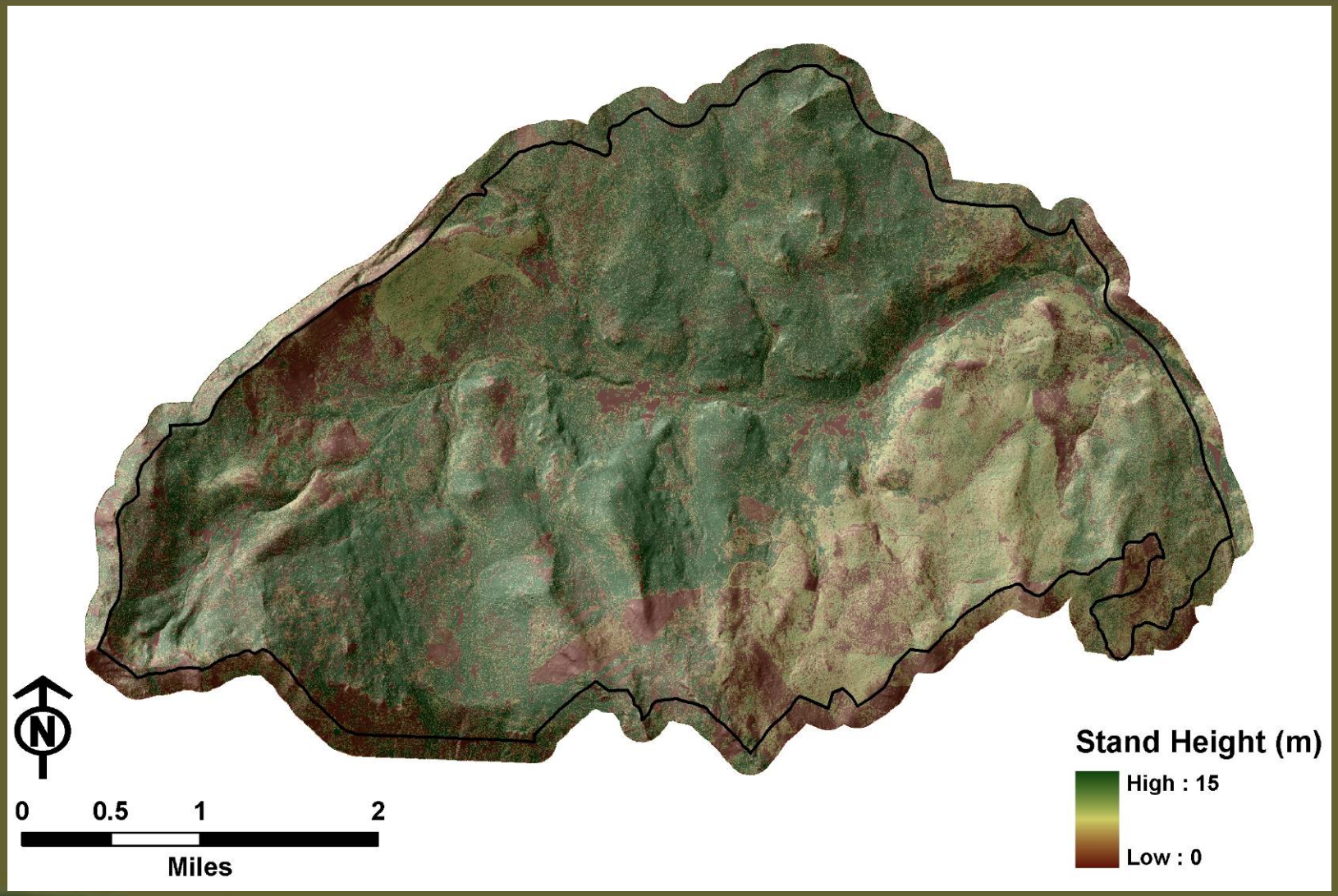
LiDAR: Aspect (Degrees)



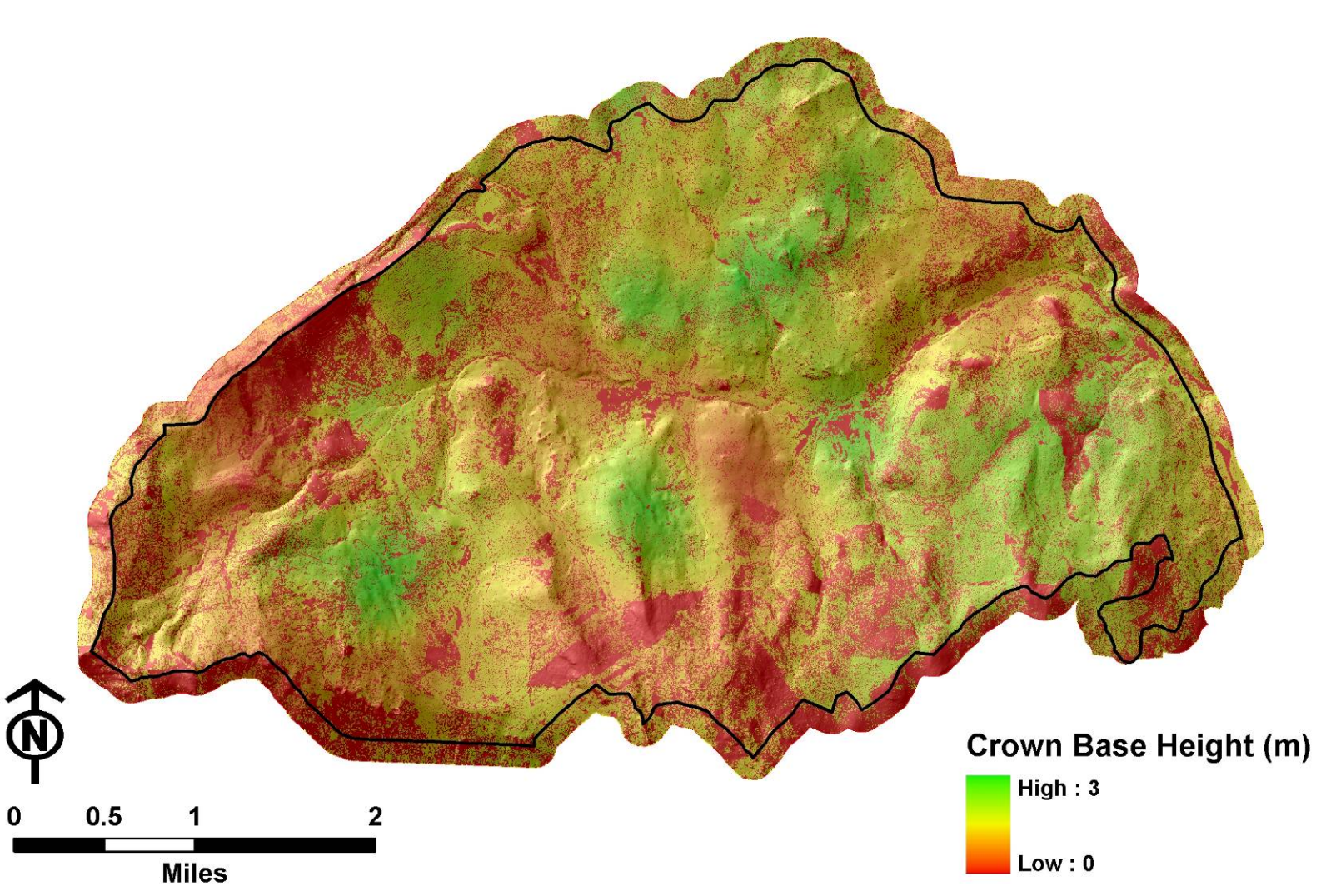
LiDAR: Canopy Cover (Percent)



USFS: Stand Height (meters)



USFS: Canopy Base Height (1sd) (m)

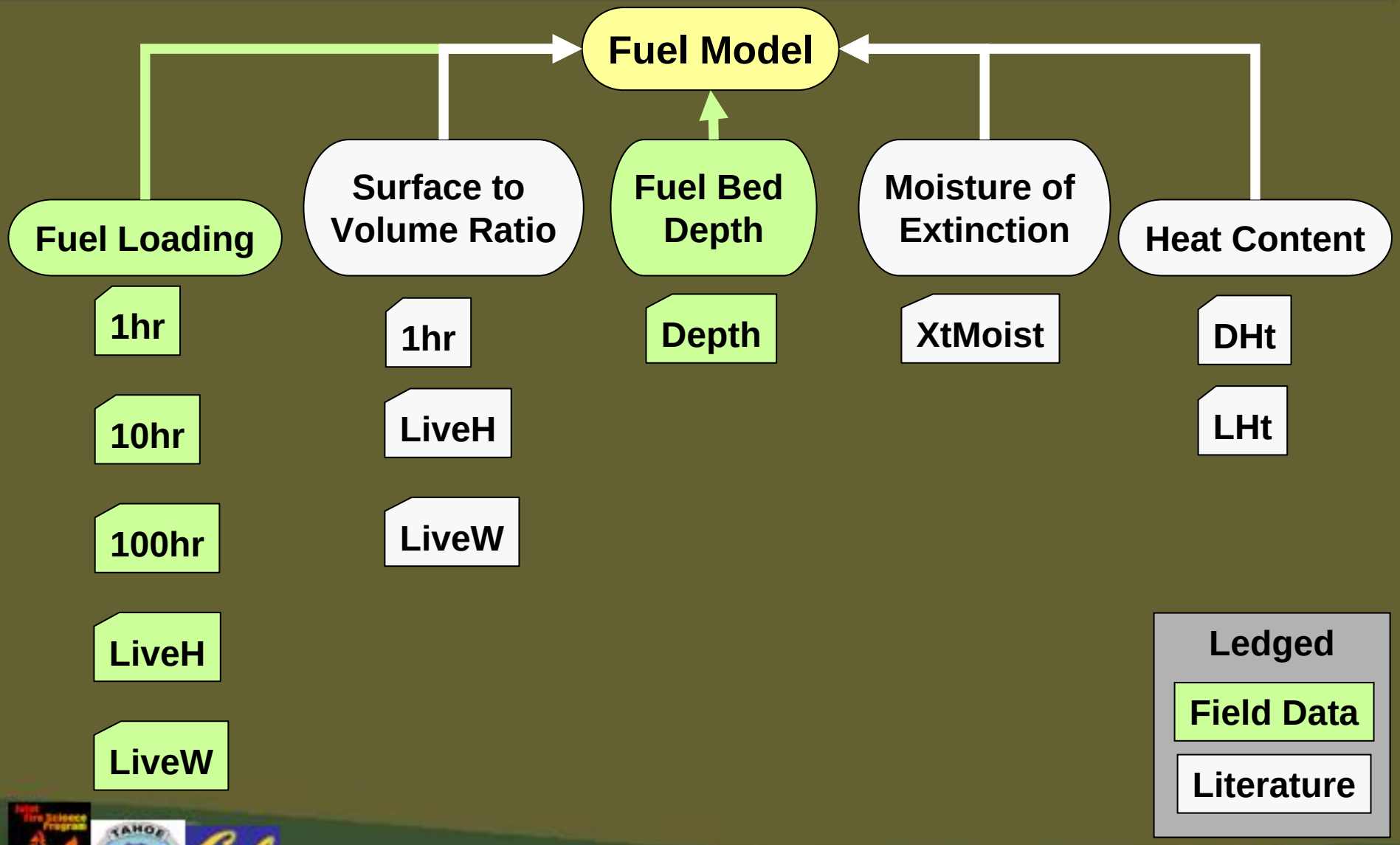


USFS: Canopy Bulk Density

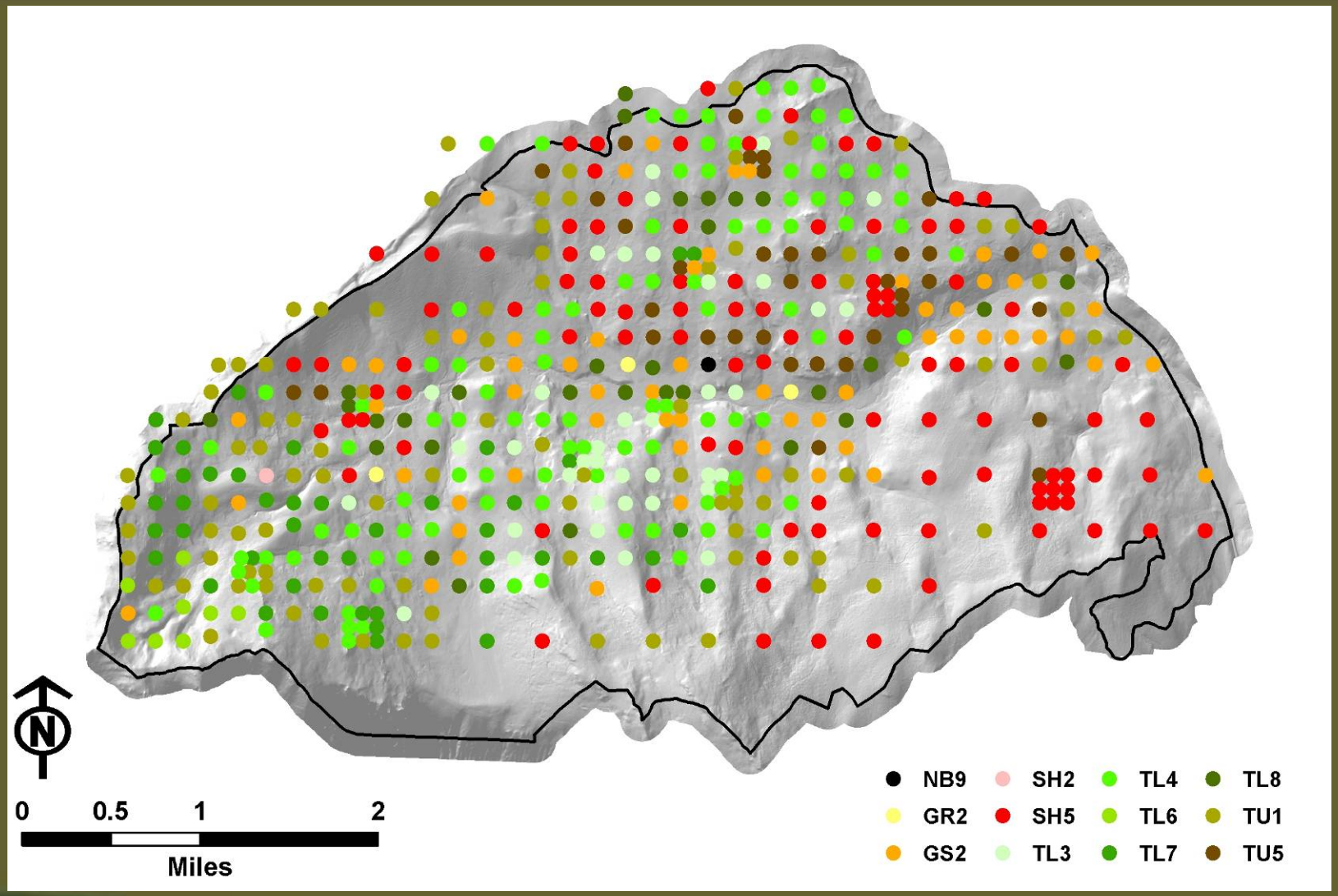
0.2 kg/ha

Fuel Model

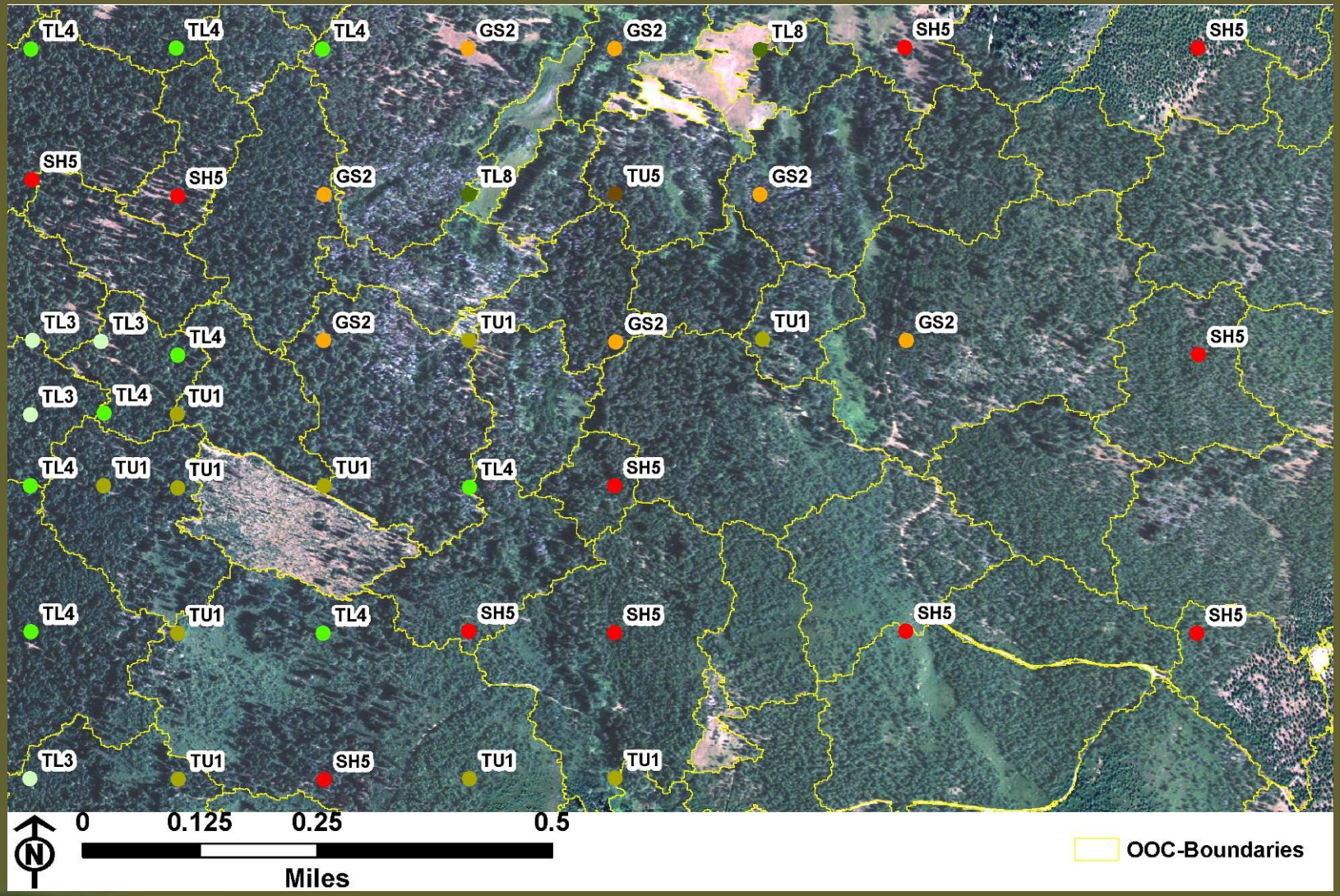
FUEL MODEL


Fuel Model
Fuel Loading
Surface to Volume Ratio
Fuel Bed Depth
Moisture of Extinction
Heat Content
1hr
10hr
100hr
LiveH
LiveW
1hr
LiveH
LiveW
Depth
XtMoist
DHt
LHt
Ledged
Field Data
Literature

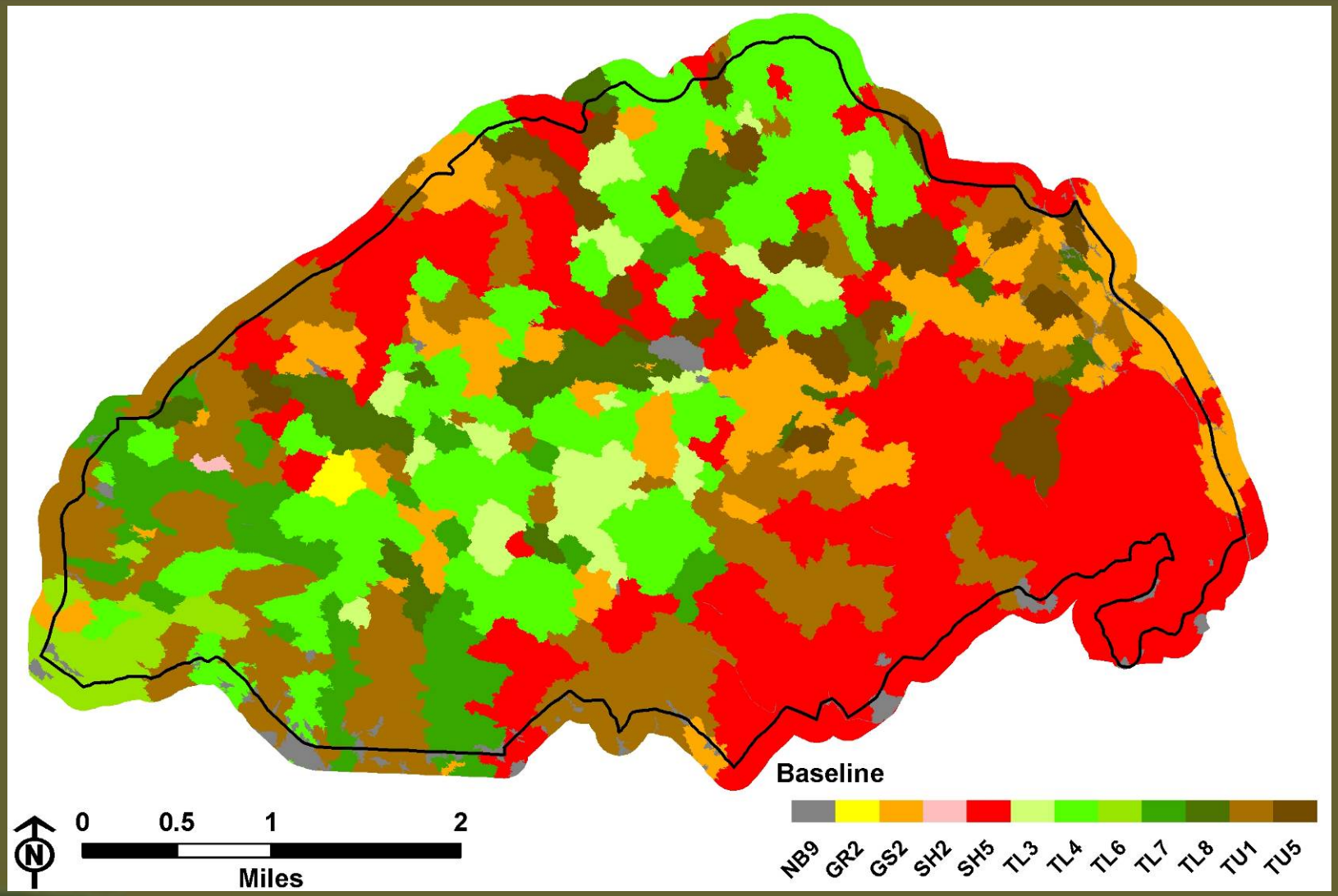
Berkeley: Fuel Field Data



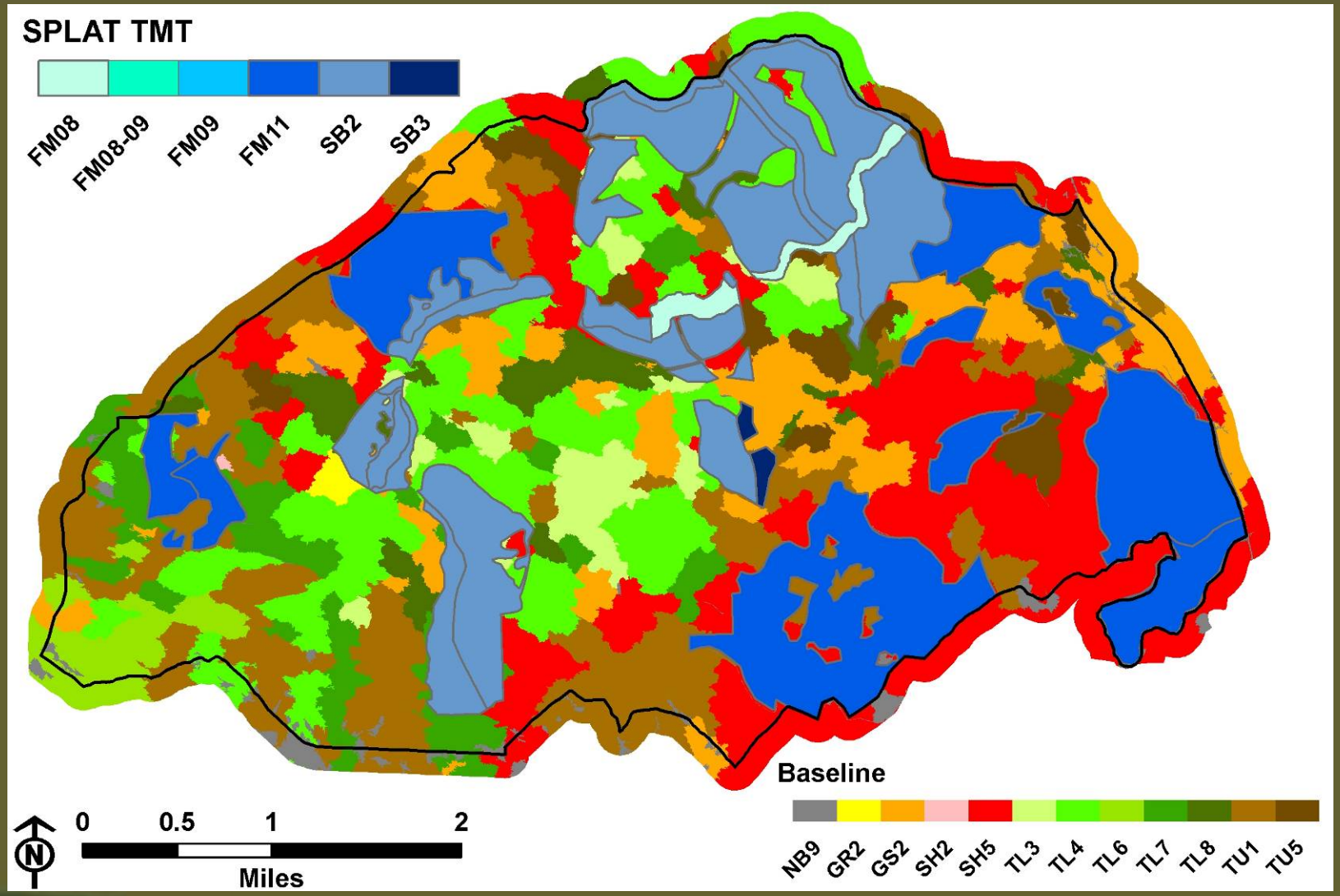
Vegetation Segmentation



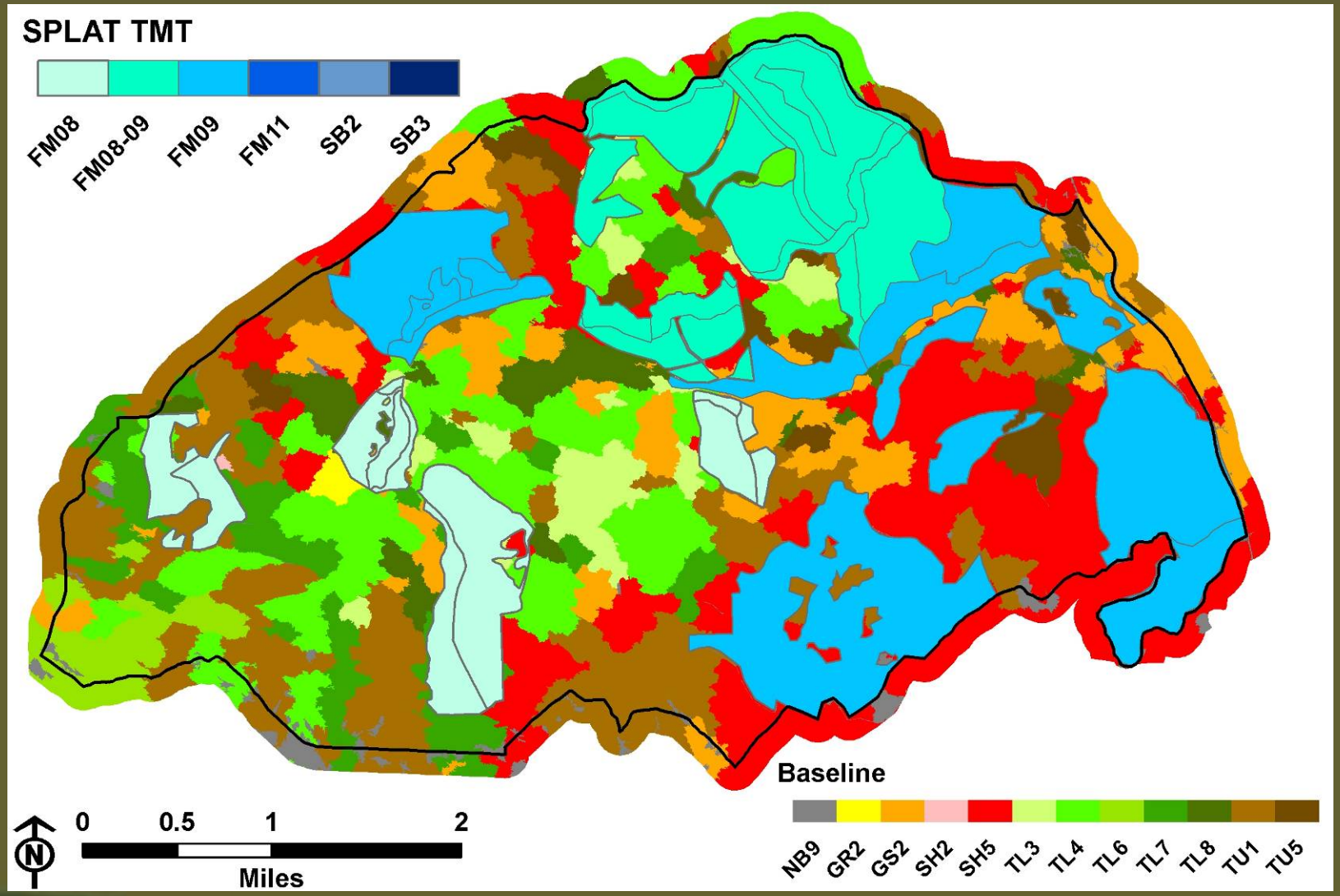
Fuel Model – Baseline



Fuel Model – SPLAT Mid TMT



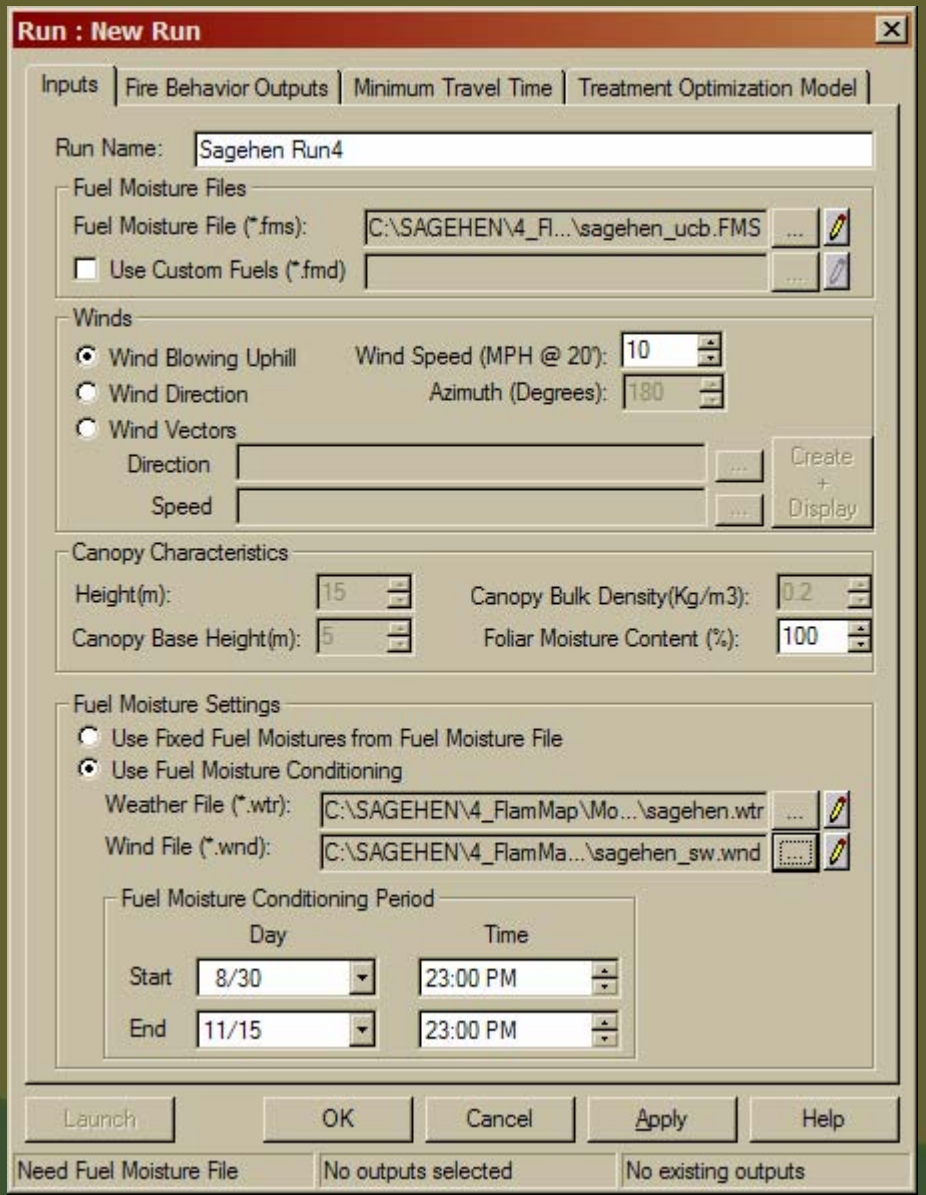
Fuel Model – SPLAT Final TMT



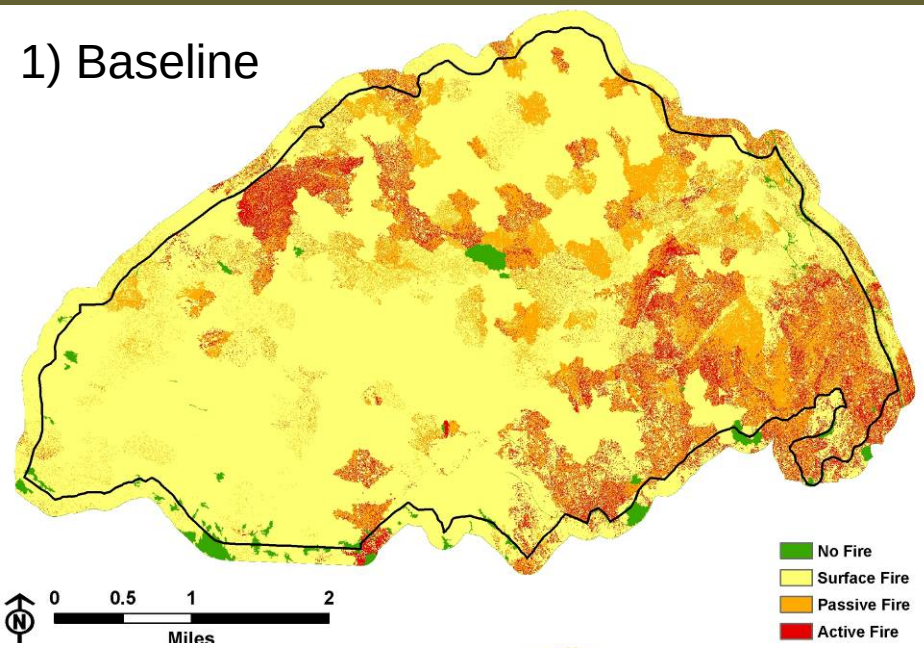
SB Fuel Model Data

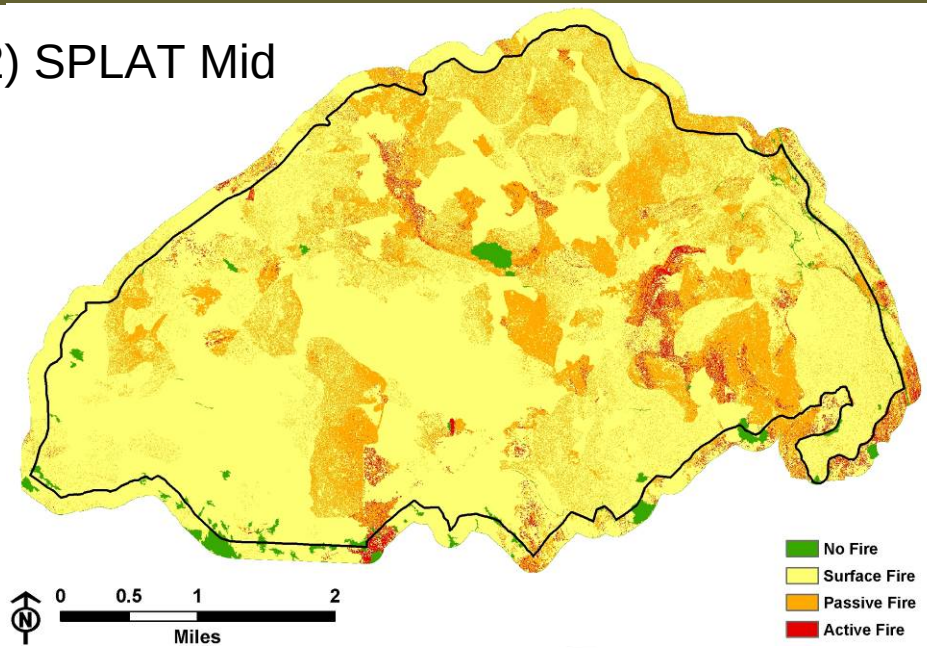
ID	Fuel Loading						Surface to Volume Ratio			Fuel Bed	XtMoist	Heat Content	
FMCODE	ton/acre						1/ft			feet	%	BTU/lb	
FMCODE	1h	10h	100h	LiveH	LiveW	FMTYPE	1HSAV	LiveHSAV	LiveWSAV	Depth	Xmoist	DHt	LHt
101 GR1	0.1	0	0	0.3	0	dynamic	2200	2000	9999	0.4	15	8000	8000
102 GR2	0.1	0	0	1	0	dynamic	2000	1800	9999	1.0	15	8000	8000
121 GS1	0.2	0	0	0.5	0.65	dynamic	2000	1800	1800	0.9	15	8000	8000
141 SH1	0.25	0.25	0	0.15	1.3	dynamic	2000	1800	1600	1.0	15	8000	8000
142 SH2	1.35	2.4	0.75	0	3.85	N/A	2000	9999	1600	1.0	15	8000	8000
144 SH4	0.85	1.15	0.2	0	2.55	N/A	2000	1800	1600	3.0	30	8000	8000
145 SH5	3.6	2.1	0	0	2.9	N/A	750	9999	1600	6.0	15	8000	8000
161 TU1	0.2	0.9	1.5	0.2	0.9	dynamic	2000	1800	1600	0.6	20	8000	8000
162 TU2	0.95	1.8	1.25	0	0.2	N/A	2000	9999	1600	1.0	30	8000	8000
163 TU3	1.1	0.15	0.25	0.65	1.1	dynamic	1800	1600	1400	1.3	30	8000	8000
164 TU4	4.5	0	0	0	2	N/A	2300	9999	2000	0.5	12	8000	8000
165 TU5	4	4	3	0	3	N/A	1500	9999	750	1.0	25	8000	8000
181 TL1	1	2.2	3.6	0	0	N/A	2000	9999	9999	0.2	30	8000	8000
183 TL3	0.5	2.2	2.8	0	0	N/A	2000	9999	9999	0.3	20	8000	8000
184 TL4	0.5	1.5	4.2	0	0	N/A	2000	9999	9999	0.4	25	8000	8000
185 TL5	1.15	2.5	4.4	0	0	N/A	2000	9999	1600	0.6	25	8000	8000
187 TL7	0.3	1.4	8.1	0	0	N/A	2000	9999	9999	0.4	25	8000	8000
188 TL8	5.8	1.4	1.1	0	0	N/A	1800	9999	9999	0.3	35	8000	8000
201 SB1	1.5	3	11	0	0	N/A	2000	9999	9999	1.0	25	8000	8000
202 SB2	4.5	4.25	4	0	0	N/A	2000	9999	9999	1.0	25	8000	8000
203 SB3	5.5	2.75	3	0	0	N/A	2000	9999	9999	1.2	25	8000	8000
99 NB9													

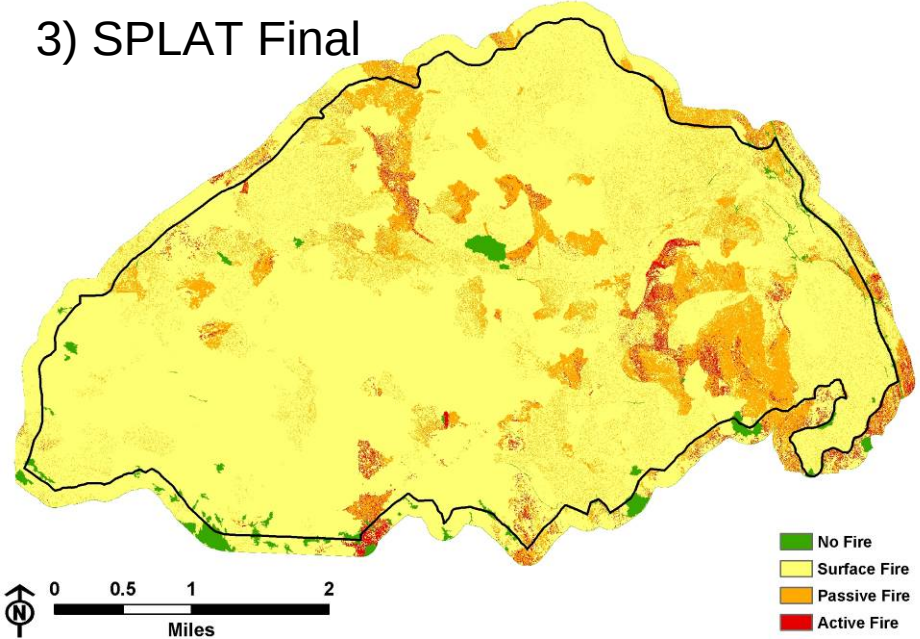
RESULTS:

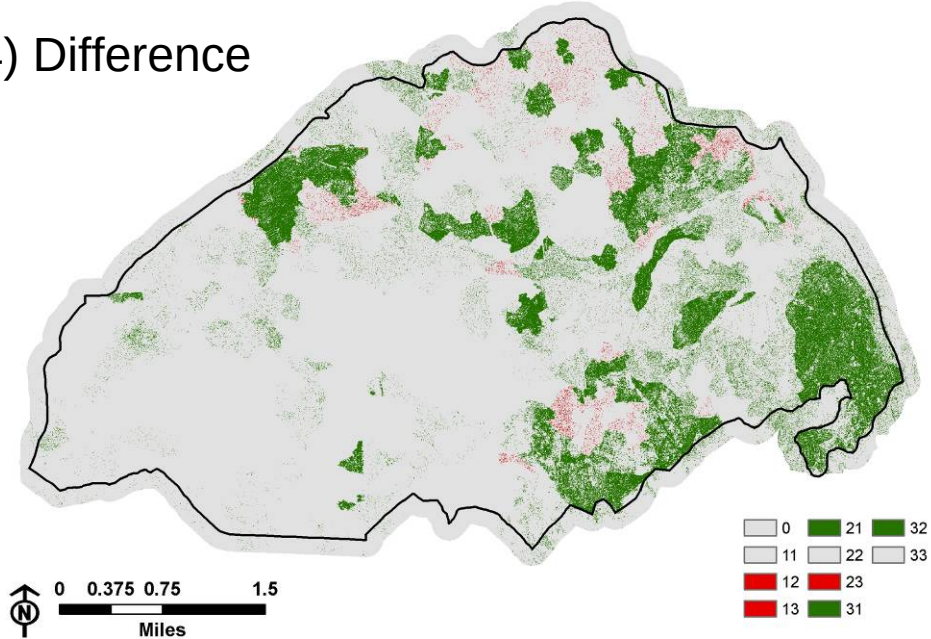

Run : New Run
Inputs
Fire Behavior Outputs
Minimum Travel Time
Treatment Optimization Model
Run Name:
Sagehen Run4
Fuel Moisture Files
Fuel Moisture File (*.fms):
C:\SAGEHEN\4_Fl...\sagehen_ucb.FMS
Use Custom Fuels (*.fmd)
Winds
Wind Blowing Uphill
Wind Speed (MPH @ 20'):
10
Wind Direction
Azimuth (Degrees):
180
Wind Vectors
Direction
Speed
Create + Display
Canopy Characteristics
Height(m):
15
Canopy Bulk Density(Kg/m3):
0.2
Canopy Base Height(m):
5
Foliar Moisture Content (%):
100
Fuel Moisture Settings
Use Fixed Fuel Moistures from Fuel Moisture File
Use Fuel Moisture Conditioning
Weather File (*.wtr):
C:\SAGEHEN\4_FlamMap\Mo...\sagehen.wtr
Wind File (*.wnd):
C:\SAGEHEN\4_FlamMa...\sagehen_sw.wnd
Fuel Moisture Conditioning Period
Day
Time
Start
8/30
23:00 PM
End
11/15
23:00 PM
Launch
OK
Cancel
Apply
Help
Need Fuel Moisture File
No outputs selected
No existing outputs

Crown Fire Activity

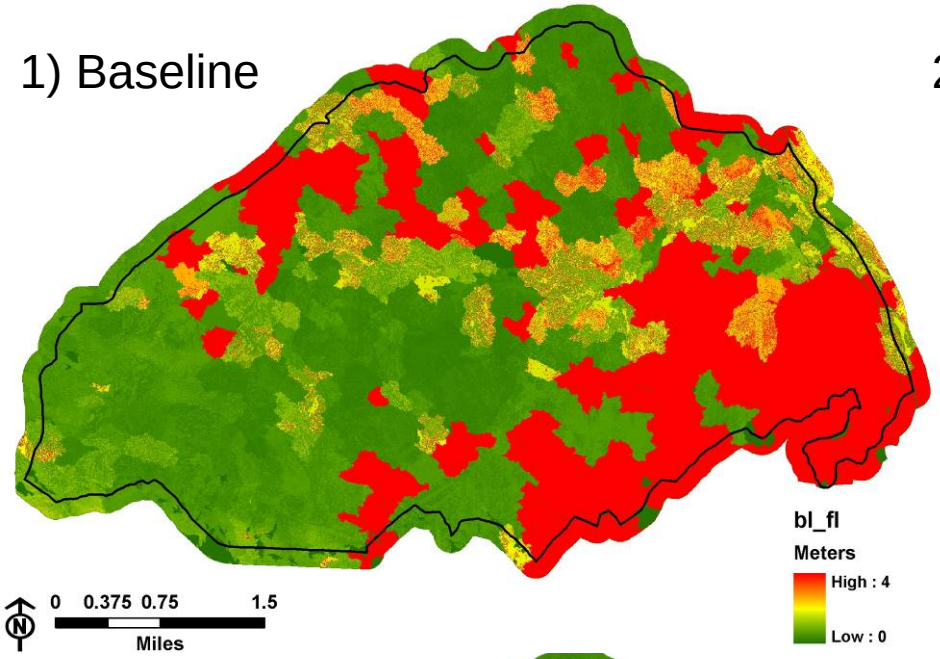


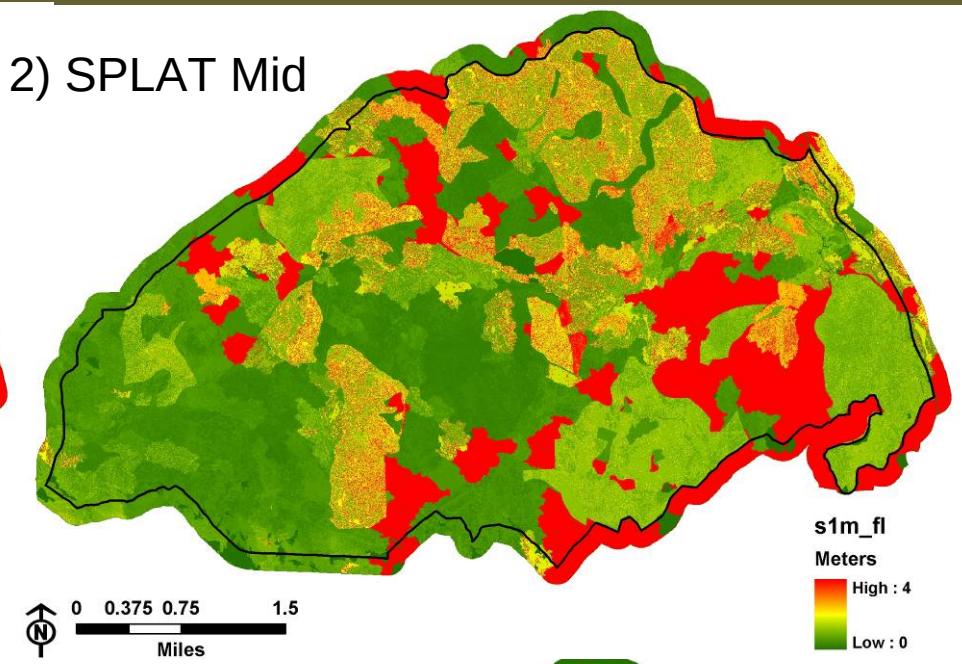


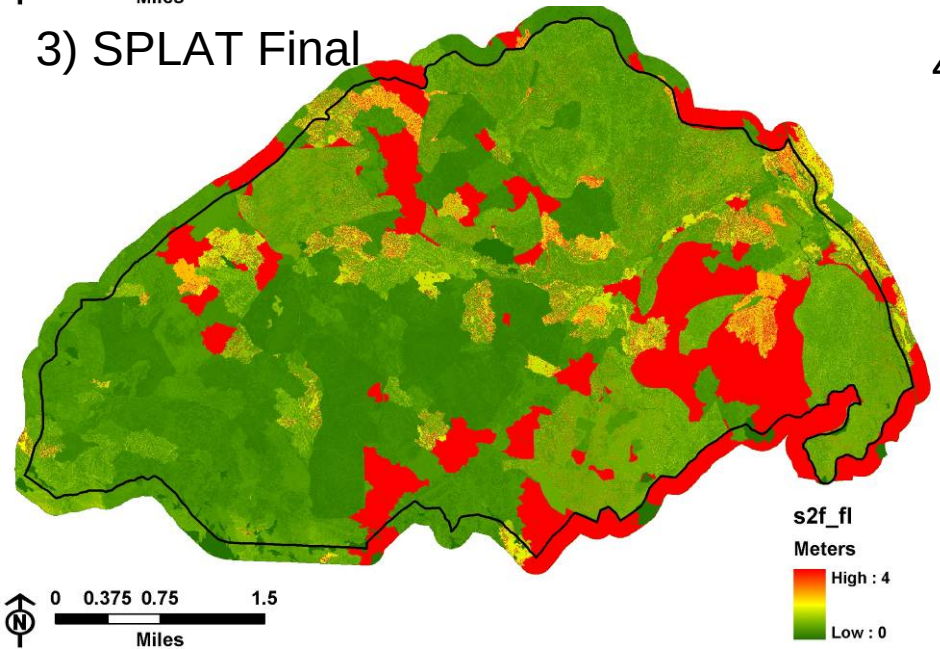


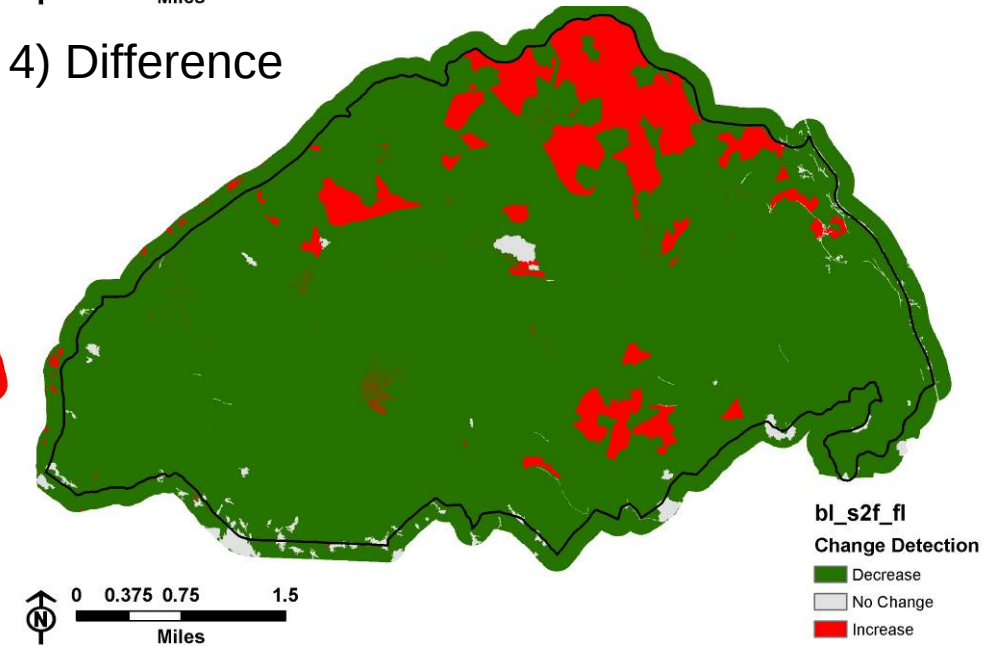


Flame Length



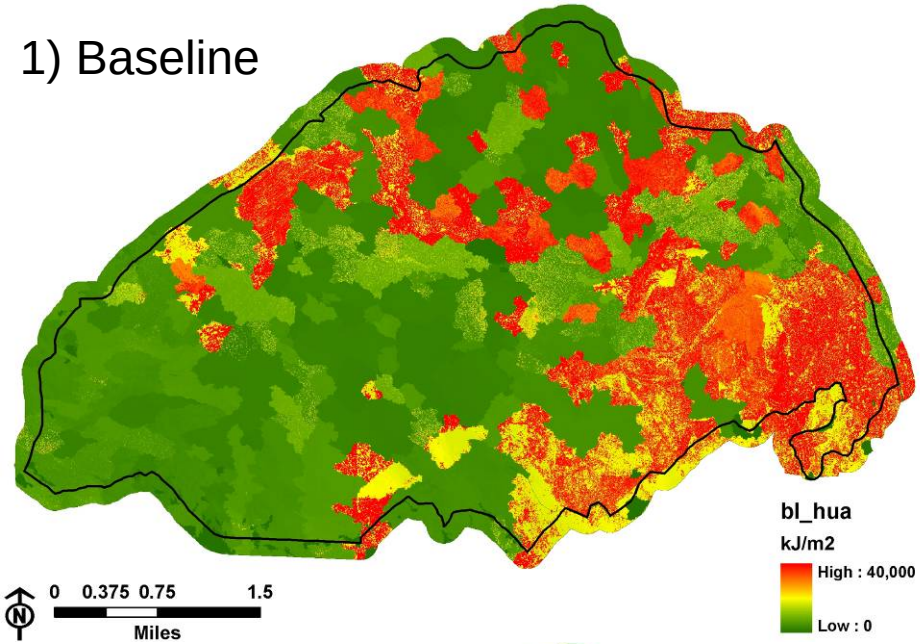




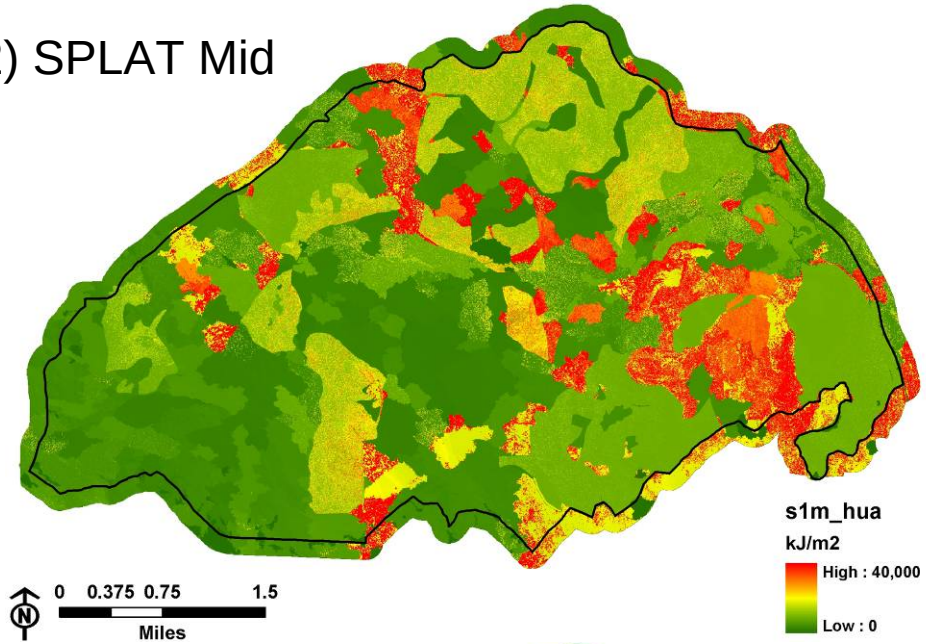


Heat / Unit Area

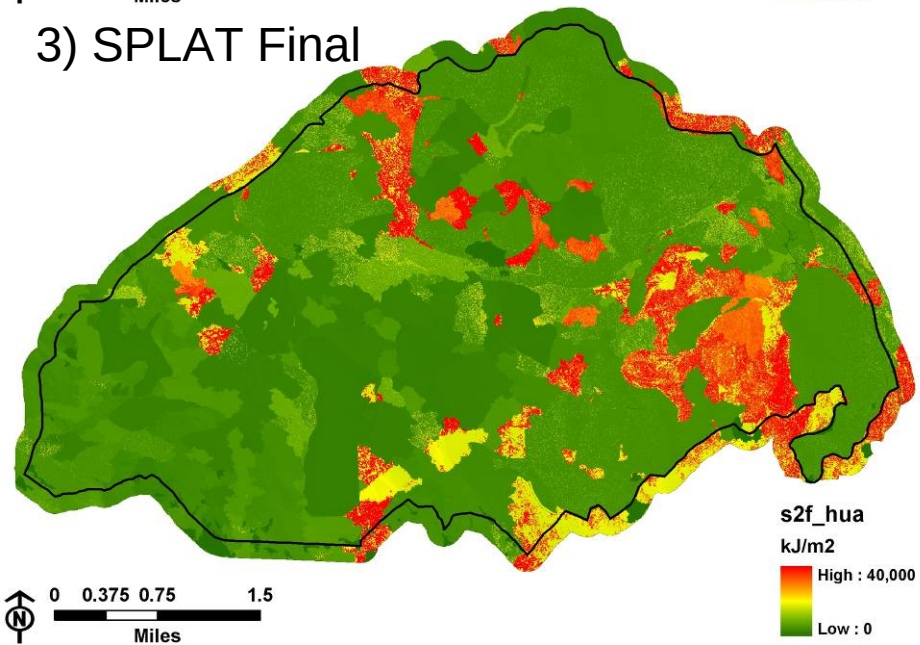
1) Baseline



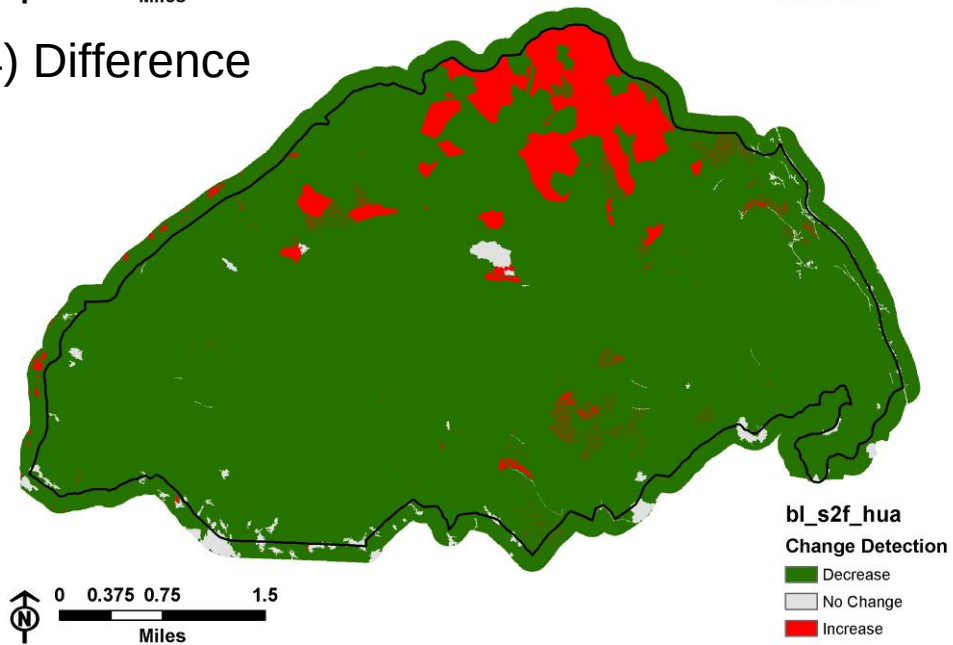
2) SPLAT Mid



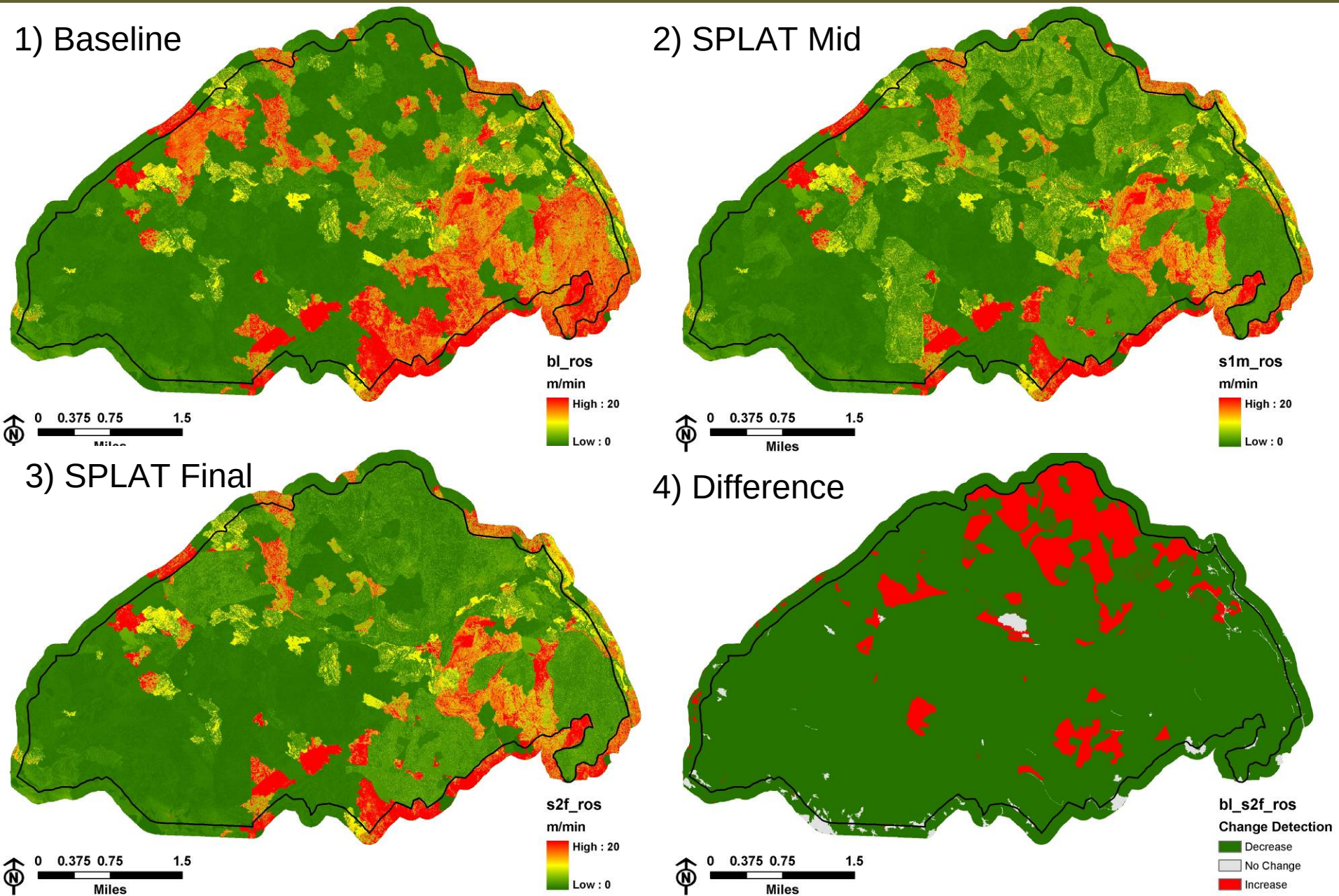
3) SPLAT Final



4) Difference



Rate of Spread



Berkeley
University of California

APPENDIX

Fuel Model

Field	Name	Data Type	English Units	Metric Units
FMod	Fuel Model	integer	number 14-50	number 14-50
1H, 10H, 100H, LiveH, LiveW	Fuel Loading	decimal	tons/acre	Metric tonnes / hectare
1HSAV, LiveHSAV, LiveWSAV	Surface to Volume Ratio	integer	1/ft	1/cm
Depth	Fuel Bed Depth	decimal	ft	cm
XtMoist	Moisture of Extinction	integer	percent	percent
DHt, LHt	Heat Content live & dead fuels	integer	BTU/lb	J/Kg