LANDFIRE data support for the Raco Plains Mid-Scale Assessment
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Summary
This document was developed to provide a landscape scale perspective for the Raco Plains, explore the potential utility of LANDFIRE data within this landscape, and to provide suggestions for opportunities that may be pursued by the Hiawatha National Forest. The Raco Plains is a fairly homogenous landscape in terms of Biophysical Settings (BpSs), and is dominated by Great Lakes Pine Barrens (GLPB). Analysis of the current distribution of the GLPB compared to reference distributions suggests that there is significant representation of uncharacteristic vegetation conditions trending towards over representation of both non-forested herbaceous cover with trees representing 20-40% cover(~11k acres) and stands with canopy closure of 80% or more (~7k acres). There are multiple reasons for these over representations, importantly including multiple criteria management decisions and potential errors in LANDFIRE mapping. However, subject to data review, it is recommended that prescribed fire be used to reduce canopy cover in herbaceous areas to below 20%, and percent cover be reduced to less than 80% in forested stands using thinning and prescribed fire. Additionally, using Raco Plains and surrounding areas as a foundation, it is recommended that the Hiawatha participate in development of a Fire Learning Network landscape (www.tncfire.org), pursue Collaborative Landscape Restoration Act funds and collaborate with The Nature Conservancy (TNC) in drafting of a Community Wildfire Protection Plan for the eastern Upper Peninsula that is currently underway (refer to Dave Maercklein of the Hiawatha NF, dmaercklein@fs.fed.us or Tina Hall of TNC, chall@tnc.org).

Context
- LANDFIRE data provides a way to explore vegetation trends across large landscapes as it is comprehensive and consistently developed.
- The Raco Plains is a relatively homogenous landscape, dominated by Great Lakes Pine Barrens, a highly fire dependant Biophysical Setting that has an all fire return interval of 5 years when surface, mixed and replacement fires are considered.
- This report focuses on exploration of the difference in vegetation conditions for the Great Lakes Pine Barrens of the Raco Plains, with additional eastern Upper Peninsula maps presented for reference

Great Lakes Pine Barrens
As defined in the LANDFIRE reference condition description and model, this BpS was historically extremely fire dependant with surface fires occurring with a 7 year return interval (Mikel and Perkins, LANDFIRE BpS description #5113441). This BpS was described with 4 succession classes:

S-Class	Vegetation	%Cover	Height
A	Sedges and Grasses dominant, some Jack Pine regeneration and shrubs	0-20%	0-1m
B	Jack Pine Regeneration	11-40%	0-5m
C	Sedges and Grasses dominant, some Jack Pine regeneration and shrubs	21-50%	5-10m
D	Jack Pine Regeneration	41-80%	10-25m

In LANDFIRE mapping, any pixel that does not meet these criteria is labeled "Uncharacteristic" (U). Additionally, the LANDFIRE reference condition description and model was created for all of Michigan.

These two facts are important to note as the height/cover combinations may or may not be too constraining for the Raco Plains and should be reviewed.

As of ca2000, there was a significant over representation of Succession Class D and Uncharacteristic pixels on the Raco Plains landscape (Figure 1).
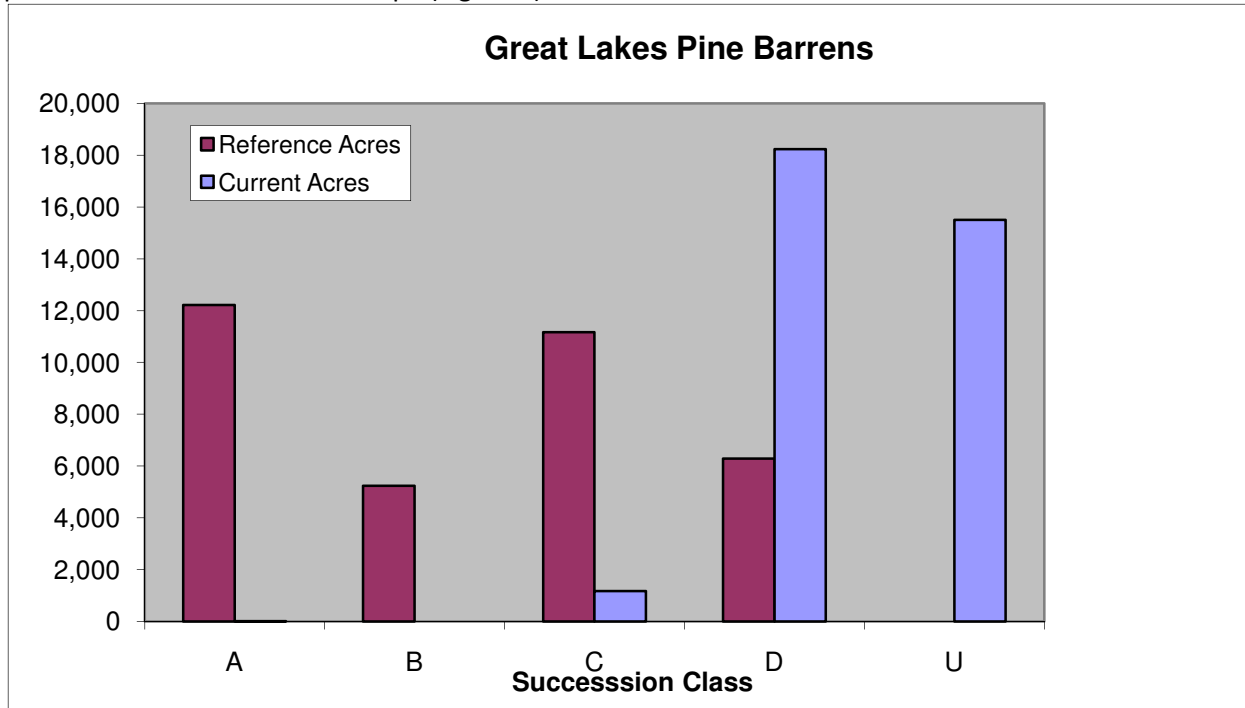

Great Lakes Pine Barrens

Figure 1: Ecological Departure for Great Lakes Pine Barrens of the Raco Plains.

While there may be real ecological implications to this trend towards high levels of uncharacteristic pixels and succession class D, it is important to consider other factors:

1. The current (2010) landscape may well be closer to reference conditions due to management over the last 10 years.
2. Reference conditions do not necessarily equal Desired Future Conditions and must be placed in the context of the broader forest plan for the Hiawatha National Forest.
3. The reference condition %cover/height combinations may or may not be appropriate for Raco Plains. For example, pixels with 0-5m height and 30% cover are mapped by LANDFIRE as Uncharacteristic due to the constraints outlined in the Mikel and Perkins model. It may be necessary to amend these combinations to make them more reasonable for the Raco Plains. That said, the Mikel and Perkins model is supported by significant literature and experience (see Mikel and Perkins LANDFIRE BpS description # 5113441).

In a local remap of Uncharacteristic Pixels using LANDFIRE data, it appears that these pixels are mostly uncharacteristic due to high % cover in the herbaceous stands, and high percent cover in the forested stands (Figure 2). While this method does not exactly replicate how LANDFIRE national mapped succession classes, it is a very close approximation and gives important clues as to the reasons for the number of acres mapped as Uncharacteristic (details available from the author).
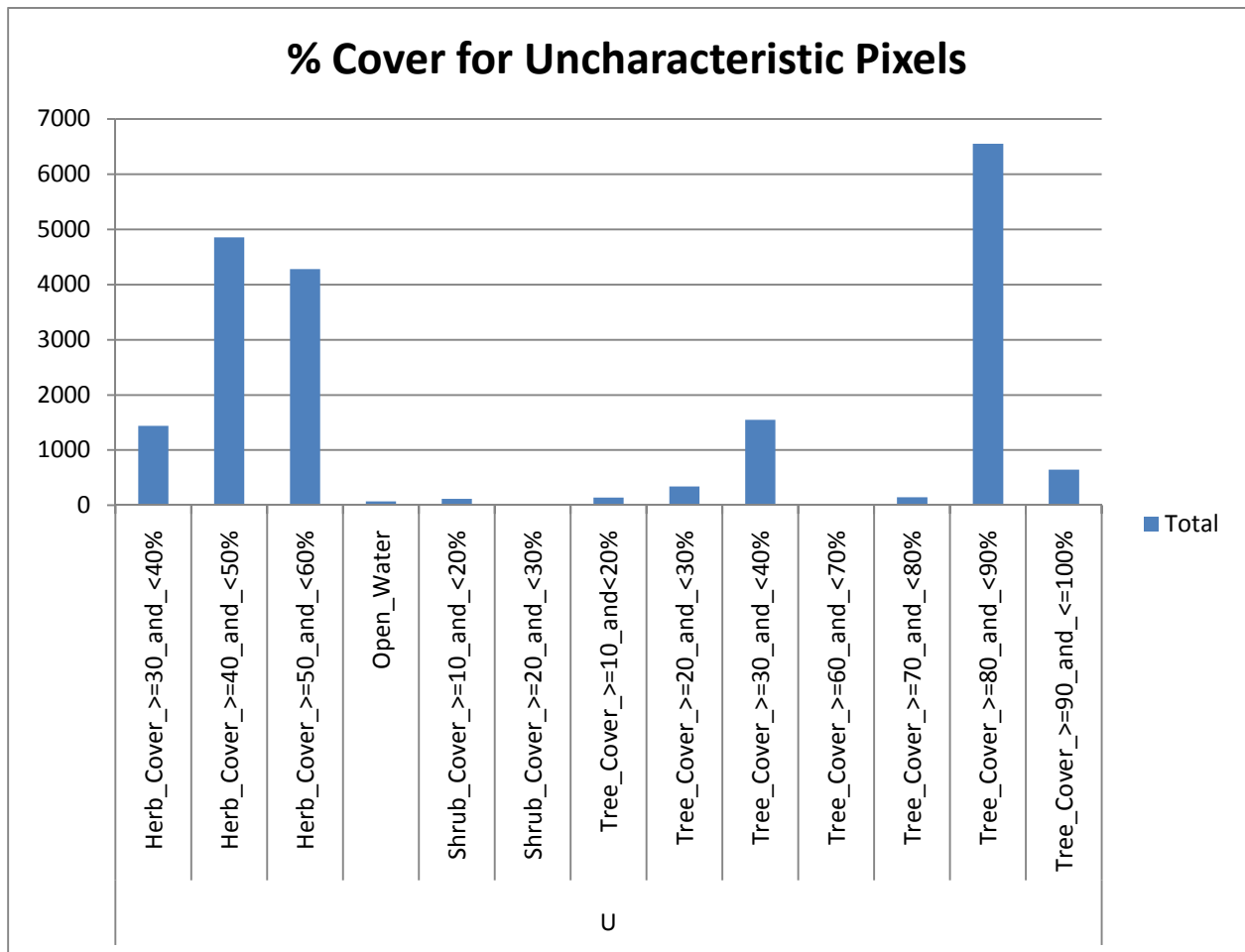
% Cover for Uncharacteristic Pixels

Categories (left to right): Herb_Cover_>=30_and_<40%, Herb_Cover_>=40_and_<50%, Herb_Cover_>=50_and_<60%, Open_Water, Shrub_Cover_>=10_and_<20%, Shrub_Cover_>=20_and_<30%, Tree_Cover_>=10_and<20%, Tree_Cover_>=20_and_<30%, Tree_Cover_>=30_and_<40%, Tree_Cover_>=60_and_<70%, Tree_Cover_>=70_and_<80%, Tree_Cover_>=80_and_<90%, Tree_Cover_>=90_and_<=100%

Legend: Total

Figure 2: Percent cover for uncharacteristic pixels within the Great Lakes Pine Barrens BpS.

Recommendations for the Raco Plains include:

1. Prescribed fire be used to reduce canopy cover in herbaceous areas to below 20%
2. Percent cover be reduced to less than 80% in forested stands using thinning and prescribed fire

Broader Landscape Perspective

The Raco Plains sits within a landscape dominated by the following:

1. State and Federal Ownership (see Figure 3)
2. Relatively high Ecological Departure from Reference Conditions (see Figure 4, and above notes regarding Reference Conditions and Desired Future Conditions. They may be different from one another).
3. A wide range of historic fire regimes (see Figure 5).

This all suggests a wider landscape scale approach to restoration of fire regimes, and collaborative landscape management. Specifically, recommendations include:

1. Working with TNC to develop a EUP/northern Lower Peninsula Fire Learning Network (www.tncfire.org).
2. Participate in current efforts to draft Community Wildfire Protection Plan for EUP.
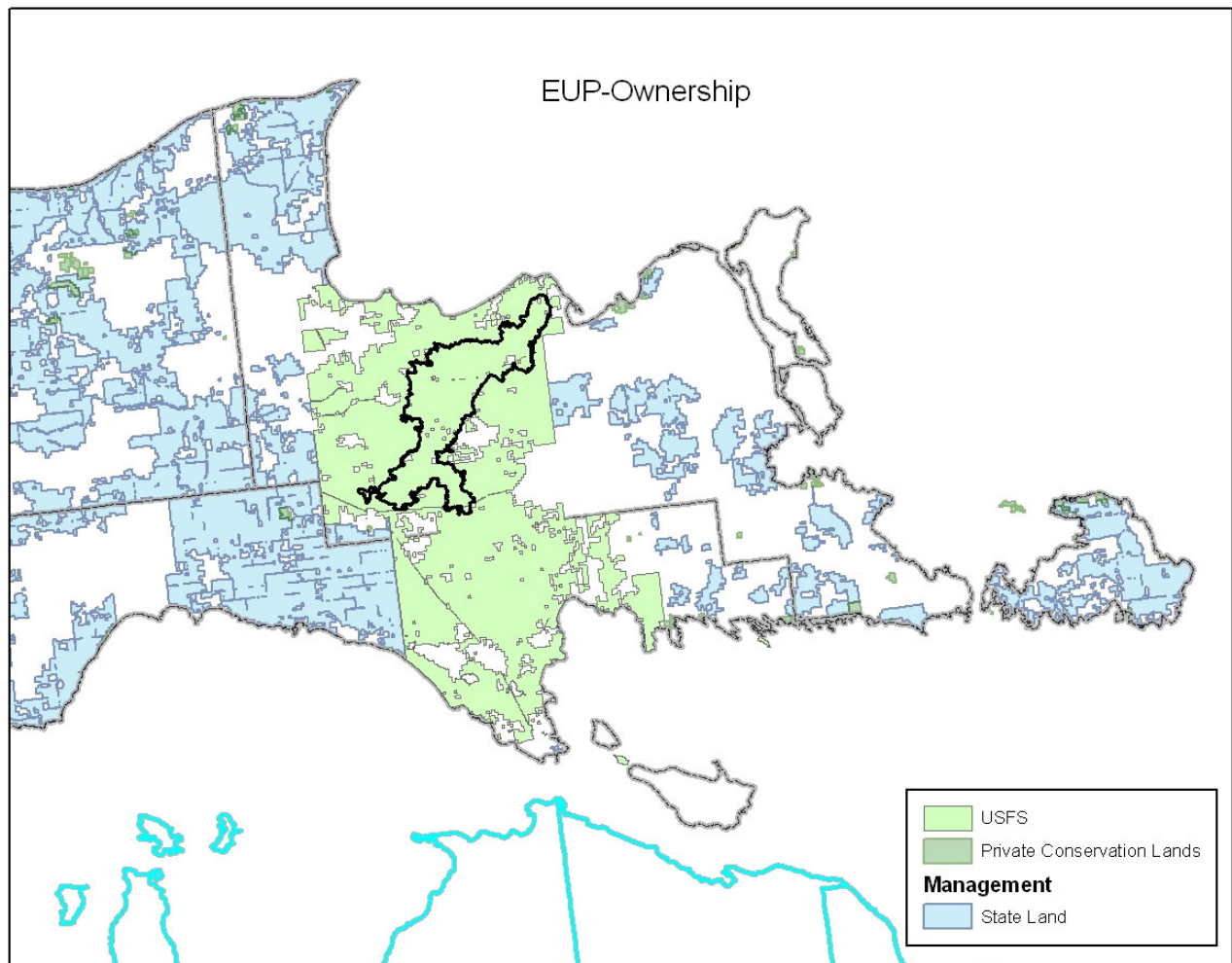3. Pursue Collaborative Forest Landscape Restoration act funds.
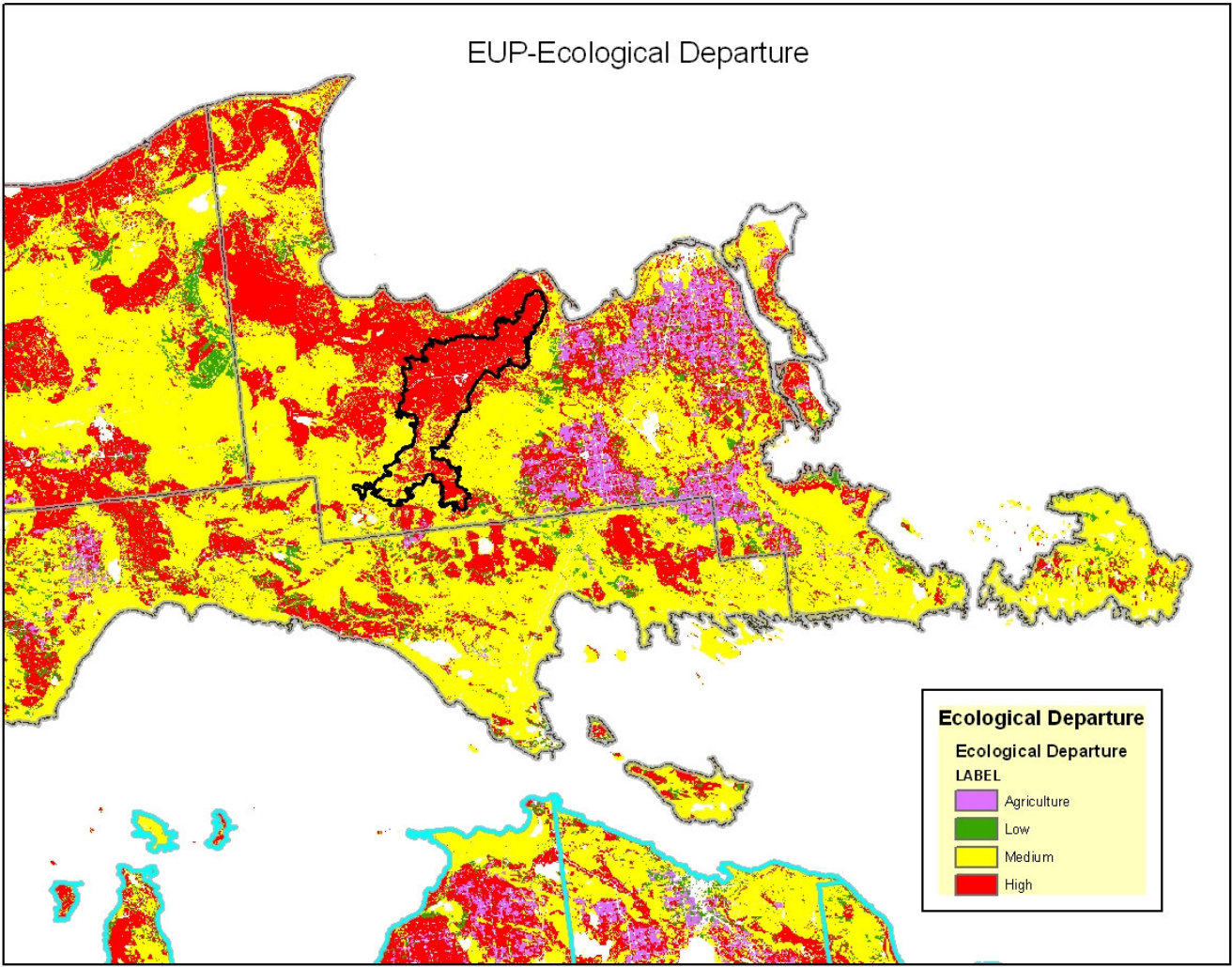

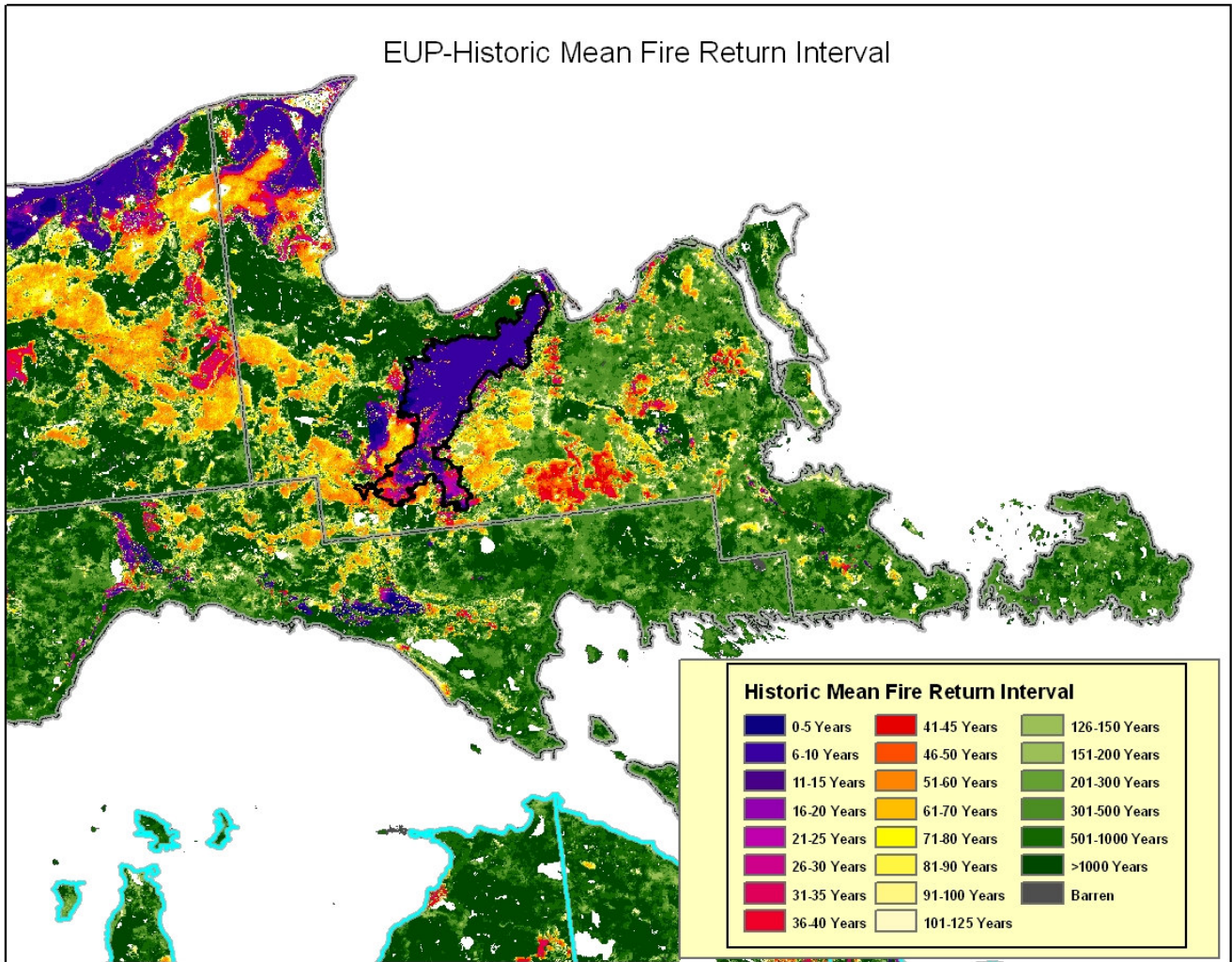**Figure 3: State and Federal Ownership for the EUP**

Figure 4: Ecological Departure for EUP

Figure 5: Historic Mean Fire Return Interval for EUP