Fuelbed characterization and mapping for Eglin Air Force Base, FL using the Fuel Characteristic Classification System (FCCS)

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Introduction

Eglin Air Force Base (EAFB) is the largest forested military reservation in the United States, and fire-dependent longleaf pine forests with a mean natural fire rotation of three years comprises 78% of Eglin's 187,555 hectares.

To maintain the fire regime, the natural resources management section for the base operates an ambitious prescribed fire program. Increasingly, more accurate assessments of the impacts of prescribed fire are necessary to justify and adequately plan burning operations. To assist with planning efforts, we present a state and transition model and associated FCCS fuelbed map for EAFB.

Methods

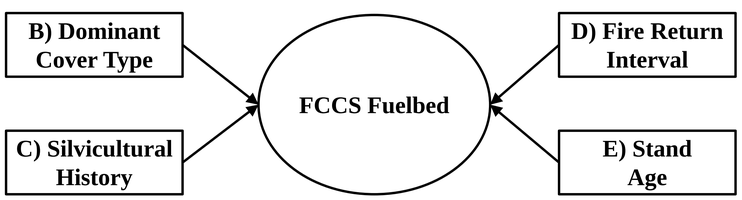
State and Transition Model

Prior to characterizing and mapping fuelbeds we identified five main factors that can influence fuel structure. They are:

A) Topographic Position

1. Wet Flatlands 2. Mesic Flatlands 3. Mesic Uplands 4. Xeric Uplands

Independent state and transition models within each of the above categories



Fuelbed Nomenclature

Numeric codes are assigned to levels within each factor in the following sequence (examples follow):

A-B-C-D-E

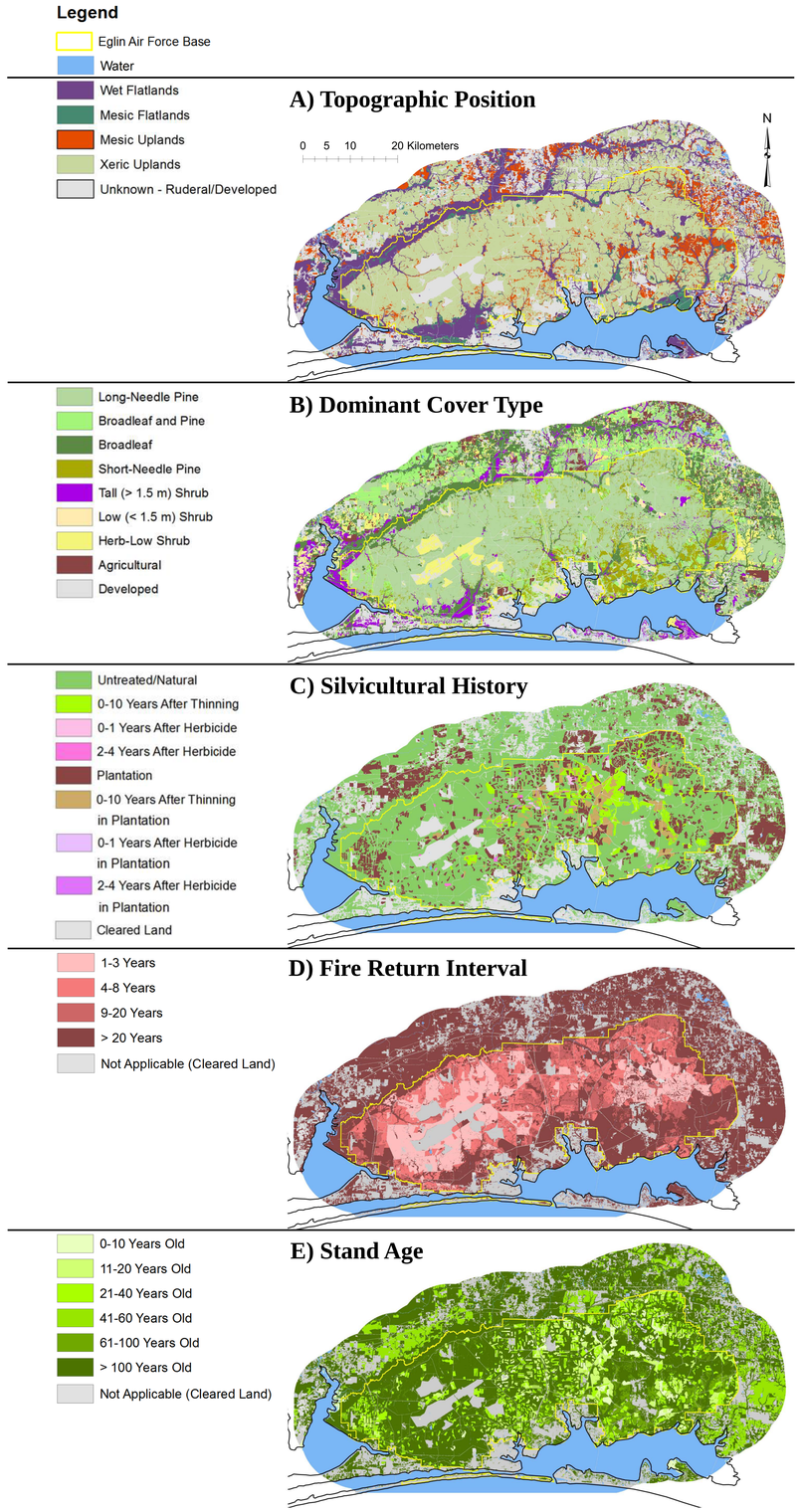
Fuelbed No. 4-1-1-1-6
4: Xeric Uplands **(A)**
1: Longleaf Pine **(B)**
1: Natural Stand **(C)**
1: 1-3 Year Fire Int. **(D)**
6: 100+ Years Old **(E)**

Fuelbed No. 4-1-1-3-6
4: Xeric Uplands **(A)**
1: Longleaf Pine **(B)**
1: Natural Stand **(C)**
3: 9-20 Year Fire Int.**(D)**
6: 100+ Years Old **(E)**

Fuelbed No. 4-4-1-4-6
4: Xeric Uplands **(A)**
4: Sand Pine **(B)**
1: Natural Stand **(C)**
4: 20+ Year Fire Int. **(D)**
6: 100+ Years Old **(E)**

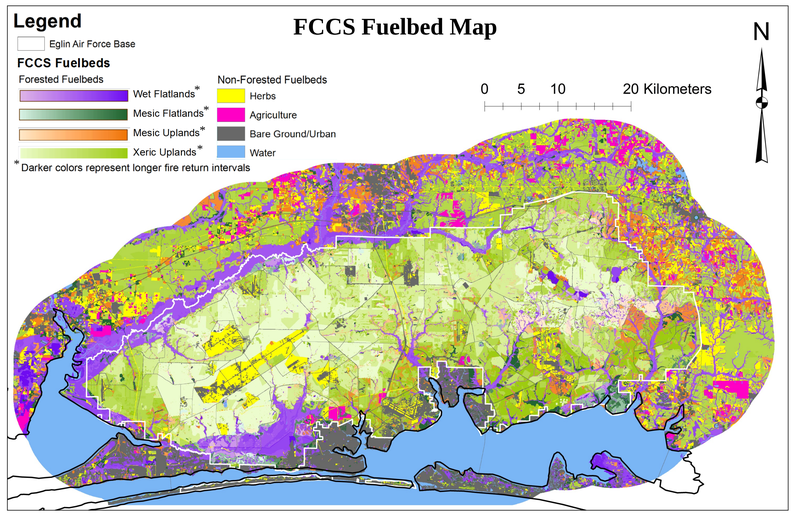
Mapping Fuelbed Layers

Fuelbed layers were mapped for EAFB and the surrounding 10 km at 30 m resolution. Layers are derived from the Florida Natural Areas Inventory Cooperative Land Cover Map and spatial datasets provided by EAFB.



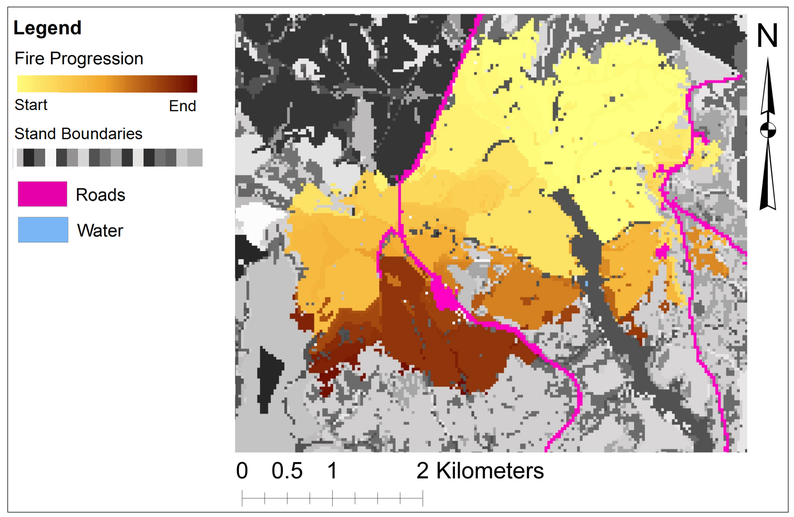
Fuelbed Map

The fuelbed map was created by adding the five fuelbed layers together within a framework of rules that prevents incongruous combinations. The map represents vegetative fuel conditions at EAFB in 2014. Ground validation was performed with two independent datasets, n = 116 and n = 200, and fuelbed mapping was 73.5% and 85.1% accurate, respectively.



Applications

This fuelbed map can be used as a tool to improve the accuracy and spatial representation of fuels across the landscape including:

1. More accurate emissions assessments for prescribed fires.
2. Spatial representation of fire hazard.

The FCCS fuelbed map can also be used as an input for the Fuelbed Dynamics Model (FDM), a landscape-fire succession model that uses cellular automata to spread disturbance across the landscape and pathways in the associated state and transition model to drive succession. The map below shows a 1050 hectare wildfire at EAFB simulated by FDM. These simulations can be used to assess the impact of fire management scenarios on fuels and corresponding measures of flammability.