LANDFIRE
Existing and Potential Vegetation: Classification, Mapping, and Inventory at a National Scale

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LANDFIRE DELIVERABLES

Vegetation Characteristics

- Existing vegetation type (EVT), cover (EVC), and height (EVH)
- Environmental Site Potential (ESP)
- Bio-physical Settings (BpS)

Fire behavior

- Fire behavior fuel models- 13
- Fire behavior fuel models- 40
- Canopy bulk density
- Canopy base height
- Canopy cover
- Canopy height
- FCCS/FLM

Fire ecology

- Historical fire return interval
- Historical fire severity
- Historical fire regime group
- Current Succession Class
- Vegetation departure
- Vegetation Condition Classes

LANDFIRE Versions

- "National" effort
  - LF National (1.0)
  - Circa 2001
- "Refresh" effort
  - LF 2001 (1.05) - circa 2001 w/ improvements
  - LF 2008 (1.1) – updated w/1999-2008 disturbance
- "Update" effort
  - LF 2010 - circa 2001 w/ refinements updated w/ 2001-2010 disturbance

MAIN TOPICS

- **CLASSIFICATION**
  - Map Unit development - LF National (1.0)
  - Legend additions - LF2001(1.05) -2008 (1.1)
  - Legend revisions - LF2010 (1.2))
- **MAPPING**
  - LANDFIRE National Vegetation (EVT, ESP, BpS)
  - LF2001 improvements
  - LF2010 Refinements
- **INVENTORY**
  - LANDFIRE National Plot keying and validation
  - LF 2001-2008 crown fuel mapping (CBD,CBH)
  - LF 2010 tree attribution

Map Unit Requirements

- ✓ **Identifiable**
  - from field or plot data
- ✓ **Map-able**
  - 30 meter resolution
  - 60-80% accurate
- ✓ **Model-able**
  - provide required model inputs
- ✓ **Scalable**
  - Aggregate to and/or link with other classifications

~ NVC Class/Subclass	NVC Formation	NVC Alliance	NVC Association
~20 units MRLC 2000	~300 units	~1,800 units	~5,000 units

1997 Version National Vegetation Classification

~ NVC Class/Subclass	NVC Formation	NatureServe Ecological Systems	NVC Alliance	NVC Association
~20 units	~300 units	~600 units	~1,800 units	~5,000 units

MRLC 2000

Gap Analysis Program

National Park Mapping

~ NVC Class/Subclass	NVC Formation	NVC Division Macrogroup Group	NVC Alliance	NVC Association
~20 units	~300 units	~500 units	~1,800 units	~5,000 units

2008 Revised National Vegetation Classification

LF National Vegetation Map Units

- NLCD National Land Cover Classes
- Ecological Systems
- Aggregated Ecological Systems
- Introduced and Ruderal Vegetation
- Mappable NVC Alliances

LF 2001 – LF 2008 Vegetation Map Units

- NLCD National Land Cover Classes
  - Added Vegetated Urban Classes
  - Added Herbaceous Wetlands
- Ecological Systems
- Aggregated Ecological Systems
- Introduced and Ruderal Vegetation
- Mappable NVC Alliances
- Expanded Agricultural types w/the Cropland Data Layer (CDL)

LF 2010
Vegetation Map Units

- LANDFIRE Existing Vegetation Type
  - Non-Vegetated
  - Urban Vegetated
  - Agricultural
  - Sparsely vegetated
  - Arctic and Alpine vegetation
  - Xeromorphic shrublands and grasslands
  - Mesomorphic shrublands and grasslands
  - Mesomorpic forests

Predictive Modeling with Classification Trees

- Winnow predictor variables
- Use sequence table to assign reference data – QA/QC
- Extract data for each predictor variable for each reference plot
- Randomly select ~ 2% of plots from each dataset for independent accuracy assessment later across "super-zones"
- Model stratifications, then each map unit
- Use 10-fold cross-validation for zone accuracy
- Apply rules in the GIS to the produce

Existing Vegetation Mapping Process

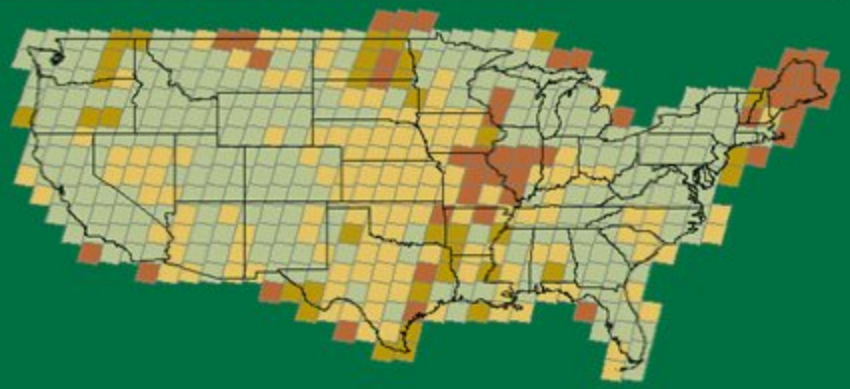
LANDSAT Imagery

Biophysical Gradients

Field Reference Database

Existing Vegetation
Environmental Site Potential
Bio-physical Settings

Landsat Data Acquisition and Processing



- At least three dates per pixel
- Strict processing standards for radiometric and illumination calibrations
- From radiance to TOA reflectance

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Generating LF-LZ Mask

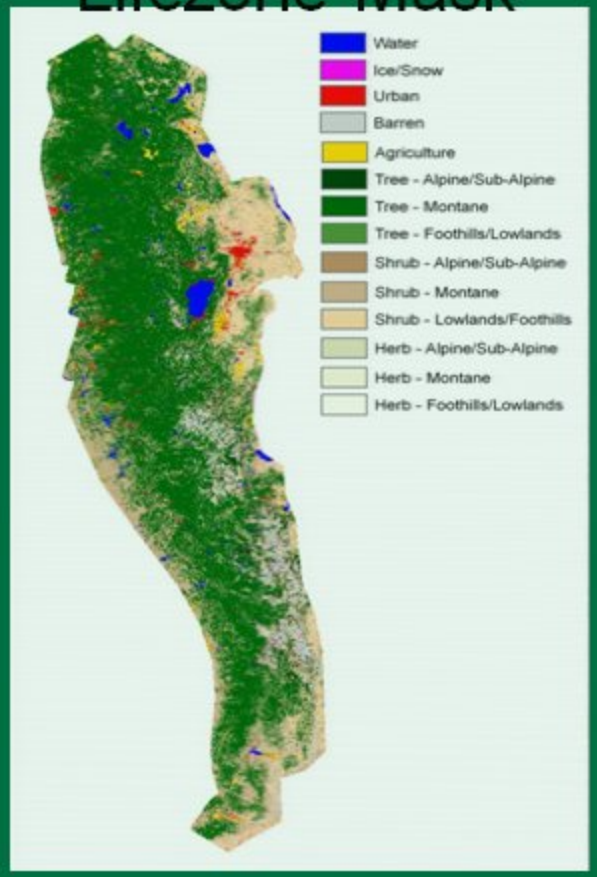
Lifeform Mask

+

Lifezone Mask

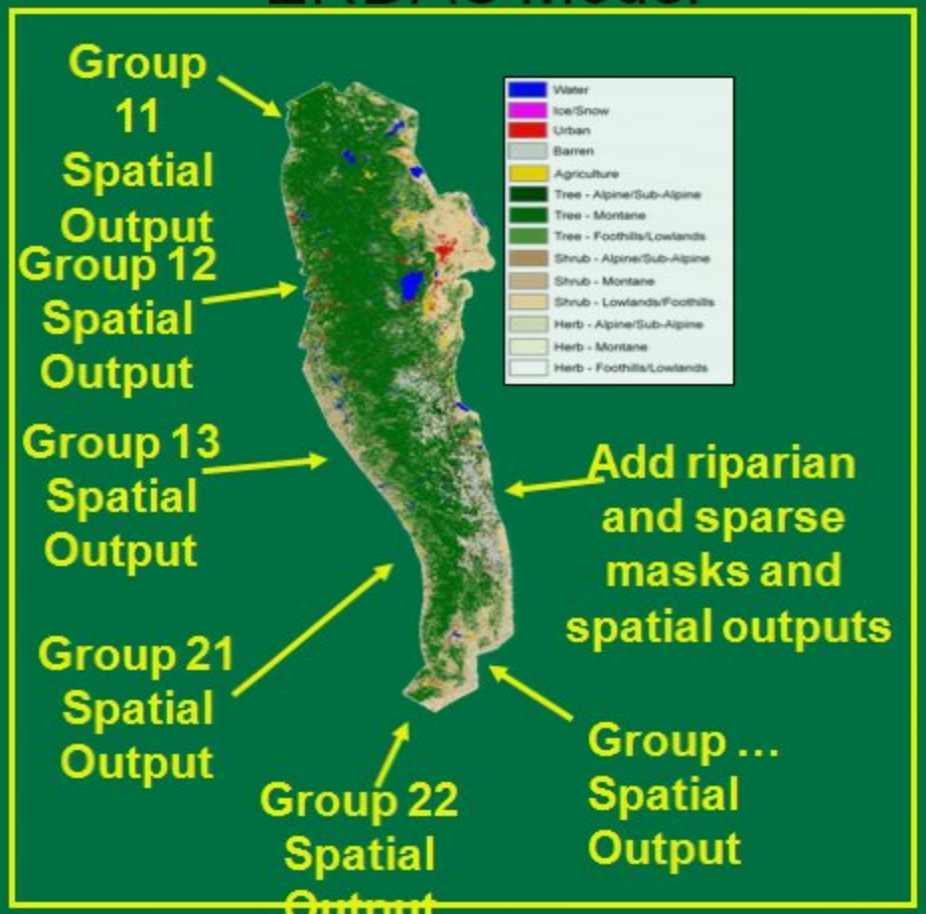
=

Combined Lifeform/ Lifezone Mask



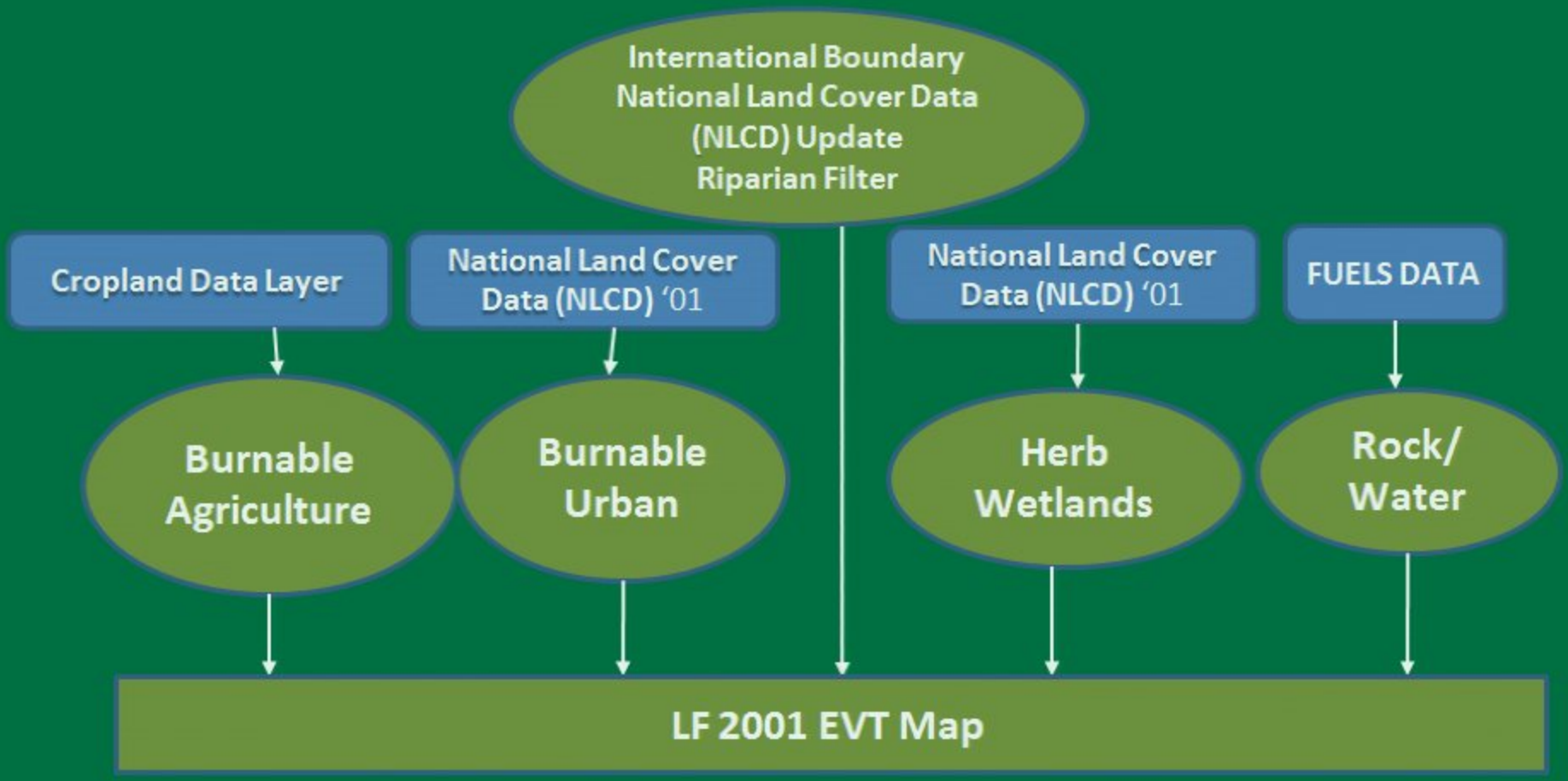
FINAL EVT MAP

ERDAS Model

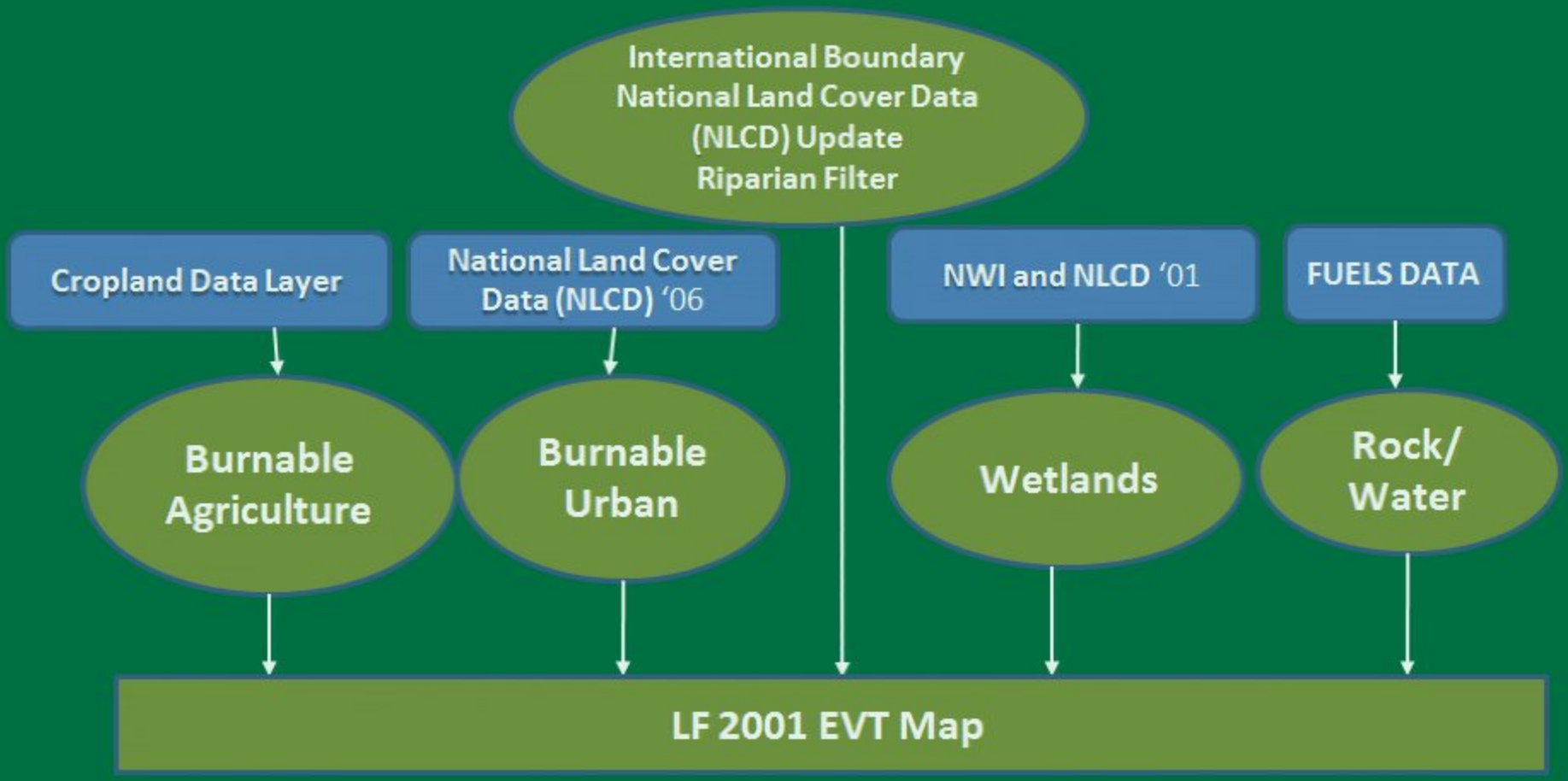


EVT MAP

LF 2001 Improvements



LF 2010 Improvements



LANDFIRE Potential Vegetation

What are we mapping?

- **Environmental Site Potential (ESP)** - native vegetation that could be supported at a given site in the absence of disturbance, based on the biophysical environment ("climax")
- **Biophysical Settings (BpS)** - native vegetation that may have been dominant on the landscape during a presettlement reference period, based on the current biophysical environment and an approximation of the historical disturbance regime

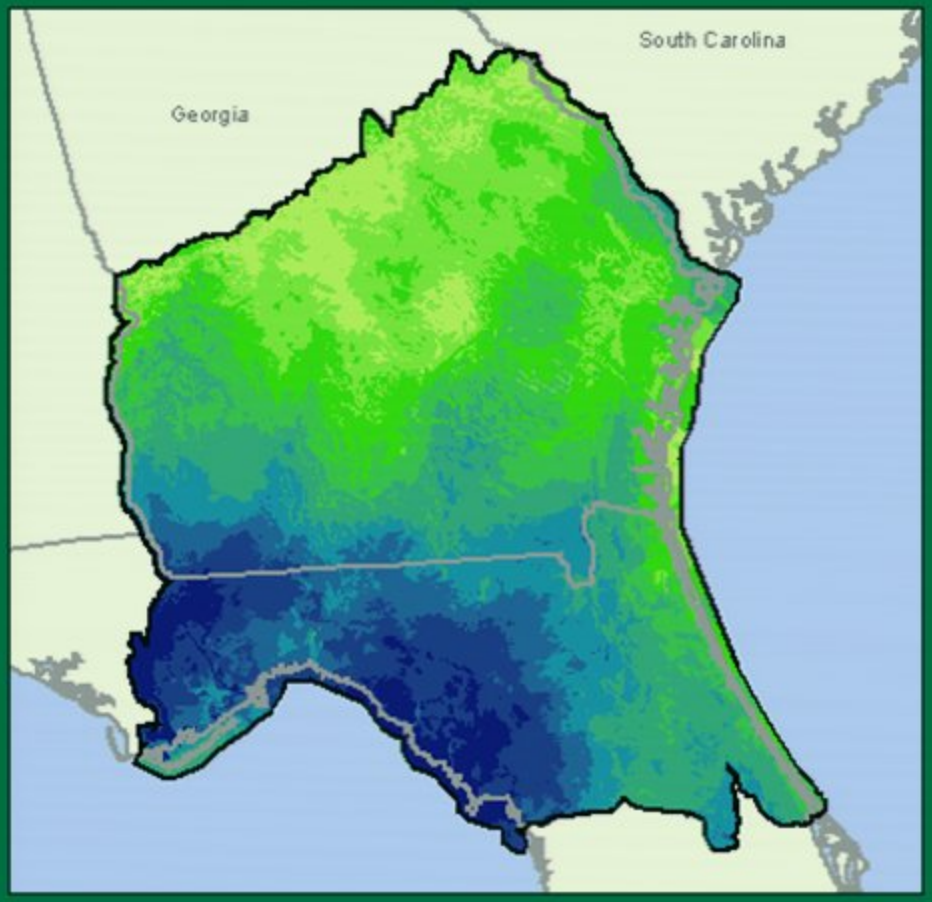
Potential Vegetation Mapping Process

Biophysical Gradients

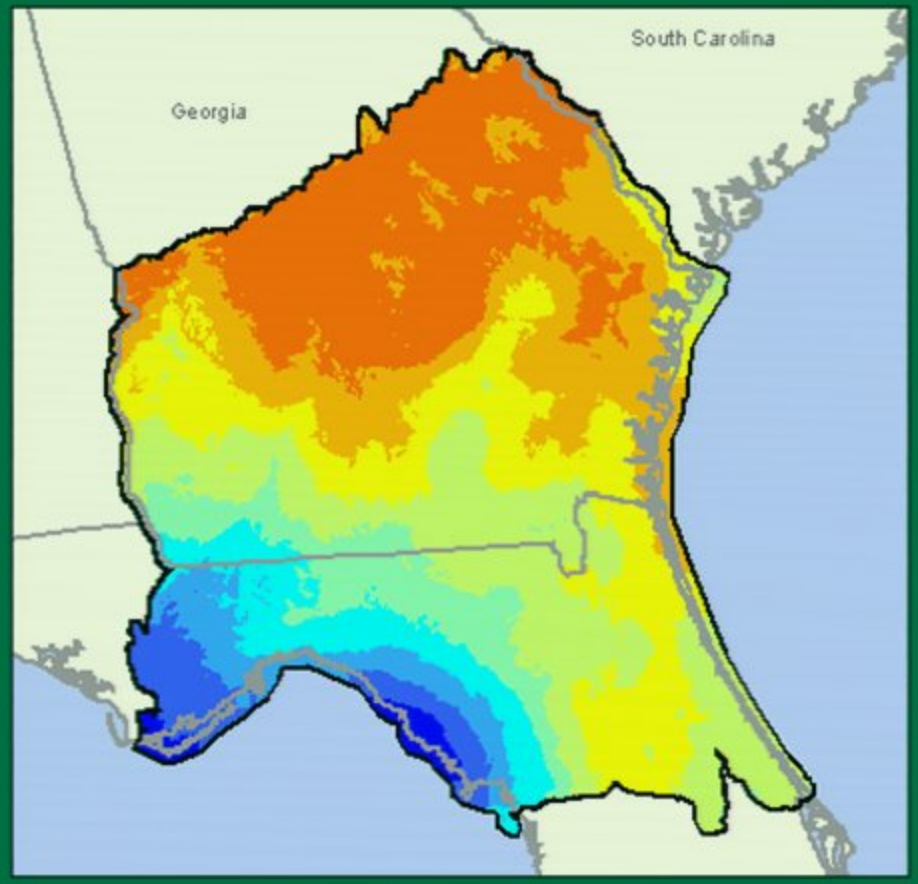
Field Reference Database

Environmental Site Potential
Bio-physical Settings

Bio-physical Gradient Variables



Average Annual Actual Evapotranspiration



Average Annual Precipitation

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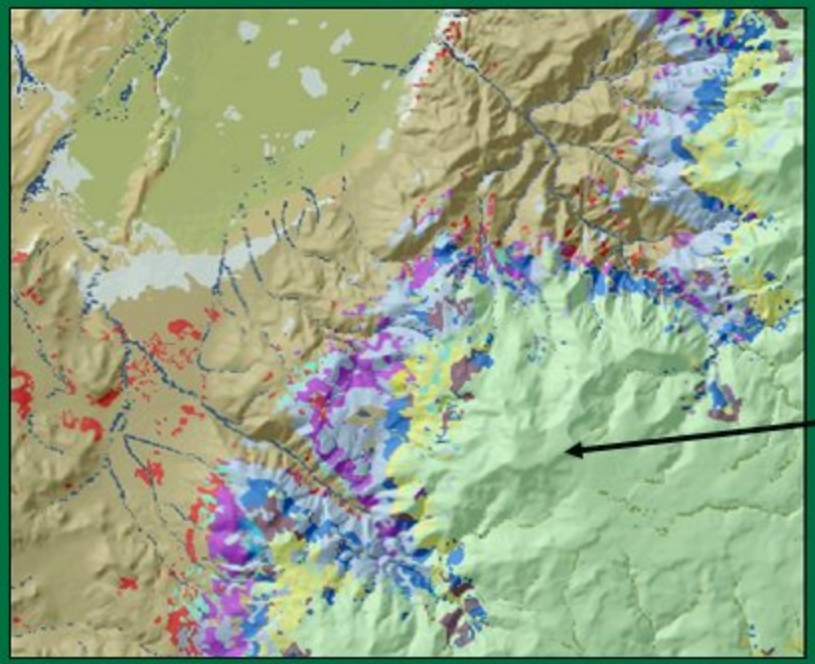
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland



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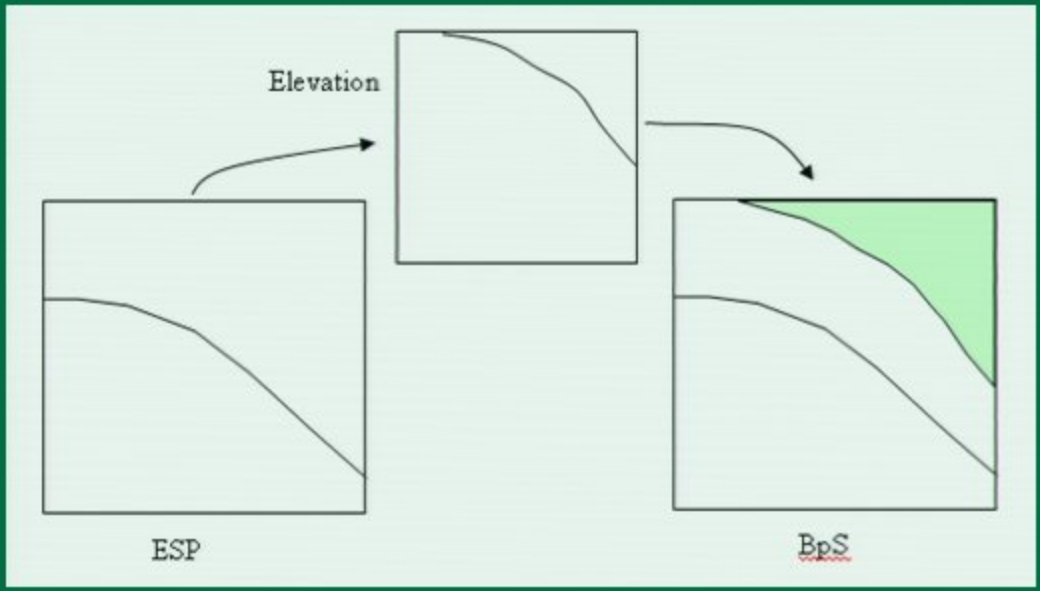
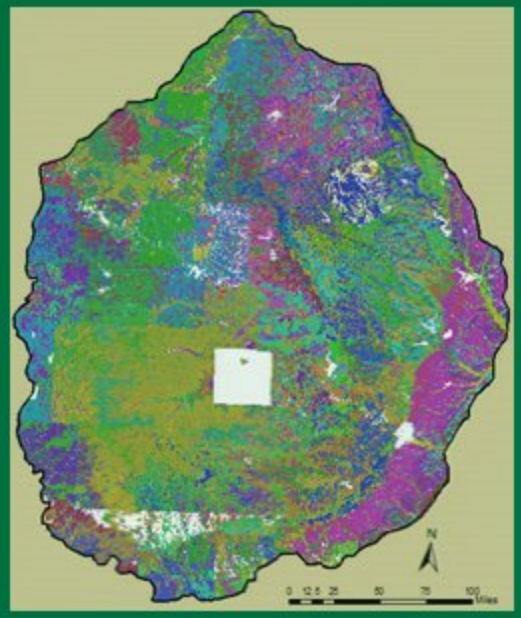
BpS Mapping Methods

Spatial recoding: use spatial GIS layers to directly assign the pixels in certain settings to certain BpS units. Common GIS layers used: elevation, section/subsection



LF 2001 BpS Remap

- Focus on Western rangelands
- Use available SSURGO
- Crosswalk MUID's to BpS and use as training sites



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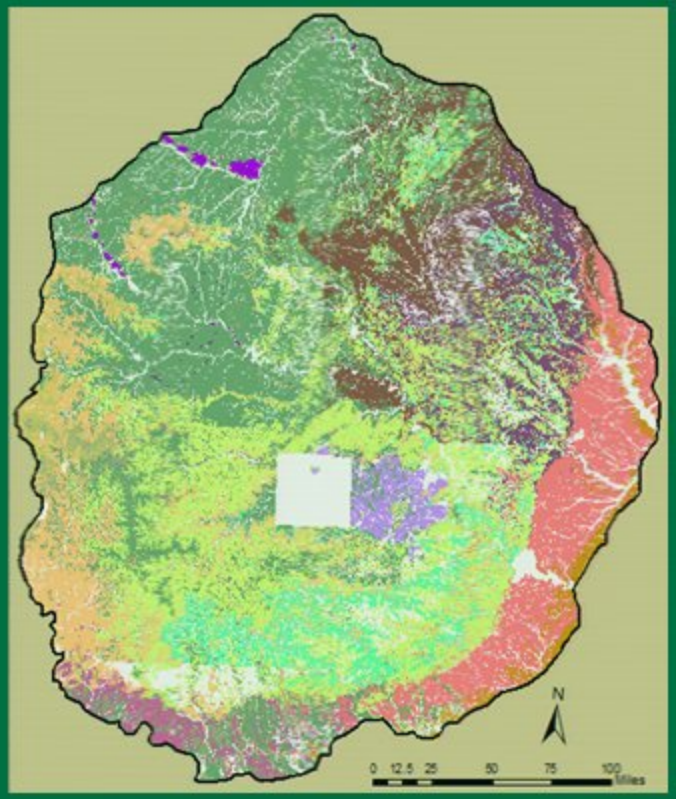
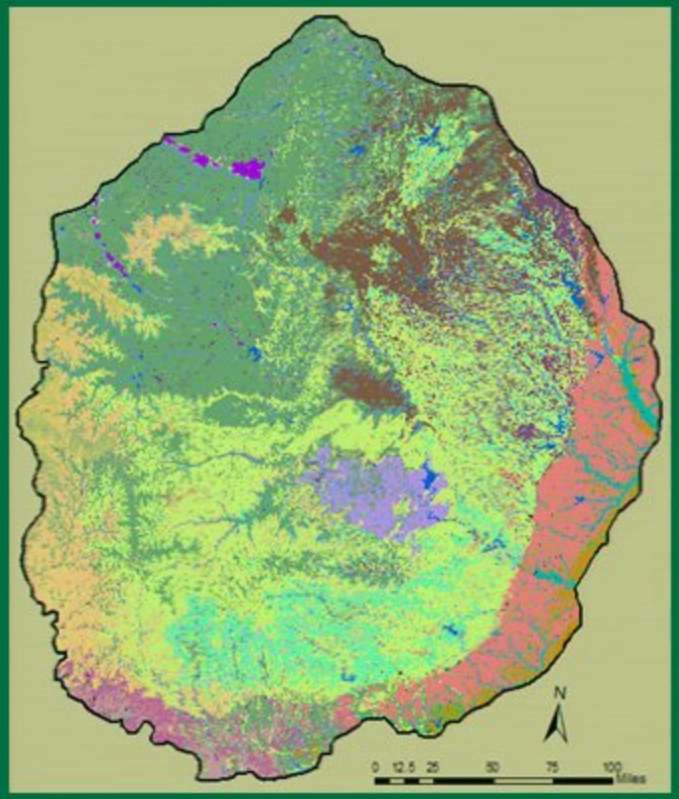
LF 2001 BpS Remap

- See5 map to BpS





LANDFIRE Reference Database

✓ **Identifiable**

- from field or plot data
- through dominance of species or groups of species on the plots
- through individual or groups of indicator species on plots
- dichotomous **Field Key** with field and floristic criteria
- **Sequence Table** for plot data with floristic criteria

SEQUENCE TABLES

Sequence Table
INPUTS

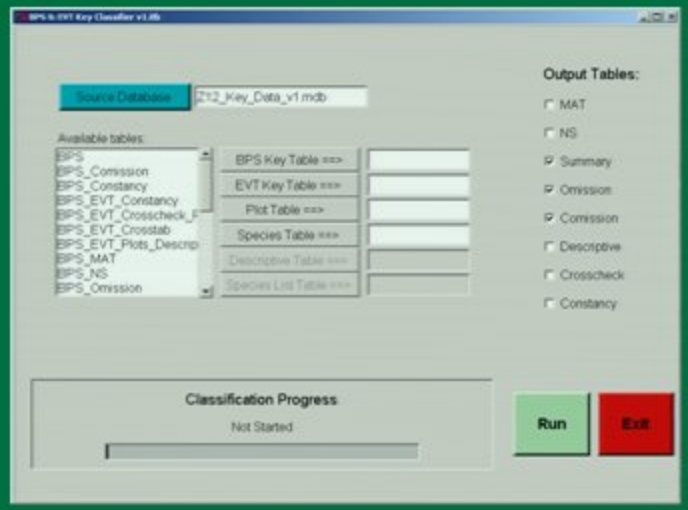
EVT Table
ESP Table
Plots
Species List
Species
Descriptive

Sequence Table
EVT OUTPUTS

EVT_Commission
EVT_Constancy
EVT_MAT
EVT_NS
EVT_Ommission
EVT_Summary

Sequence Table
ESP OUTPUTS

ESP_Commission
ESP_Constancy
ESP_MAT
ESP_NS
ESP_Ommission
ESP_Summary



AUTO KEY

Sequence Table
BPS_EVT OUTPUTS

ESP_EVT_Constancy
ESP_EVT_Crosscheck Plots
ESP_EVT_Crosstab
ESP_EVT_Plots Descriptive
EVT_BPS_Dom_CoDom Spp

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Sequence Table Validation

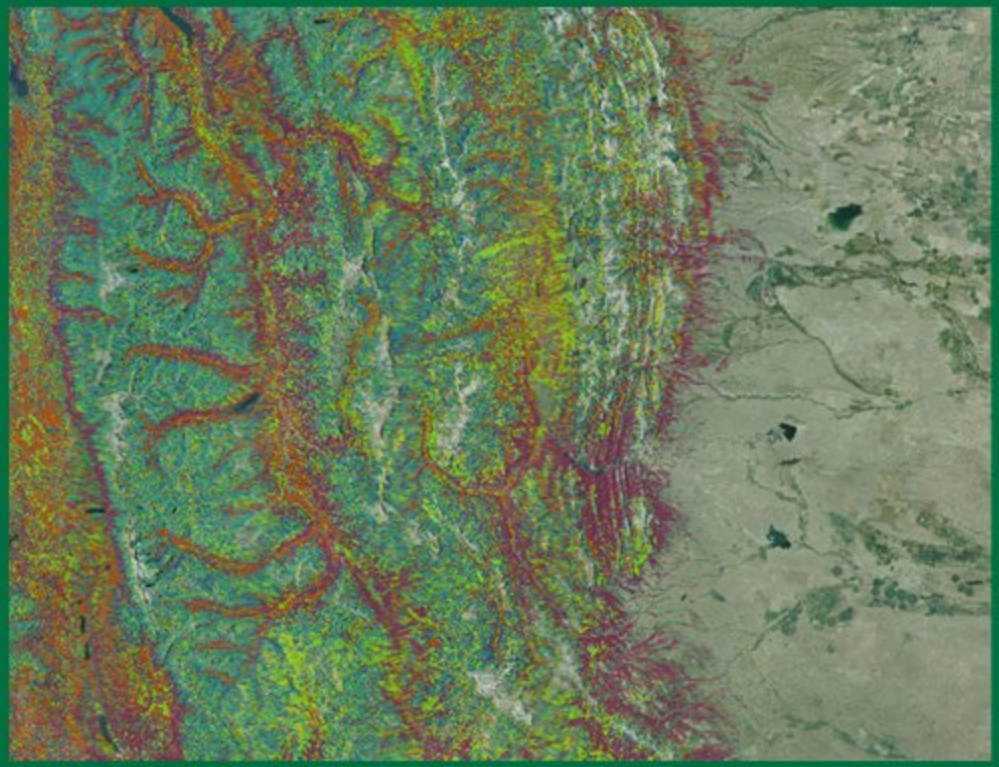
- Improvements #1 in LF Refresh
  - Compared sequence table plot assignments to expert assignments
  - Looking into assigning NVCS types directly

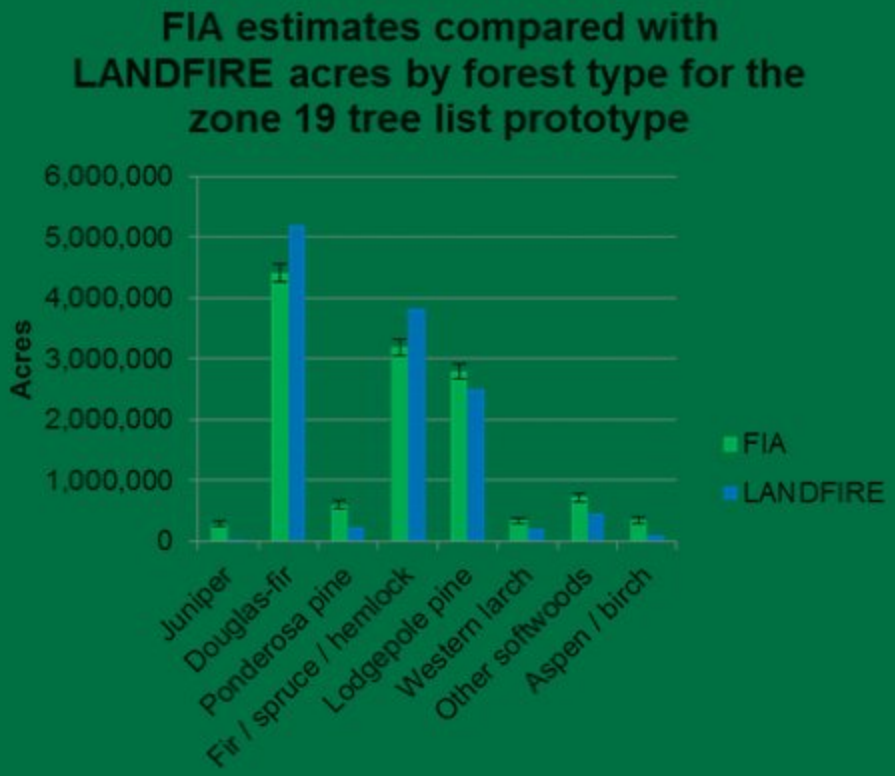
Canopy Fuels Mapping

- CBH mapping
  - Tree plot data drives the process
  - FVS to calculate CBH for each plot
  - Plot data stratified w/ various levels of EVT
  - Remove outliers and calculate average minus one SD as strata CBH

LF 2010 Tree Attribution

FIA Forest Type as mapped from imputed plots





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