



LANDFIRE BpS Review

What is it? How does it work?

Why does it matter?

Randy Swaty, Ecologist
The Nature Conservancy LANDFIRE Team

Presented to

Southwest Fire Science Consortium
January 20, 2016

*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.*

Today's Agenda



Randy Swaty
rswaty@tnc.org

- The what and how about LANDFIRE BpS models
- A bit about BpS review: why it's necessary, and how it will work
- How you can be involved
- Where to go for more information and help

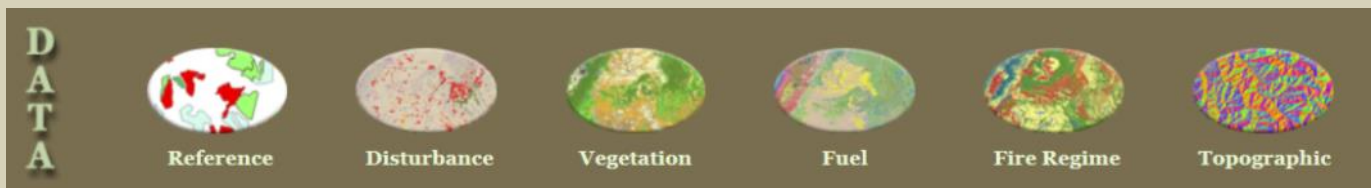
BpS = Biophysical Settings

Introduction to LANDFIRE

LANDFIRE

*Land*scape *Fire* and Resource Management Planning Tools Project

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



KEYWORDS: nationwide, consistent, ecological models, GIS data, tools, fire/non-fire, spatial data



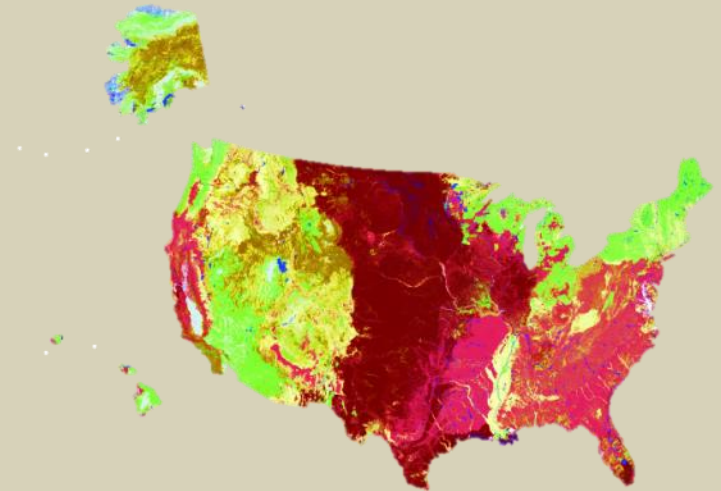
Spatial Datasets

LANDFIRE

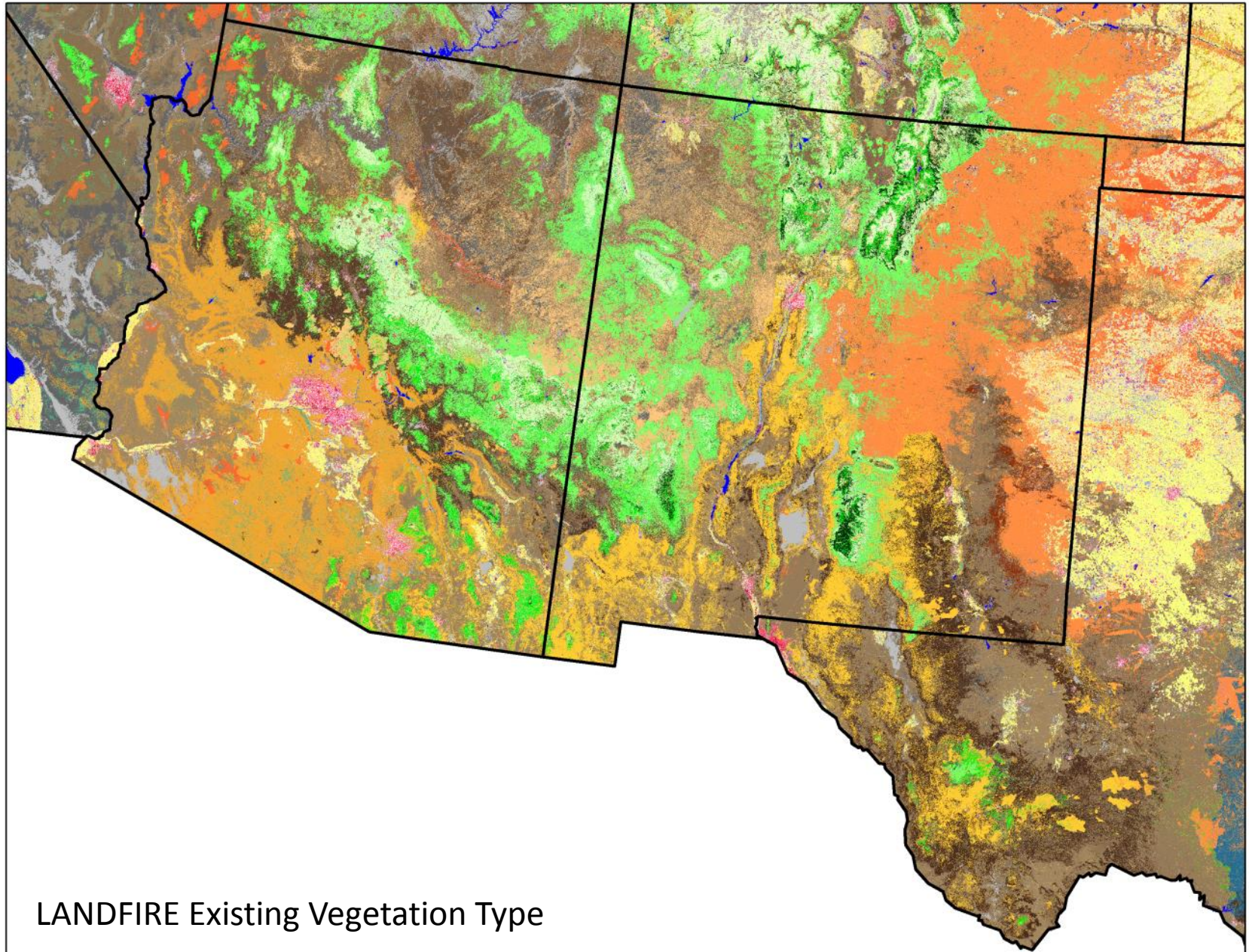
- Uses peer-reviewed, consistent, repeatable scientific methods
- Delivers an “all-lands” spatial dataset of vegetation

LANDFIRE Products

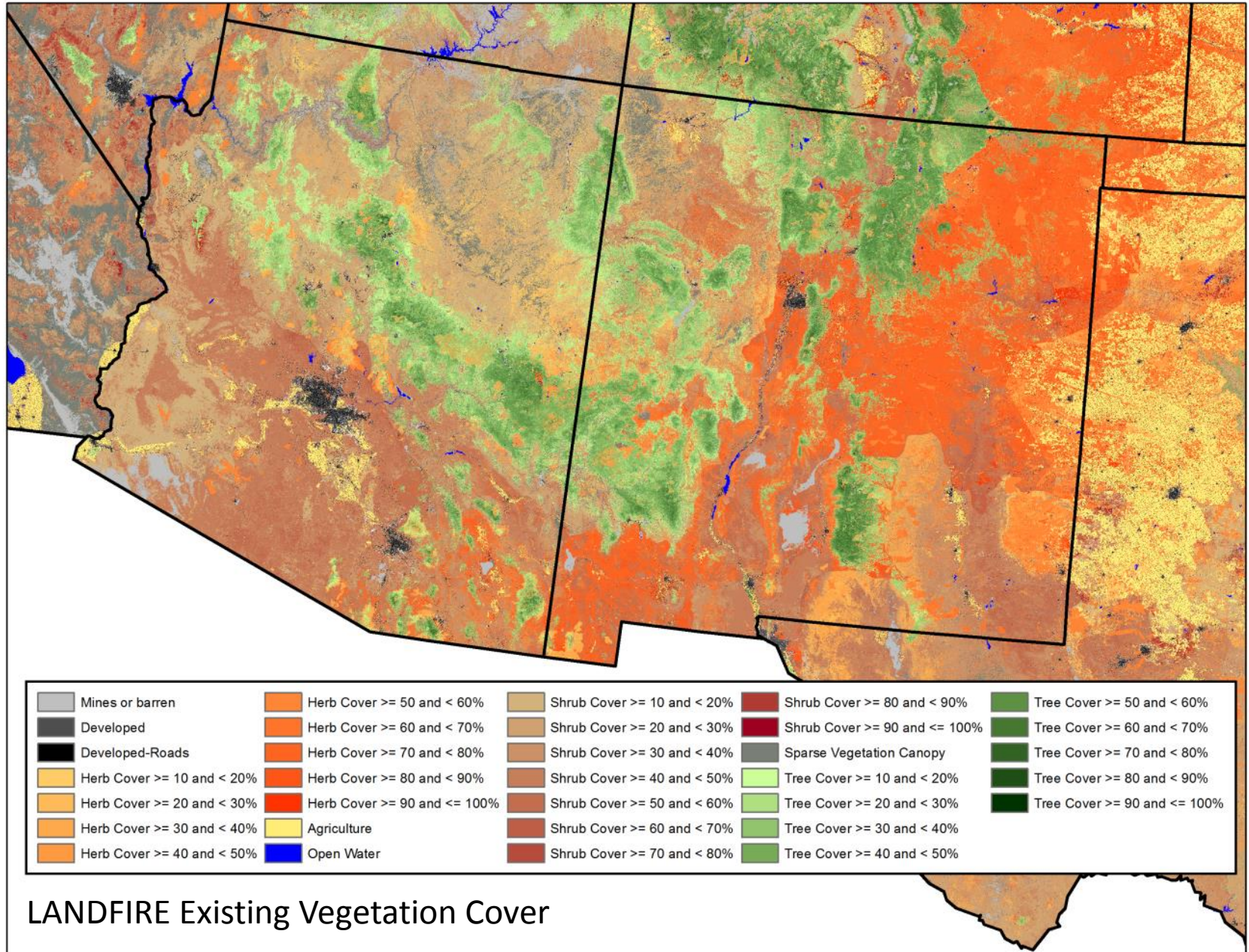
- Vegetation-not just fire
- Fire Regimes
- References and Baselines
- Fuels (Models and Measurements)
- Disturbance Characteristics
- Topographic and GIS Spatial Analysis



Spatial Datasets

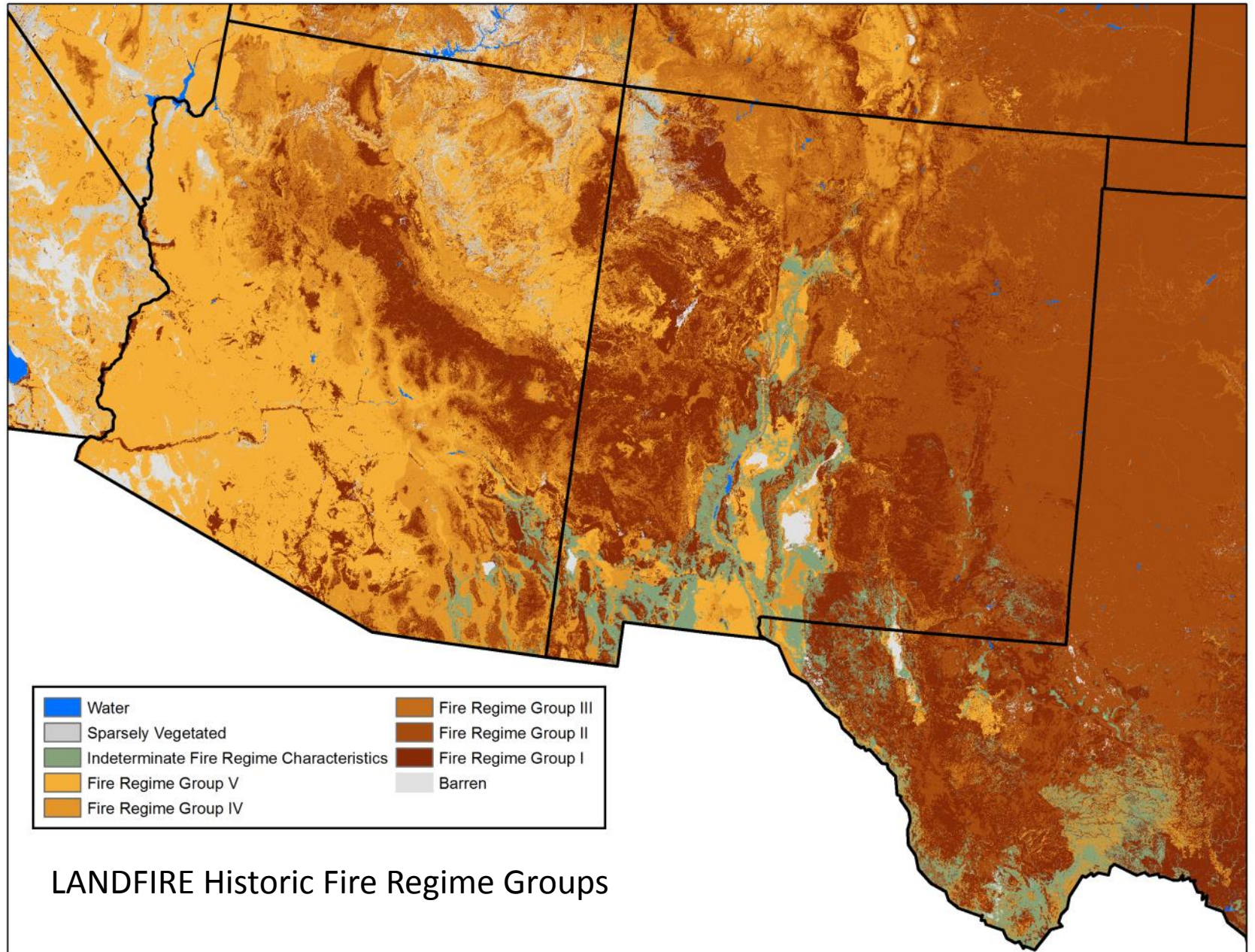


Spatial Datasets



LANDFIRE Existing Vegetation Cover

Spatial Datasets



LANDFIRE Historic Fire Regime Groups

The link...

- The Biophysical Settings Model and Description bundles are linked to many spatial data sets
- Spatial datasets are not perfect-we are always working to improve
- Some areas for improvement are linked to the BpS descriptions

LANDFIRE Vegetation Models

VDOT Model Results

Date/time of currently imported results: []

LANDFIRE Model Tracker Database v4.1.03

View Report

Fields in green should match VDOT model.

Quality Control

1610780 - Colorado Plateau Blackbrush-Mormon-tea Shrubland

General | Classes | Height/Cover Summary | Disturbances | Relevant Literature

Biophysical Setting ID: 1610780

Biophysical Setting Name: Colorado Plateau Blackbrush-Mormon-tea Shrubland

Land Cover Class: Upland Shrubland

Modeler 1 Name: Mike Behrens@blm.gov

Modeler 2 Name: Kara Painter@nps.gov

Model Date: 10/29/2004

Geographic Range: Occurs in the Southwest, Southern Great Plains, Great Basin, Colorado Plateau and CA geographic areas.

Biophysical Site Description: This ecological system occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 560-1600m. Precipitation is generally <12in. Substrates are shallow, typically calcareous, non-saline and gravelly or sandy soils over sandstone or

Vegetation Description: The vegetation is characterized by an extensive open shrublands dominated by Coleogyne ramosissima often with Ephedra viridis, Ephedra torreyana or Grayia spinesa. Sandy portions may include Artemisia filifolia as codominant. The herbaceous layer is sparse (usually

Disturbance Description: Fire regime group II. The mean fire interval is generally approximately 75yrs with high variability due to annual variation in drying of shrub foliage, shrub mortality and grass and forb production related to drought and moisture cycles. There is also high variation in ignitions

Adjacency/Identification Concerns: Following fires, the invasion of non-native annual grasses is likely. Invasion of exotic annual grasses has drastically altered the fire regime in these areas. Where non-native annual grasses have invaded, fire may be much more frequent than the reference condition and can.

Scale Description: Large areas of this BpS are represented by the driest portions of the Mojave, Sonoran and Chihuahuan deserts. Smaller areas of cold desert would be located on

Uncharacteristic Native Conditions

Issues/Problems

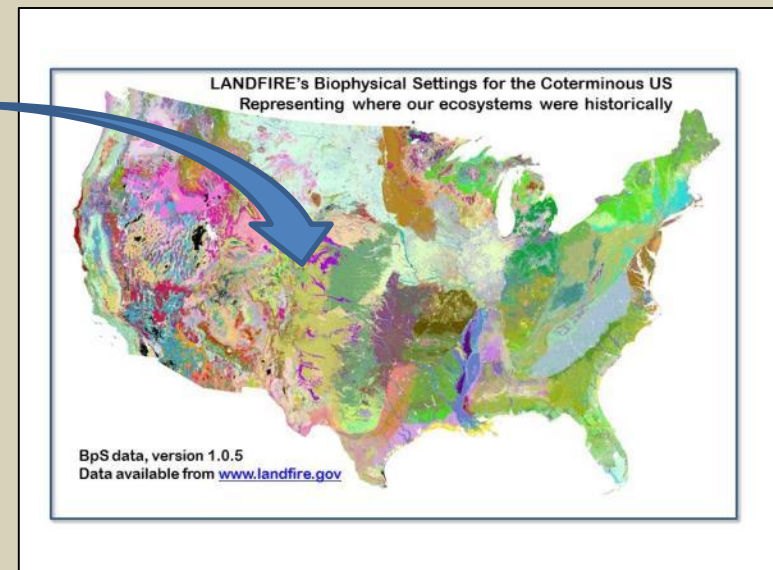
Model Dominant Species

Model Zone

Mapzones

This BpS is lumped with:

This BpS is split into multiple models (explain differences)



Vegetation Model & Description Bundle

- **WHAT:** describe how ecosystems (Biophysical Settings) looked and functioned prior to major European Settlement
- **WHY:** to use as a reference to compare current conditions to (READ-not a prescription)
- **HOW:** worked with hundreds of experts to describe and model, followed by expert review, incorporation of feedback then QA/QC
- **WHEN:** ~ **2,000** models and descriptions completed in 2008. TNC's LANDFIRE team submitted 200-400 pages of documentation and associated models every two weeks.



WHAT

Two-part bundle

LANDFIRE Biophysical Setting Model

Biophysical Setting: 2810110 **Rocky Mountain Aspen Forest and Woodland**

☐ This BPS is lumped with:
☐ This BPS is split into multiple models:

General Information

Contributors (also see the Comments field) **Date** 4/27/2005

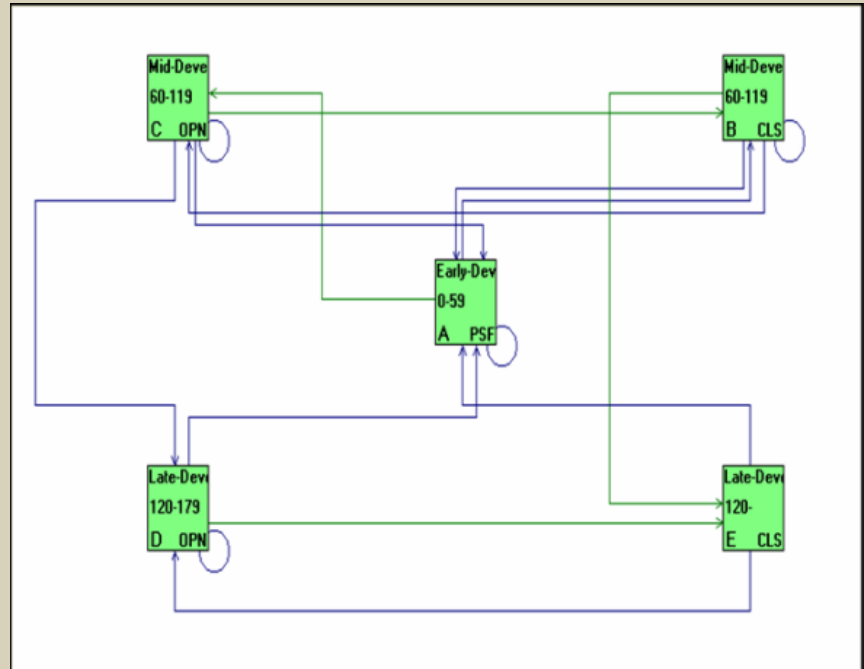
Modeler 1 Kelly Pohl kpohl@tnc.org **Reviewer** Laurie Huckaby lhuckaby@fs.fed.us
Modeler 2 **Reviewer** Chuck Kostecka kostecka@webaccess.net
Modeler 3 **Reviewer** Vic Ecklund vecklund@csu.org
FRCC

<u>Vegetation Type</u>	<u>Map Zones</u>	<u>Model Zones</u>	
Forested	28	0	
Dominant Species*	General Model Sources		
POTR5	<input checked="" type="checkbox"/> Literature	<input type="checkbox"/> Alaska	<input type="checkbox"/> N-Cent. Rockies
SYOR	<input checked="" type="checkbox"/> Local Data	<input type="checkbox"/> California	<input type="checkbox"/> Pacific Northwest
ARUV	<input checked="" type="checkbox"/> Expert Estimate	<input type="checkbox"/> Great Basin	<input type="checkbox"/> South Central
		<input type="checkbox"/> Great Lakes	<input type="checkbox"/> Southeast
		<input type="checkbox"/> Northeast	<input type="checkbox"/> S. Appalachians
		<input type="checkbox"/> Northern Plains	<input checked="" type="checkbox"/> Southwest

Geographic Range
Western Colorado, Utah, northern New Mexico, northern Arizona, central Nevada.

Biophysical Site Description
This type occurs on flat to moderately steep terrain (<50%) on all aspects. Elevation typically ranges from 2275m-3335m (7000' to 11000') in mapzone 28. Stable aspen typically occurs above grass, sagebrush, or P/I. Soils are generally deep, mollic, cool, and moist. As a species, aspen is adapted to a much broader range of environments than most plants found associated with it.

*Textual description informed
by ecological model*



*State-and-transition
ecological model*

Description: the Basics

General	Classes	Height/Cover Summary	Disturbances	Relevant Literature			
Biophysical Setting ID		Biophysical Setting Name		Land Cover Class	Name		Email
5013110		North-Central Interior Dry Oak Forest and Woodland		Forested	Modeler 1	Greg Nowacki	gnowacki@fs.fed.us
					Modeler 2		
					Modeler 3		
					Date	3/16/2007	
Geographic Range		Biophysical Site Description					
Province 222. For Michigan 222J. For Wisconsin 222K, L and R.		This system occurs most commonly on interlobates where outwash, ice-contact, and end moraine landforms are situated between former glacial lobes. Other landforms suitable for development of the dry oak forest are sandy lake plain and dunes. Common to all these landforms is					
Disturbance Description		Vegetation Description					
The North-Central Interior Dry Oak Forest and Woodland is predominantly Fire Regime I, characterized by low-to-moderate severity surface fires. Historically, indigenous fires accounted for over 95% of the ignitions over these landscapes. Vegetation types varied		Oaks dominated the presettlement vegetation, especially white oak (<i>Quercus alba</i>), black oak (<i>Quercus velutina</i>), northern pin oak (<i>Quercus ellipsoidalis</i>), and bur oak (<i>Quercus macrocarpa</i>). This system is distinguished from North-Central Interior					
Adjacency/Identification Concerns		Uncharacteristic Native Conditions					
This type intergrades and can be easily confused with North-Central Interior Dry-Mesic Oak Forest and Woodland (1310). Fire suppression within the last century has allowed this system to be converted to that system on the Inamier soils within the historic range		Though present historically, red maple has been typified as the "native invasive" in oak forests. Its abundance in these systems measured in both stem density and basal area has grown considerably due to fire suppression and the marked increase in fire return					
		Model Dominant Species					
		QUAL		Quercus alba			
		QUVE		Quercus velutina			
		QUEL		Quercus ellipsoidalis			
		QUCO2		Quercus coccinea			
		CAGL8		Carya glabra			
		PRSE2		Prunus serotina			
		SAAL5		Sassafras albidum			
		QUMA2		Quercus macrocarpa			
		Model Zone		Mapzones		<input type="checkbox"/> This BpS is lumped with:	
		<input type="checkbox"/> Alaska		1st MZ		50	
		<input type="checkbox"/> California		2nd MZ			
		<input type="checkbox"/> Great Basin		3rd MZ			
		<input checked="" type="checkbox"/> Great Lakes		4th MZ			
		<input type="checkbox"/> Northeast		5th MZ			
		<input type="checkbox"/> Northern Plains		6th MZ			
		<input type="checkbox"/> Northern Rockies		7th MZ			
		<input type="checkbox"/> Pacific Northwest					
						<input type="checkbox"/> This BpS is split into multiple models (explain differences)	

Originally captured in the "Model Tracker Database"

Description: Succession Classes

Class A

Landscape %

Cover Type

Struct. Stage

Class Indicator Species

Indicator	Spp.	Canopy Position
ANGE	Andropogon gerardii	Upper
SCHIZ4	Schizachyrium	Upper
SONU2	Sorghastrum nutans	Upper

Description PRAIRIE. This class ranges from 0-4 years and succeeds to class B. Class A is grassland prairie maintained by frequently recurring fire. Replacement fire was modeled with the probability of occurring every 10 years. Native Americans used these lands for hunting, and agriculture/native plant gathering. If fire is absent for a few years, tree seedlings and sprouts would recruit into trees and form savannas. Heavy grazing, though unlikely to have large-scale impact, would have kept certain patches from progressing to a woody shrub vegetation stage and would have maintained Class A. Native grazing was modeled with the probability of occurring every 100 years.

Fire Fuel Behavior Model

Structural Data (for upper layer lifeform):

Min Canopy Closure %
Max Canopy Closure %
Min Height
Max Height
Max tree size class

Upper Layer Lifeform (select one)

☐ Tree ☐ Shrub ☒ Herb

☐ Upper Layer Lifeform is not Dominant

If checked, please specify the dominant lifeform, and its minimum and maximum canopy cover and height:

Class B

Landscape %

Cover Type

Struct. Stage

Class Indicator Species

Indicator	Spp.	Canopy Position
QUAL	Quercus alba	Upper
QUVE	Quercus velutina	Upper
ANGE	Andropogon gerardii	Lower
SCHIZ4	Schizachyrium	Lower

Description SAVANNA. This class ranges from 5-14 years and succeeds to class C. Savannas conditions occurred where fire was fairly frequent allowing some trees to develop (5-15 yrs). Any area that does not burn frequently would convert to woodland conditions (class C). Replacement fire, modeled at the probability of occurring every 40 years, would send class B to class A. Surface fire, modeled at the probability of occurring every 33 years, would maintain the system in this class. Native grazing, modeled at the probability of occurring every 100 years, would also maintain the system in this class.

Fire Fuel Behavior Model

Structural Data (for upper layer lifeform):

Min Canopy Closure %
Max Canopy Closure %
Min Height
Max Height
Max tree size class

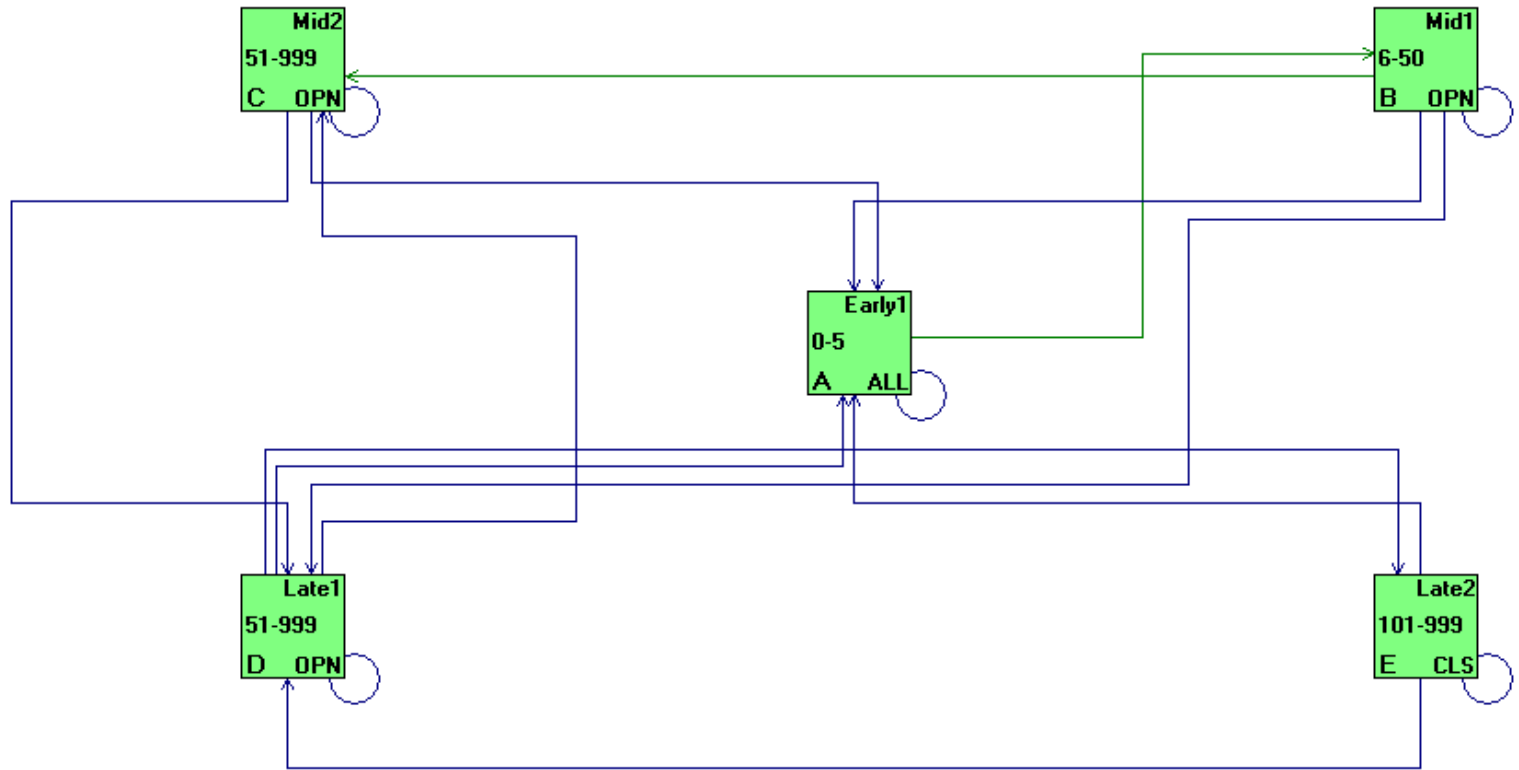
Upper Layer Lifeform (select one)

☒ Tree ☐ Shrub ☐ Herb

☐ Upper Layer Lifeform is not Dominant

If checked, please specify the dominant lifeform, and its minimum and maximum canopy cover and height:

Modeling: Succession Class Percent



Boxes = Succession classes.

Lines = disturbances or succession

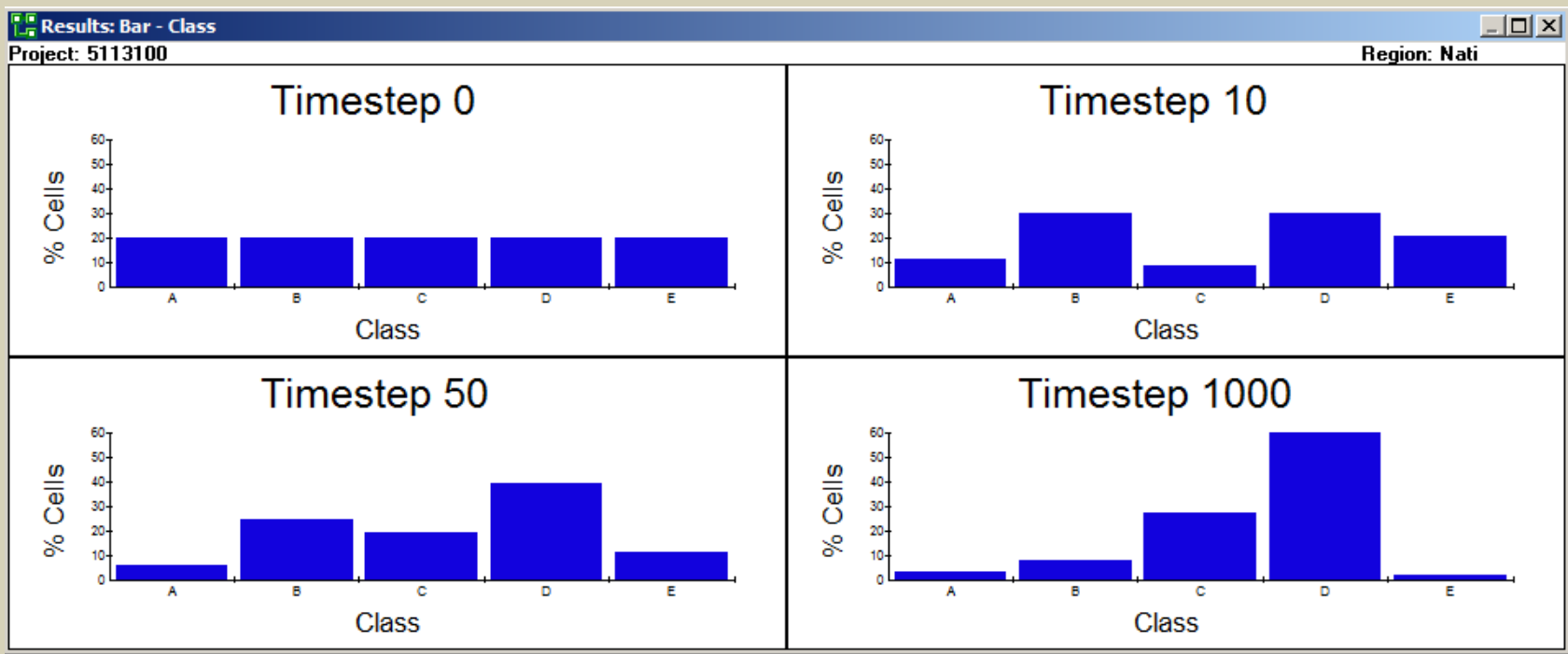
Modeling: Succession Class Percent

Inputs for VDDT modeling included:

- basic parameters for each Succession Class (structure, start and end age)
- types and annual probability of disturbances
- what happens when there is not a disturbance

Models were run:

- 10 times for 1,000 cells, 1,000 years



Modeling: Review

“High-touch” hands-on process

1. Experts reviewed models and descriptions
2. Reviews were incorporated into the descriptions & models
3. Automated and manual quality assurance and quality control.

Not perfect!



Delivered

- Description and Model bundles delivered every two weeks
- First cog in the machine of BpS, S-Class, Vegetation Departure and other mapping processes

www.landfire.gov/national_veg_models_op2.php

Alerts
Notifications
Get Data


DATA

Reference Disturbance Vegetation Fuel Fire Regime Topographic

Download Model Products - with VDDT model


Select a mapping zone to download Vegetation Dynamics Model products, including model description (.pdf), reference condition summary table (.csv), metadata (.htm) and VDDT model (.mdb).

Model Search: Unsure of which model you need? Download and use this [spreadsheet](#) to help you identify candidate LANDFIRE models. Search instructions are included on the first worksheet of the workbook.




The map shows the contiguous United States and Alaska, divided into numerous small, numbered mapping zones. The zones are numbered from 1 to 79, with some zones in the western and southern regions having multiple numbers. The map is used to select a specific mapping zone for downloading model products.

Uses






Journal of Arid Environments

Volume 124, January 2016, Pages 388–397



Precipitation regime classification for the Mojave Desert:
Implications for fire occurrence


Jerry Tagestad^a, , , Matthew Brooks^b, Valerie Cullinan^a, Janelle Downs^a, Randy McKinley^b



Contents lists available at [ScienceDirect](#)


Forest Ecology and Management

journal homepage: www.elsevier.com/locate/foreco



Post-fire forest dynamics and climate variability affect spatial
and temporal properties of spruce beetle outbreaks
on a Sky Island mountain range

Christopher D. O'Connor^{a,c,*}, Ann M. Lynch^{b,c}, Donald A. Falk^{a,c}, Thomas W. Swetnam^c

 CrossMark

Ecosystems
DOI: 10.1007/s10021-013-9704-x

ECOSYSTEMS
© 2013 Springer Science+Business Media New York (Outside the USA)

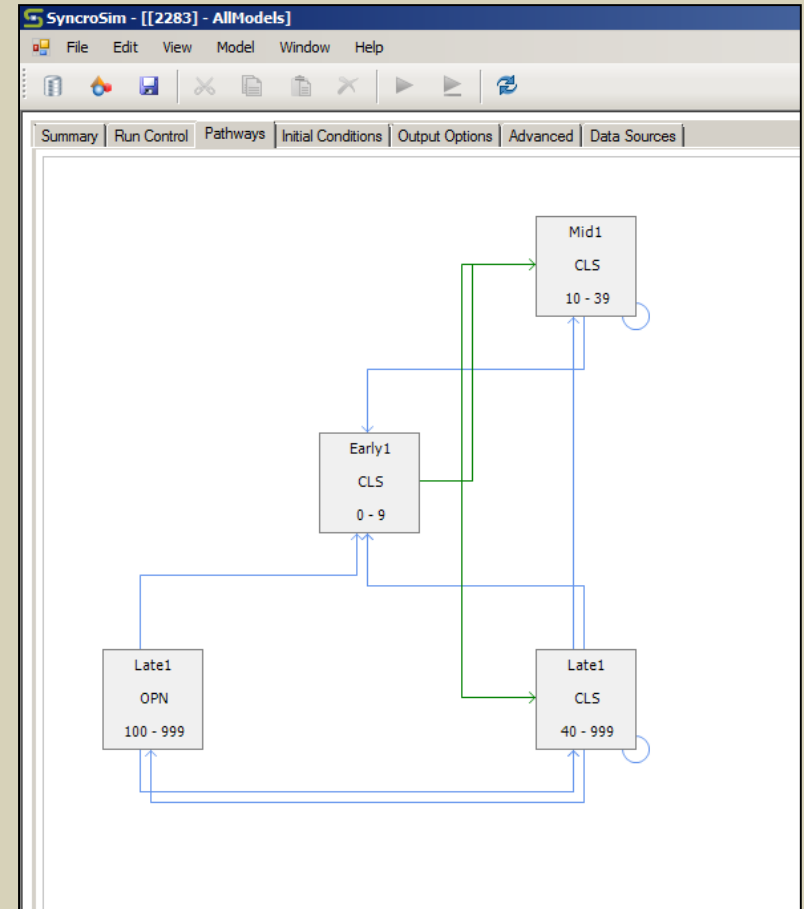
**Previous Fires Moderate Burn
Severity of Subsequent Wildland
Fires in Two Large Western US
Wilderness Areas**

Sean A. Parks,^{1,2*} Carol Miller,¹ Cara R. Nelson,² and Zachary A. Holden³

- Research
- Conservation planning
- Input for other models
- Fire management planning
- Ecological assessment

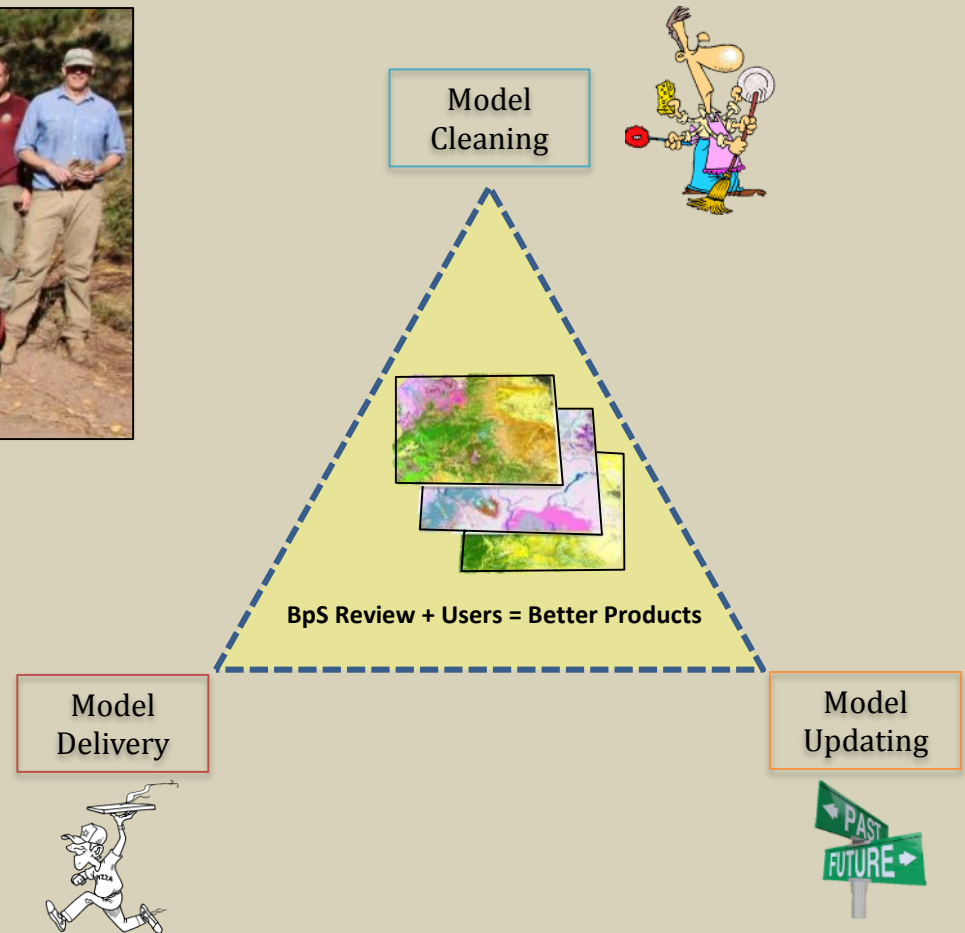
Why Review?

- “Blunders” e.g. typos, inconsistencies, and so on
- New science
- Missed opportunities
- Potential for upgraded delivery system
- Updated modeling software



Our Philosophy

BpS Review + Users = Better Products



BpS Review Process

- We are currently “cleaning” the BpS list, removing duplicates and near duplicates.
- We will post those documents, ~1200 of them, to a dedicated BpS Review website.
- We will then invite review. Contributors will have option to review only a Word document, or can do the document and the model.
- Most review will be conducted in contributors’ locations, e.g. office desk, laptop, etc., though the LANDFIRE team will hold WebEx sessions and be available to help.
- **Review will be incorporated and delivered via a Web Site (TBD).**



The screenshot shows the homepage of the LANDFIRE Biophysical Settings Review Site. The header features the The Nature Conservancy logo on the left, the title "LANDFIRE Biophysical Settings Review Site" in the center, and a LANDFIRE logo on the right. Below the header is a navigation bar with links: Home, About, Review, Resources, and Contacts. The main content area is divided into two columns. The left column has a heading "We Need Your Help! To contribute to ecological knowledge" followed by two paragraphs of text. The right column has a heading "About The Nature Conservancy's LANDFIRE Team" followed by a paragraph of text and a small image of a forest. At the bottom of the left column is a heading "Where You Fit In" followed by a paragraph of text.

The Nature Conservancy  **LANDFIRE**
Biophysical Settings Review Site 

[Home](#) [About](#) [Review](#) [Resources](#) [Contacts](#)

We Need Your Help!

To contribute to ecological knowledge

All ecosystems are dynamic, changing due to growth, succession and disturbances. Modeling large landscapes in the United States requires the collective knowledge of experienced and knowledgeable vegetation and fire experts. In collaboration with hundreds of colleagues, LANDFIRE produced more than 1,000 state-and-transitions models — one for every ecosystem (called Biophysical Settings or BpS) mapped by the Program. The result is a major contribution to basic and applied vegetation ecology across the country.

LANDFIRE models represent how Biophysical Settings looked and worked prior to major European settlement. These descriptions play a part in national vegetation mapping and assessment, and on-the-ground management across the country. A new phase is underway as LANDFIRE deepens and broadens the science and applicability of those models.

Where You Fit In

LANDFIRE is updating the BpS models and invites you to help improve this one-of-a-kind, comprehensive and unique encyclopedia of ecological knowledge. Along the way you will meet new people, learn about the models and contribute to a product that influences vegetation management across the U.S.

About The Nature Conservancy's LANDFIRE Team

LANDFIRE is a national program with partners, colleagues and resources spread across the United States in many different agencies and organizations. We are The Nature Conservancy's LANDFIRE team, operating as part of the North America Conservation Region within The Nature Conservancy. We are located coast to coast—Florida, Michigan, Minnesota, Colorado, Oregon.



Online Connections



LANDFIRE Program Home <http://www.landfire.gov>



Conservation Gateway: <http://nature.ly.landfire>



Twitter: [@nature LANDFIRE](https://twitter.com/nature_landfire)



YouTube: [LANDFIREvideo](https://www.youtube.com/LANDFIREvideo)



Bulletins/Post cards via e-mail

– Opt in: http://eepurl.com/baJ_BH



Email: LANDFIRE@tnc.org