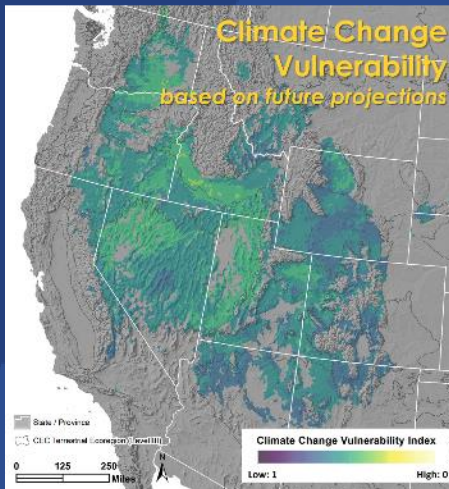


# Tools for Ecological Restoration and Seed Sourcing

Colorado Plateau Native Plant Program meeting, February 5, 2018



A quick way to determine what to plant and where to source your plant material in a climate smart way. Currently, this beta pilot is only available for the Appalachian Ridge and Valley region

[Find Your Site](#)

[Jump to Ecosystems Descriptions](#)

[What is SeedSmart?](#)

[Contact Us and Send Us Feedback](#)

*Patrick McIntyre*, Senior Ecologist, Western North America

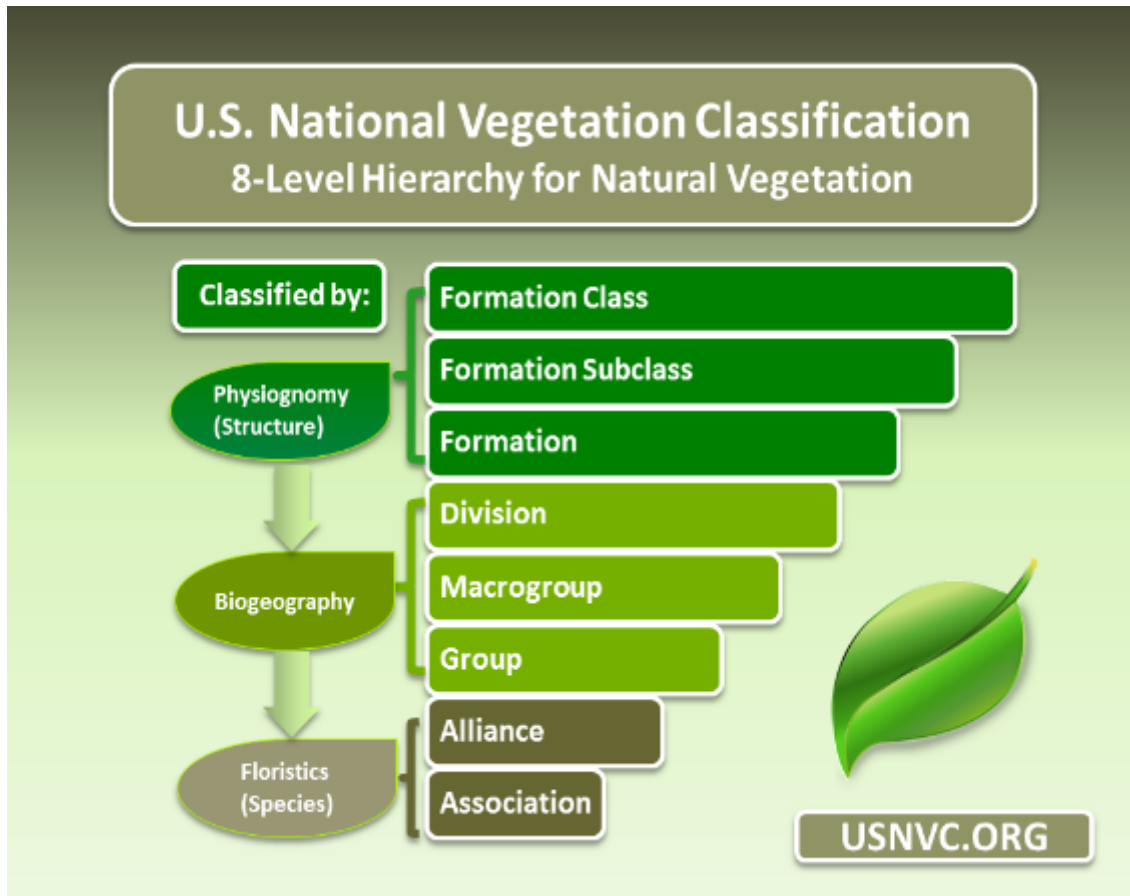
# NatureServe resources and tools supporting the National Seed Strategy

- ◆ Classification and Mapping
  - **What species to plant?**
- ◆ Vulnerability to predicted threats?
  - **Climate, invasives, fire regime?**
- ◆ Sourcing and planning
  - **Where to source material?**
- ◆ Integration: SeedSmart tool (expansion beyond eastern US)





# US National Vegetation Classification





# NVC Resources supporting restoration

**NatureServe EXPLORER.**

An Online Encyclopedia of Life

Search About Us About the Data Local Programs Help

Welcome to NatureServe Explorer, an authoritative source for information on more than 70,000 plants, animals, and ecosystems of the United States and Canada. Explorer includes particularly in-depth coverage for rare and endangered species.

**Highlights**

**November 2016 Data Refresh!**  
Updated information for thousands of species and ecological communities, including many Canadian fungi.

**Make A Difference! Support NatureServe Today.**

**Additional Data Resources**  
[Find more NatureServe data.](#)

**Species Quick Search**

or search Species and/or Ecological Communities & Systems by Name, Taxonomy, Location, or Conservation Status.

NatureServe Explorer is a product of NatureServe and its natural heritage member programs.

Use the database to easily find:

- scientific and common names
- conservation status
- distribution maps
- images for thousands of species
- life histories, conservation needs, and more

## Composition & cover information

Species	Constancy	Av. Cover	Range
<b>Herbaceous</b>			
<i>Campanula rotundifolia</i>	95%	1%	1
<i>Geum triflorum</i>	95%	3%	1-15
<i>Poa pratensis</i>	95%	7%	1-38
<i>Achillea millefolium</i>	89%	1%	1-3
<i>Agoseris glauca</i>	79%	1%	1-3
<i>Elymus trachycaulus</i> ssp. <i>subsecundus</i>	74%	1%	1

## Field Keys

Key to USNVC Upland Macrogroups, Groups and Alliances in the Central Basin and Range Ecoregion (Selected Divisions)

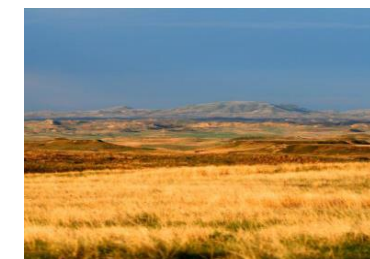
### 1.B.2 Cool Temperate Forest & Woodland

#### D194 Rocky Mountain Forest & Woodland

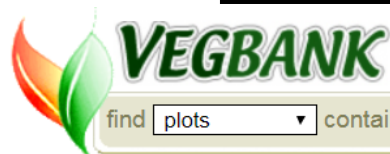
**M1a.** Macrogroup of high montane and subalpine forests/woodlands in mountainous regions of the western U.S. and southwestern Canada. Characteristic trees include *Abies lasiocarpa* (subalpine fir), *Larix lyallii* (subalpine larch), *Picea engelmannii* (Engelmann spruce), *Pinus albicaulis* (whitebark pine), *Pinus aristata* (bristlecone pine), *Pinus contorta* (lodgepole pine), *Pinus flexilis* (limber pine), *Pinus longaeva* (Great Basin bristlecone pine), *Populus tremuloides* (quaking aspen), and *Tsuga mertensiana* (mountain hemlock) (which is also important in Pacific maritime macrogroups). Varies from nearly closed-canopy forests to very open or patchy short-statured woodlands, clumps of tree islands or ribbons with intervening grasslands or shrublands near upper treeline. .... **G2**

..... **M020 Rocky Mountain Subalpine-High Montane Conifer Forest**

**M1b.** Conifer and mixed deciduous-conifer macrogroup of lower montane forests, woodlands and savannas of the southern Rocky Mountains, Colorado Plateau, and Great Basin. Characteristic trees include *Abies concolor* (white fir), *Juniperus scopulorum* (Rocky Mountain juniper), *Pinus ponderosa*



## Plot Data



find  containing

[advanced search](#)

[browse data](#)

## Special-status Species

### At-Risk Species Reported for this Association

Scientific Name (Common Name)	NatureServe Global Status
<i>Penstemon pudicus</i> (Kawich Range Beardtongue)	G1



# BLM User Guide -NVC



## A BLM VEGETATION GUIDEBOOK FOR THE U.S. NATIONAL VEGETATION CLASSIFICATION



A supplement to the Integrated Vegetation Management Handbook, including guidance on plot data inventory, vegetation mapping, and assessment and monitoring of rangeland condition.





# BLM Guidebook Chapters



## TABLE OF CONTENTS

- 1 Introduction to Guidebook
- 2 Introducing the USNVC
- 3 Introducing the USNVC For BLM Use
- 4 Common Terminology
- 5 Vegetation Type Inventory
- 6 Assessment of Vegetation Type Condition
- 7 Planning Vegetation Type Management
- 8 Monitoring of Vegetation Type Condition
- 9 Reporting
- 10 Advantages and Limitations of the USNVC for BLM
- 11 References
- 12 Appendices



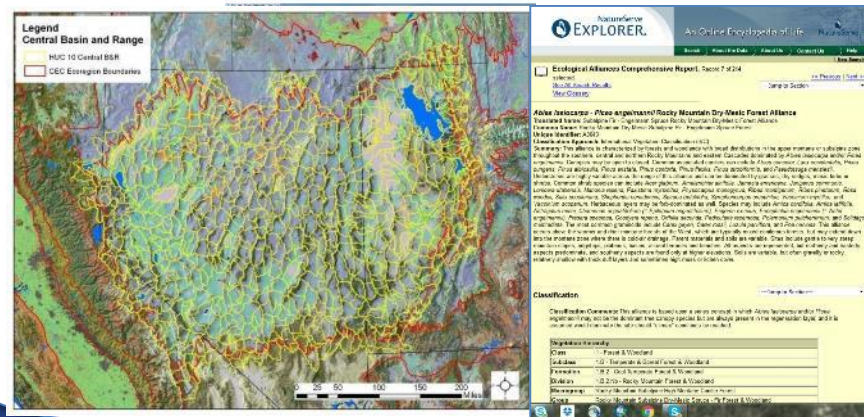
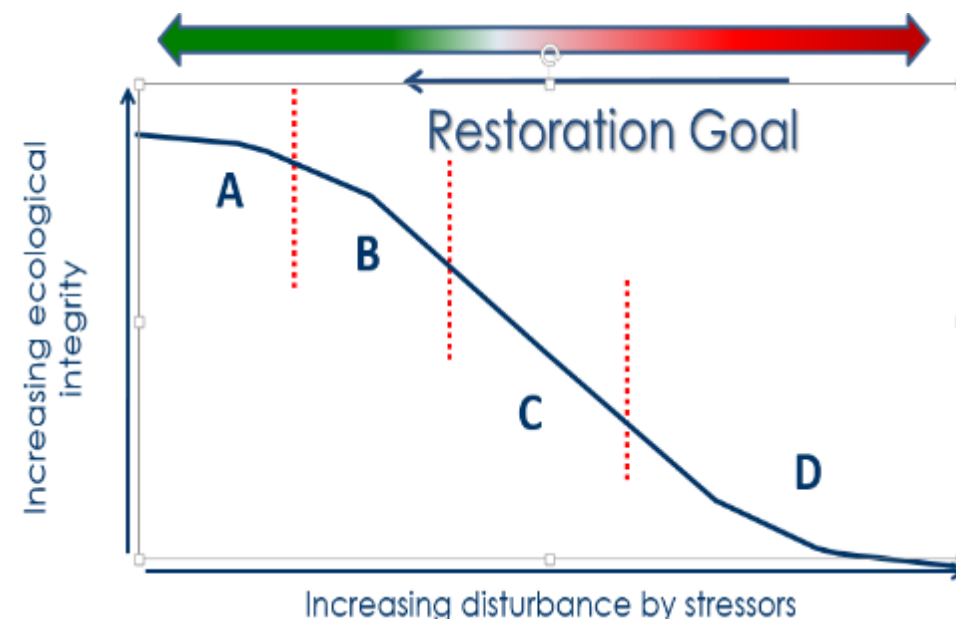




# 7 Planning Vegetation Management



- ✓ BLM Planning & the NVC
- ✓ extent of types, rare types
- ✓ attributes of condition such as fire regime departure
- ✓ fuels management
- ✓ Desired condition of types
- ✓ Native plant composition
- ✓ Sourcing plant materials





# HCCVI Assessment

Sensitivity



Adaptive Capacity

**Resilience  
Score**

Exposure



**Exposure Score**

Exposure →

LH	MH	HH
LM	MM	HM
LL	ML	HL

↑ Resilience

Vulnerability:  
Very High, High,  
Moderate, Low

*"by area...today, or by mid-century"*





**Ecological Systems**



**HCCVI Assessments**



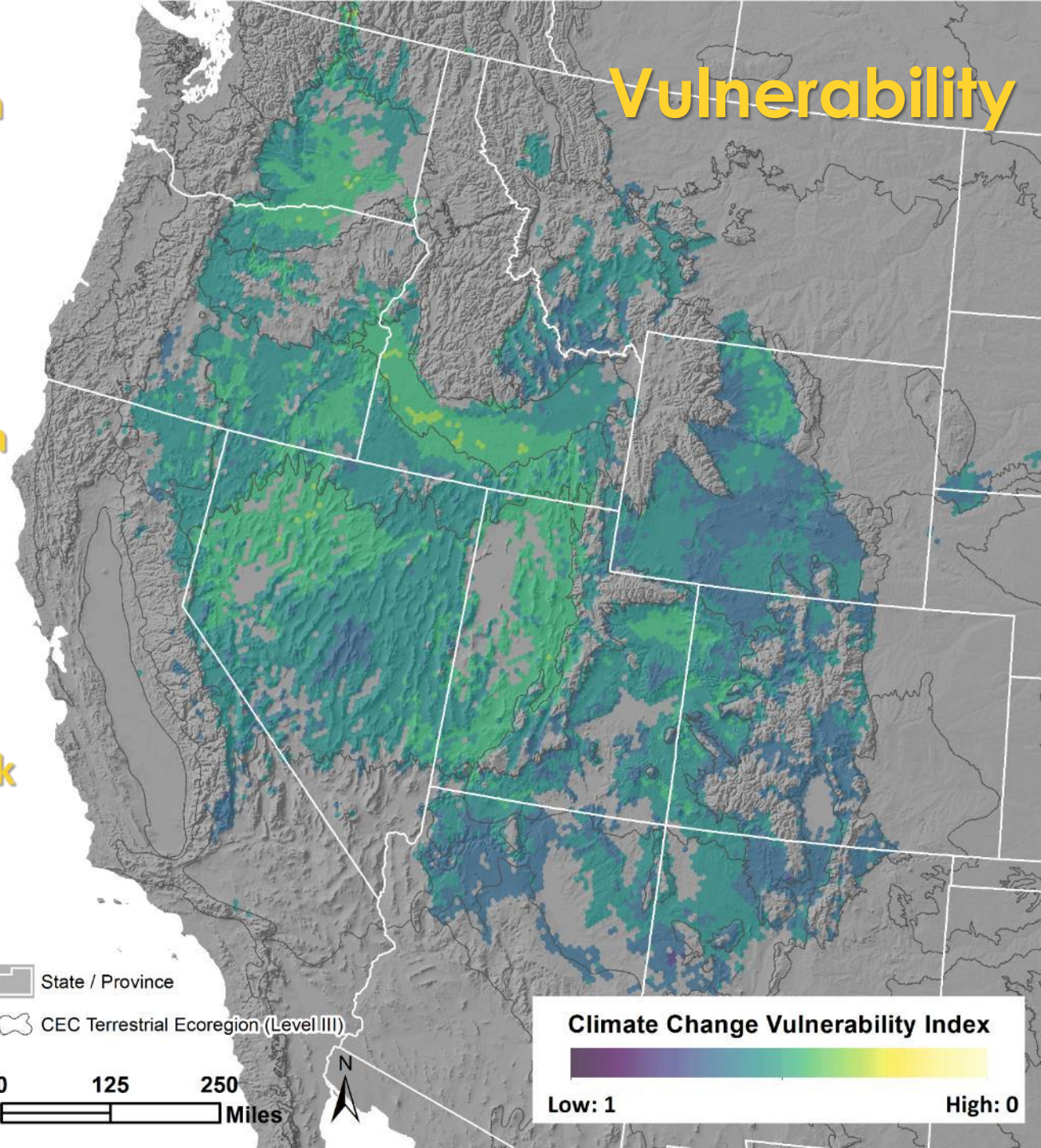
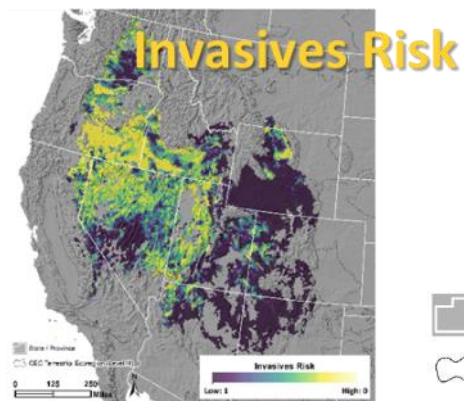
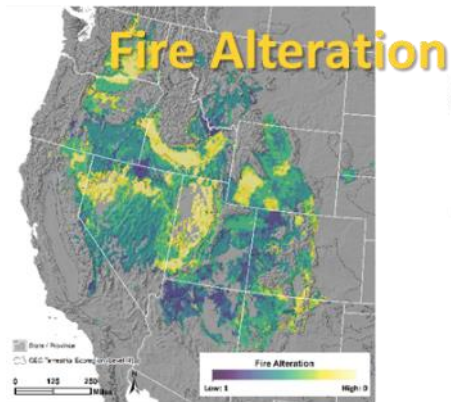
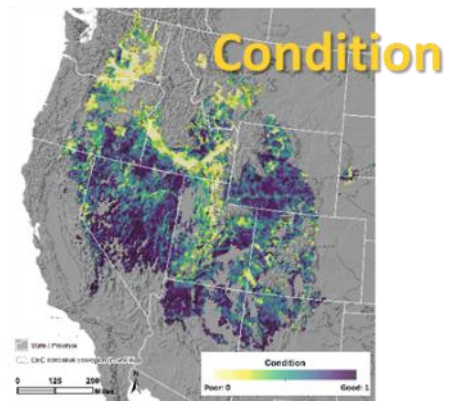
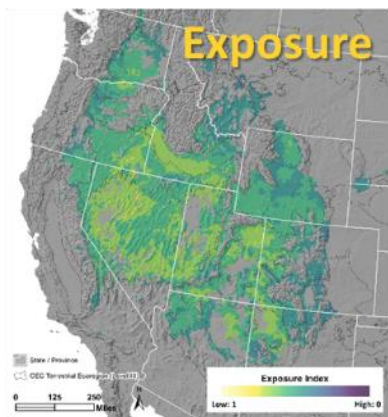
**Tech. Report**



**GIS  
Layers**



# Intermountain Basins Big Sagebrush Shrubland

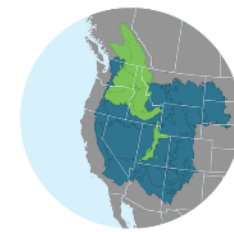






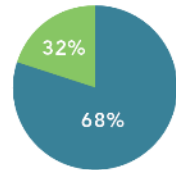
# CLIMATE CHANGE VULNERABILITY

## INTERMOUNTAIN BASINS BIG SAGEBRUSH SHRUBLAND



### HOW VULNERABLE IS IT?

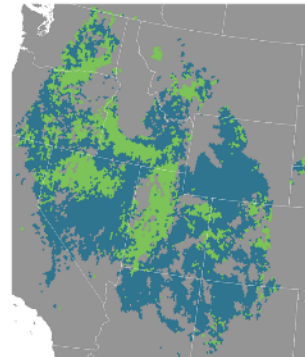
BASED ON A COMPARISON OF CLIMATE CONDITIONS FROM 1981–2014 COMPARED TO A 20TH CENTURY BASELINE PERIOD (1948–1980). Vulnerability to climate change is a combined measure of climate change exposure and relative ecological resilience. High exposure and/or low resilience lead to high vulnerability to the effects of climate change.



PROPORTION OF THE DISTRIBUTION BY VULNERABILITY CATEGORY.

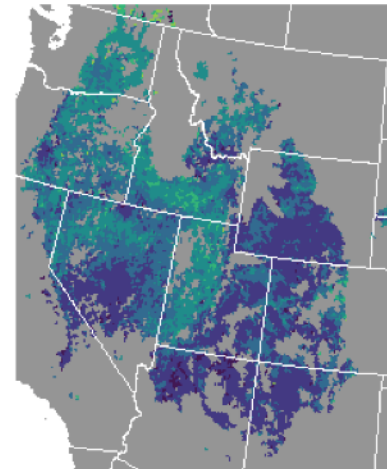
#### VULNERABILITY

- VERY HIGH
- HIGH
- MODERATE
- LOW



HABITAT CLIMATE CHANGE VULNERABILITY INDEX (HCCVI) result for this ecosystem summarized by 100 km<sup>2</sup> hexagon.

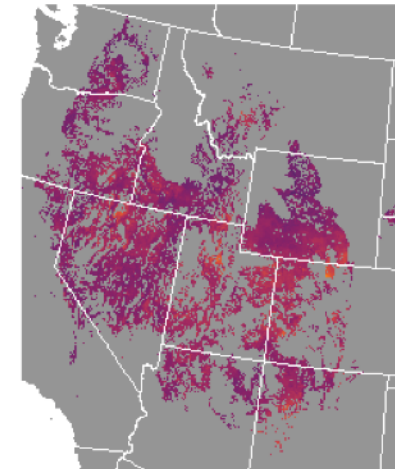
### WHY IS IT VULNERABLE?



RESILIENCE



**OVERALL RESILIENCE MAP** RESILIENCE measures non-climate ecosystem stress and adaptive capacity. Areas of lower resilience (light green on the map) currently have high risk for invasive plants, fragmentation and altered fire regimes.



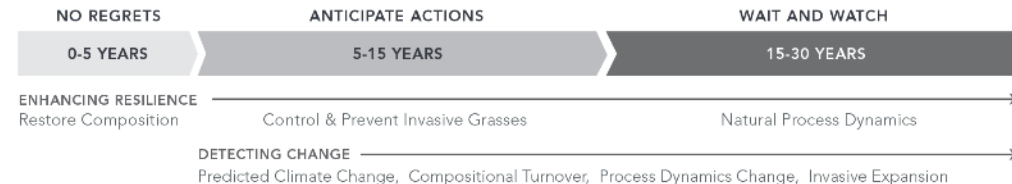
EXPOSURE



**CLIMATE EXPOSURE** for the ecosystem is a single index of exposure to climate change. Where exposure is high (red on the map), the species comprising the ecosystem are currently exposed to stress due to climate change.

### WHAT CAN WE DO?

**CLIMATE SMART MANAGEMENT TIMELINE** Resource managers are confronted with the need to identify actions to respond to climate change now and 30 years in the future. In the short term, managers should aim to enhance resilience by maintaining or restoring species composition, dynamic processes, and connectivity. In the longer term, it will be necessary to detect ecosystem change in response to both climate change effects and management actions.



## 2017 Pilot launched for Eastern US- Appalachian Ridge & Valley

**Layers On/Off**

Select Ecosystem:

Allegheny-Cumberland Dry Oak F...

☐ Off Allegheny-Cumberland Dry Oak Forest and Woodland

Transparency: 25

☒ On Study Area

☐ Off Potential Systems

Potential Systems Transparency: 0

☐ Off Existing Systems

Existing Systems Transparency: 0

☐ Off Protected Areas

Protected Areas Transparency: 0

☐ Off EPA Ecoregions

☐ Off Counties

☐ Off Watersheds

☐ Off States

[Back](#) Northeastern Interior Dry-Mesic Oak Forest Details

Summary ▾

Description ▾

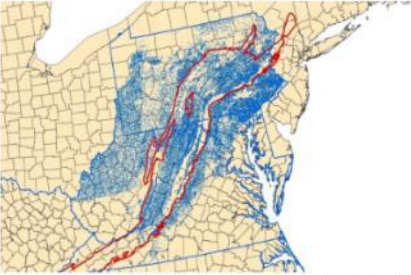
Characteristic Plants ▾

Variations and Inclusions ▾


Dynamics ▾

Criteria ▾

Images ▲



Range of Northeastern Interior Dry-Mesic Oak Forest (in blue) in study area (red outline)



Example of Northeastern Interior Dry-Mesic Oak Forest © Pennsylvania Natural Heritage Program

[Source Your Seeds](#)

[Back](#)

Your restoration target is:

### Northeastern Interior Dry-Mesic Oak Forest

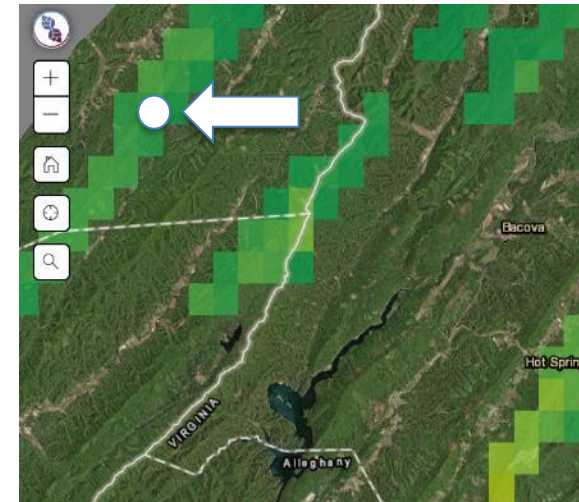
This very common forest system is often known as "Oak-Hickory Forest", with both oaks and hickories being prominent in the canopy. It occurs on neither highly acidic nor highly alkaline soils, and is intermediate in species richness. Heaths may be present but are not dominant, and plants characteristic of rich soils, such as blue cohosh or maidenhair fern are absent or minor in cover.

To see if your site matches this map's prediction

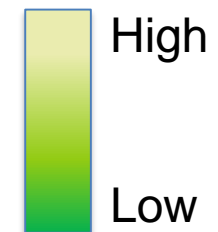
[Verify With Key](#)

I am sure this is my target.

[Skip the Key](#)



Climate Distance  
(relative to baseline)







It's a team effort!

Healy Hamilton, chief scientist

Pat Comer, chief ecologist

Marion Reid, vegetation ecologist

Stephanie Auer, bioclimate analyst

Jon Hak, spatial modeler/ecologist

Regan Smyth, landscape ecologist

Keith Schulz, vegetation ecologist



*Patrick McIntyre, [patrick\\_mcintyre@natureserve.org](mailto:patrick_mcintyre@natureserve.org)*