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When are we going to get there?

Stand structure in early 1900s

Labeling of Forest Management the last 100 Years

- Subsistence Forest Management
- High Grading
- Selective Harvest
- Industrial forestry
- High Yield Forestry
- New Perspectives Mid 1980's
- New Forestry
- Ecosystem Management
- Landscape Management
- Restoration
- Ecosystem Services
- Community Collaboration Forest Management???

More…Labeling of Forest Management the last 100 Years

- Integrating fuel reduction treatments
- Forest dynamics after thinning
- Risk-based prioritization
- Whole-landscape management strategy
- Uneven-aged management
- Increasing ecosystem function & resilience
- **All mixed up!**

THE R WORD

- Restoration – what do we mean?
- Restoring ecosystems to conditions consistent with their evolutionary environments (HRV)
- Restoring resiliency to ecosystems

Added benefits

- Reduce threats to communities
- Contribute to economic sustainability
- Conserve wildlands for present and future generations

- Importance of scale – Stands, Landscapes & Time

- Restoration Terminology needs updating and context in an era of climate change

Restoration

A Multi-disciplinary Framework

Scientific framework

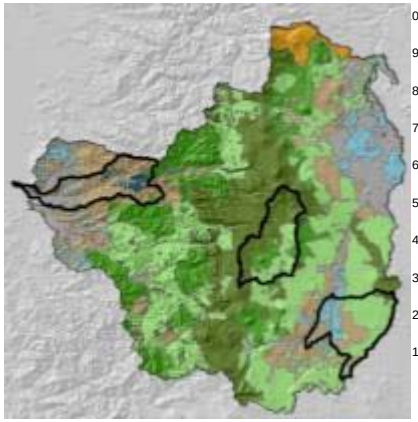
Social, economic and political framework

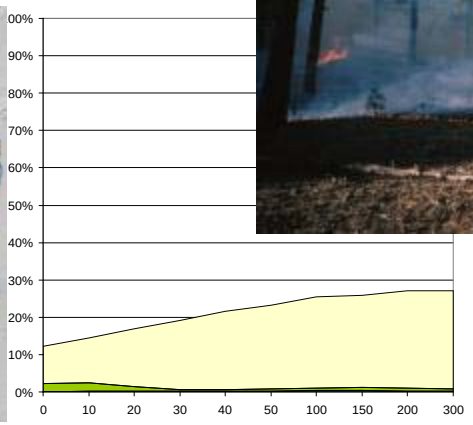
Adaptive management framework

Operational framework

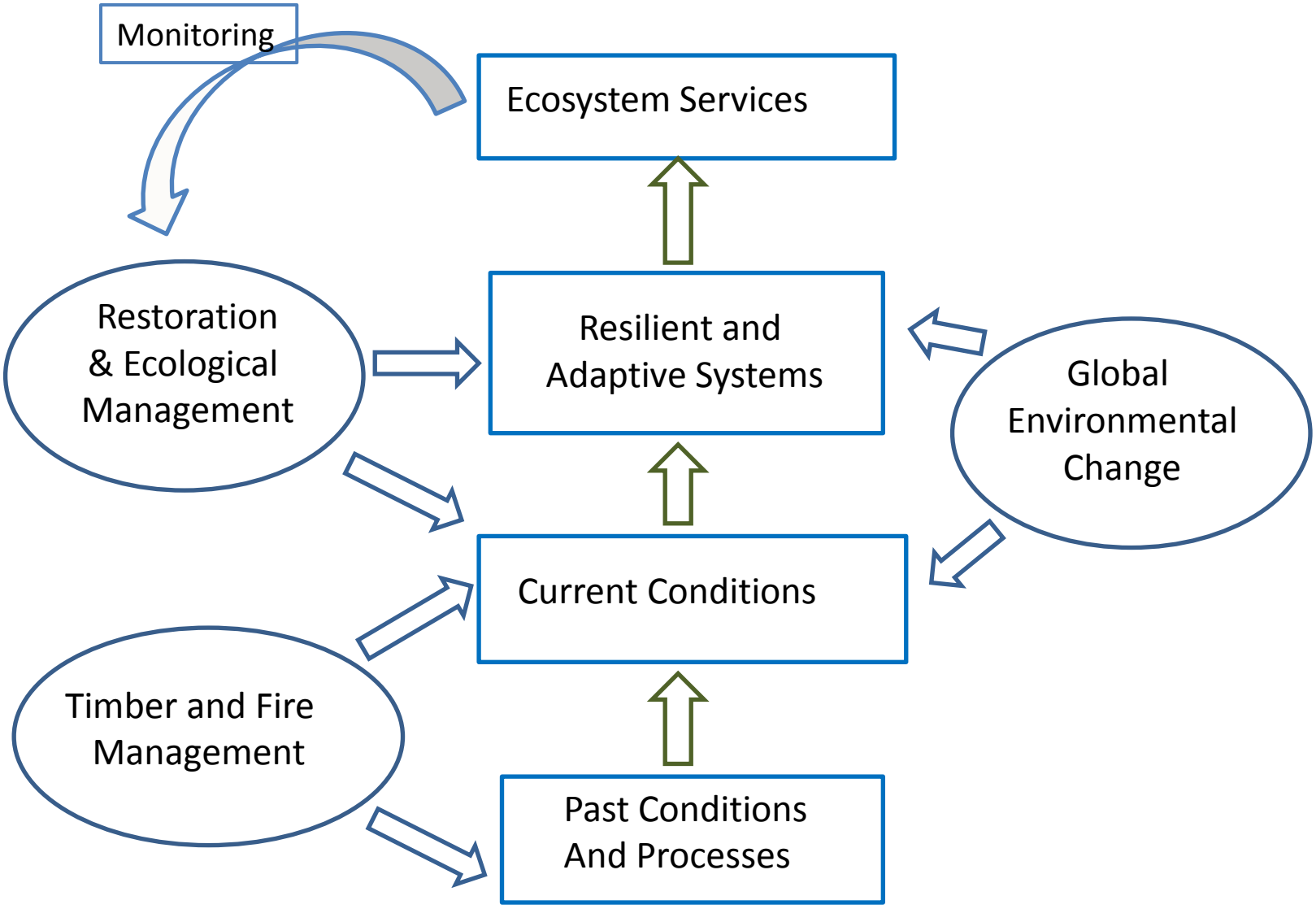
Desired Future Condition

- Integrate
  - Historic range of variability
  - Current-day values
  - On-going efforts
  - Science-based, best management practices

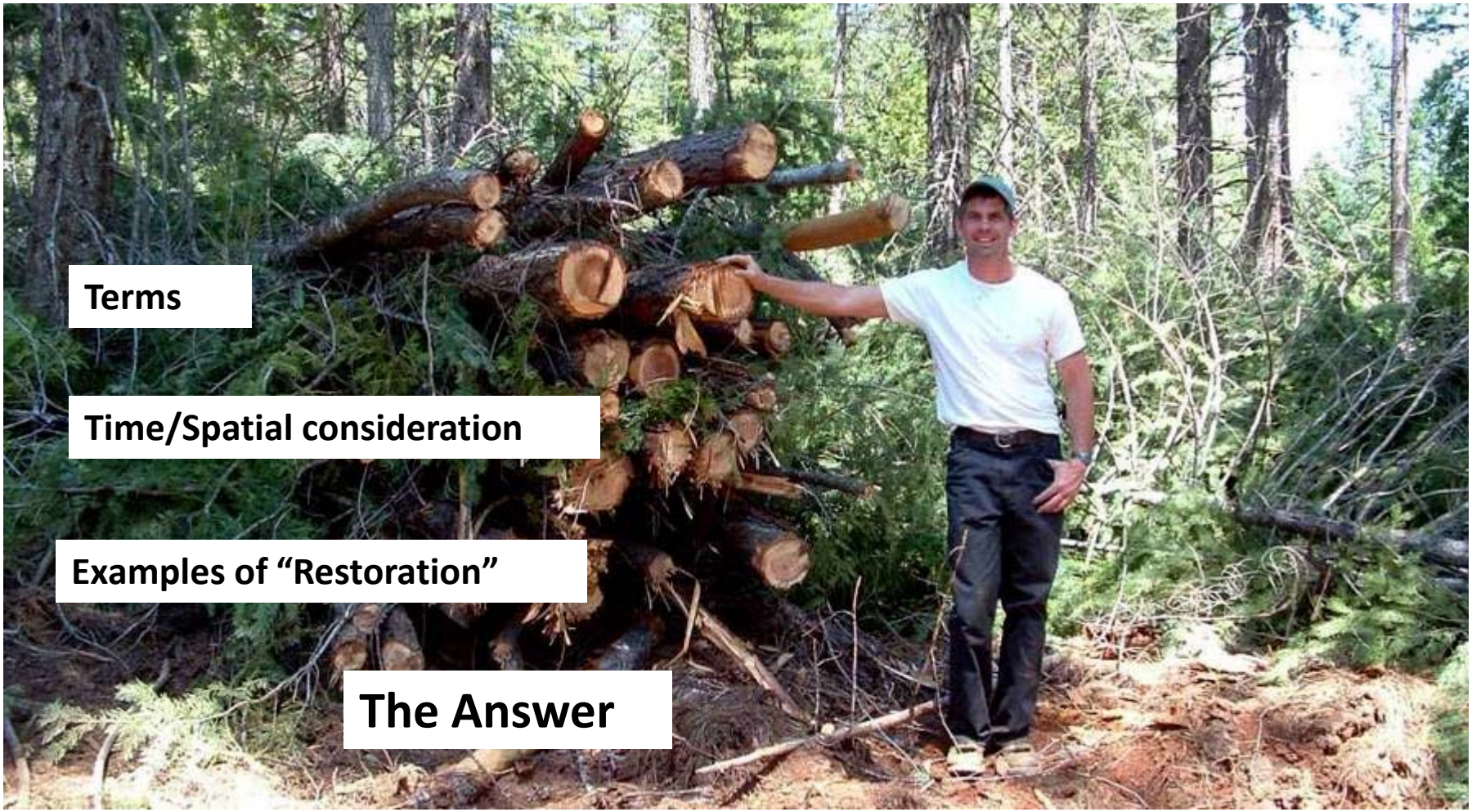




A Contemporary Vision of Restoration



Can a **Working Forest** be a **Restored Forest**



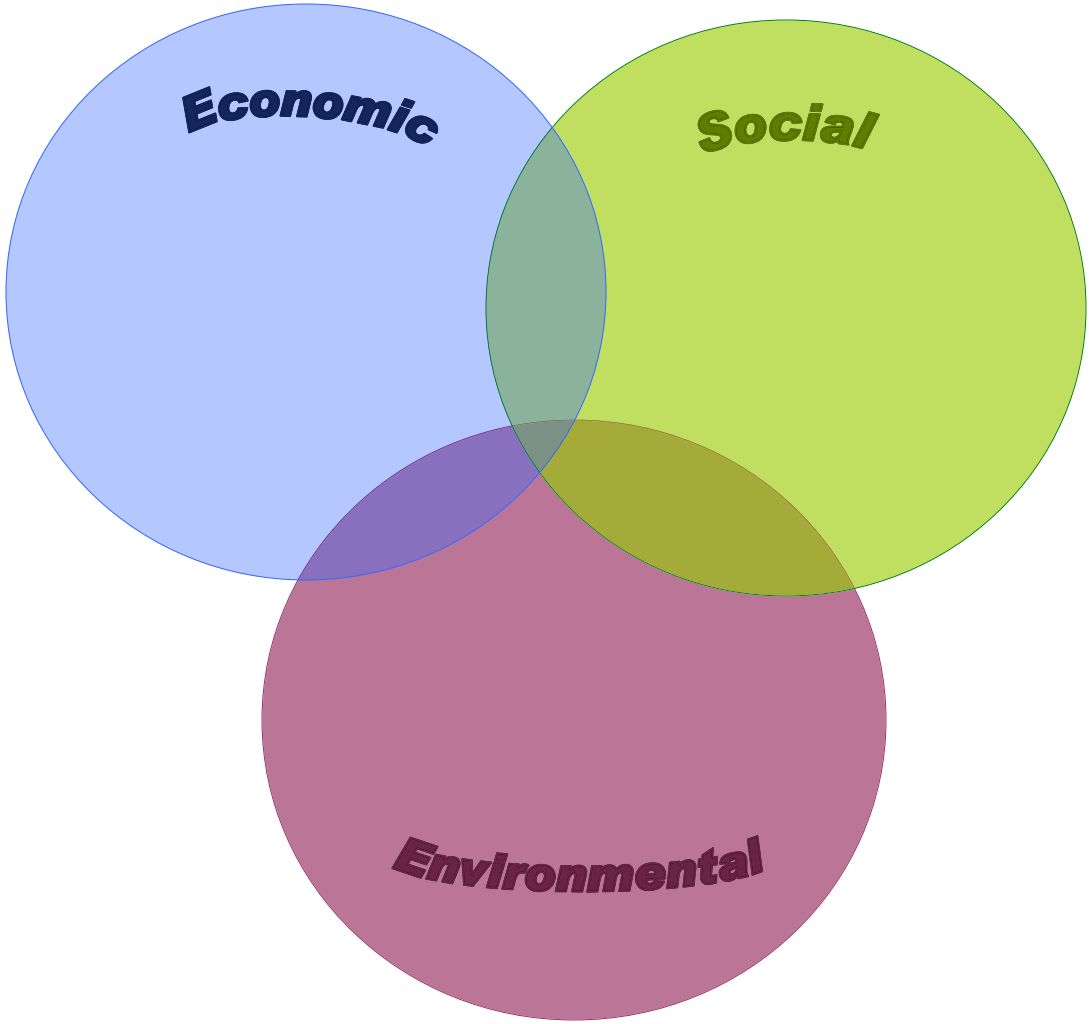
Paul Harlan VP-Resources Collins Pine Co

Define some Terms

- **Restored Forest** is a term we use to describe the outcome we desire or achieve
- **Managed Forest** is applied to forests that we impact and influence with our actions
- **Productive Forest** is a term to describe the outputs from a forest based on our value system

But remember that **Restored** and **Productive** are **values we** apply to things.

Refugee camp, South Africa


Economic
Social
Environmental

It's not just about what you intend to do… implementing the specific practice.

It's also about *how* you intend to get there… the *process* of planning and decision-making.

Help people see a different perspective

Instead of a scenic aesthetic,

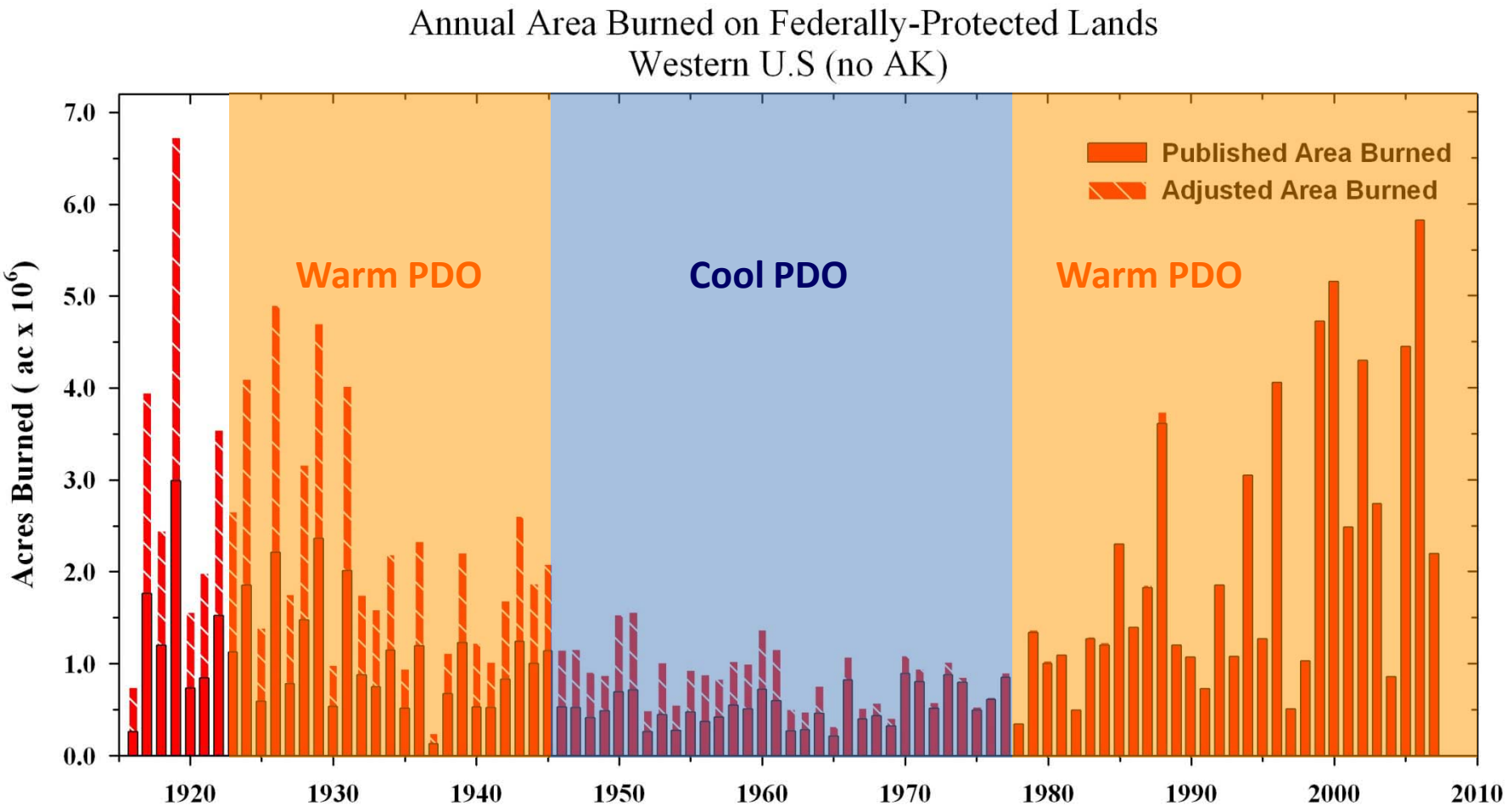
…aim for

an ecological aesthetic

Keys to improving public acceptance

- **Focus on decision processes**
- **Pay attention to local context**
- **Recognize local concerns and assets**
- **Agree on “natural conditions”**
- **Address uncertainty and tradeoffs**
- **Develop understanding, not just information**
- **Aim for more holistic evaluation of conditions**

Area burned – Western U.S., 1916 - 2007

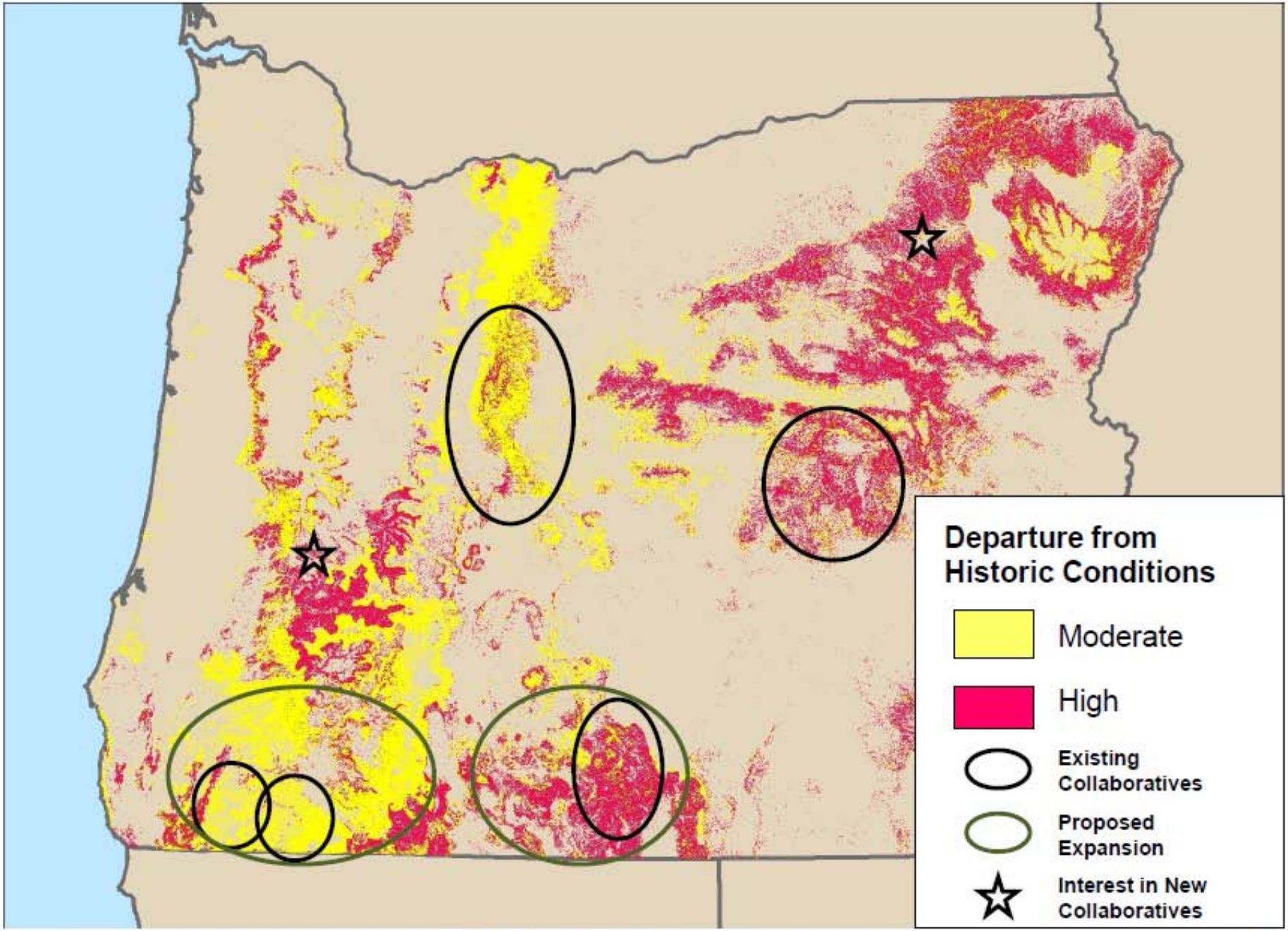


Fire suppression → Fire exclusion → Fuel accumulation

Lots of fire → Much less fire → Lots of fire

Courtesy of David Peterson

Oregon's Fire Prone Forests and the Status of Collaborative Working Groups



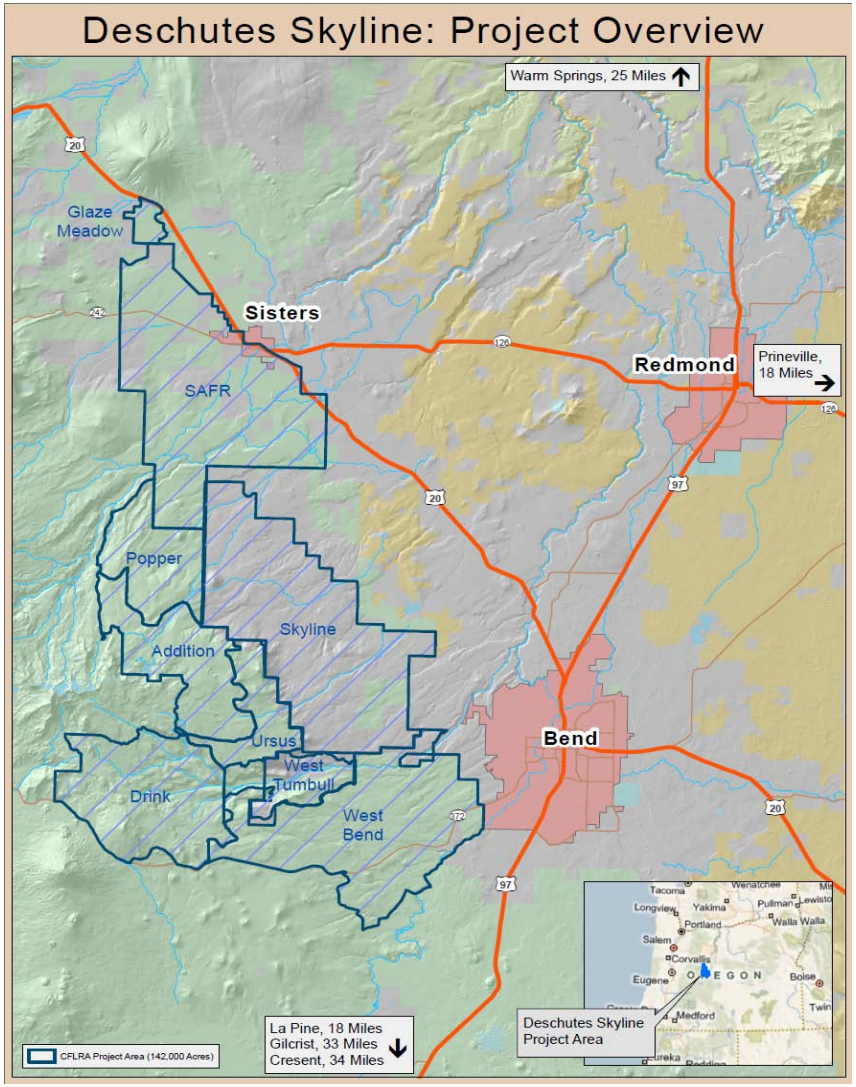
Deschutes National Forest

- Last 10 years of Fuels Treatments
  - Wildland Urban Interface (WUI) – 60%
  - Non WUI – 40%

Deschutes Skyline Forest
Collaborative Forest Landscape Restoration Act

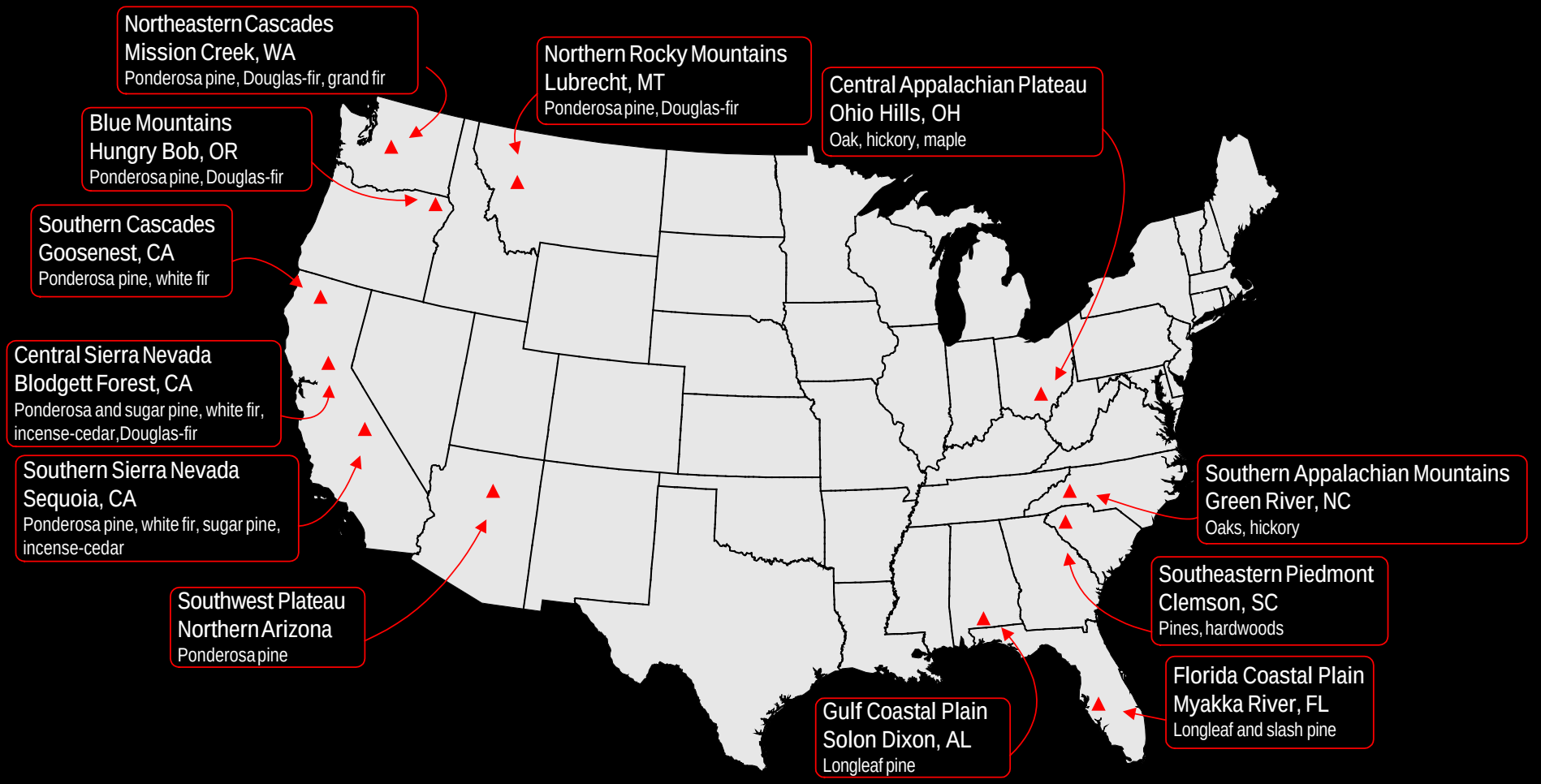
Collaboration – Deschutes Skyline Forest

- 2 community organizations focused on federal forest management (COPWRR, FLN)
- 1 community wildfire protection planning and implementation group (Project Wildfire)
- 1 Provincial Advisory Committee
- 1 Watershed Council (Upper Deschutes)



Adaptive Management

Fire and Fire Surrogate Study Sites



Numbers of FFS papers by ecosystem component

Overstory vegetation	26	Bark beetles	5
Understory vegetation	19	Pathology and fungi	10
Fuels and fire behavior	29	Economics	5
Soils	29	Sociology	3
Vertebrates	43	Multivariate	14
Invertebrates	12	Study descriptions	11

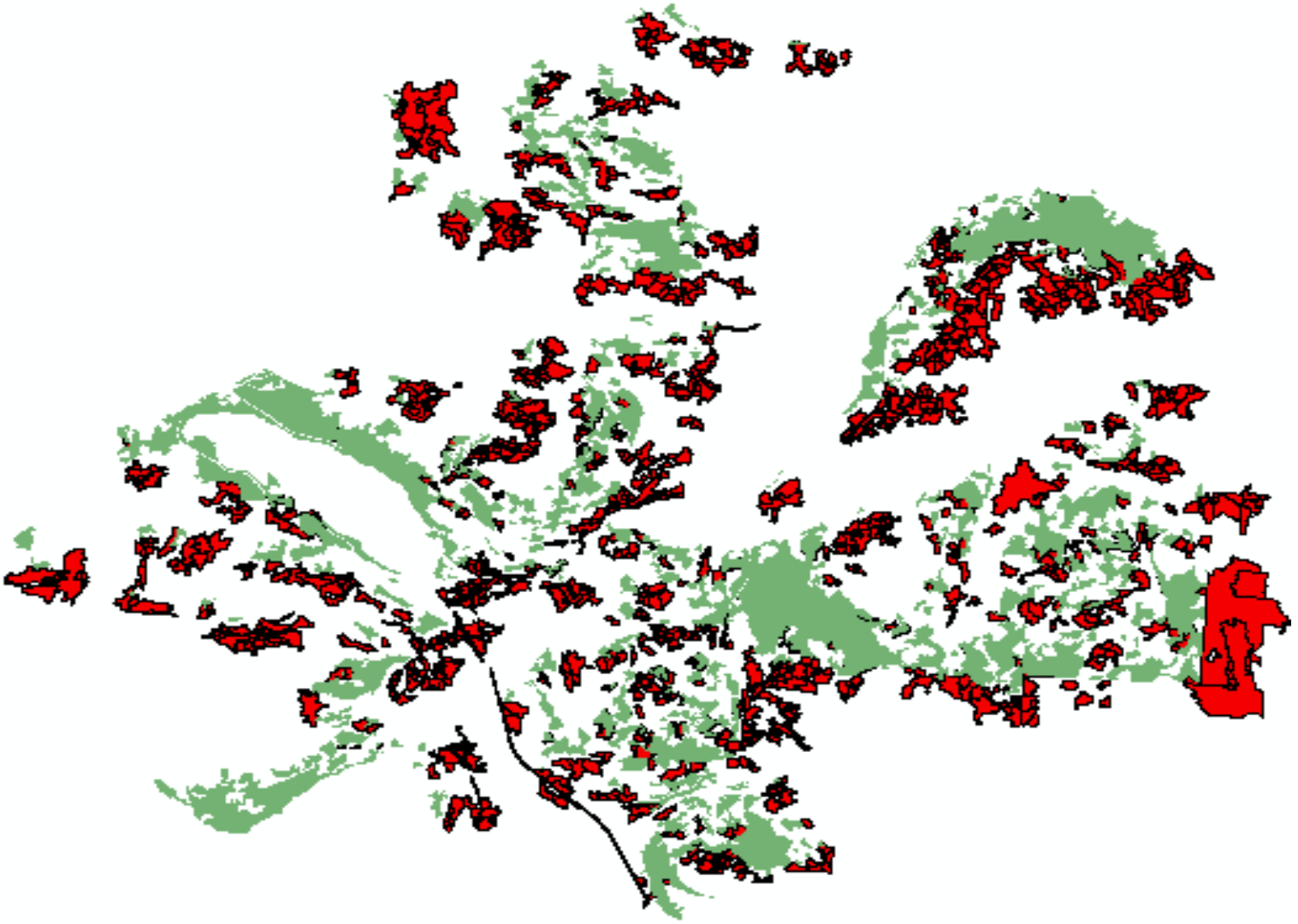
- **Carefully designed and implemented restoration efforts, reduced fire severity, acreage burned, and suppression costs.**

Wildfire Risk

$$E(L) = \sum_i p(f_i) * RF(f_i)$$

1. Exposure Analysis	$p(f_i)$	Fire probability at intensity level *i*
2. Effects Analysis	$RF(f_i)$	Response function intensity *i*
3. Expected loss	$E(L)$	Expected loss

Strategic fuel treatments Five Buttes

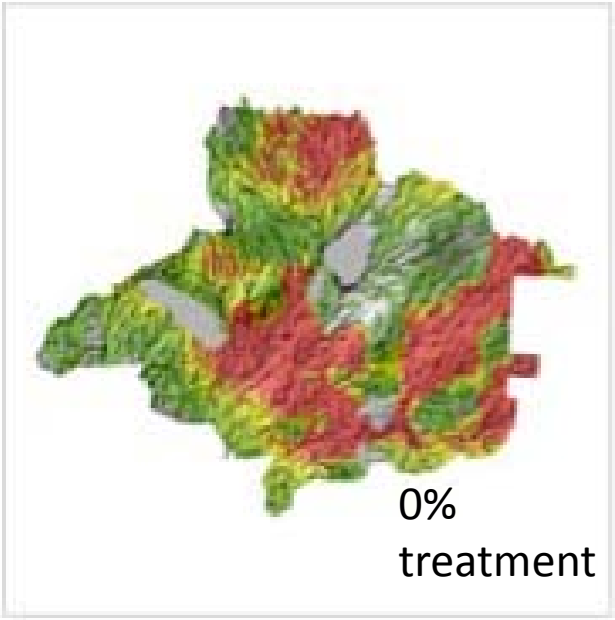


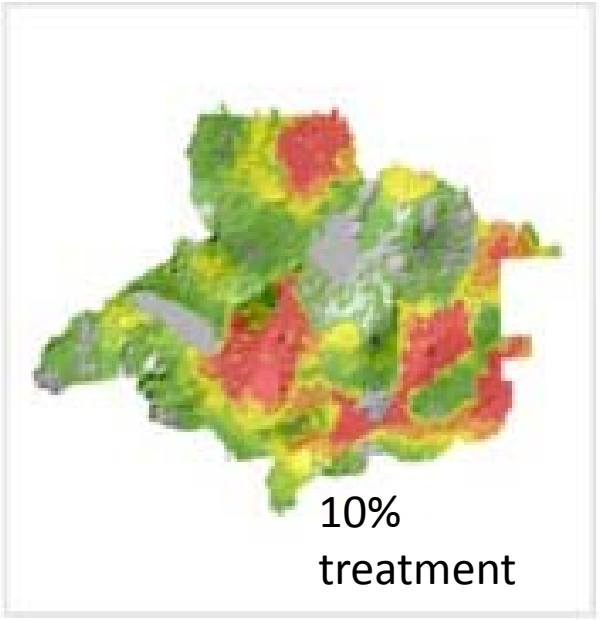
Assumptions

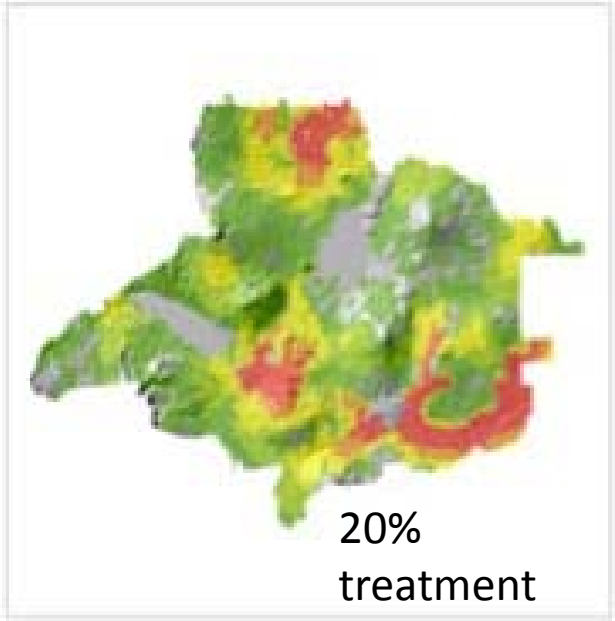
- Treatments save ponderosa pine from potential wildfire loss
- Untreated stands lose ponderosa pine according to the current level of hazard
- Finite budget and treatment area

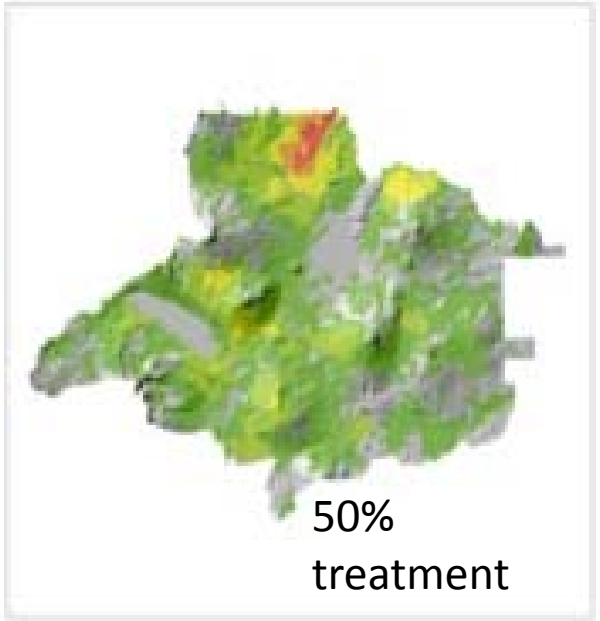
- *Objective: identify the patch location and fuel treatments to save the most ponderosa pine trees*

Effect of fuel treatments on burn probability – Five Buttes

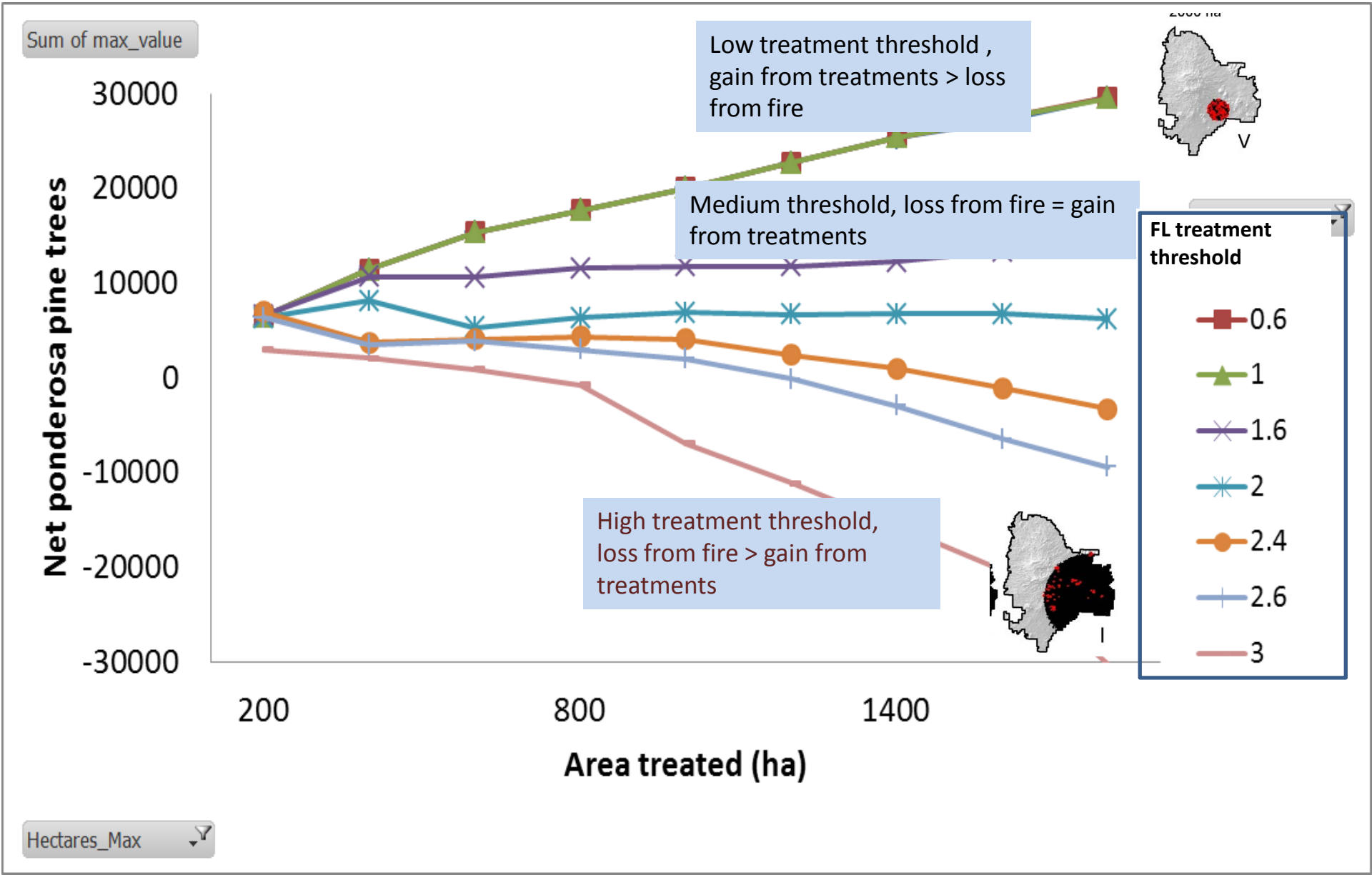








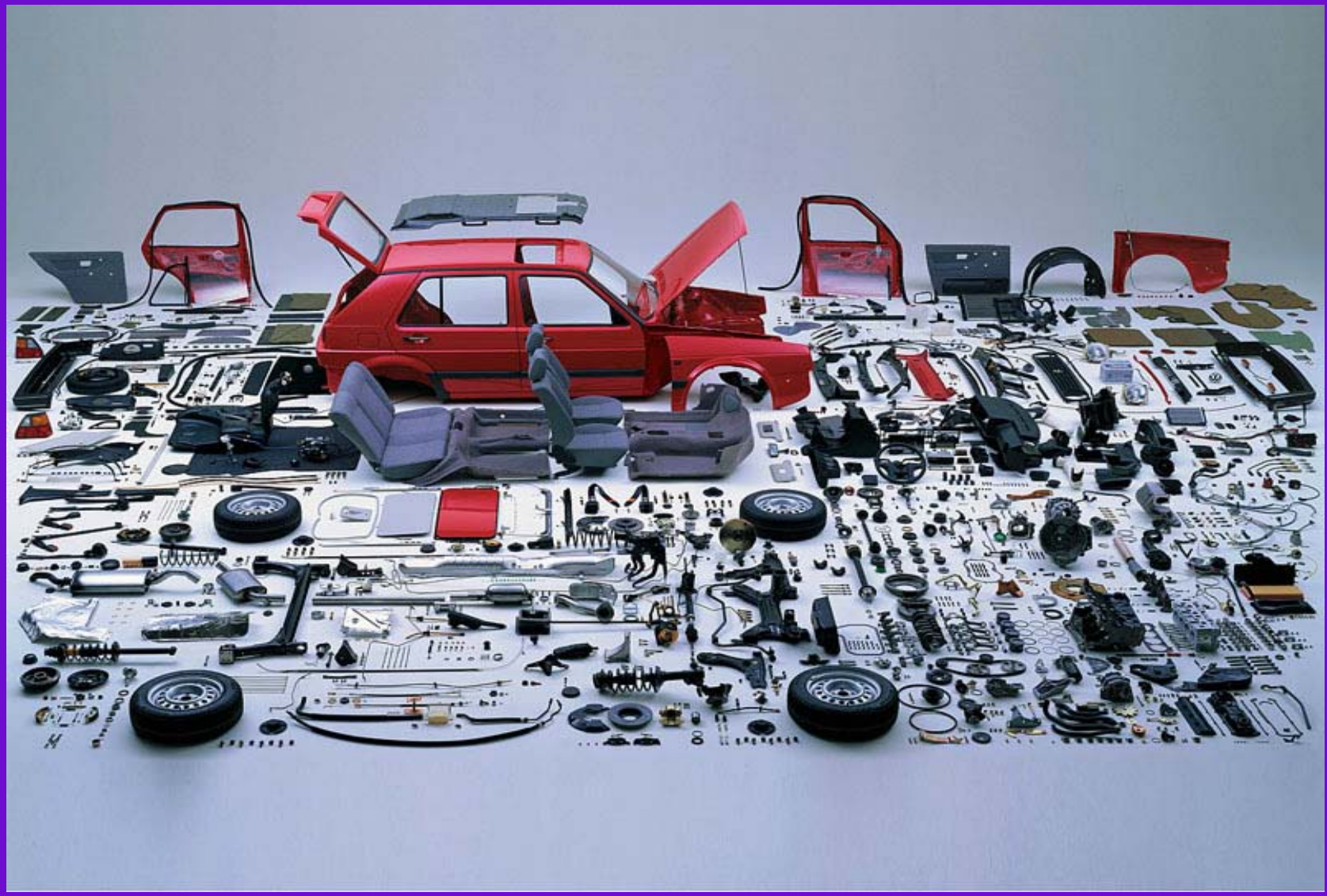
Effect of treatment area and flame length threshold on ponderosa pine after wildfire



Treatments

1. Thin from below to UMZ, mow, and underburn
2. Thin from below to 75% of UMZ, mow, and underburn
3. Thin from below to 50% of UMZ, mow, and underburn
4. Thin from below to 75% of UMZ, regeneration cut 10% of area in openings to begin transition to a multi-cohort stand structure
5. Control: retain for near-term the current structure

The Pieces of the Restoration Puzzle




Overstory
Soil Microbes
Understory

Forest Restoration Beyond Fuel Reduction: What is the Vision?

October 12-14, 2011 - Willie Hall,
Central Oregon Community College - Bend, Oregon

PHOTO COURTESY: STEPHEN FITZGERALD

Objectives

The objectives of this conference are to discuss and answer questions about:

1) Expressions of different visions of restored forests by various stakeholders;

2) How fuel reduction and fire can be integrated with forest restoration;

3) Discuss the economics, mechanics and tools used for forest restoration;

4) Explore the social aspects of forest restoration;

5) Establish and use reference conditions to formulate restoration goals; and

6) Effects of restoration treatments on various resources such as wildlife, soils, and water.


If conservation of soil N is desired
Design burn prescriptions that limit duff consumption

Soil effects are not that great unless:

- Piles cover > or = 20% surface
- Piles are dominated by large wood

Managing for Resilient Spatial Patterns:

From Reference Pattern to Prescriptions & Monitoring

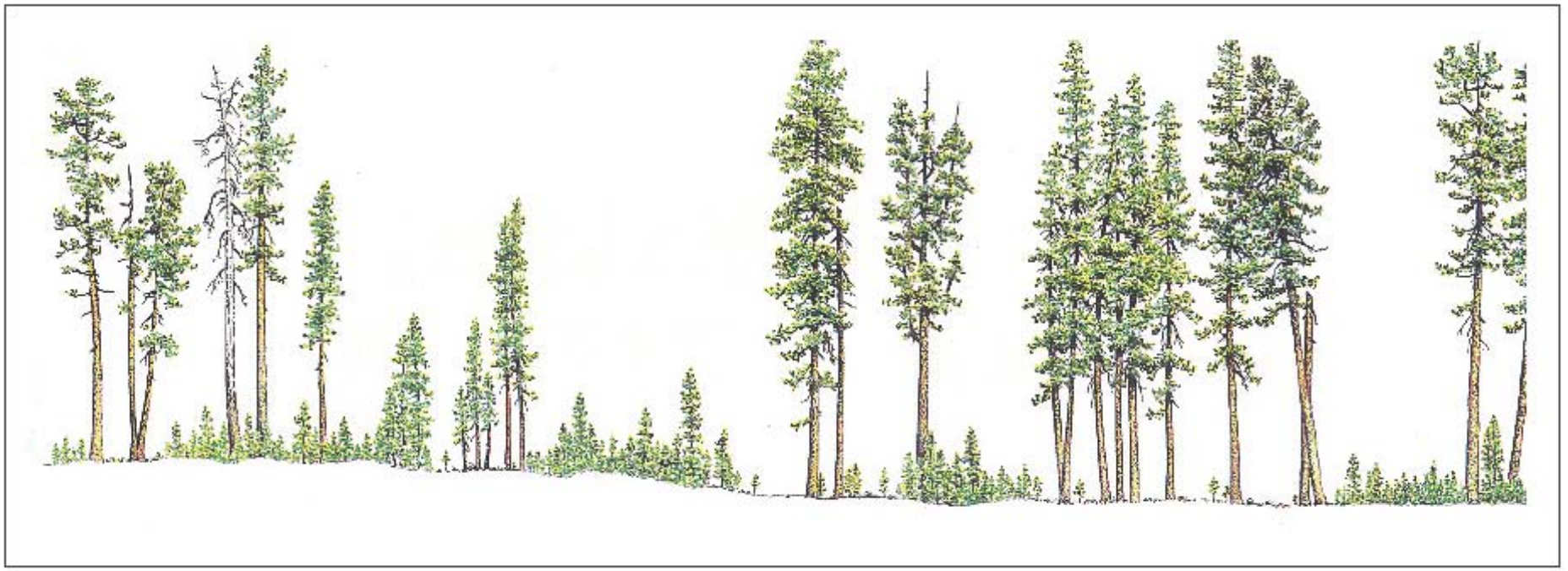


Illustration: Bob Van Pelt

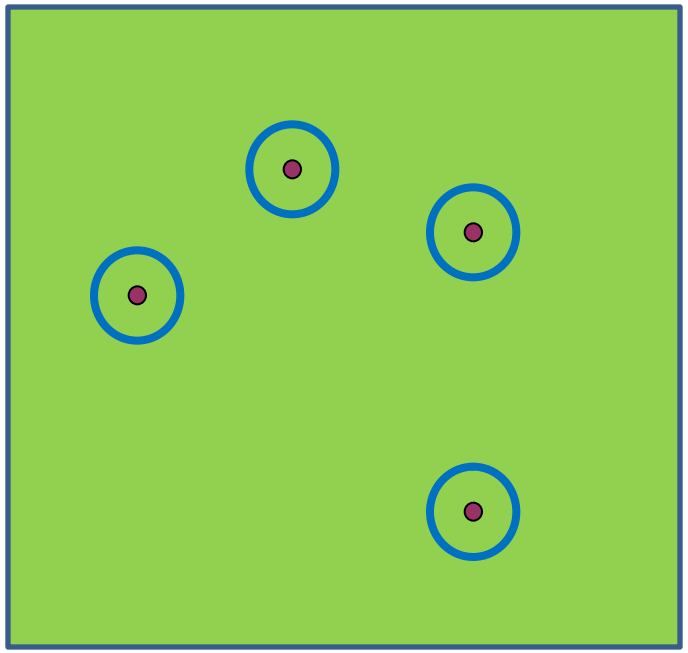
Derek Churchill: University of Washington
Andrew Larson: University of Montana
Matt Dalhgreen: The Nature Conservancy

Figure 2—An example of the clumped tree distribution and canopy gaps produced by an active fire regime. The photograph is an aerial view of the Beaver Creek Pinery, which has experienced very little fire suppression.

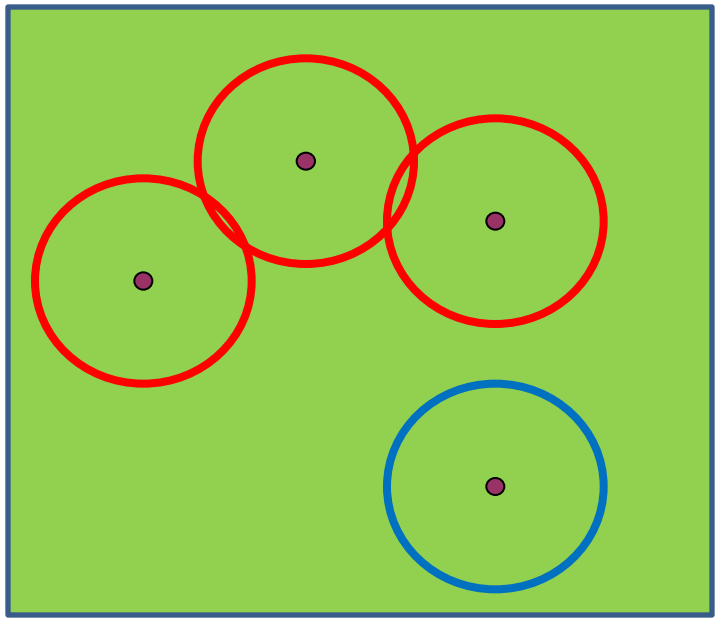
Photo by Carl Skinner, from: North, M. et al., 2009. An Ecosystem Management Strategy for Sierran Mixed- Conifer Forests. *USDA Forest Service: Pacific Southwest Research Station. General Technical Report*, PSW-GTR-220.

Plotkin Cluster Detection Algorithm

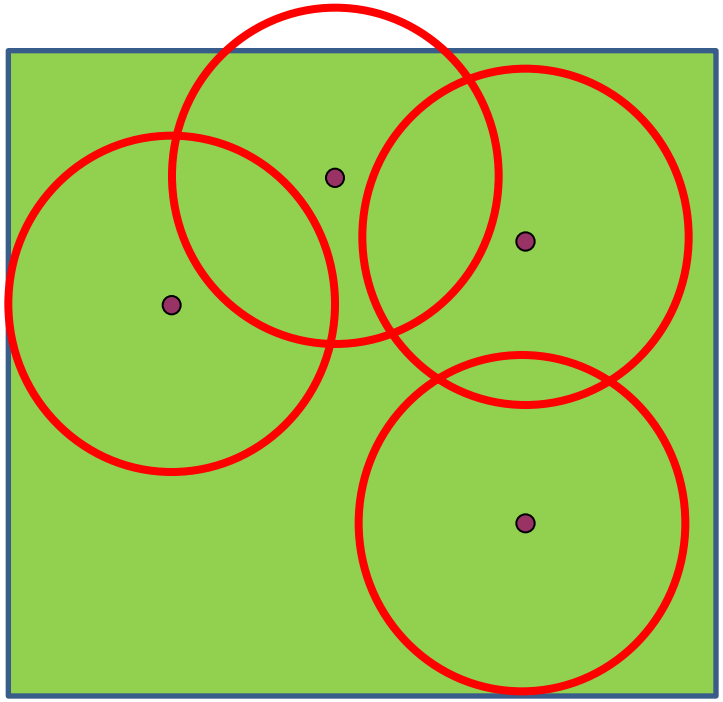
1m distance



2m



3m

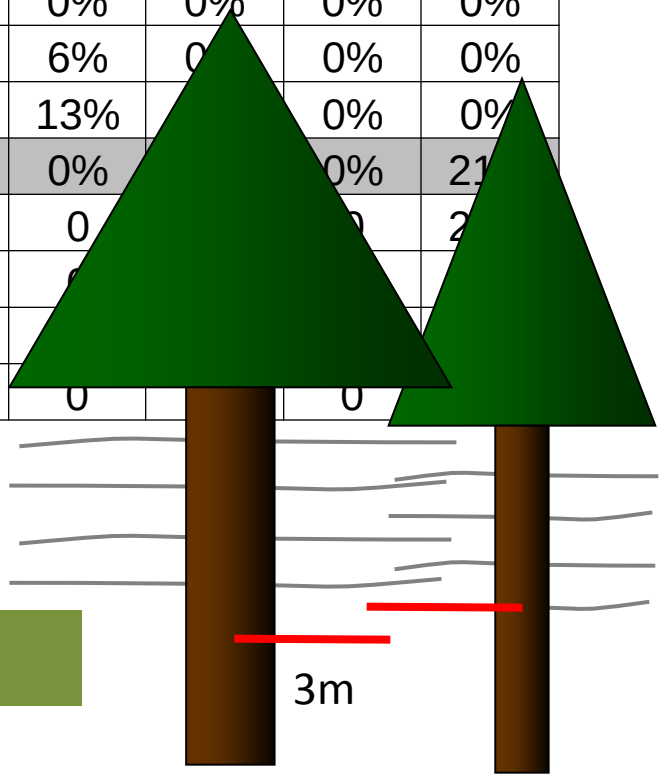


Plotkin et al. 2002

Proportional Clump Size Distribution

Percent of trees in clumps of different sizes

Intertree Distance (m)	Clump Size (# of trees) 1	2	3	4	5	6	7	8	9	10+
1	91%	9%	0%	0%	0%	0%	0%	0%	0%	0%
2	76%	19%	6%	0%	0%	0%	0%	0%	0%	0%
3	72%	19%	6%	4%	0%	0%	0%	0%	0%	0%
4	57%	20%	11%	0%	5%	0%	6%	0	0%	0%
5	52%	22%	6%	7%	0%	0%	13%		0%	0%
6	42%	17%	12%	8%	0%	0%	0%		0%	21
7	35%	17%	19%	8%	0	0	0		0	2
8	35%	17%	19%	8%	0	0	0			
9	33%	17%	19%	0	10%	0				
10	31%	17%	19%	0	0	12%	0		0	



6m: Max crown interlock distance

Conclusions

- Operationally practical method to define “clumpiness” based on reference conditions. Working on companion method for large openings

- Tradeoffs between large trees, species composition, & openings

- Tool for monitoring and adaptive management

- Reference stands studies tells us what not to do

Sycan – Fremont/Winema Landscape- Partnership Burn w USFS/TNC

All mixed up: Challenges and opportunities for restoring mixed conifer forests in Central Oregon

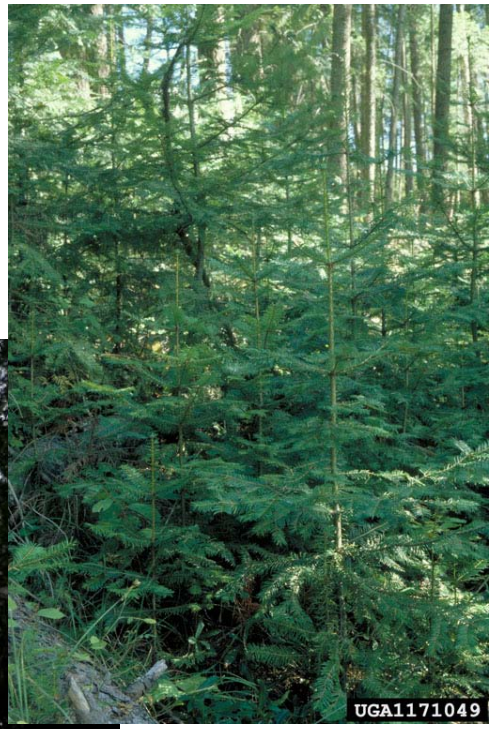
Thomas A. Spies, PNW Research Station
Andrew Merschel, Oregon State University

Challenges For Restoration/Management

- Defining goals
  - Spatially and temporally dynamic reference
  - Pattern/Structure vs Process
    - Structure vs fire regime
  - Elements vs entire community
    - Big pines or entire mosaic
  - Owl habitat vs ecosystem goals
    - Right balance?

Challenges For Restoration

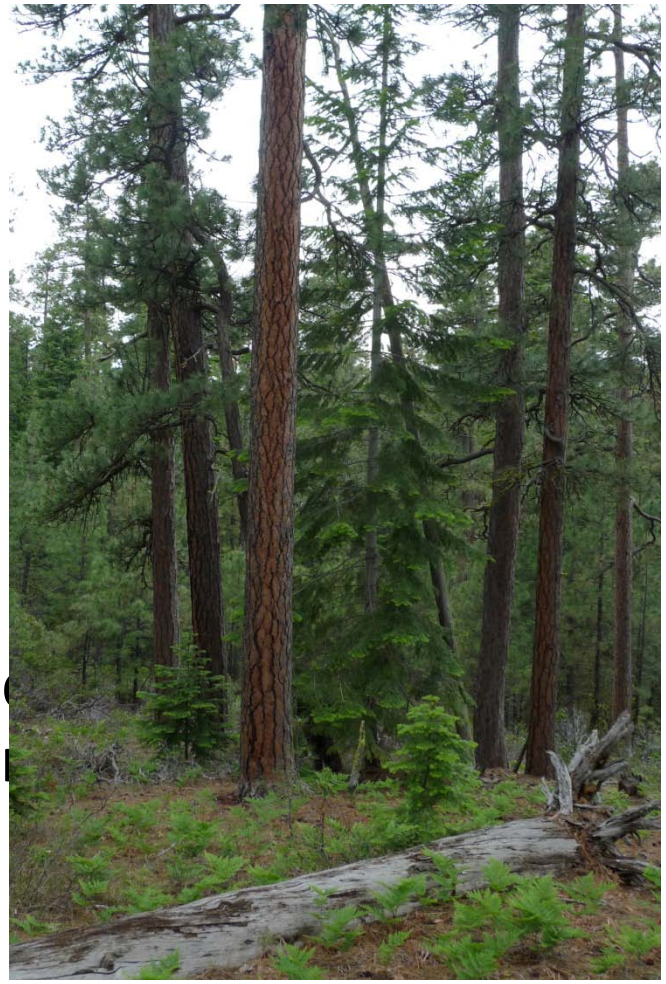
– Landscape inertia/mass effects

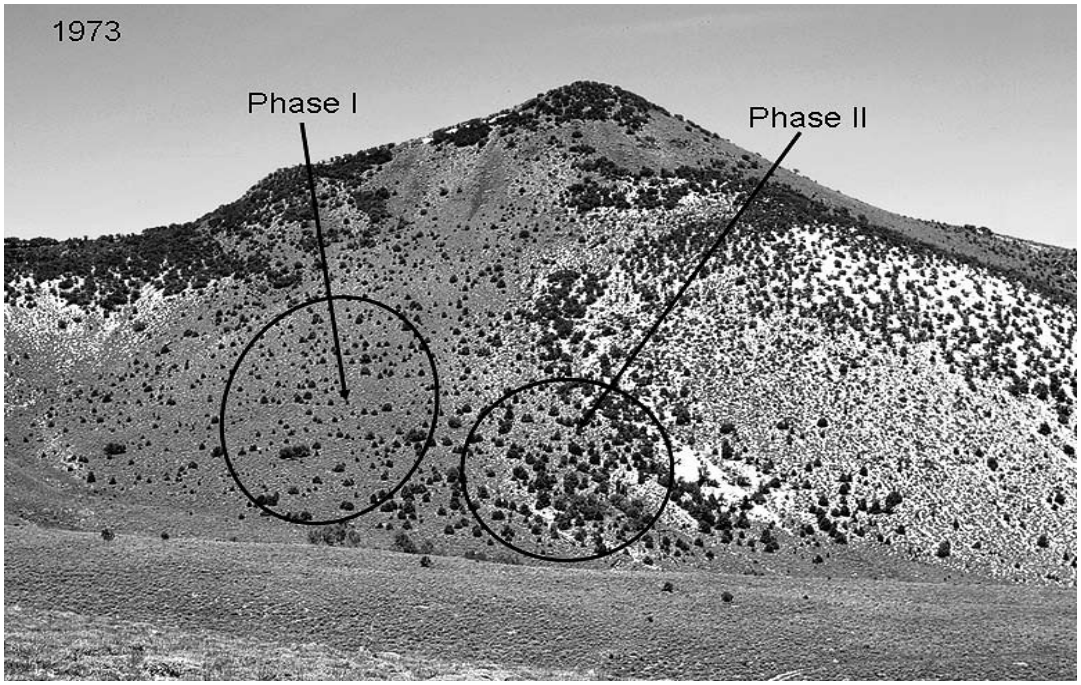


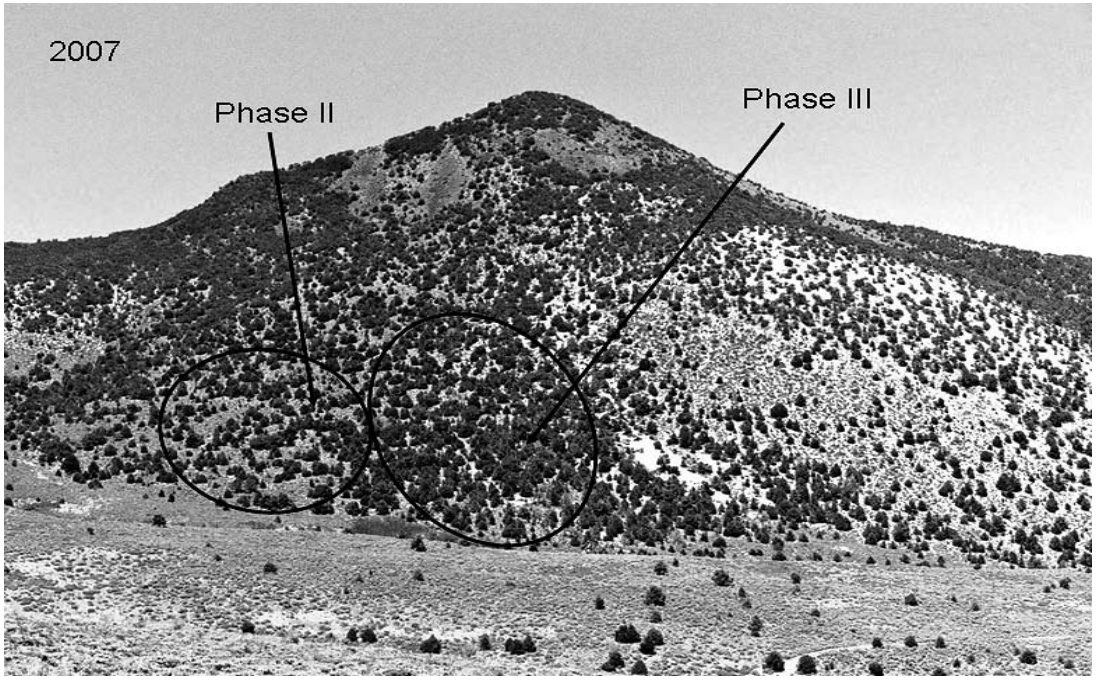
Conclusions

- All mixed up in many senses:
  - Environment
  - Structure/composition
  - Spatial pattern
  - History
  - Goals for species or ecosystems

Uncertainties remain about rates an succession, disturbance regimes a climate and humans





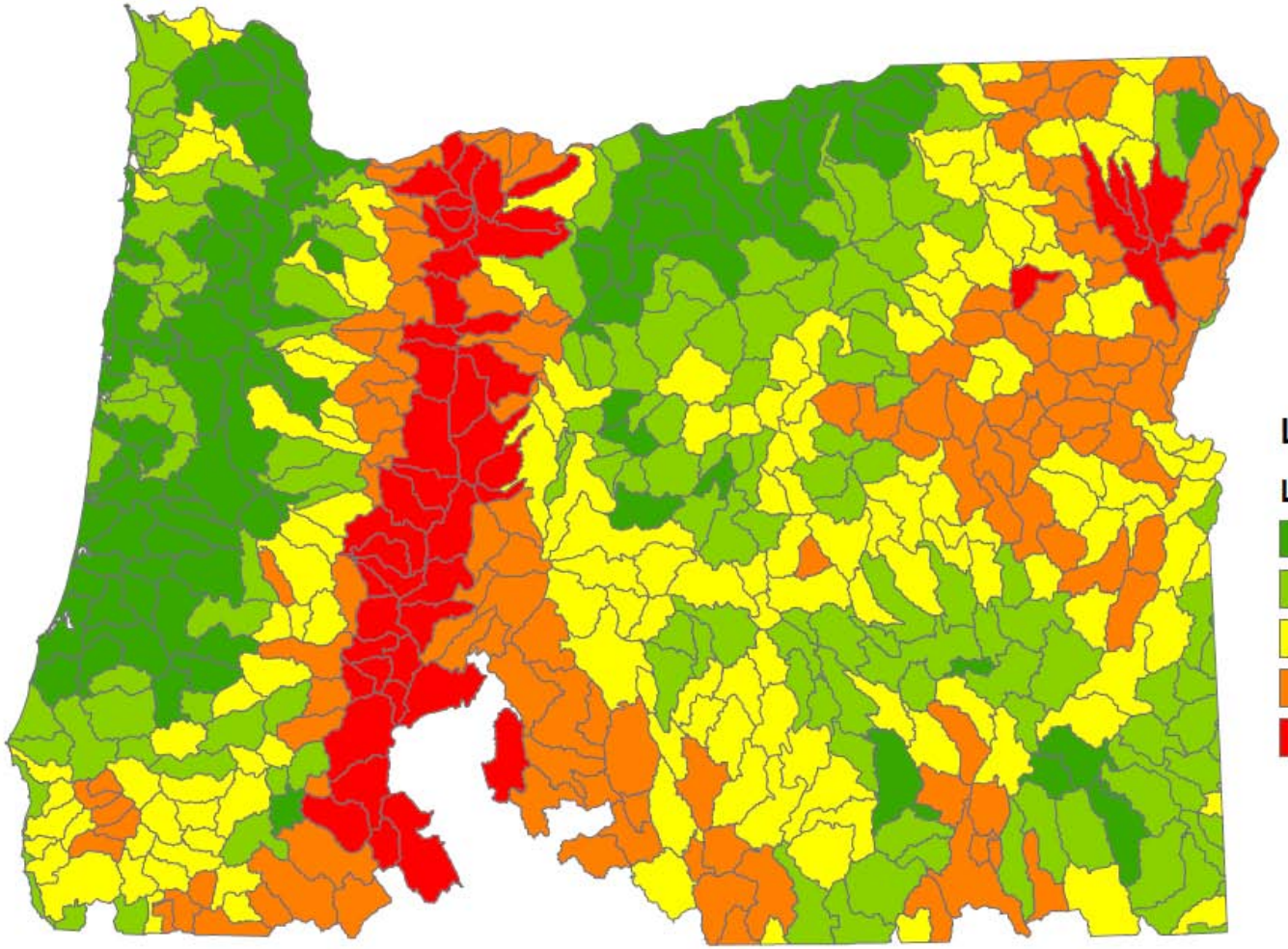


Miller et al. 2008

Adaptive

Incorporating climate change

summer flow sensitivity to Δ snowmelt magnitude



Grant et al. (in prep)

A Vision of Watershed Restoration

- focused on water/aquatic resources
- based on integrated, whole-watershed management strategies
  - ridgetop to valley bottom
  - protection/passive restoration as foundation
  - complemented by active restoration

How Much Is Enough?

- What proportion of a landscape needs to be treated?
  - FlamMap, ArcFuels
- Will this vary by how and where the treatments are placed on the landscape?
- Great questions!
- Use wildfires to treat the landscape…use of ~~wildland fire~~…

Summary

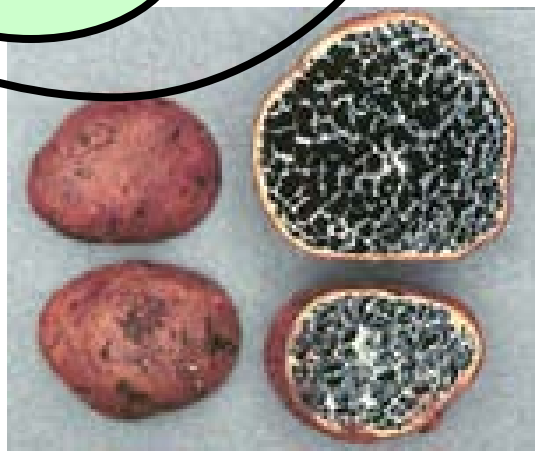
- Current warming tending in northern latitudes will lead to increased area burned by wildfire
- Will this vary by how and where the treatments are placed on the landscape?
- Warmer and drier climate will reduce the effectiveness of fuel treatments
- Develop and incorporate adaptation strategies

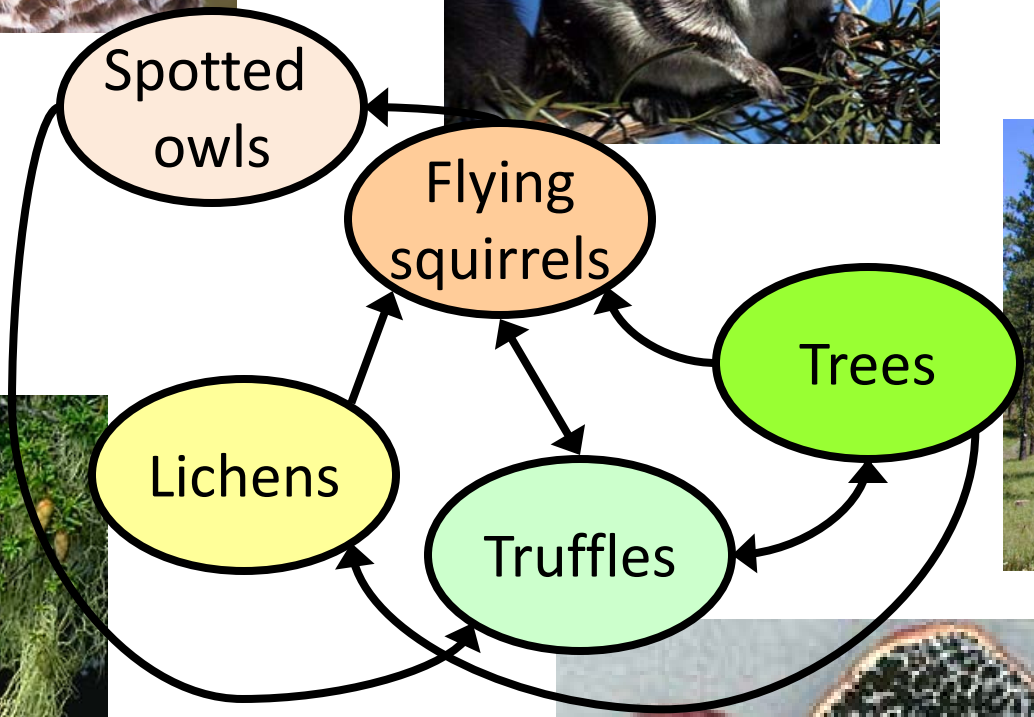
Develop & *test* better prescriptions to meet ecological & social objectives…

Wildlife/ecological elements to maintain & restore…..

- Heterogeneity: skips & gaps, clustering, etc.
  - Canopy & understory diversity, esp. shrubs.
  - Fire effects.
  - ***Prescribe for variability, not averages***.
- Large live & dead trees. More large trees in diameter distribution – not classic reverse-J distribution.
- Defective trees…pattern & process!
  - Insects & disease
  - Mistletoe
- Large logs, woody debris.

Manage for “Ecological Webs”





Understory diversity: flying squirrel fitness increases w/ richness of plant understories…

Lehmkuhl et al. 2006

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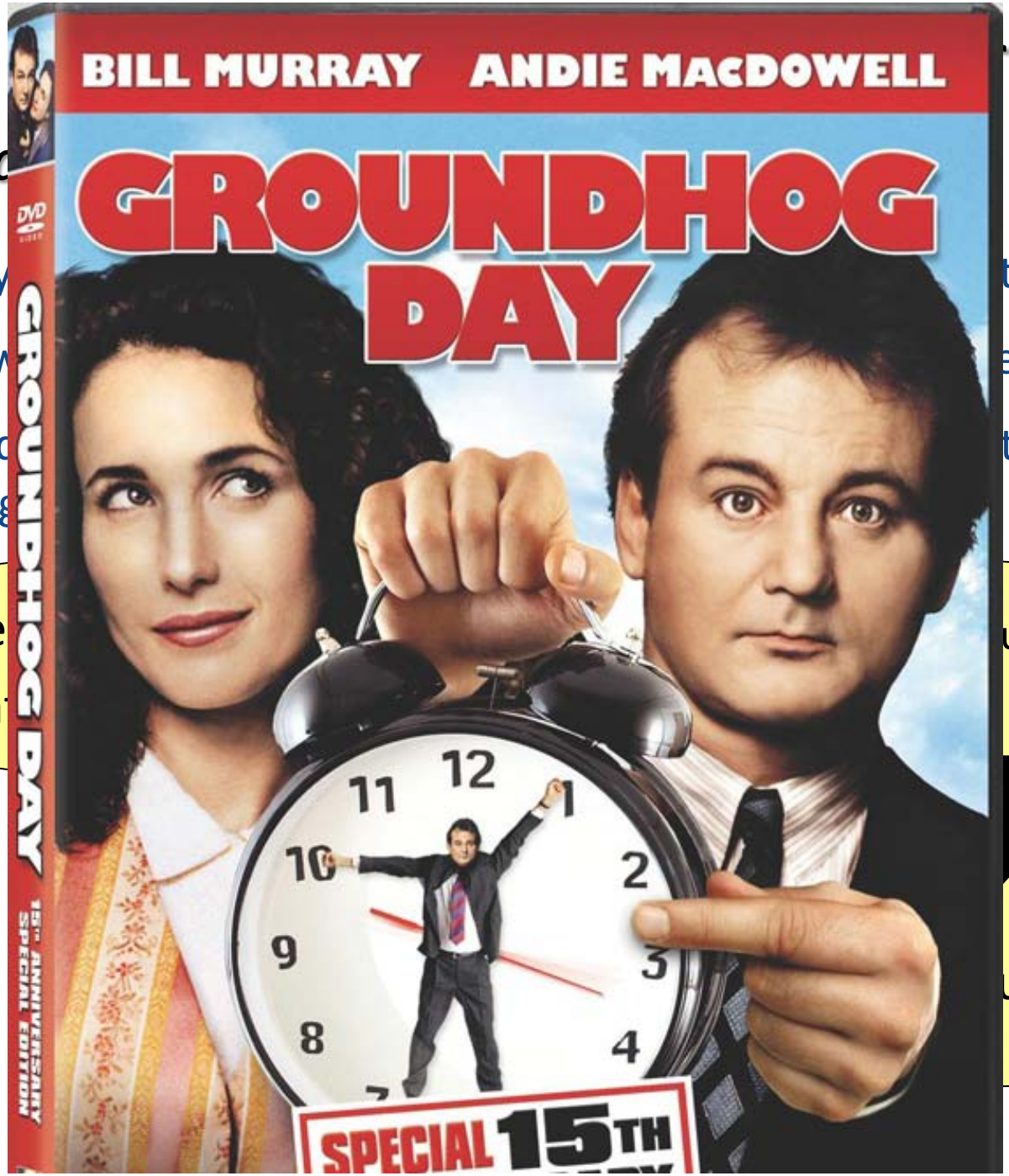

Rural Areas, the Fabric of Our Nation