2018 Byerly Lecture

Private forest owners and climate change adaptation: How science and society will shape future forests

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CENTER FOR SCIENCE & TECHNOLOGY POLICY RESEARCH

COMMUNITIES AND FORESTS IN OREGON

Canyon Creek Complex wildfire
August 12-October 31, 2015

CNN 2015

Blue Mountain Eagle 2015

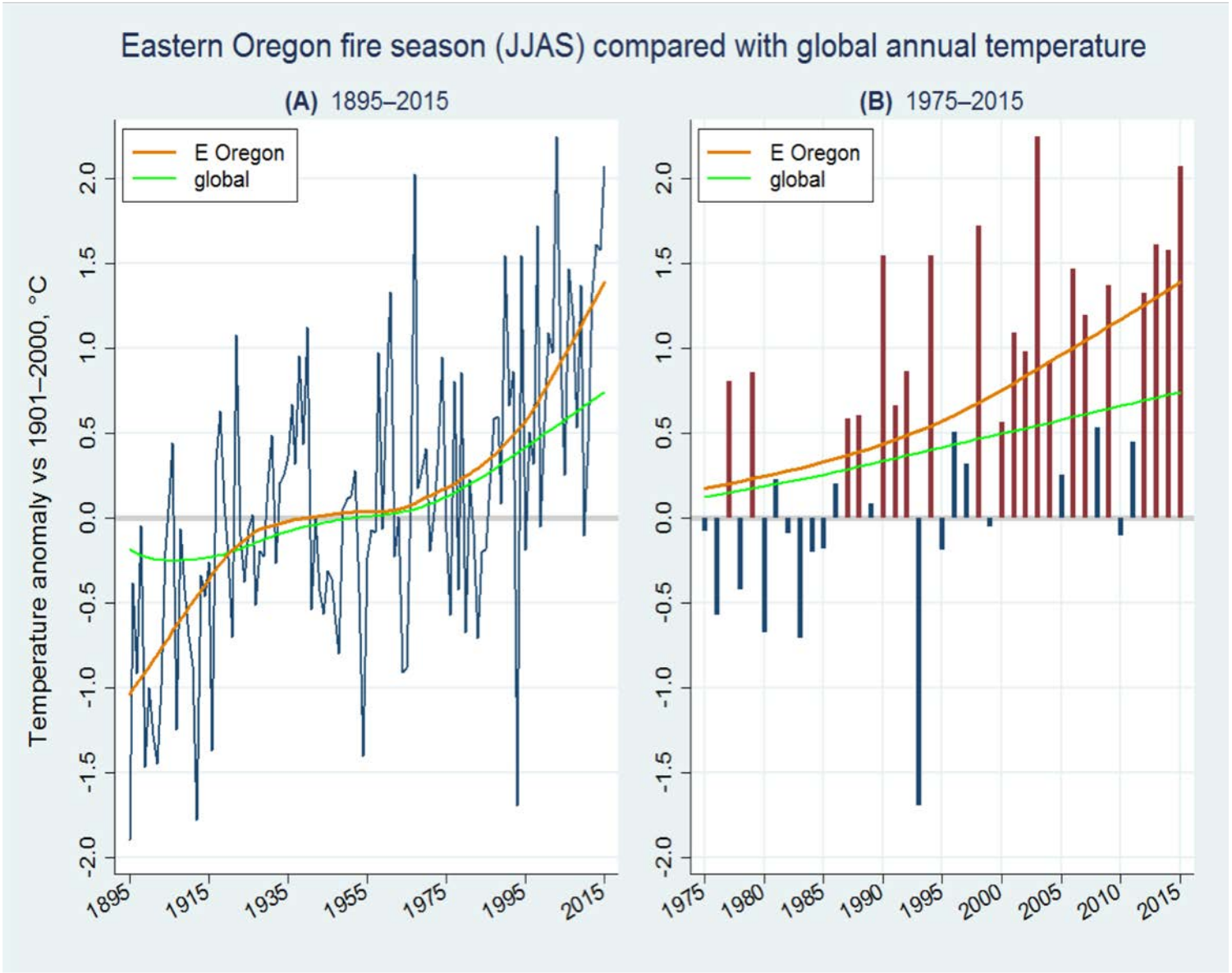
Climate change adaptation and forest management

1. **Climate change:** threat multiplier and force of ecosystem change
   - Multiplies disturbances; impacts tree species
2. **Private forest owners:** Who are they? Where are they?
3. Climate change **adaptation and forest management**:
   - Ecologist perspective
   - Forest owner perspective
4. **Forests of the future:** Scientists, practitioners, landowners, and the road ahead

1. **Climate change:** threat multiplier and force of ecosystem change

   - Multiplies disturbances, impacts tree species
   - Exacerbates existing socio-ecological problems of suppression, fuels, and rising ignitions

Eastern Oregon summer temperatures warmed an average of 0.66 °F/decade 1975-2015, faster than global warming (0.30 °F)



Hartter et. al. 2018

1. **Climate change:** threat multiplier and force of ecosystem change

   - Multiplies disturbances; impacts tree species
   - Exacerbates existing socio-ecological problems of suppression, fuels, and rising ignitions

1. Climate change: threat multiplier

The 1910 Fires:

- 87 people died
- Instigated fire suppression policies of the 20th century

Ed Pulaski's tunnel

Smokey the Counterproductive Bear

- Today > 95% of wildfires in the US are suppressed

1. **Climate change:** threat multiplier

- High-grading changed forest structure

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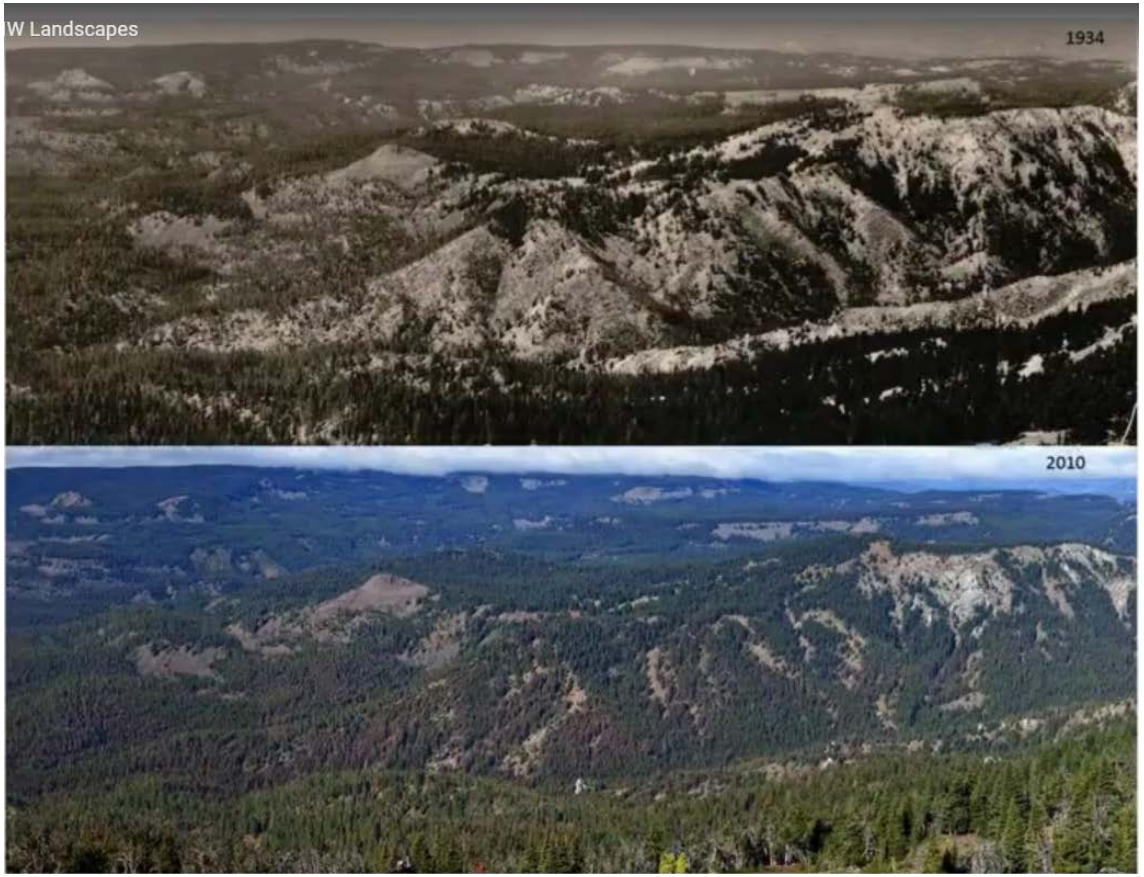
- High-grading changed forest structure

Near Wenatchee, WA
1934 vs. 2010

Historically frequent **low-mixed** severity fires → forest heterogeneity

Absence of fire → forest homogeneity and **mixed-high** severity fire regimes



Credit: Hessburg et al. 2016
(Osbourne Collection, John Marshall Photography)

1. **Climate change:** threat multiplier

- High-grading changed forest structure

SCIENCE

Climate Change Blamed for Half of Increased Forest Fire Danger

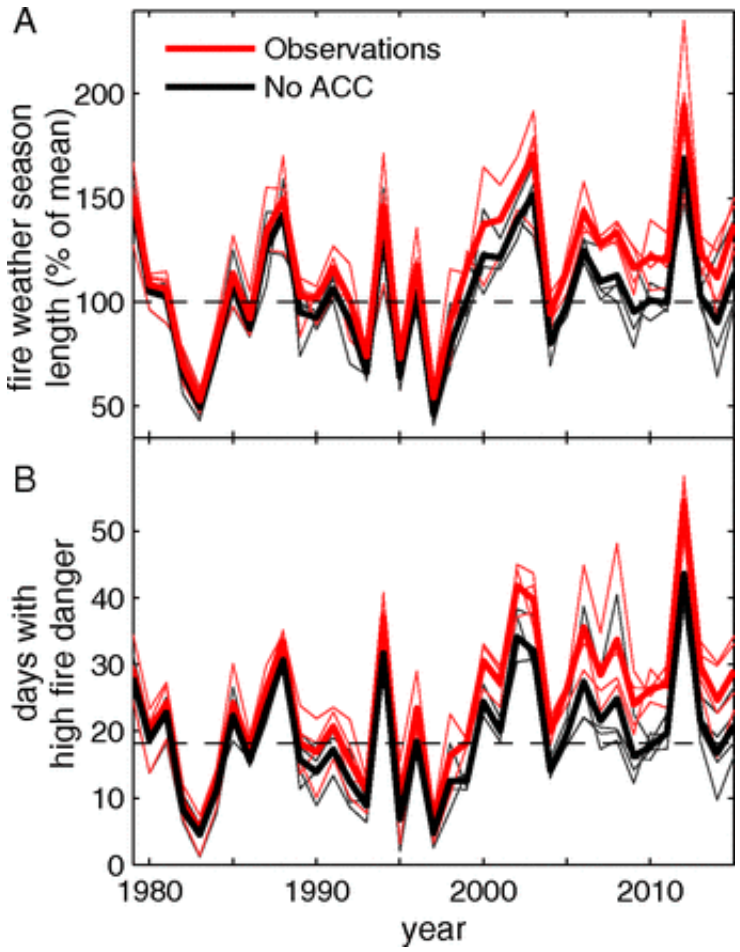
By TATIANA SCHLOSSBERG OCT. 10, 2016

The Loma Fire rages on the Santa Cruz Mountains summit beyond the Giant Dipper Roller Coaster in Santa Cruz. Shmuel Thaler/The Santa Cruz Sentinel, via Associated Press

Climate change → more frequent, larger fires

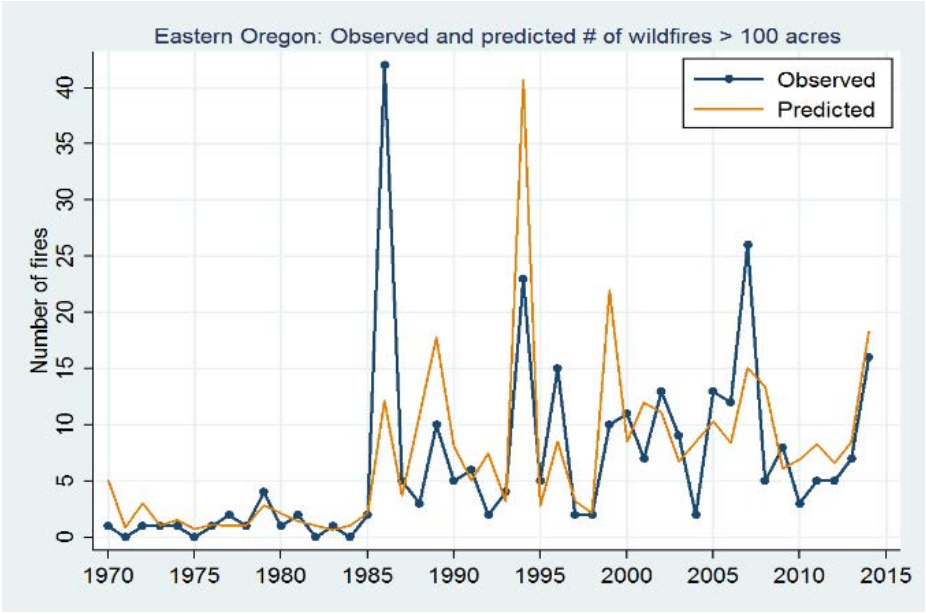
1. **Climate change:** threat multiplier

- High-grading changed forest structure



Abatzolglou & Williams 2016

- Climate change doubled the area burned in the western US 1984-2015

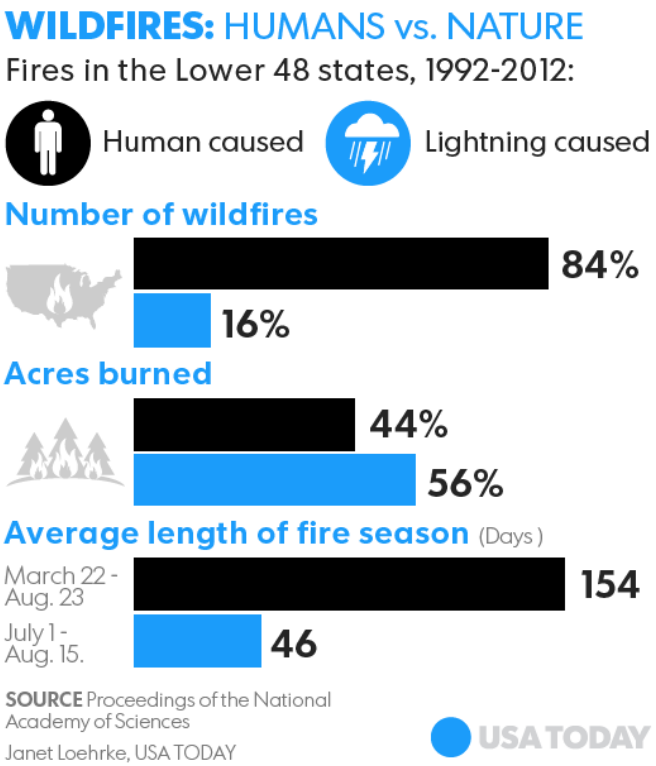


Hamilton et al. 2016

1. **Climate change:** threat multiplier

Humans have expanded the “wildfire niche” across the US and other countries

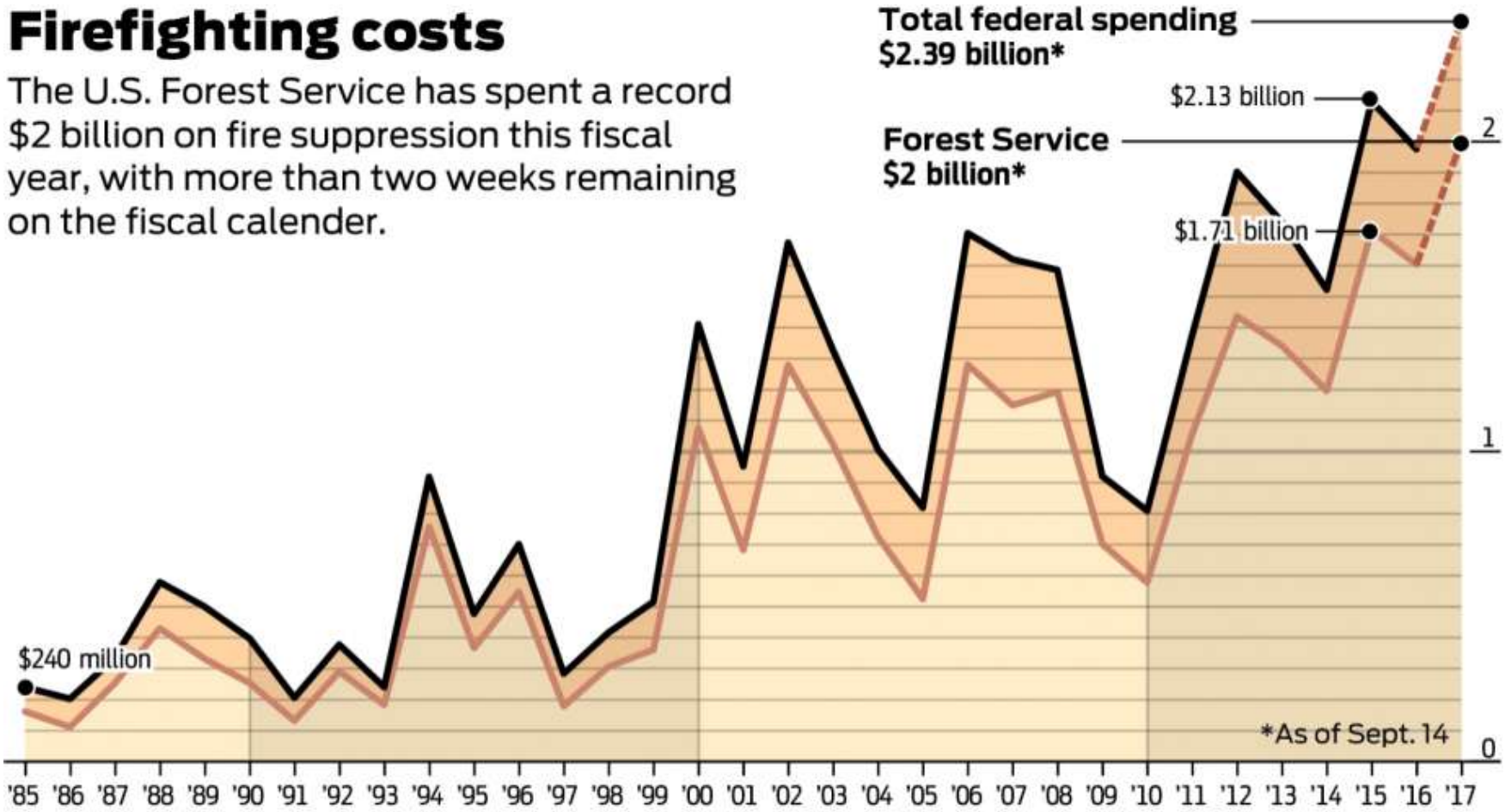
Denver Post



Balch et al. 2016

Firefighting costs

The U.S. Forest Service has spent a record $2 billion on fire suppression this fiscal year, with more than two weeks remaining on the fiscal calender.

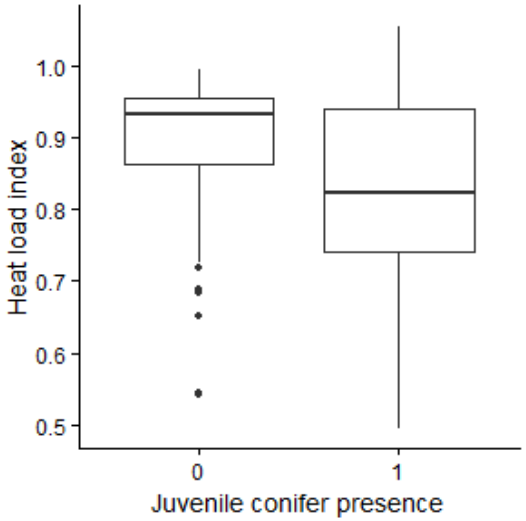


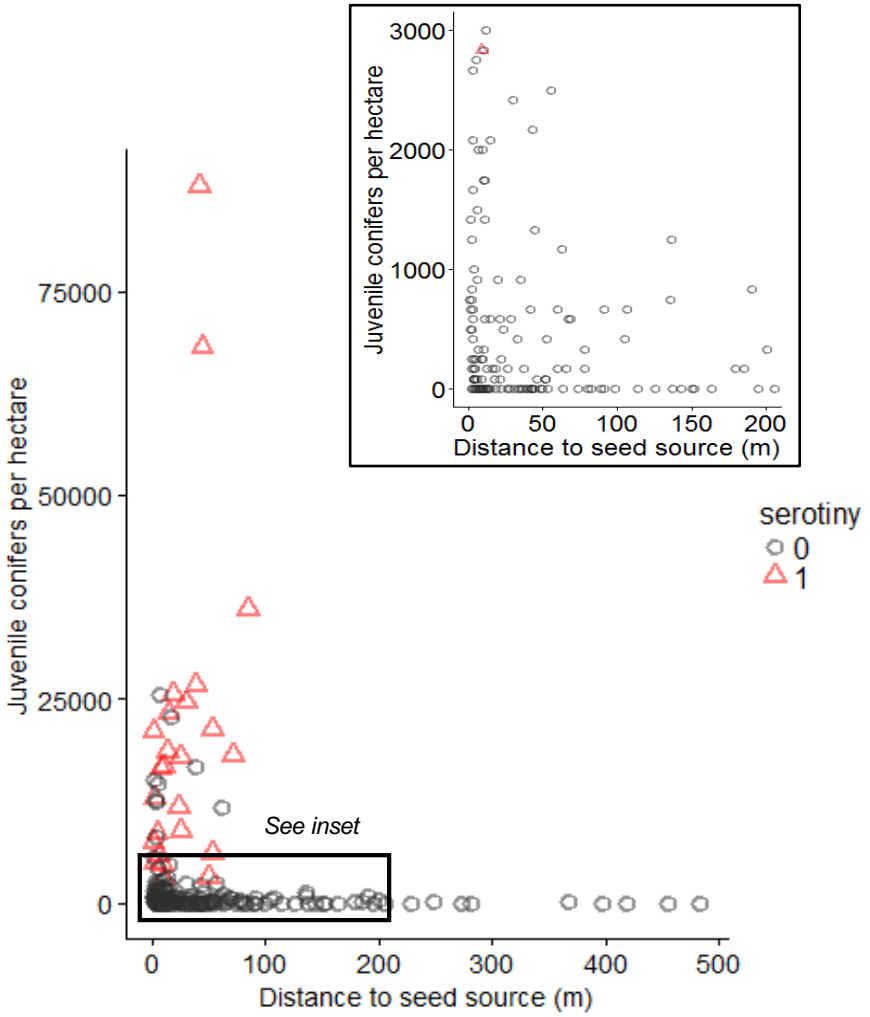
Note: Total federal spending on fire suppression consists of the expenses of the Forest Service and the Department of the Interior, which includes the Bureau of Indian Affairs, Bureau of Land Management, National Park Service, and U.S. Fish and Wildlife Service.

Source: National Interagency Fire Center

John Blanchard / The Chronicle

1. **Climate change:** impacts tree species





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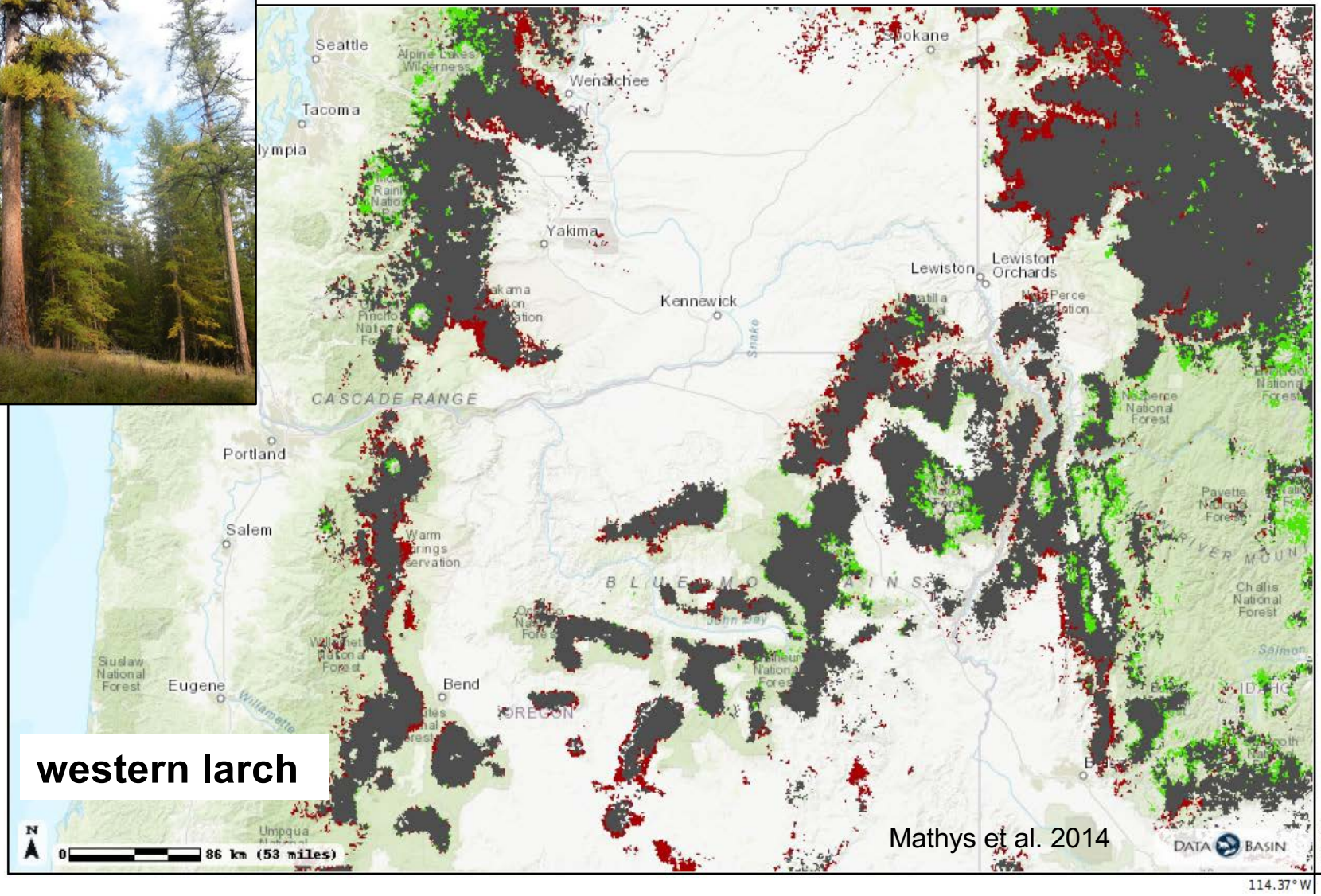
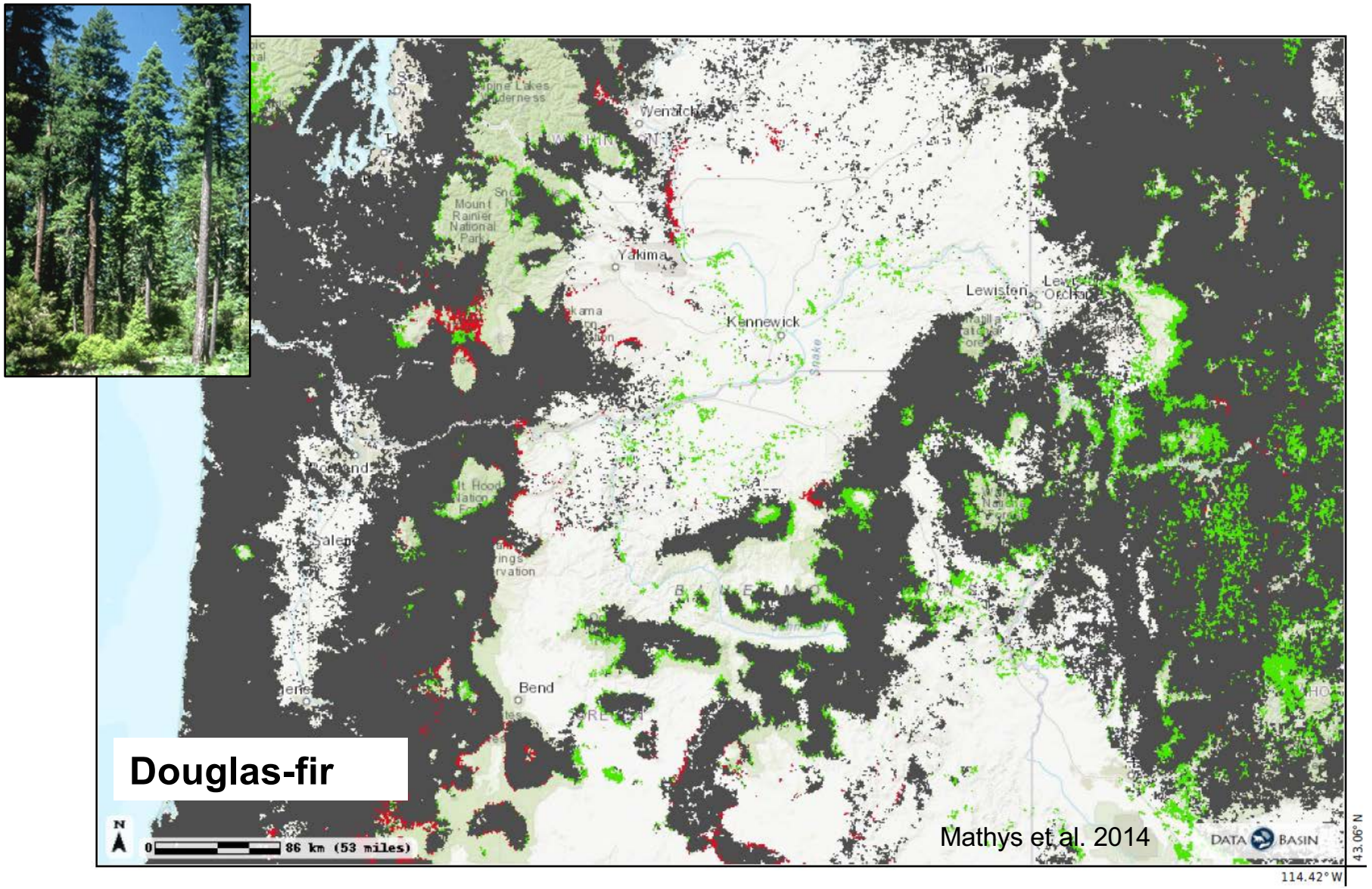


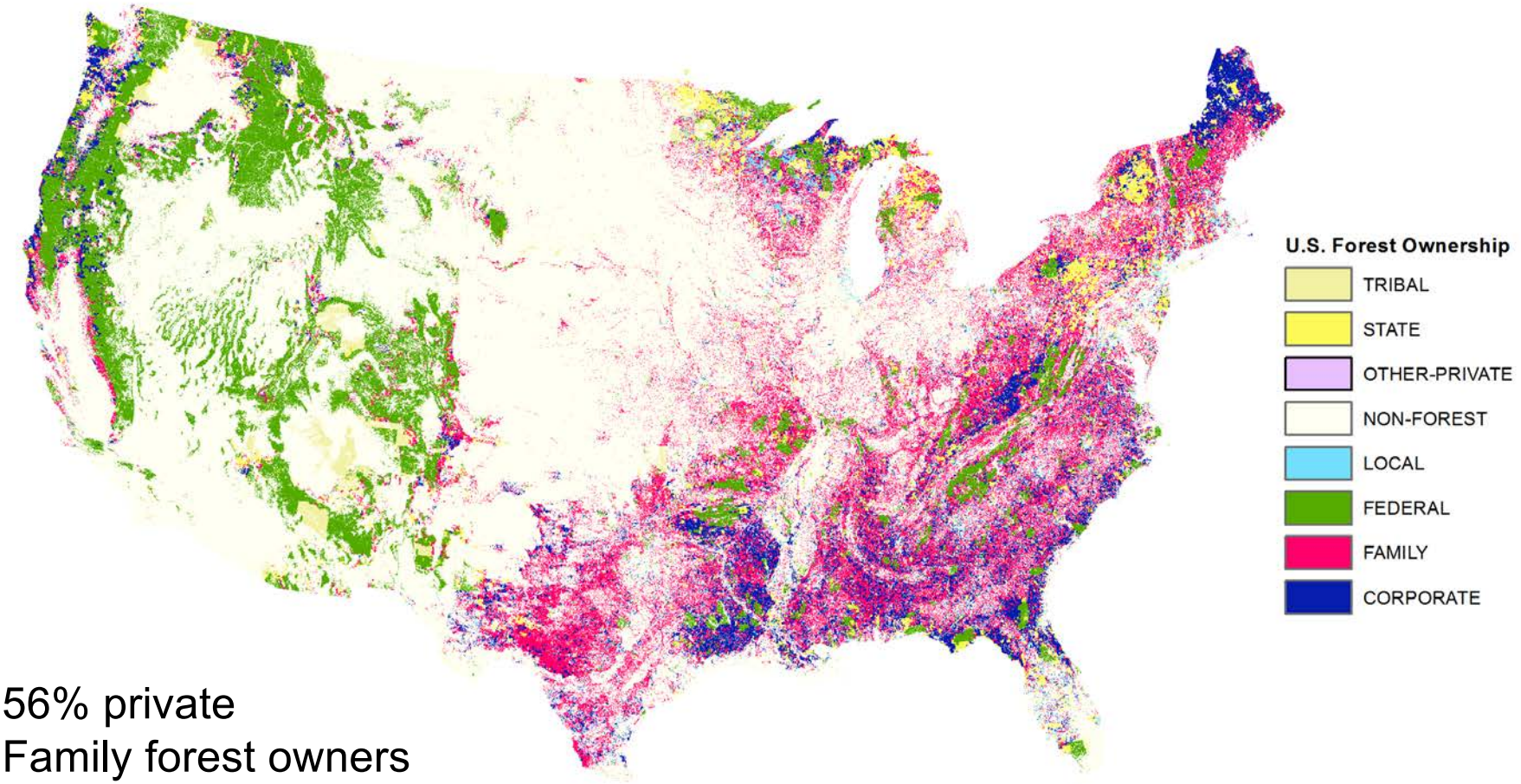
western larch

Mathys et al. 2014

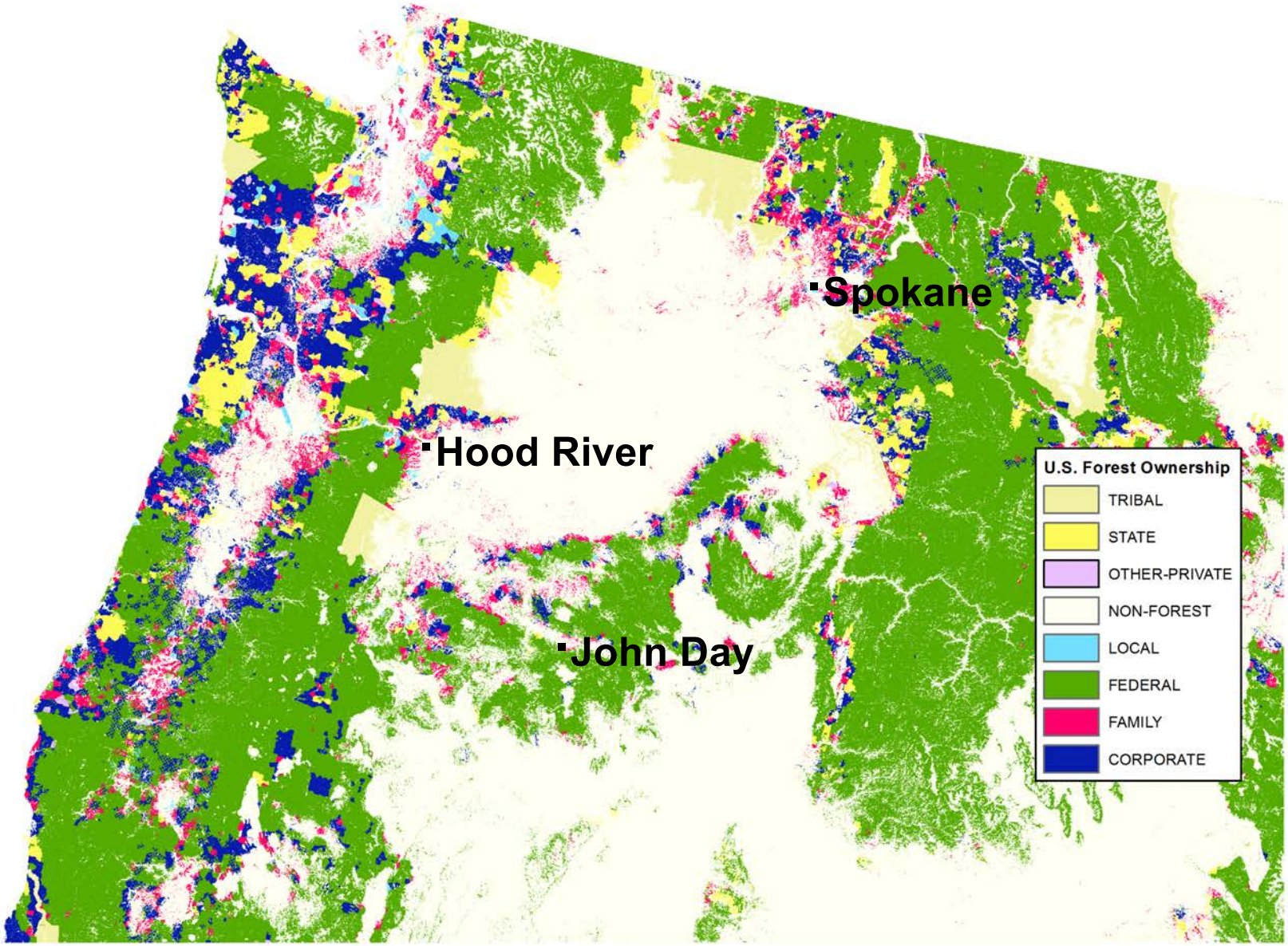
1. **Climate change:** impacts tree species



2. Private forest owners: Who are they? Where are they?



- 56% private
- Family forest owners control 36% of US forests


Spokane
Hood River
John Day
U.S. Forest Ownership
TRIBAL
STATE
OTHER-PRIVATE
NON-FOREST
LOCAL
FEDERAL
FAMILY
CORPORATE

3. Climate change **adaptation and forest management**

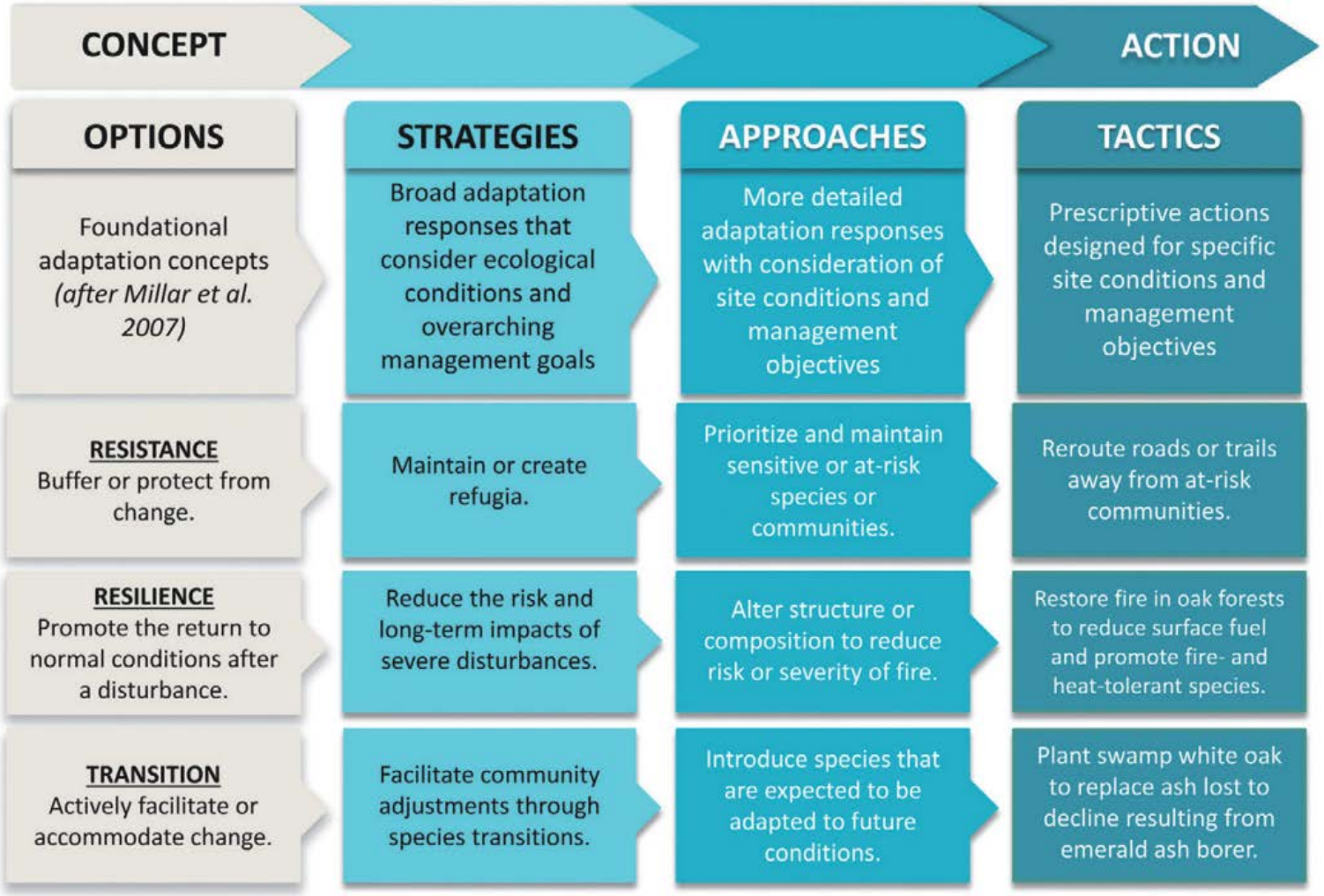
Actions to reduce or avoid:

- forest cover loss
- declines in forest productivity
- alterations to ecosystem processes

CO_2 capture and storage

- reductions in ecosystem services forests provide (wildlife, recreation, wood products)

3. Climate change **adaptation and forest management:** Ecologist's perspective

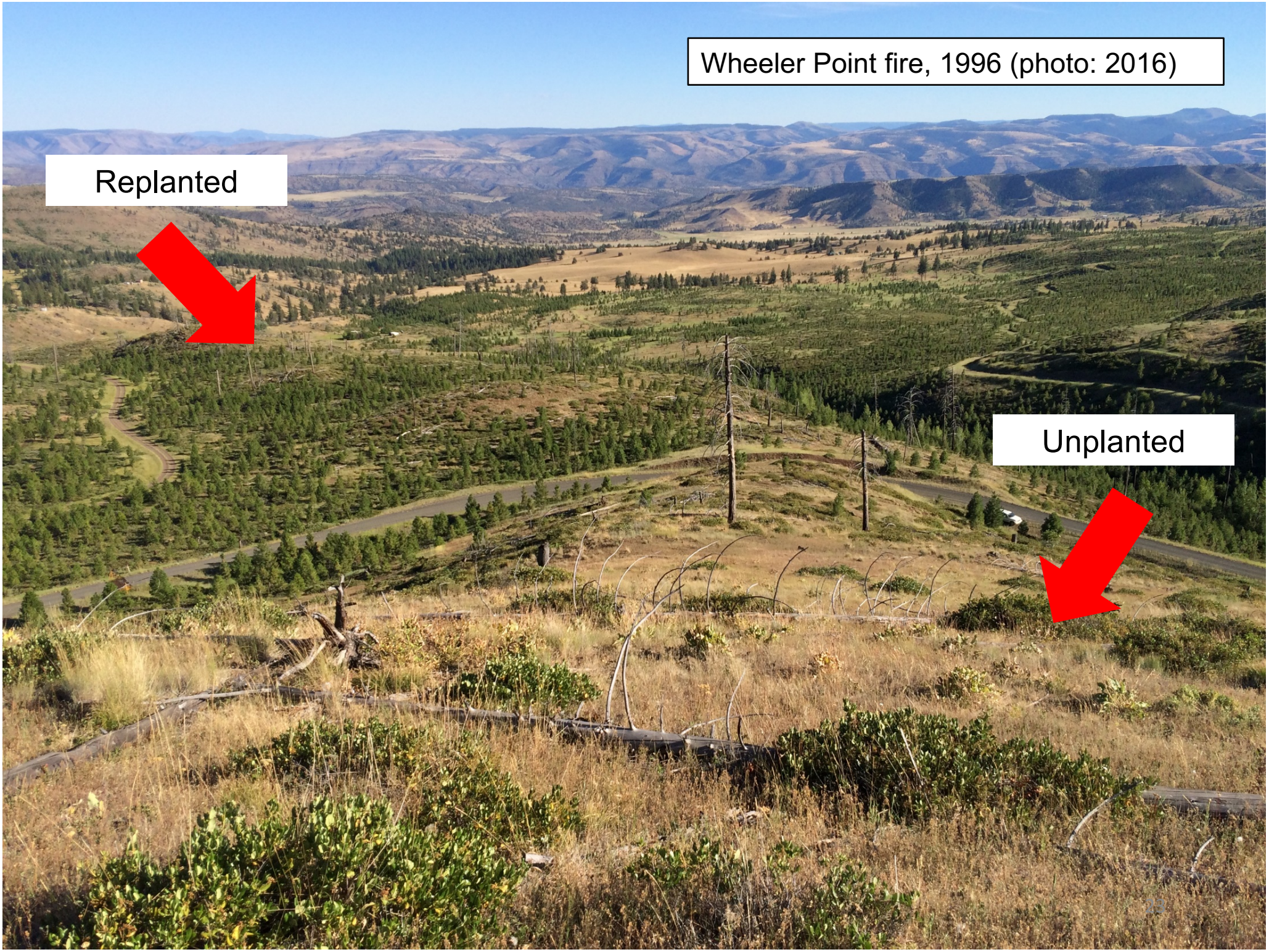


Swanston et al. 2016

3. Climate change **adaptation and forest management:** Ecologist's perspective

Structure	Composition

• Density management
  ○ Thinning
  ○ Replanting at lower densities
• Fuels reduction
  ○ Rx burns
  ○ Manual/mechanical fuels removal
	• Assisted migration
	  ○ Traditional or molecular breeding
	• Diversification – plant multiple species rather than monocultures


Wheeler Point fire, 1996 (photo: 2016)
Replanted
Unplanted

Fuel Treatments

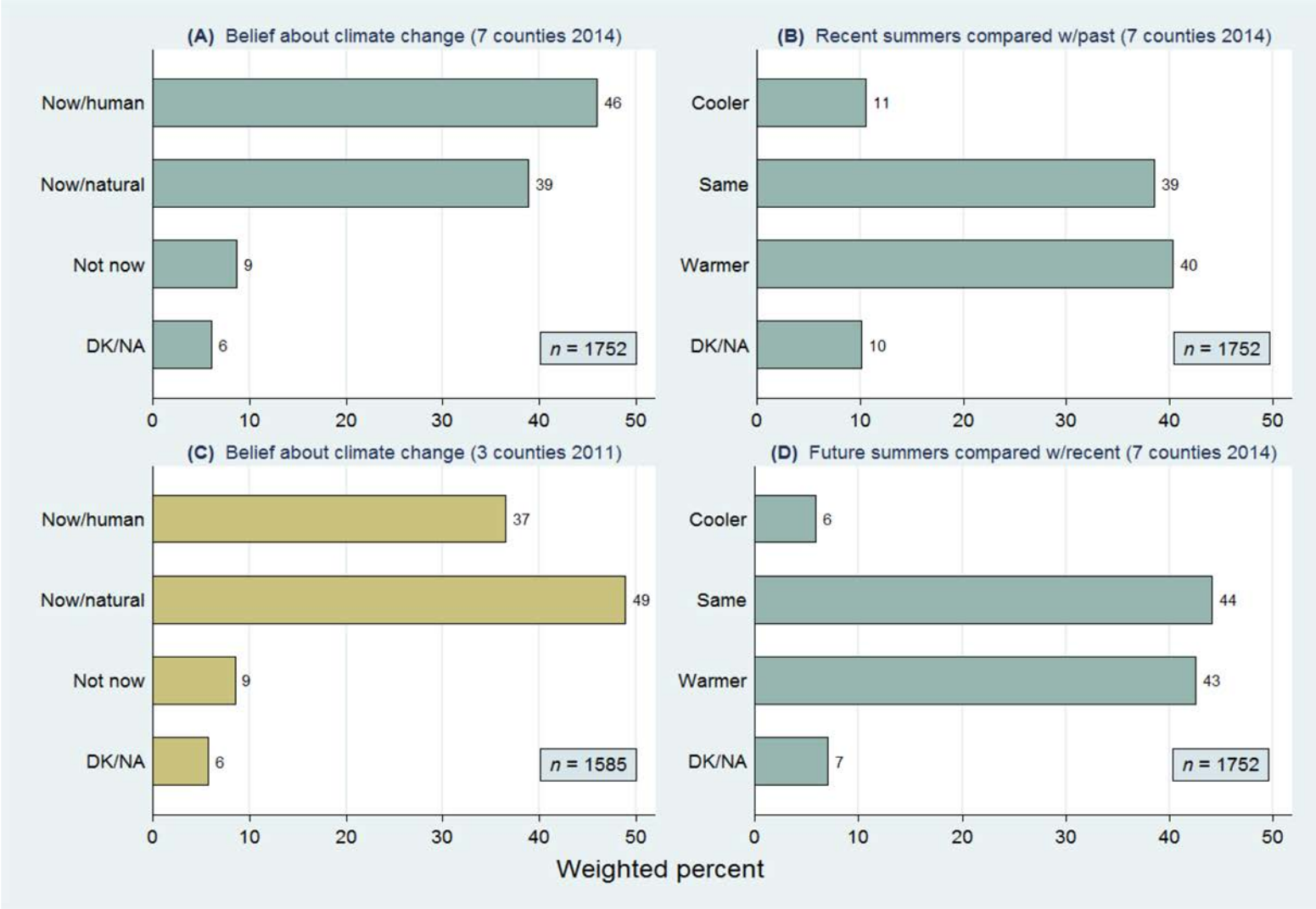
- Pace and scale of fuel treatments is insufficient
- 1% of U.S. Forest Service fuel treatments experience wildfire each year, and only remain effective for 10-20 years

3. Climate change **adaptation and forest management:** Forest owner's perspective

Oregon Forest Practices Act:

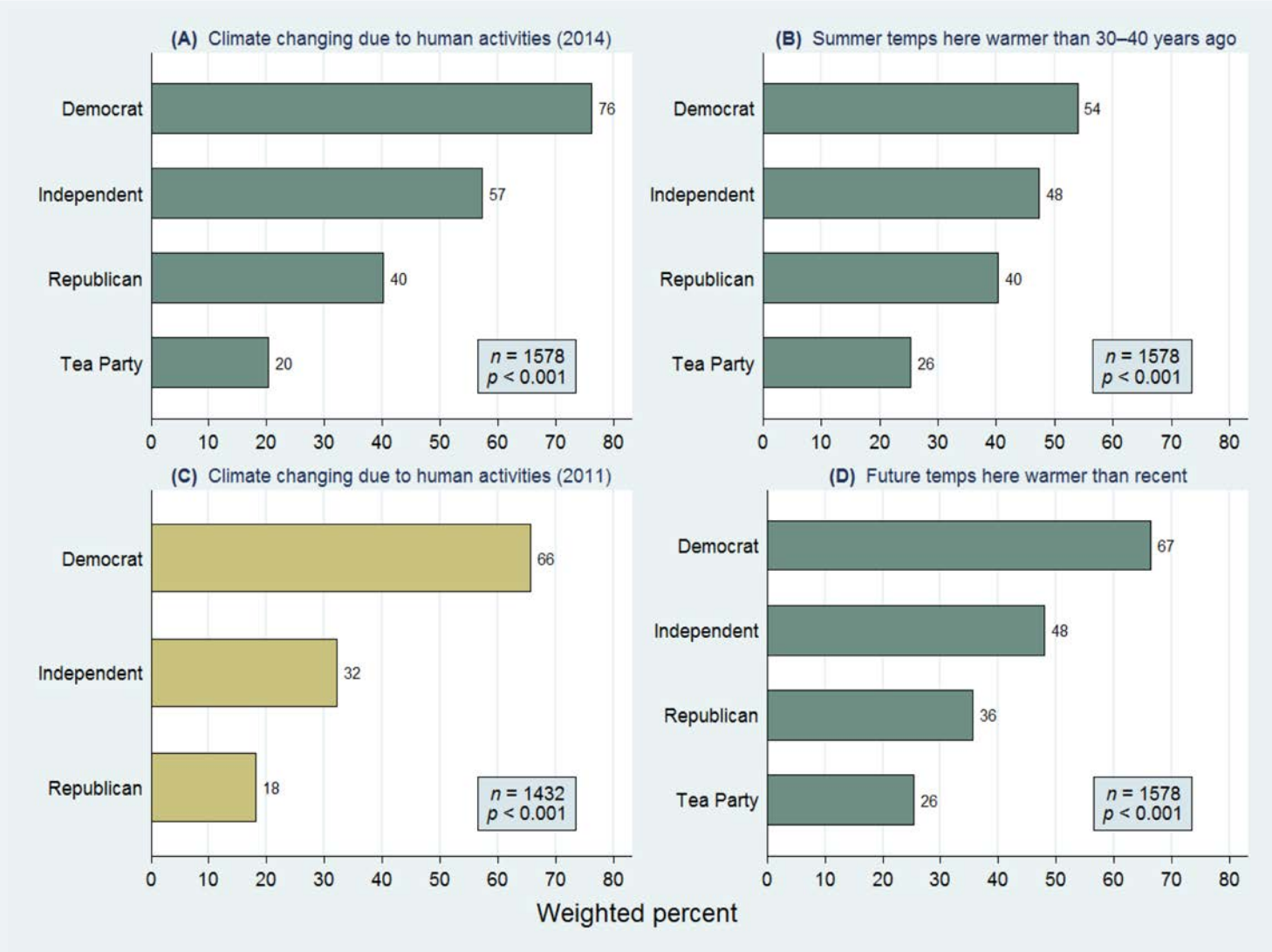
"Landowners are encouraged to reforest with a mixture of acceptable tree species, where appropriate, to reduce the risk of insect and disease losses and to promote stand diversity. **Seedlings or seeds used for artificial reforestation should be from seed sources that are genetically adapted to the growing site**" (OFPA 2018, OAR 629-610-0050)

3. Climate change **adaptation and forest management:** Forest owner's perspective



Hartter et. al. 2018

3. Climate change **adaptation and forest management:** Forest owner's perspective



Hartter et. al. 2018

3. Climate change **adaptation and forest management:** Forest owner's perspective

2012 Mail Survey: Please rank these potential threats to your forest lands from 1 (most threatening) to 7 (least threatening):

Threat	Threat Ranking						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Wildfire	56.7%	11.3%	11.6%	6.3%	0.7%	2.6%	1.1%
Insects in your trees	11.8%	37.6%	20.8%	13.0%	8.1%	3.7%	1.1%
Diseases that affect your trees	4.9%	17.9%	34.0%	23.7%	11.0%	4.0%	1.5%
Drought	3.7%	9.0%	9.1%	26.0%	27.2%	18.3%	6.1%
Long-term climate change	2.2%	2.7%	5.7%	4.3%	12.7%	21.2%	50.2%
Extreme weather events	2.2%	6.6%	7.5%	9.3%	23.3%	31.5%	19.5%
Neighboring forest land	4.7%	11.3%	9.4%	15.7%	17.0%	17.9%	20.3%
Other	13.8%	3.6%	1.9%	1.7%		0.7%	

Landowner taking anticipatory actions:

G14: "Our goal is to maintain our property as a forested site in the face of climate change. . . I think that if areas in the southern Blue Mountains aren't managed it will be deforested -- burned over and not reforested."

Examples of **reactive** adaptation:

W6: "Yes, climate change will stress forests and trees will become disease prone and will die. **Overall it may have effects on species, which ones can live in certain areas. I'm keeping an eye on it but I haven't planned explicitly for it. I'm in watch and wait mode - [I have] talked to [Local Forester] about possibly needing to thin even more if drought happens."**

*G7: "*I'll continue to manage to reduce wildfire risk. . . If I notice it getting drier and direr and drier, then ya I'll probably thin the inventory a bit."

C4: "**But no one really knows what's going to happen**, we haven't thought that far in advance - we would harvest if trees got too unhealthy."

►**Uncertainty**

Findings: Implementation Needs

Resource needs shared by eastern OR forest owners:

- **Equipment**
- **Locally-focused education**
- **Labor pool**
- **More grants/cost-share programs**
- **Institutional** – multi-ownership projects

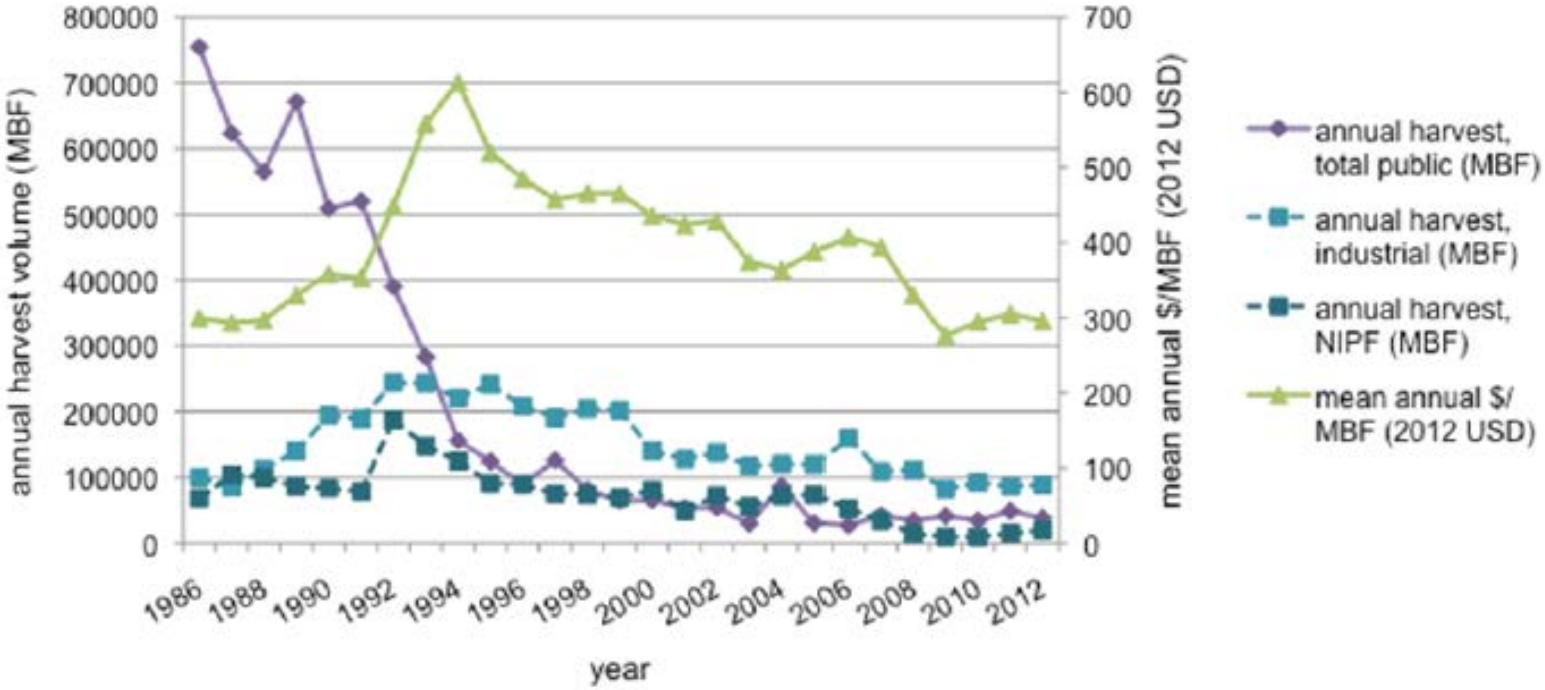
- **Improved log markets/infrastructure** – profit incentive and chip/biomass market

WH3: "We'd be more interested in thinning it out, but there's no market."

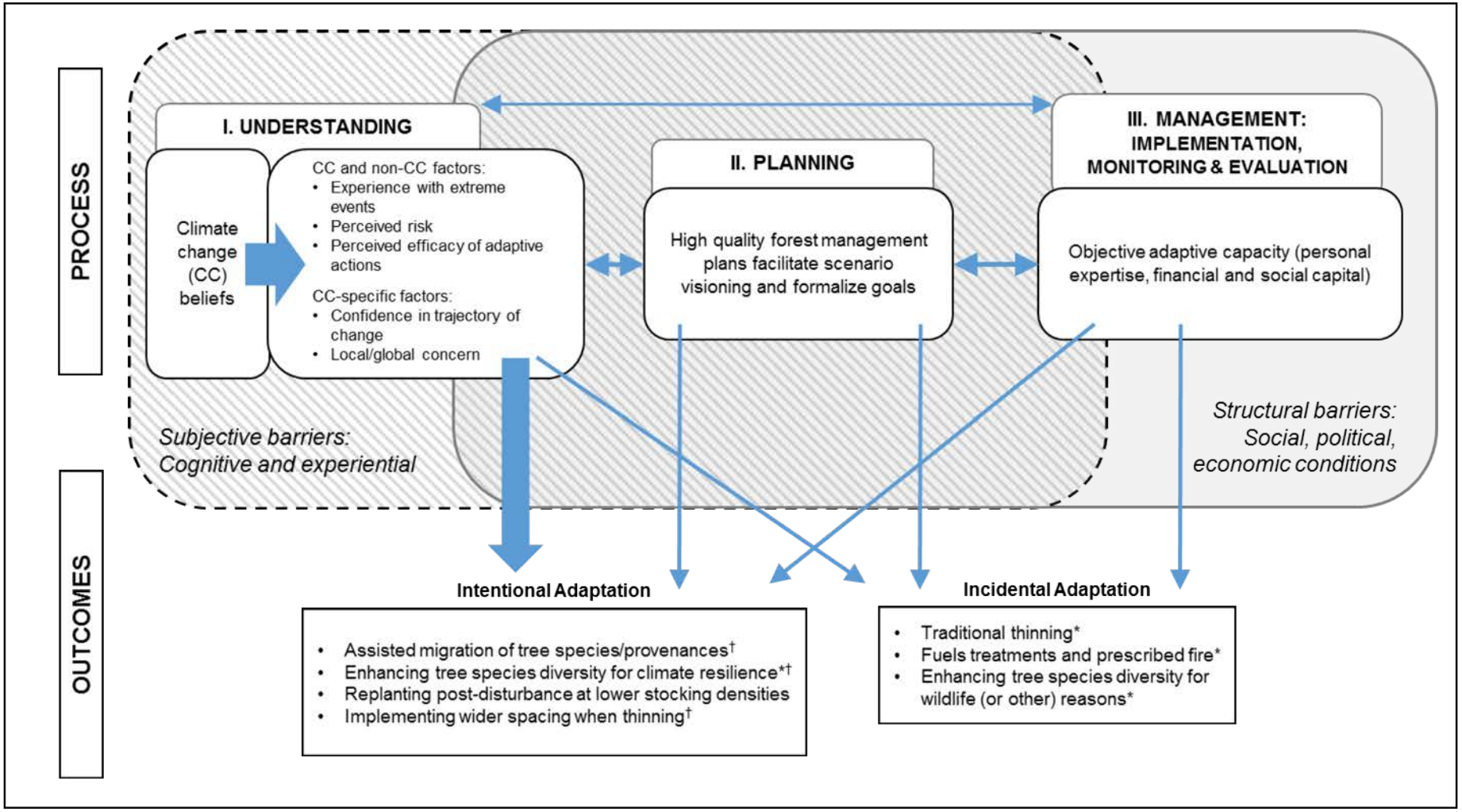
- **Time**

Political & Economic Challenges

- No market for small-diameter timber
- Weak timber market in many communities in part because of fallout from federal policies



Boag 2015



Boag et al. 2018. *In press.* Ecology & Society.

4. **Forests of the future:** Scientists, practitioners, landowners, and the road ahead

Barriers:

- Inactive forest owners lack multiple resources – funds and/or economic incentives, education, equipment, labor, time
- Few are concerned by climate change, in part due to politicization of the issue
- For those who are aware and concerned, most favor **reactive adaptation**: may be effective strategy for drought (*stressor*), but potentially maladaptive for wildfire, insects and disease (*shocks*) that will increase as climate warms

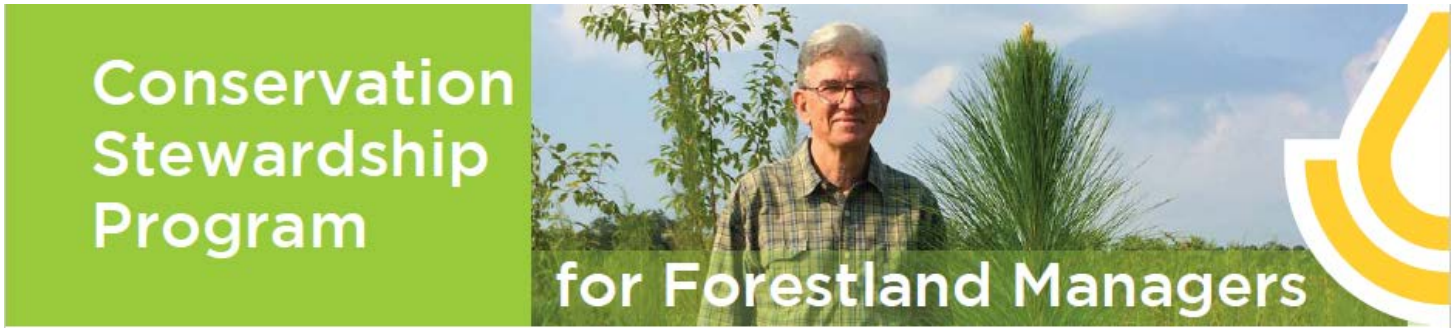
Opportunities:

- Synergies between managing forests for improved growth and yield, wildfire mitigation, and adaptation: **"Meet people where they're at,"** i.e. fuels management needs to happen regardless of climate change
- **Forest Management Plans** support diverse goals and may promote both **longer planning horizons** and potentially **encourage "visioning" of future conditions and potential adaptation options**

4. **Forests of the future:** Scientists, practitioners, landowners, and the road ahead

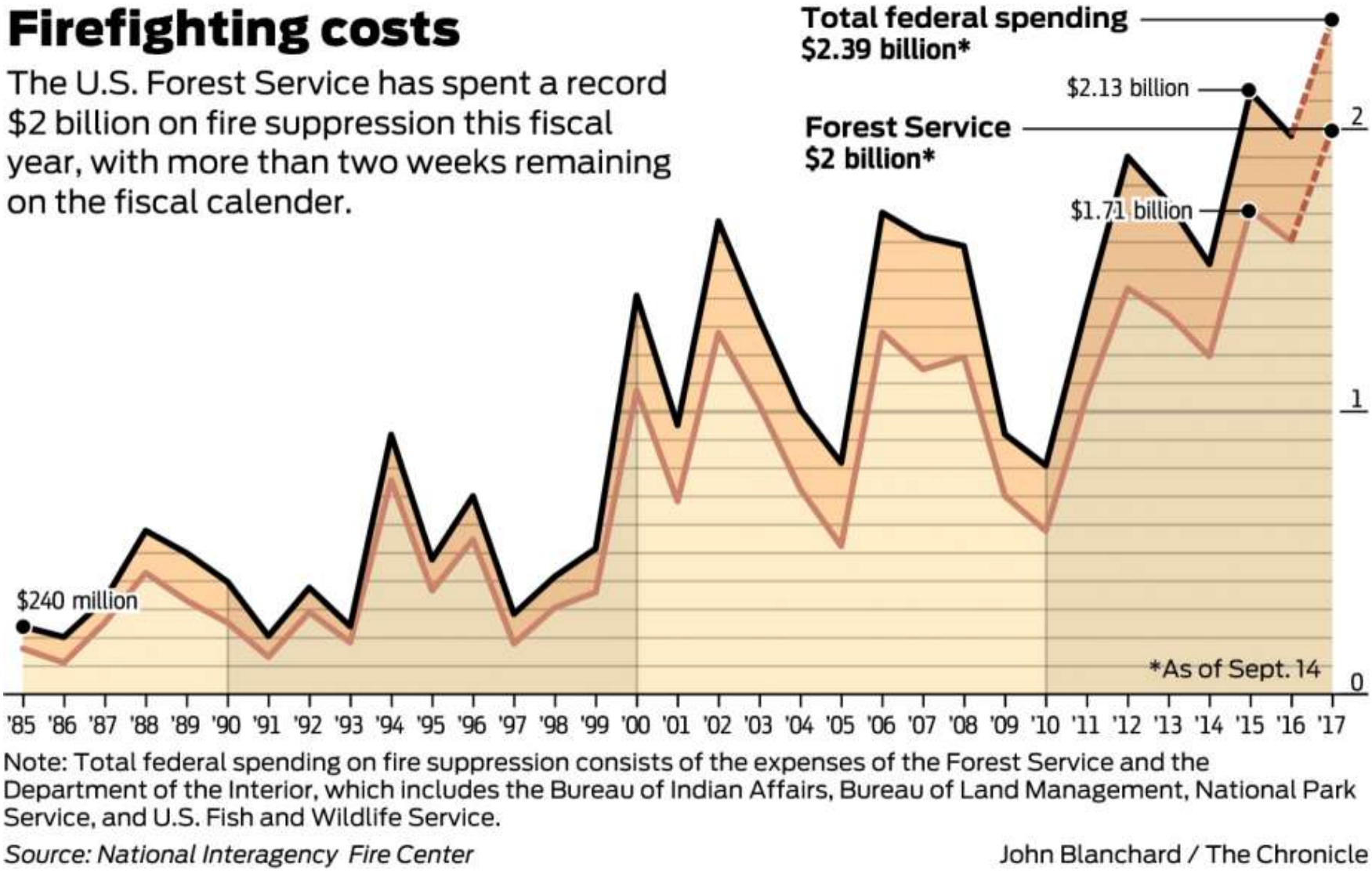
- Cutting and burning to save forests is politically controversial
  - **Ecological scientists**: which actions support climate change adaptation and mitigation?
  - **Social scientists:** How do you incentivize adaptation on private lands that provide substantial public benefits?

Supporting private landowners: USFS Forest Stewardship Program, state forestry agencies, NRCS, University extension etc.



Oregon State UNIVERSITY OSU

March 2018: Congress passes wildfire funding fix, beginning 2020



Adaptation Workbook

a climate change tool for land management and conservation

Get Started About



FORESTS URBAN FORESTS AGRICULTURE

Tailored to your location

Relevant resources and information for your location, giving you complete flexibility to build a custom adaptation plan based on your unique management goals, values, and experience.

Peer-reviewed

Based on the best available science on climate change impacts and adaptation. You can access a library of information to learn more.

Structured process

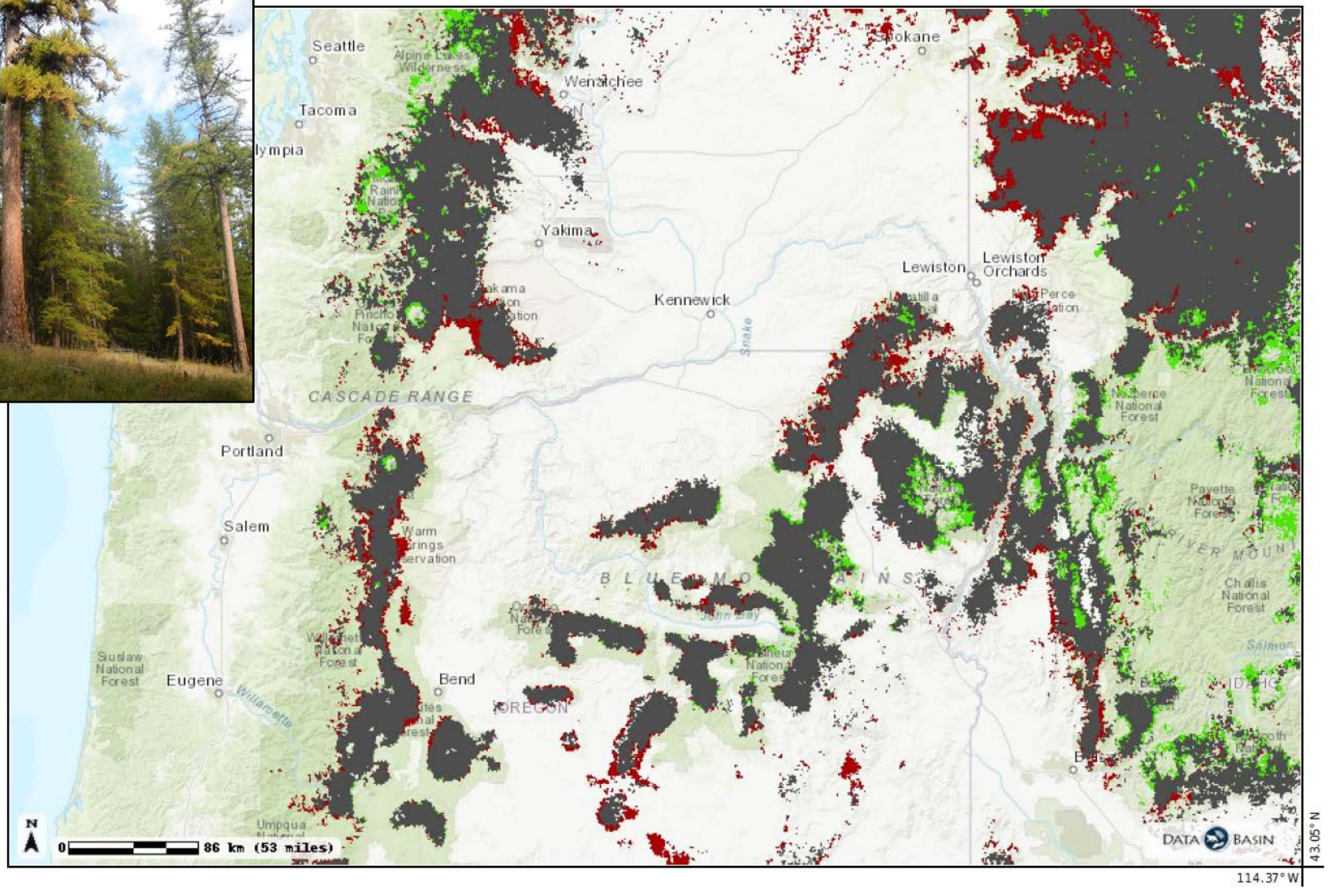
A logical, step-by-step process to help you consider climate change information for your location. The process helps you capture your thinking and align your goals to adaptation actions.

Take it with you

Create a custom adaptation plan. Save this plan to combine with other management documents and share with your colleagues.

USDA FOREST SERVICE US DEPARTMENT OF AGRICULTURE NIACS Northern Institute of Applied Climate Science

western larch: projected distribution



Partners

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WALLOWA RESOURCES

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JOINT FIRE SCIENCE PROGRAM

University of Colorado Boulder