

# Forest Management Workshop: Managing Today's Forests for Tomorrow's Challenges

Pre-Workshop Webinar

March 12, 2026

9:00 – 10:30 AM MT



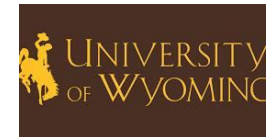
Photos: USDA Forest Service, Black Hills National Forest



Climate Hubs  
U.S. DEPARTMENT OF AGRICULTURE



United States  
Department of  
Agriculture  
Natural Resources Conservation Service



# Introductions

In the chat, share your:

- Name
- Position
- Location



Hello  
my name is

# Northern Institute of Applied Climate Science

The Northern Institute of Applied Climate Science (NIACS) develops synthesis products, fosters communication, pursues science, and provides technical assistance in climate change adaptation and carbon management.

Climate Change Adaptation

Forest Carbon Management

**NIACS is a collaborative, multi-institutional partnership led by the USDA Forest Service and comprised of federal, forest sector, conservation, higher education, and tribal organizations.**



# Translating Climate Science into Action



**USDA** Climate Hubs  
U.S. DEPARTMENT OF AGRICULTURE

**Mission:** ...to develop and deliver science-based, region-specific information and technologies, with USDA agencies and partners, to agricultural and natural resource managers that enable climate-informed decision-making, and to provide access to assistance to implement those decisions.



Foreign Agricultural Service  
U.S. DEPARTMENT OF AGRICULTURE



# USDA Climate Hubs: Workstreams



## Science and data syntheses

*Translating and delivering relevant information*

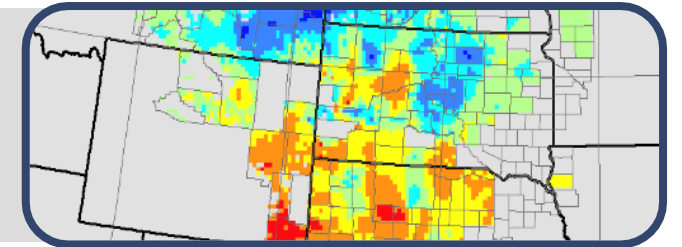
FOURTH NATIONAL CLIMATE ASSESSMENT

CHAPTER 24: NORTHWEST



## Decision-support tools and information

*Supporting climate-informed planning and decision-making*



## Outreach, convening, and training

*Facilitating engagement, discovery, and exchange*



# Webinar Agenda



- Welcome & Purpose
- What to Expect at the Workshop
- Climate Projections, Tools, & Resources
- Projected Shifts in Tree Habitat Suitability
- Preparing for the Workshop
- Q&A

# What to Expect at the Workshop



# Workshop Goals

- Consider climate change impacts and vulnerabilities specific to dry-mixed conifer forests in the Black Hills, and how those might affect the ability to meet project goals and objectives
- Identify actionable silvicultural strategies that increase resilience to expected future environmental shifts within Black Hills forests while meeting goals and objectives
- Explore silvicultural tactics across the resistance-resilience-transition adaptation spectrum
- Discuss how to monitor adaptation actions for success



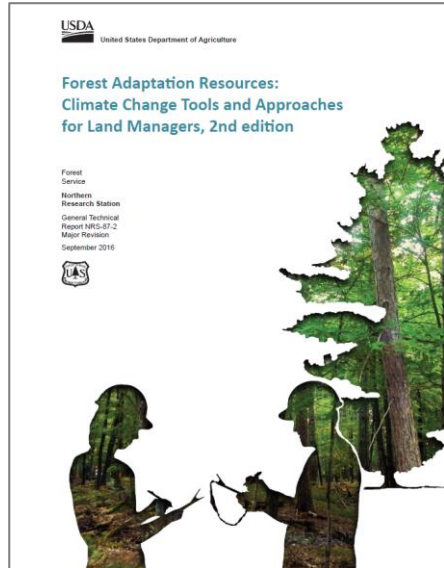
**Adaptation** - the adjustment of systems in response to climate change.



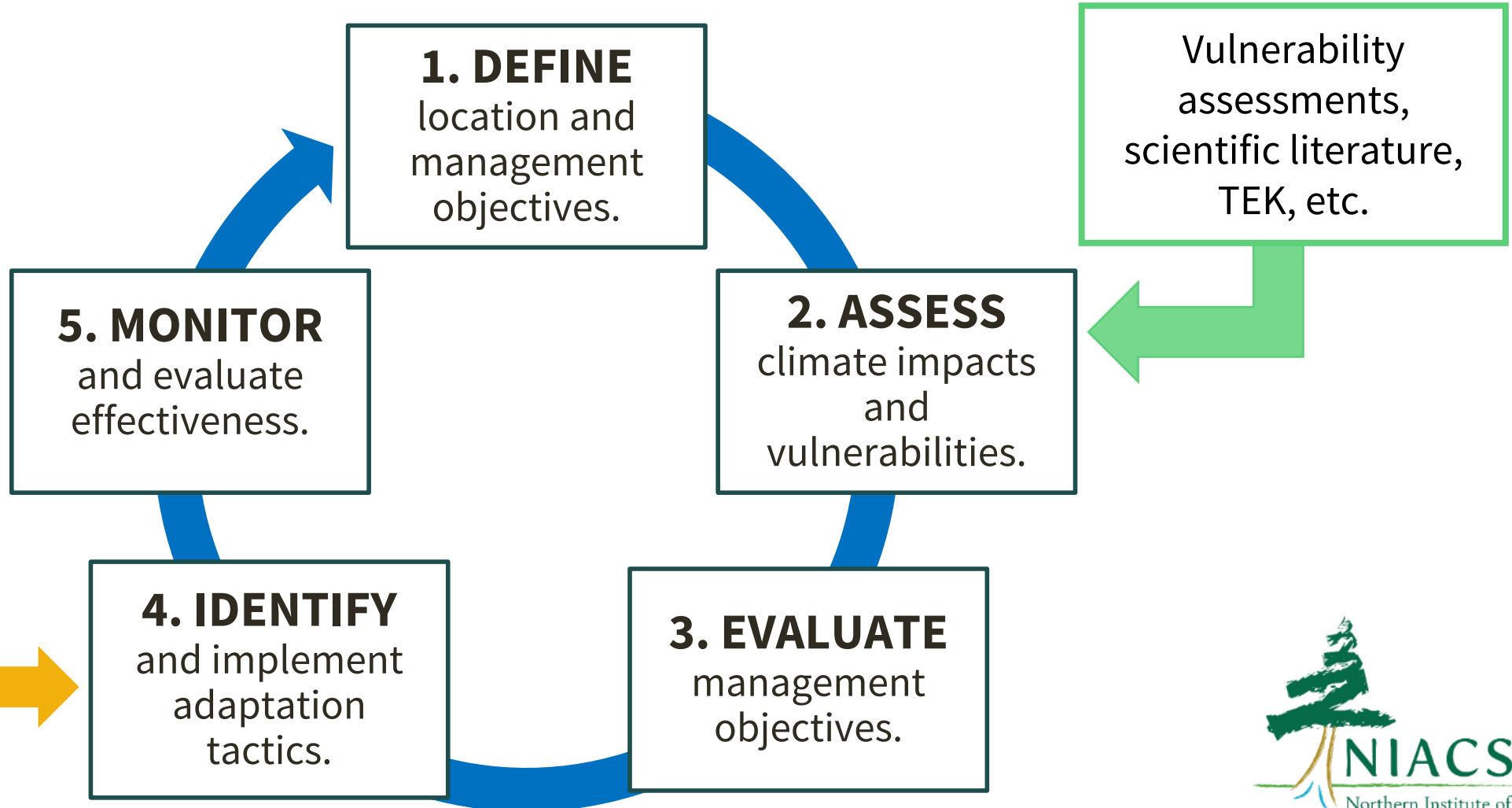
Ecosystem-based adaptation activities build on sustainable management, conservation, and restoration.

- What do you value?
- How much risk are you willing to tolerate?

# Adaptation Workbook



Adaptation Strategies and Approaches



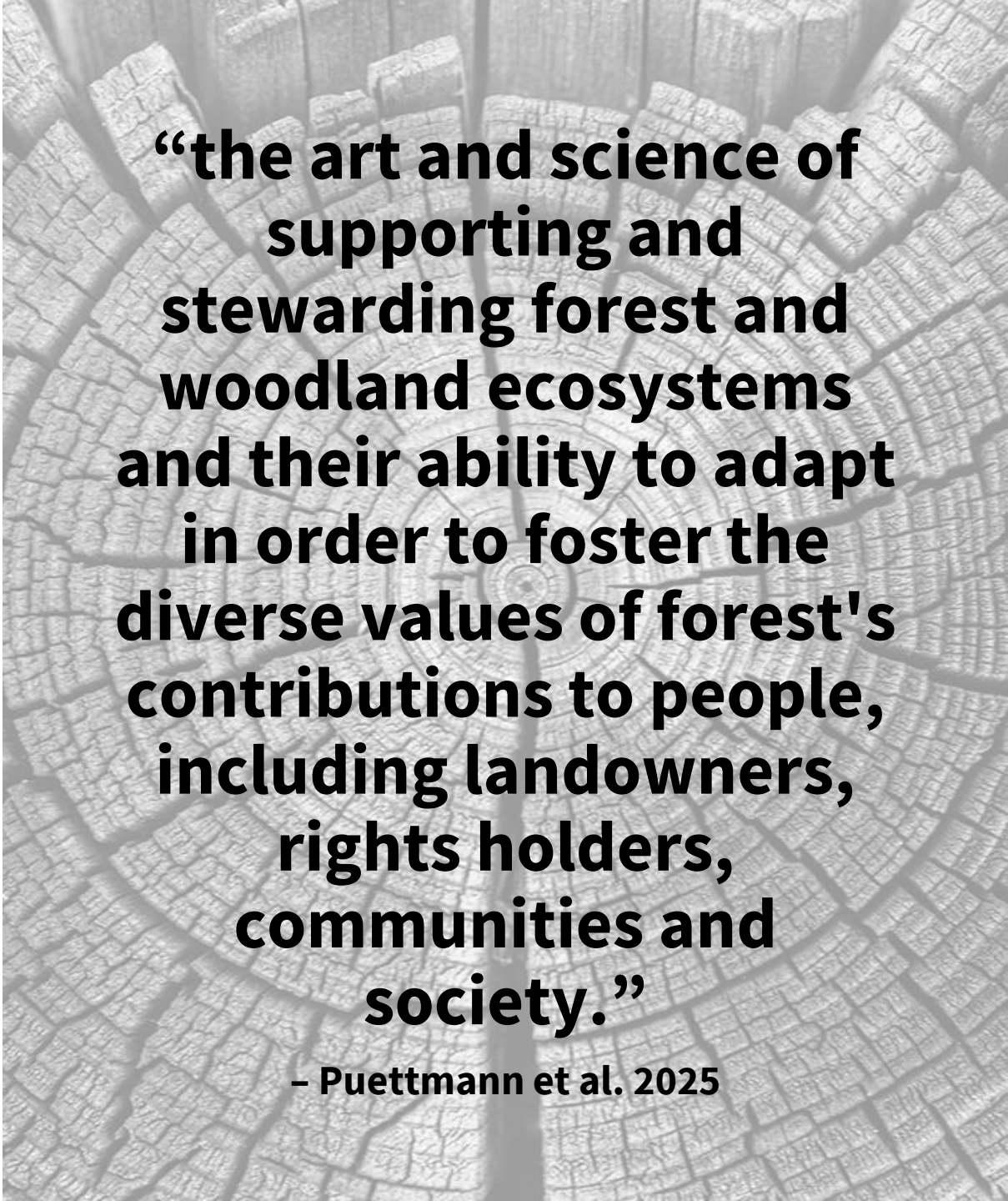
# Adaptation Workbook = Climate Change Filter



Use the Adaptation Workbook to ensure ALL of your goals and objectives are robust to climate change impacts.

# The Role of Silviculture in Climate Adaptation

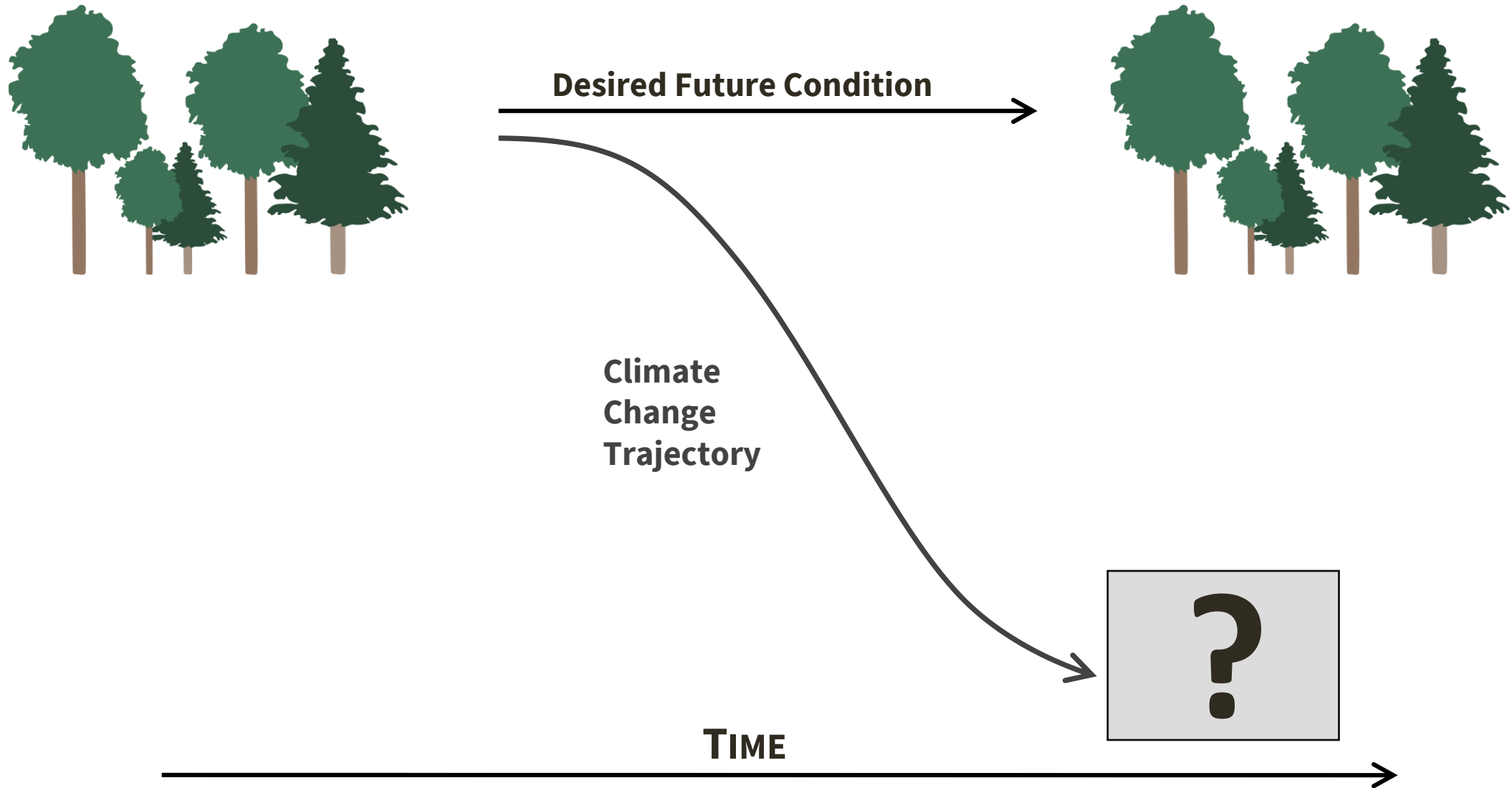
- Silviculture is the **toolbox** for carrying out forest management on the ground
- Inherent to silviculture is the process of clearly defining **desired future conditions**, and then planning and implementing actions that will direct ecosystem development to achieve those conditions
- Silviculture is **iterative** – the lessons of the past inform and refine the decisions of the future

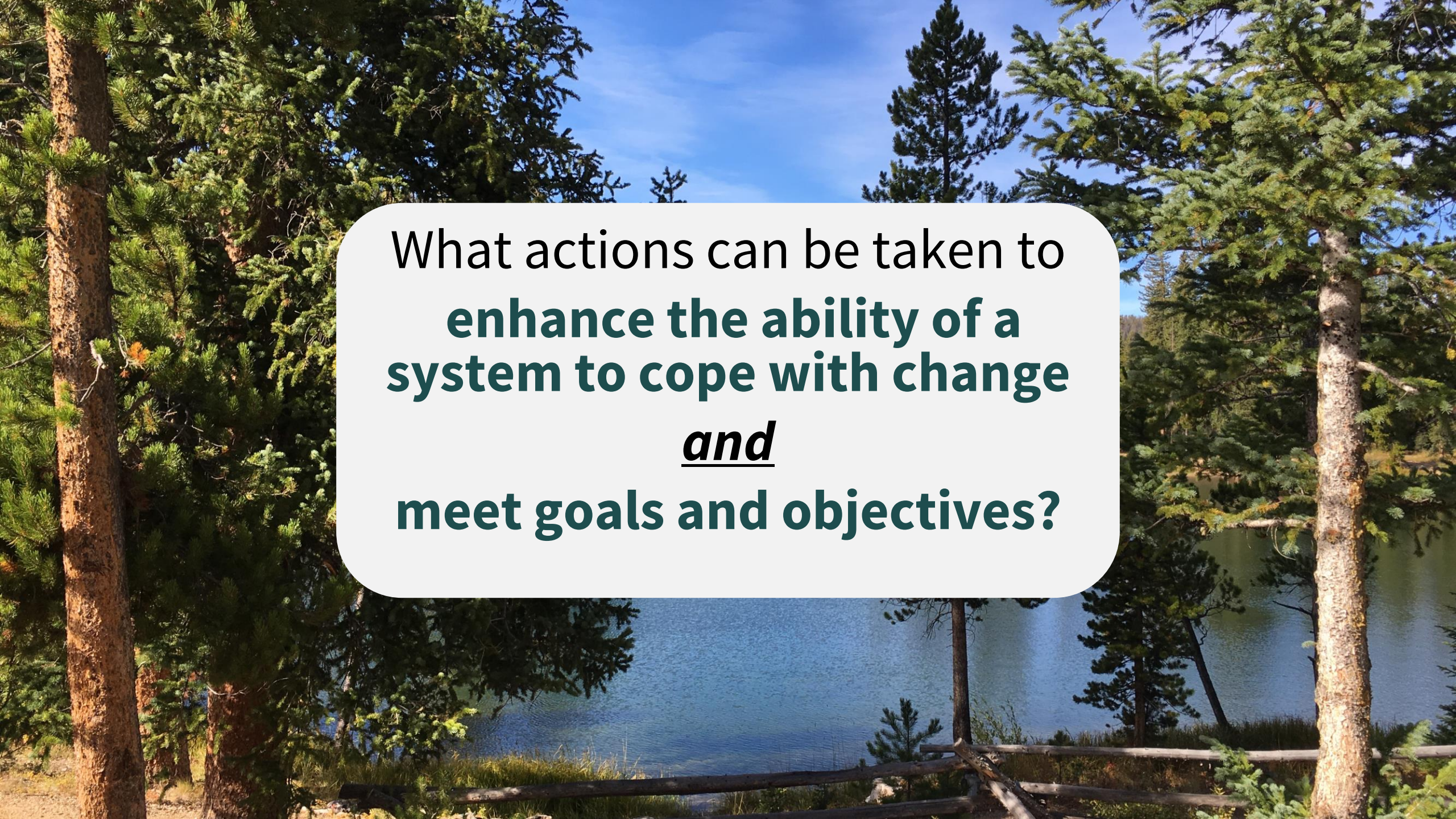


**“the art and science of supporting and stewarding forest and woodland ecosystems and their ability to adapt in order to foster the diverse values of forest's contributions to people, including landowners, rights holders, communities and society.”**

– Puettmann et al. 2025

# Climate-Driven Changes





What actions can be taken to  
**enhance the ability of a  
system to cope with change  
*and*  
meet goals and objectives?**

# Managing Risk – A Spectrum of Adaptation Options

Attribute	Resistance	Resilience	Transition	No Action
Experimental treatment definitions ( <i>sensu</i> Nagel et al. 2017)	Actions that improve the defenses of the forest against anticipated change or directly defend the forest against disturbance to maintain relatively unchanged conditions	Actions that accommodate some degree of change, but encourage a return to a prior condition or desired reference conditions after disturbance	Actions that intentionally accommodate change and enable ecosystems to adaptively respond to changing and new conditions	Given that climate change impacts all forests globally, under the “no action” forests are allowed to respond to climate change in the absence of direct silvicultural intervention as an appropriate baseline

**RESISTANCE**



**RESILIENCE**



**TRANSITION**



Reduce impacts/maintain current conditions

Forward-looking/promote change

# Intentionality

- Explicitly consider and address climate change
- Sure we might get lucky...
- Intentionally assessing risk and vulnerabilities **makes our plans more robust!**



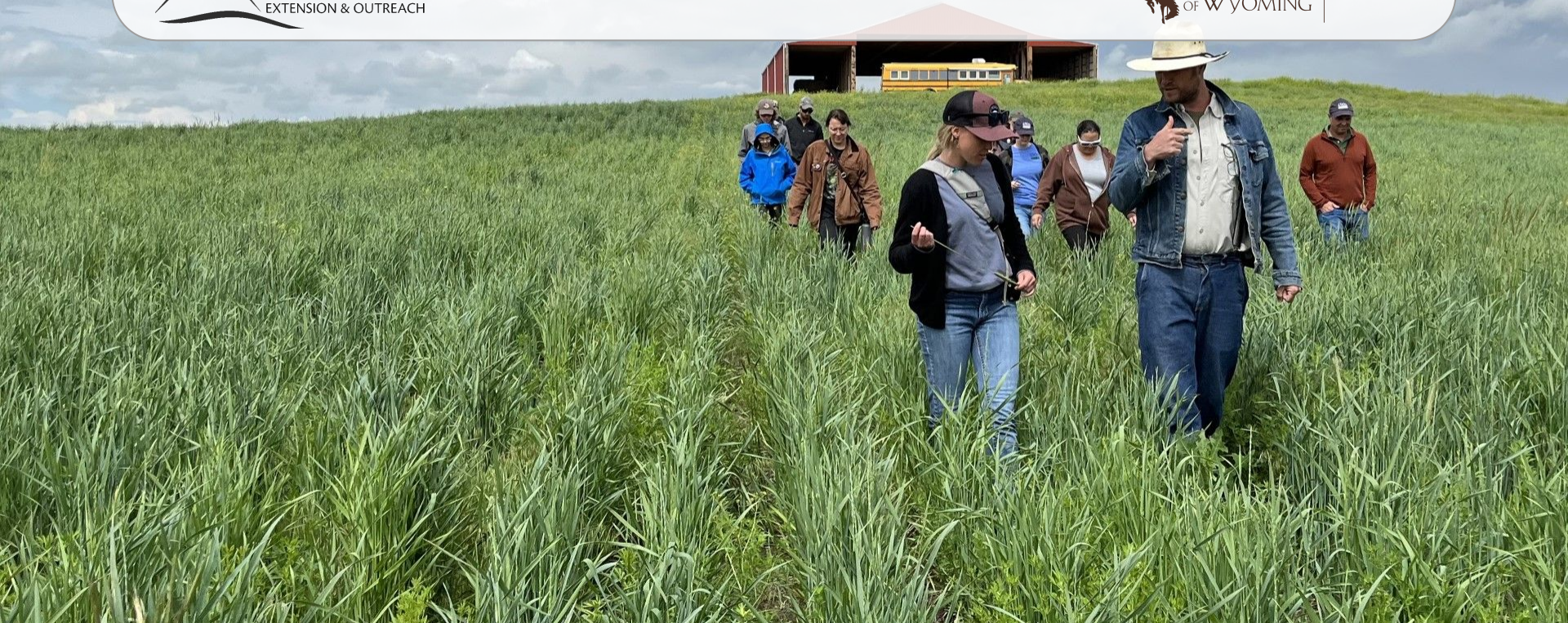
# Breakout Group Assignments

<b>Battle Creek</b>	<b>Friendshuh Game Production</b>	<b>Greyhound Fire Restoration</b>	<b>Rankin Ridge Grassland Restoration</b>	<b>Boxedler Creek</b>
Stuart Adrian	David Mallett	Lee Imrey	Ian Torrence	Mike Ray
Scott Adrian	Kylie Hammett	Shamla Imrey	Jessica Sunderland	Jamie Dedic
Mike Beck	Karen Brammer	Ken Kuhle	Nina Steinmetz	Scott Guffey
Lilly DeLange	Jerry Brammer	Kat Rowe	Nina Wajrowski	Laura Bosworth
Sterling Smith	Rayma Daigle	Harrison Brookes	Mike Baldwin	Robert Burns
Doak Nickerson		Ian Lilya	Dick Terry	Gabe Dirksen

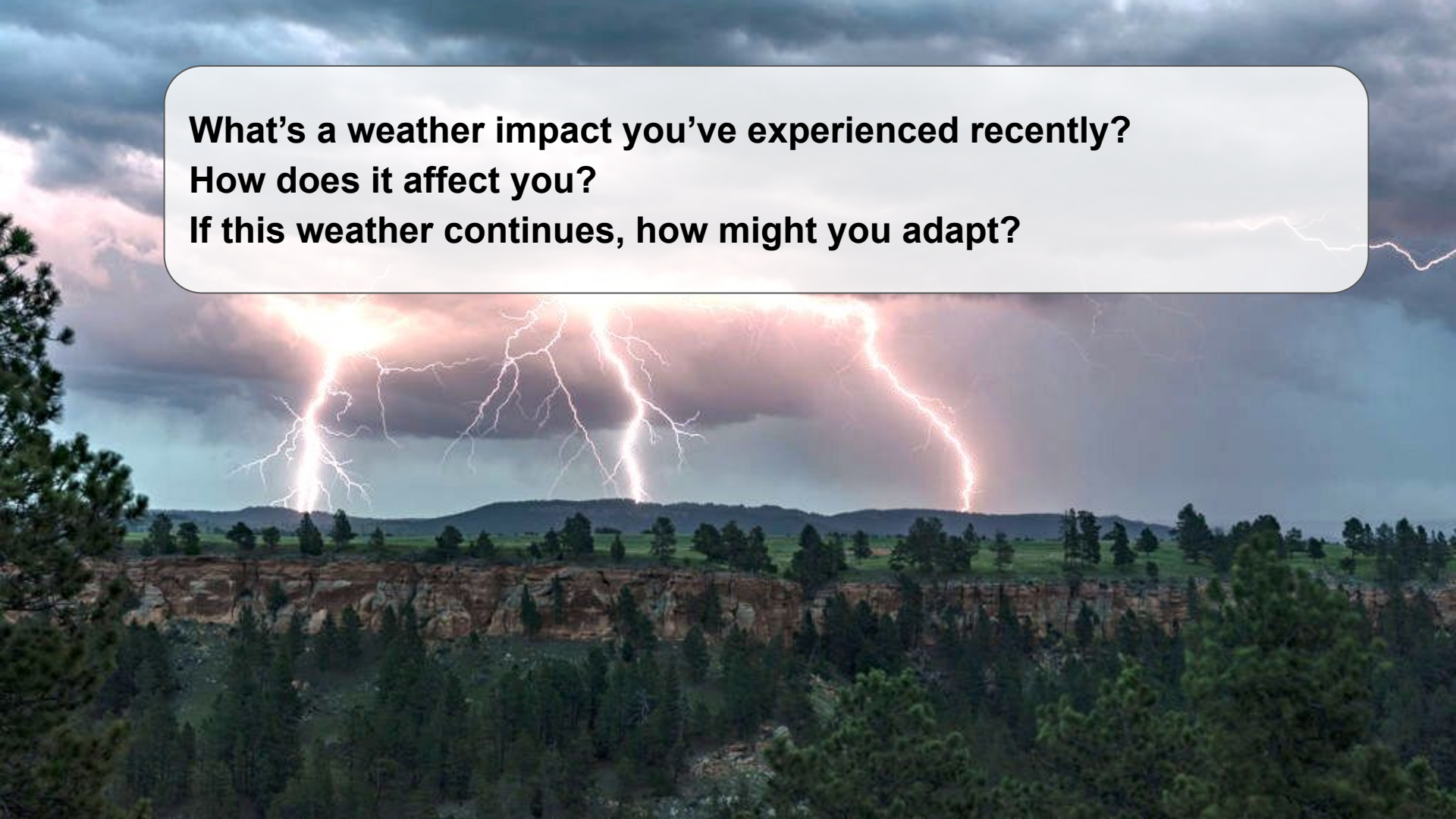
# Climate, Drought, & Weather: Tools & resources

Hannah Rodgers, Extension Specialist & Climate Hub Coordinator

Callie Surber, Extension Educator



**What's a weather impact you've experienced recently?  
How does it affect you?  
If this weather continues, how might you adapt?**



# Weather vs. Climate (Source: NOAA)

**Weather** reflects short-term conditions of the atmosphere

**Climate** is the average of weather for an extended period of time (multiple decades) at same location

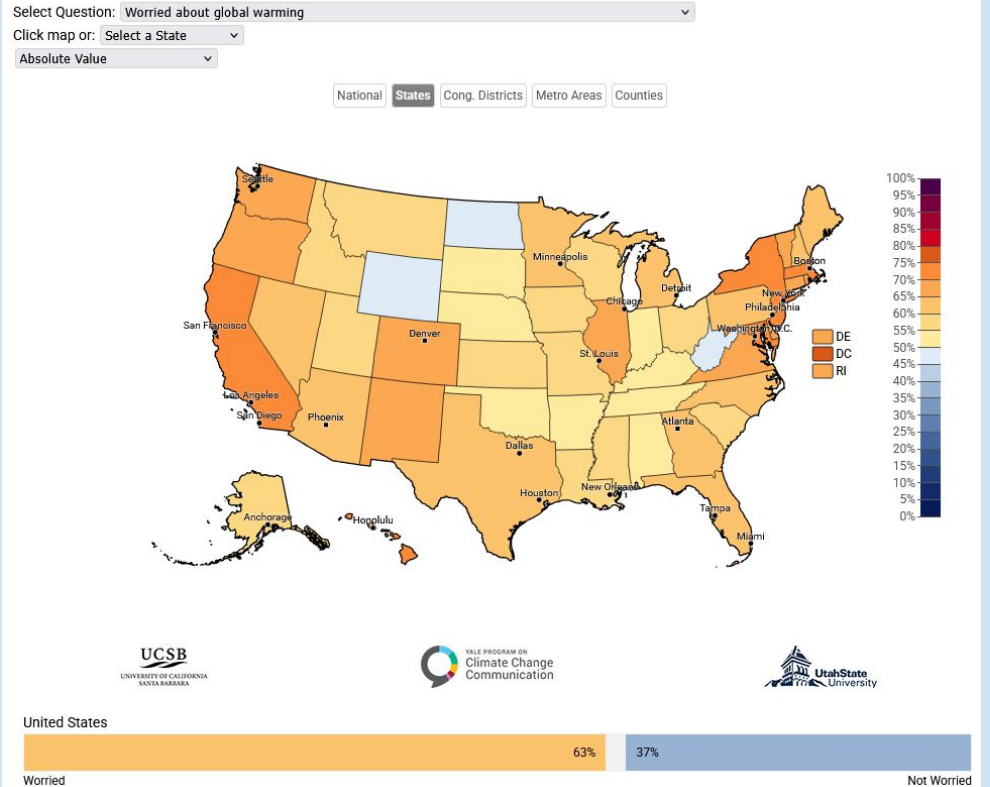
**Weather** can change from minute-to-minute, hour-to-hour, day-to-day. **Climate**, is the average of weather over time, can change across decades.



# Yale Climate Opinions Study - 2024

- Yearly study (since 2008)
- Climate opinions and behaviors
- Nationally representative sample
  - ( $n = 1,031$  in 2024)
- Represents all 50 states and all 3,142 counties

Estimated % of adults who are somewhat or very worried about global warming (nat'l avg. 63%), 2024

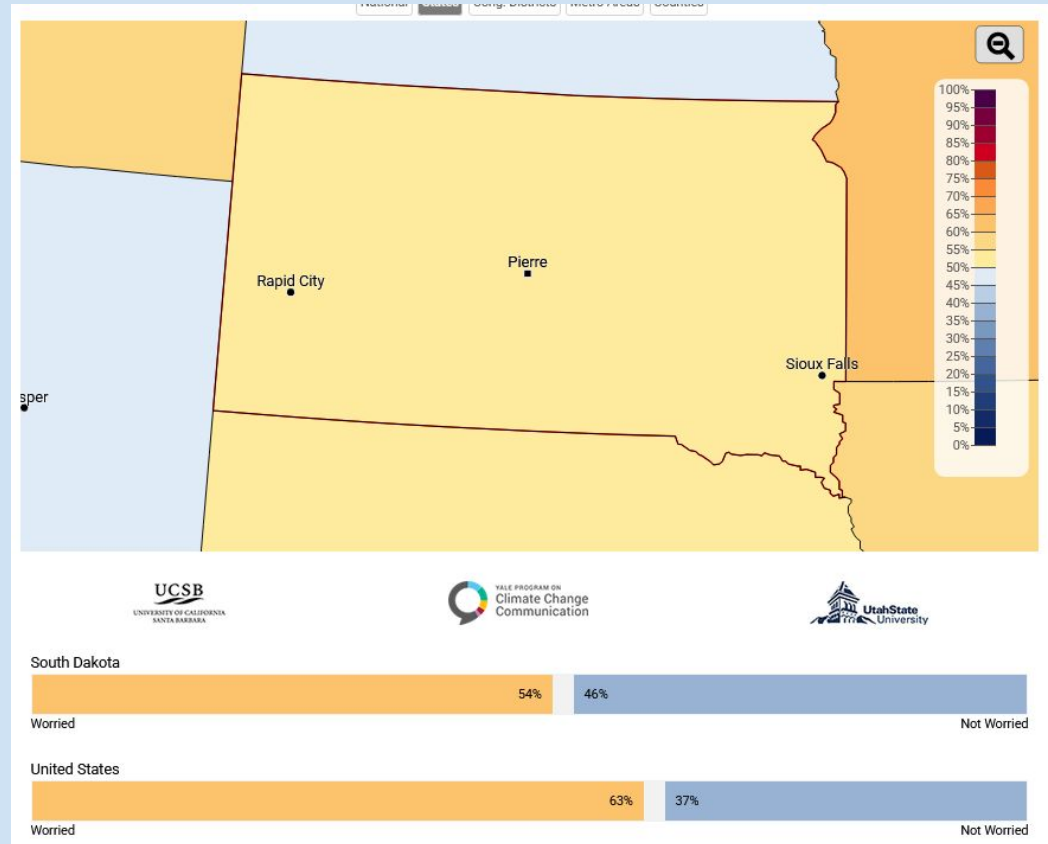


<https://climatecommunication.yale.edu/visualizations-data/ycom-us/>

# Yale Climate Opinions Study - 2024

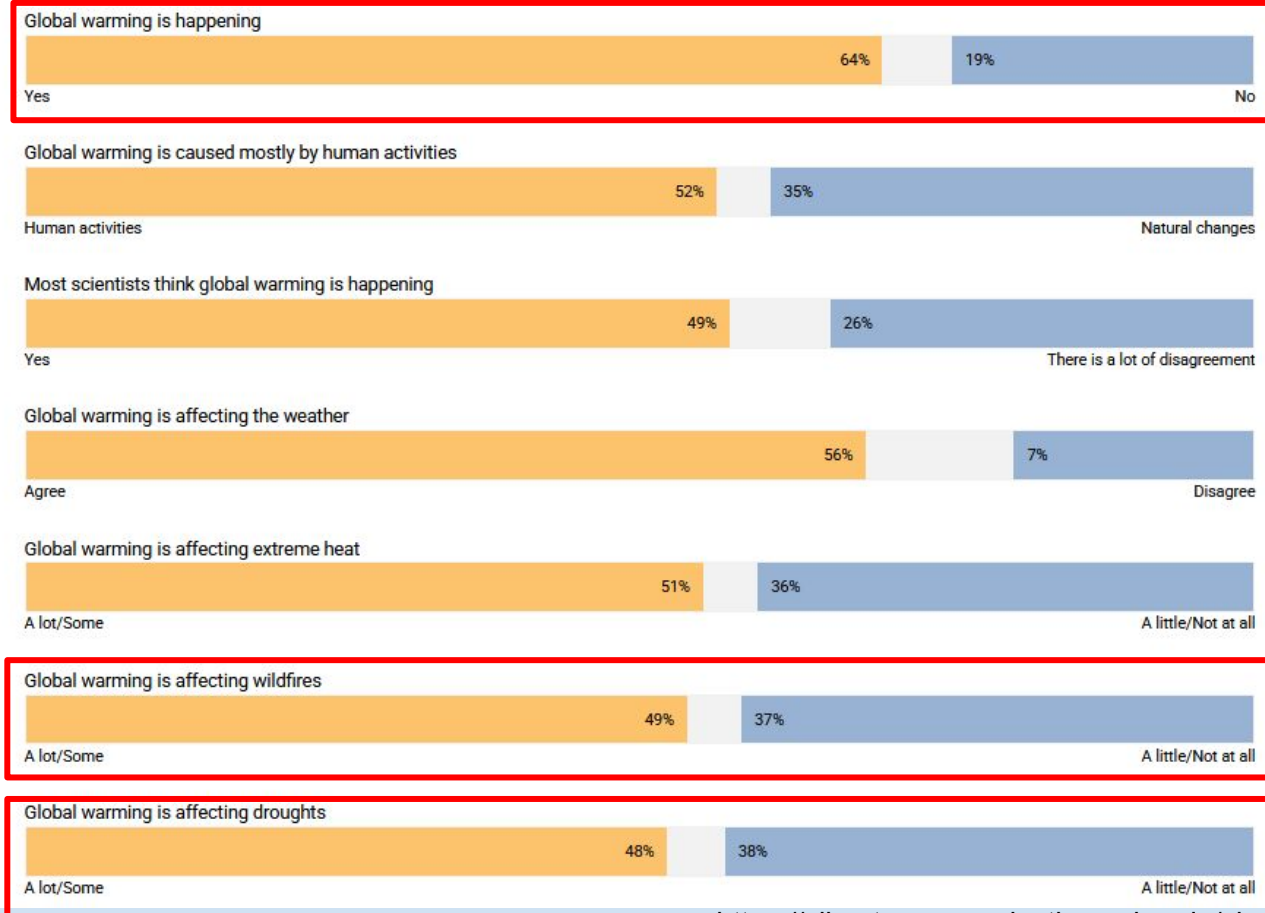
## South Dakota

- Percent of adults who are somewhat or very worried about global warming
  - US average: 63%
  - **South Dakota: 54%**



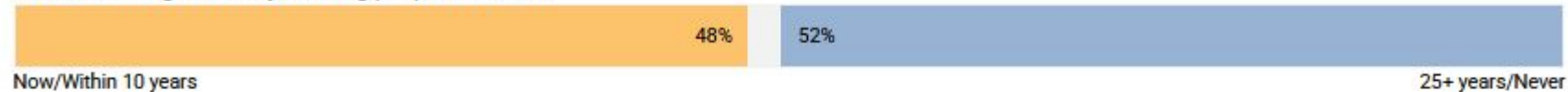
# Public Opinion Estimates, South Dakota, 2024

## BELIEFS



## Risk perceptions, South Dakota

Global warming is already harming people in the U.S.



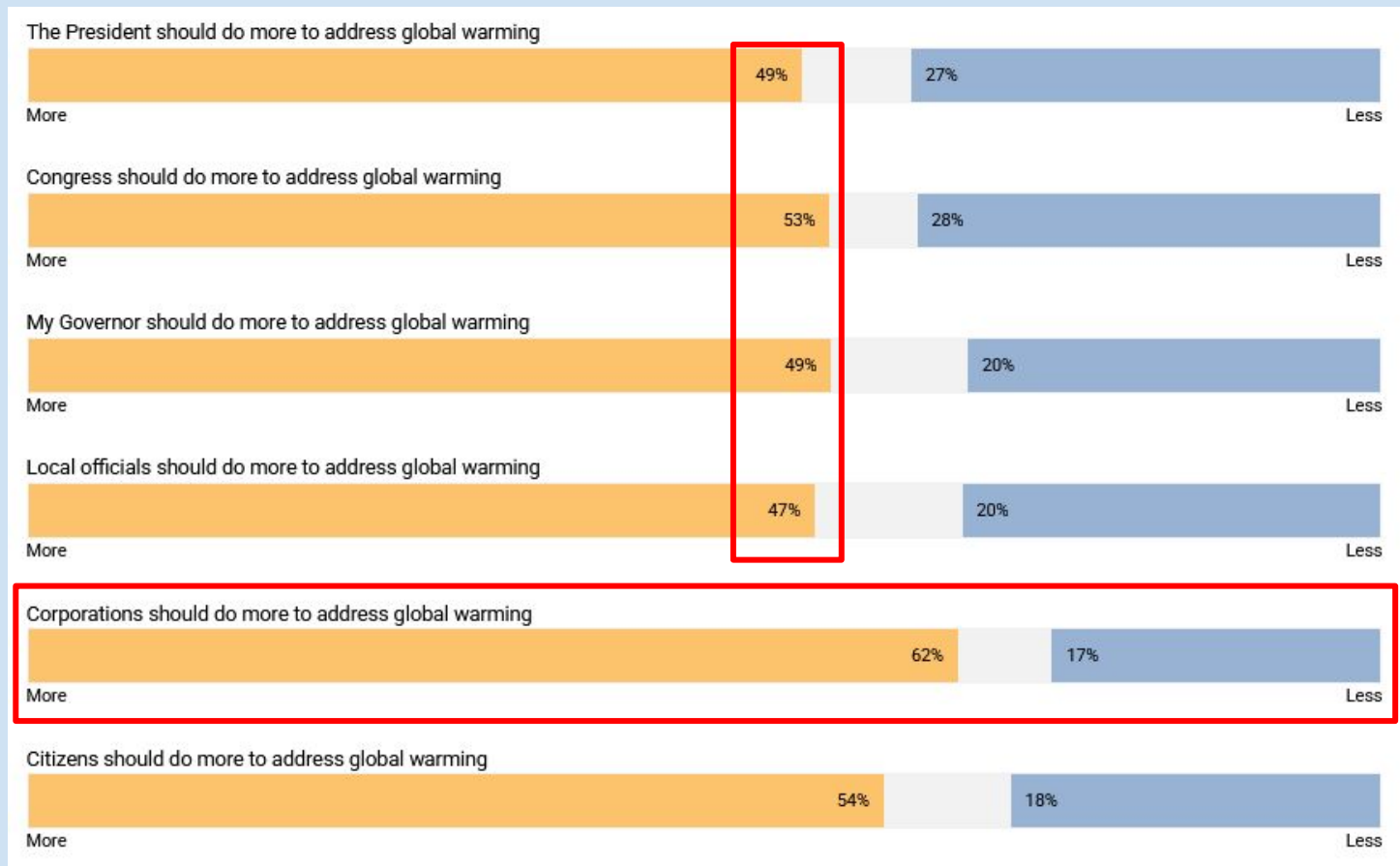
Global warming will harm plants and animals



Global warming will harm future generations



# Who should act? South Dakota



## Behaviors, South Dakota

Discuss global warming at least occasionally



Hear about global warming in the media at least once a week



## Behaviors, US Average

Discuss global warming at least occasionally

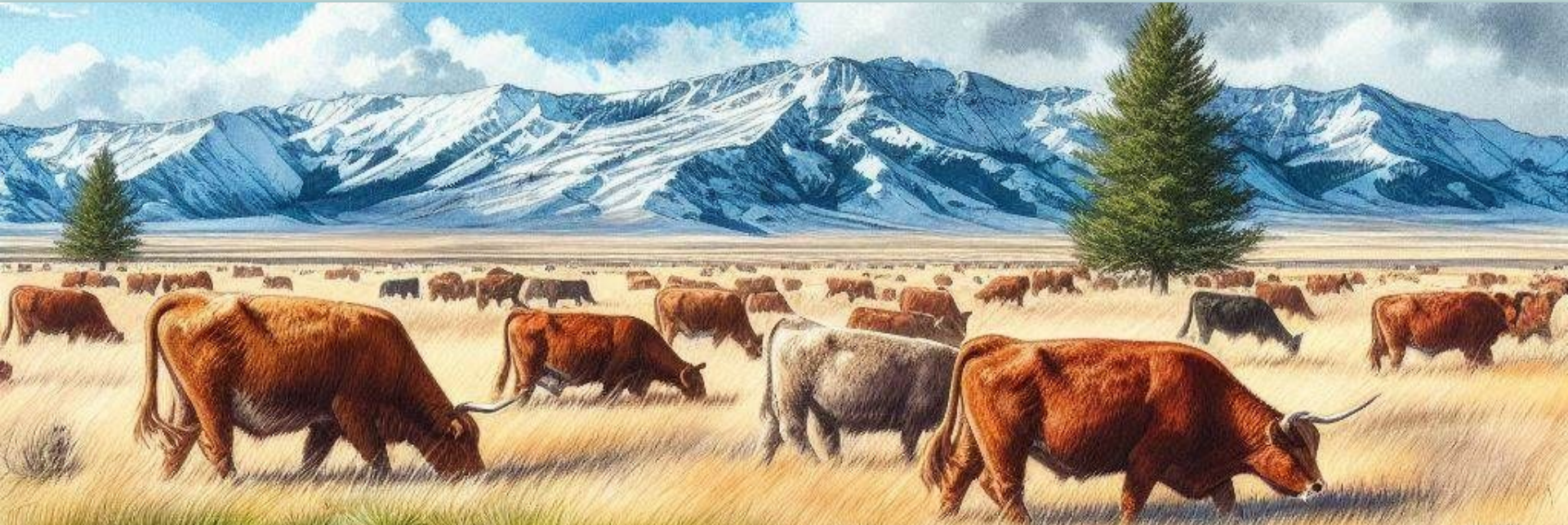


Hear about global warming in the media at least once a week



# TOOLS FOR PREDICTING & ADAPTING

1. Temperature & Precipitation Trends
2. Hail & Fire Trends
3. GrassCast
4. Historical & Future Climate Tracker





## CLIMATE QUICK REFERENCE GUIDE

## | South Dakota

### Projected Changes 2042-2070

- Temperatures, precipitation (especially in winter and spring), and large storms are projected to rise. Increased winter and spring precipitation can impact South Dakota's agricultural economy both positively (increased soil moisture) and negatively (loss of soil nutrients, planting delays, and yield losses).
- Increases in evaporation rates due to rising temperatures may increase the rate of soil moisture loss and the intensity of naturally occurring droughts.

### State Max Precipitation (Inches)

Season	Current	2040-2070	Change
Spring	6.8	7.9	+1.19
Summer	8.6	7.9	-0.63
Fall	4.5	5	+0.5
Winter	1.5	1.8	+0.34
Annual	21.2	22.6	+1.4

### State Top Causes of Crop Loss

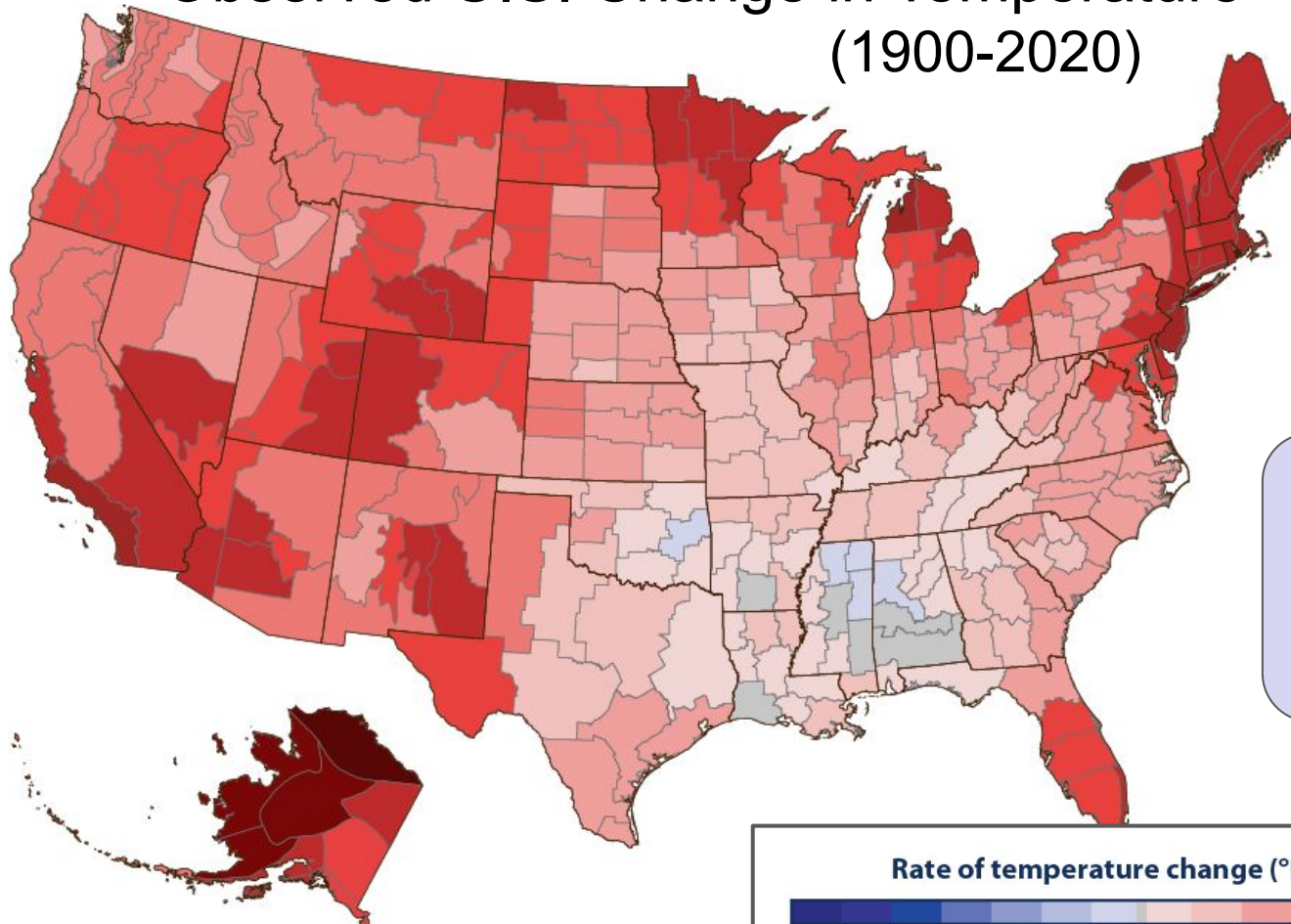
Cause of Loss	Indemnity(\$)	Acres
Excess Moisture	44,948,042	267,205
Drought	43,298,530	466,623
Hail	7,880,809	78,639
Decline in Price	4,588,793	71,438
Cold Wet Weather	2,991,151	22,295

Source: RMA crop loss data by state 1989-2020.

[swclimatehub.info/rma/rma-data-viewer.html](http://swclimatehub.info/rma/rma-data-viewer.html)

[webapps.jornada.nmsu.edu/climate-quick-guides/](http://webapps.jornada.nmsu.edu/climate-quick-guides/)

# Observed U.S. Change in Temperature (1900-2020)



Changes  
are not  
uniform!

Rate of temperature change (°F per century):

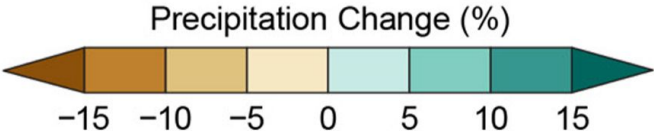


Source: EPA,

[19january2021snapshot.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature\\_](https://www.epa.gov/climate-indicators/climate-change-indicators-us-and-global-temperature_).html

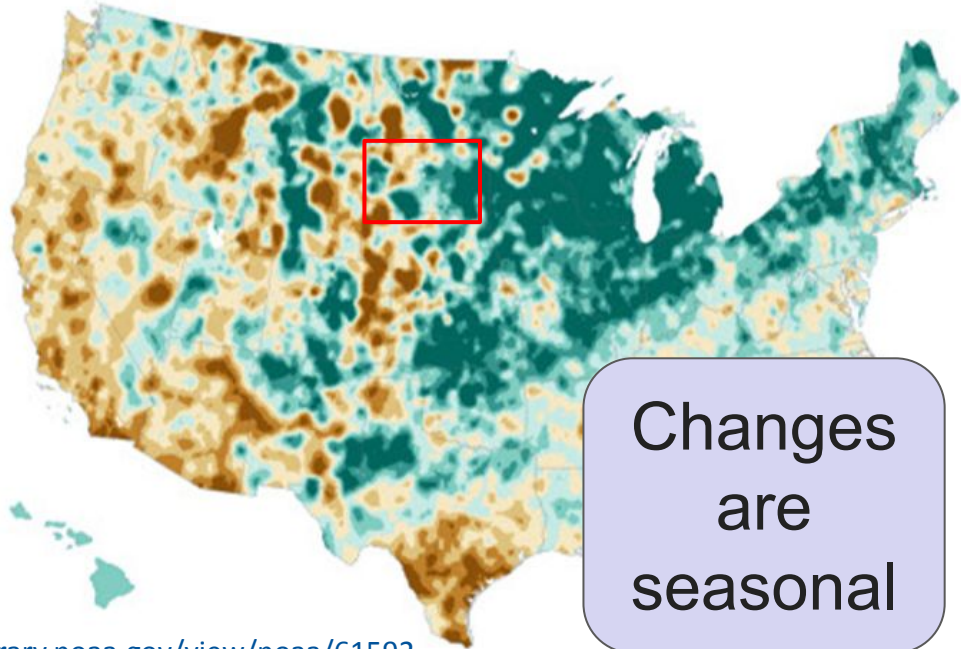
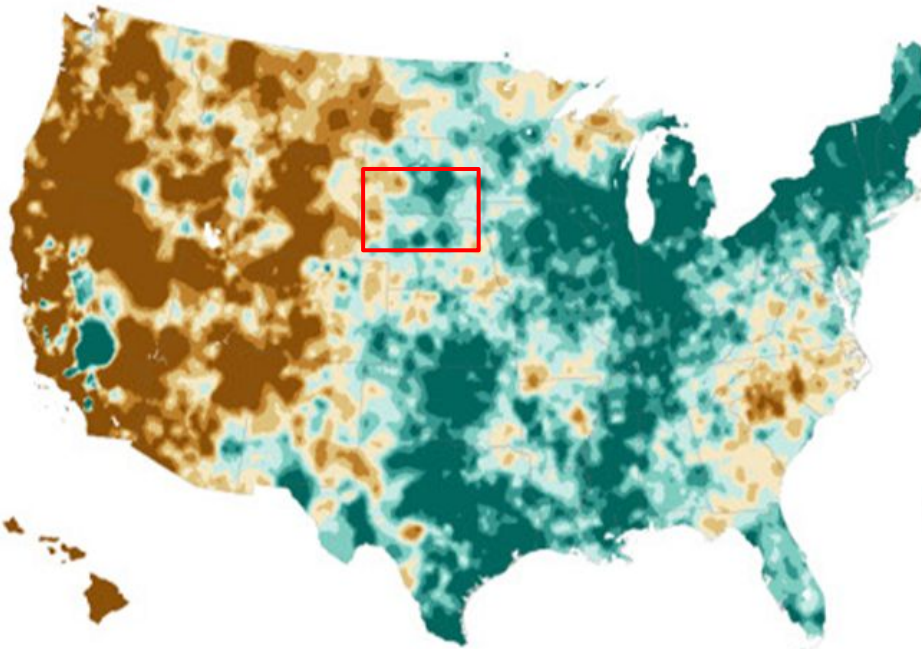
# Observed U.S. Change in Precipitation

(2002-2021 compared to 1901-1960)



## Summer Precipitation

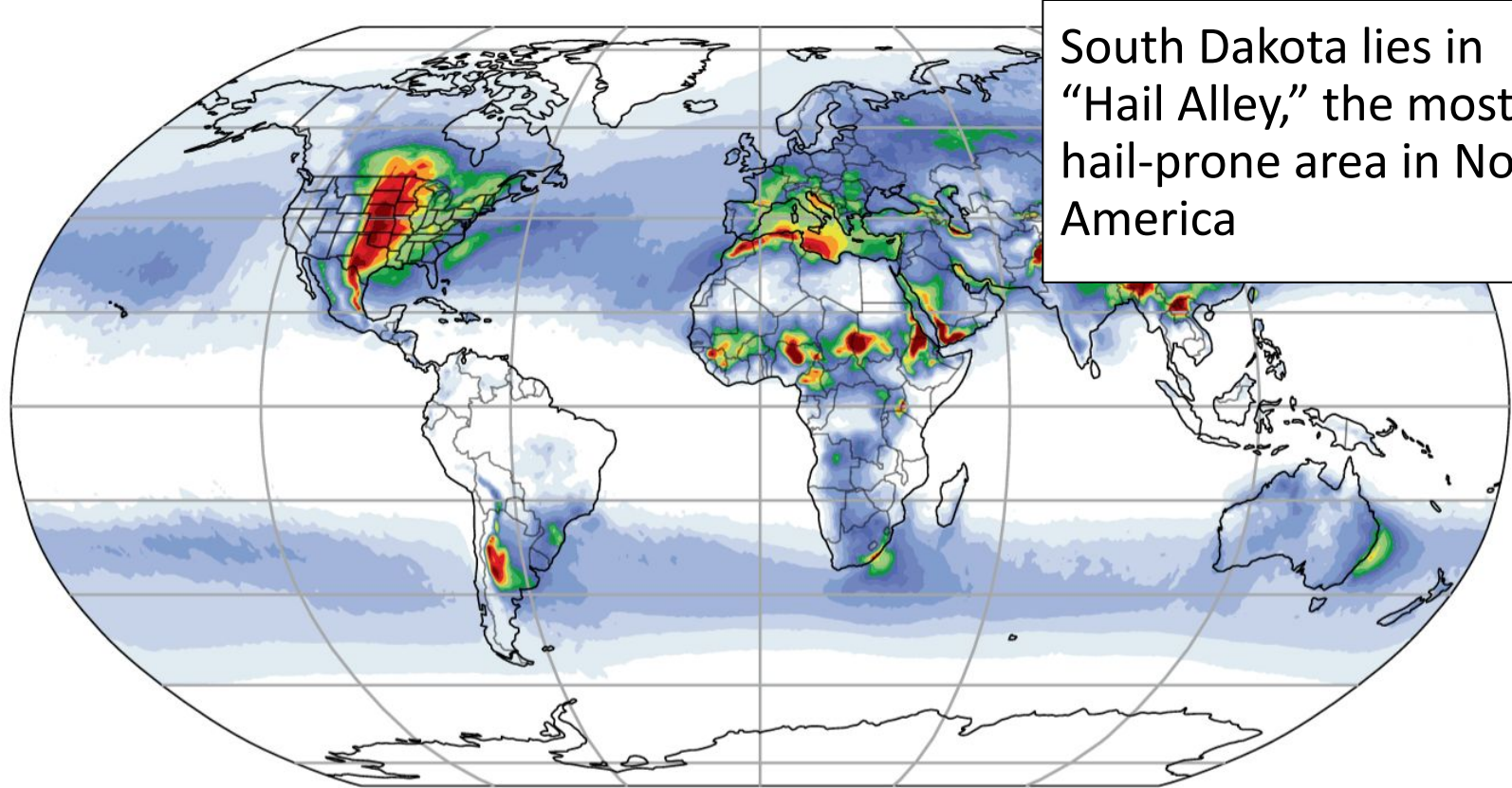
## Winter Precipitation



Changes are seasonal

Source: Fifth National Climate Assessment 2023, <https://repository.library.noaa.gov/view/noaa/61592>





South Dakota lies in "Hail Alley," the most hail-prone area in North America

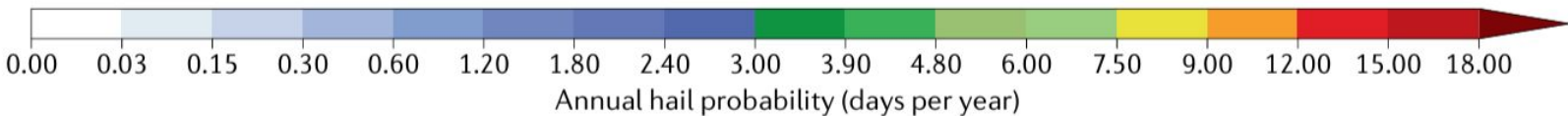
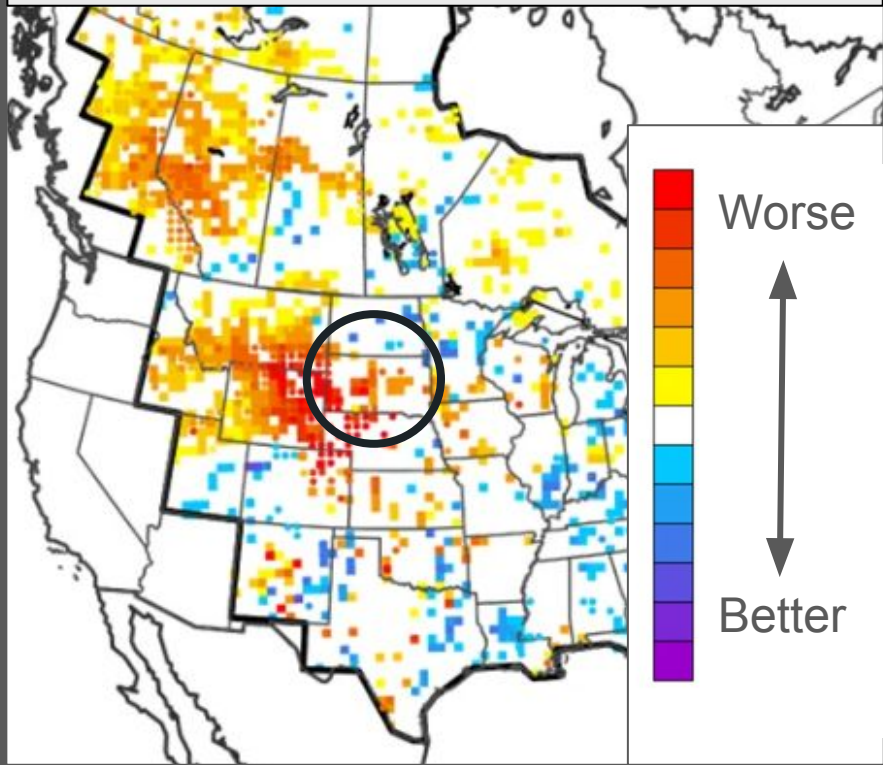


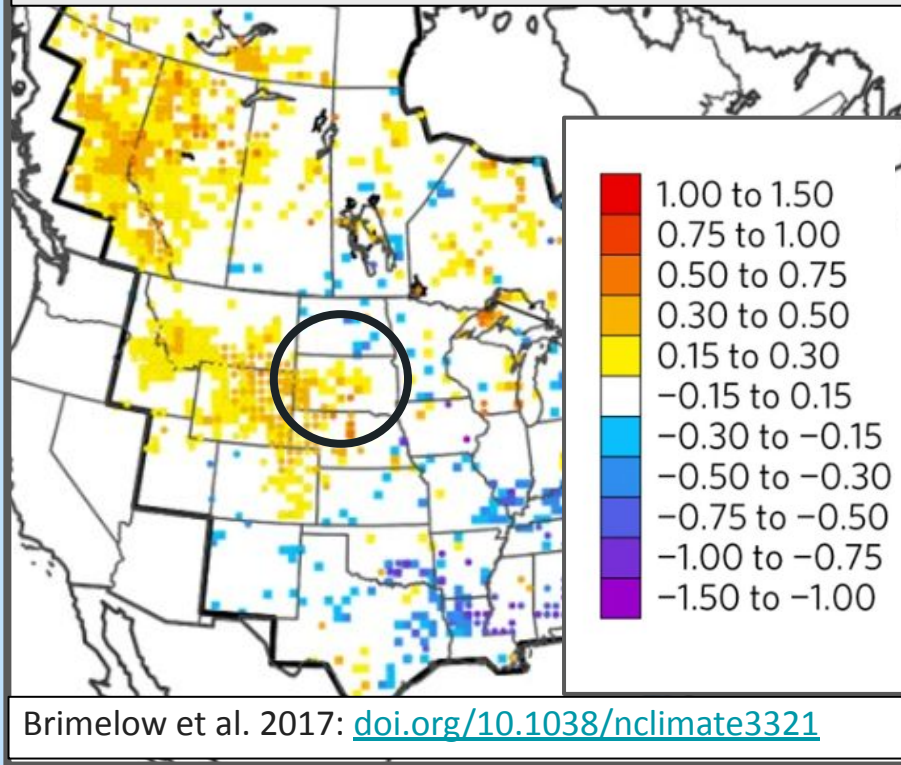
Fig. 2 | **Global hail probability.** The global estimated average annual probability of hail with a diameter >2.5 cm, normalized to areas of 100 km × 100 km, for 1979–2015. Hail is generally a rare event at any given location. Adapted from REF.<sup>85</sup>, CC BY 4.0.

# Change in summer hail over 70 years (~1990 → 2060)

Hail Damage Potential (size+frequency)



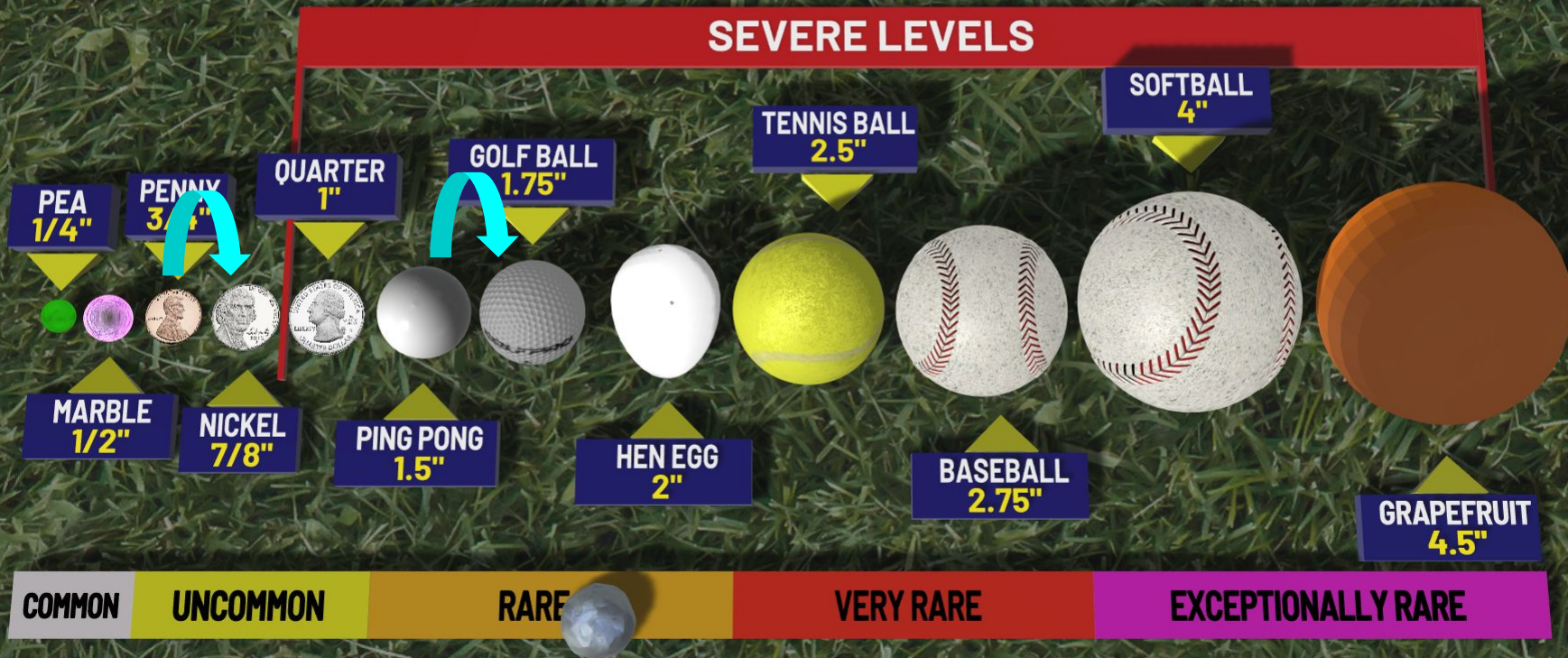
Hail Size (cm)



Brimelow et al. 2017: [doi.org/10.1038/nclimate3321](https://doi.org/10.1038/nclimate3321)

# HAIL SIZES

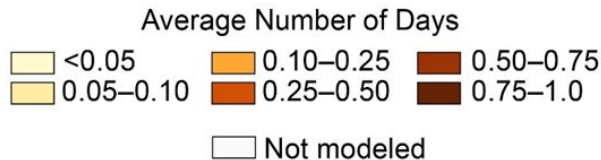
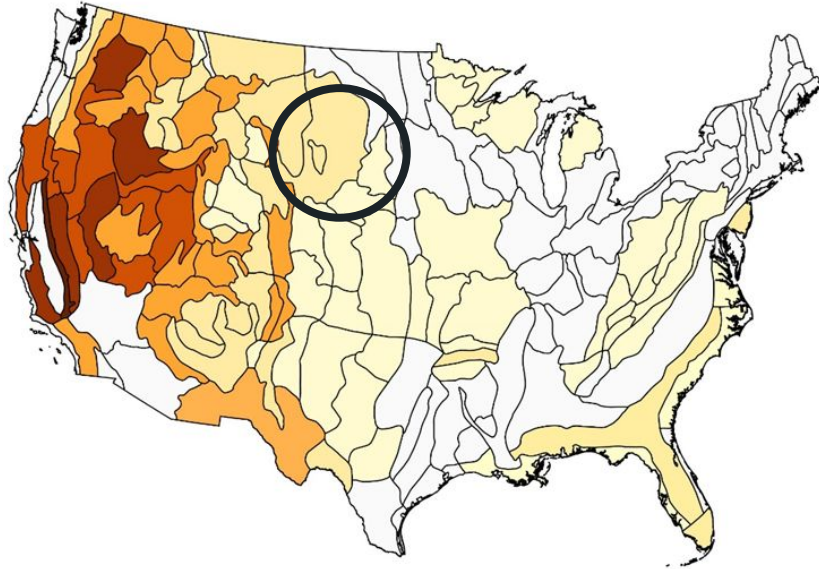
## SEVERE LEVELS



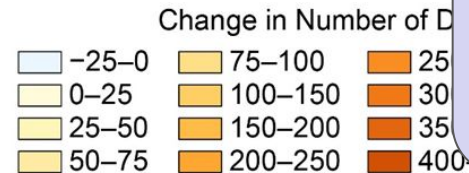
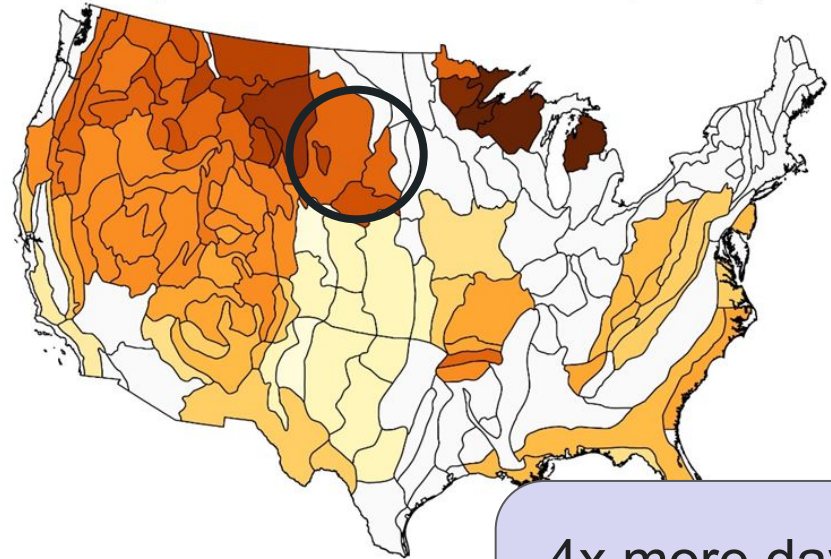
# Predicted Changes in Wildfire Conditions

May-Oct extreme weather conditions associated with very large fires

Historical (1971–2000)



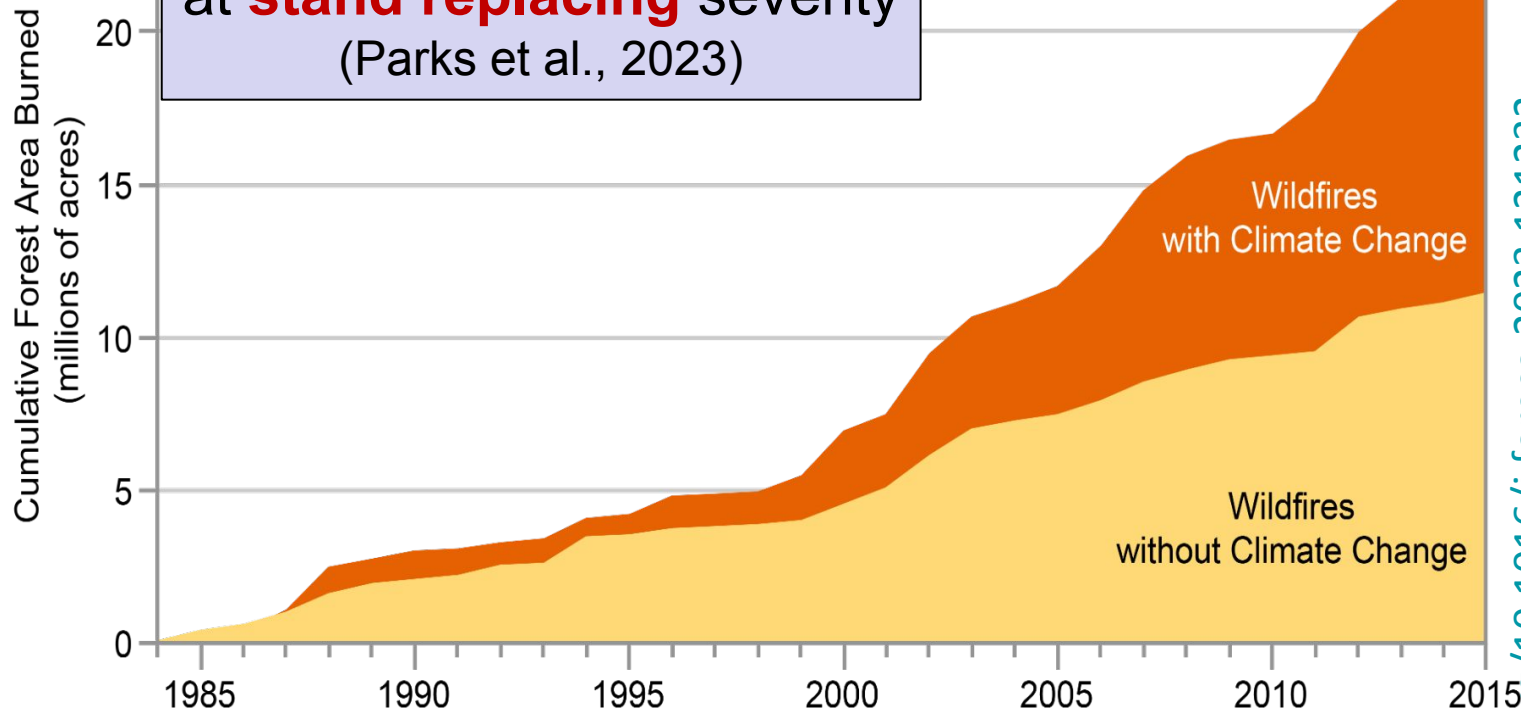
Projected change  
(2040–2069 relative to 1971–2000; RCP8.5)



4x more days  
conductive to  
large fires

# How much more area burned by climate change?

3 – 6 x more area burned at **stand replacing** severity (Parks et al., 2023)



**Area burned** by wildfire across the western U.S. is **twice** what would have burned if climate change had not occurred (Abatzoglou and Williams, 2016)

[doi.org/10.1016/j.foreco.2023.121232](https://doi.org/10.1016/j.foreco.2023.121232)

[doi.org/10.1073/pnas.1607171113](https://doi.org/10.1073/pnas.1607171113)

[nca2018.globalchange.gov/chapter/25](https://nca2018.globalchange.gov/chapter/25)

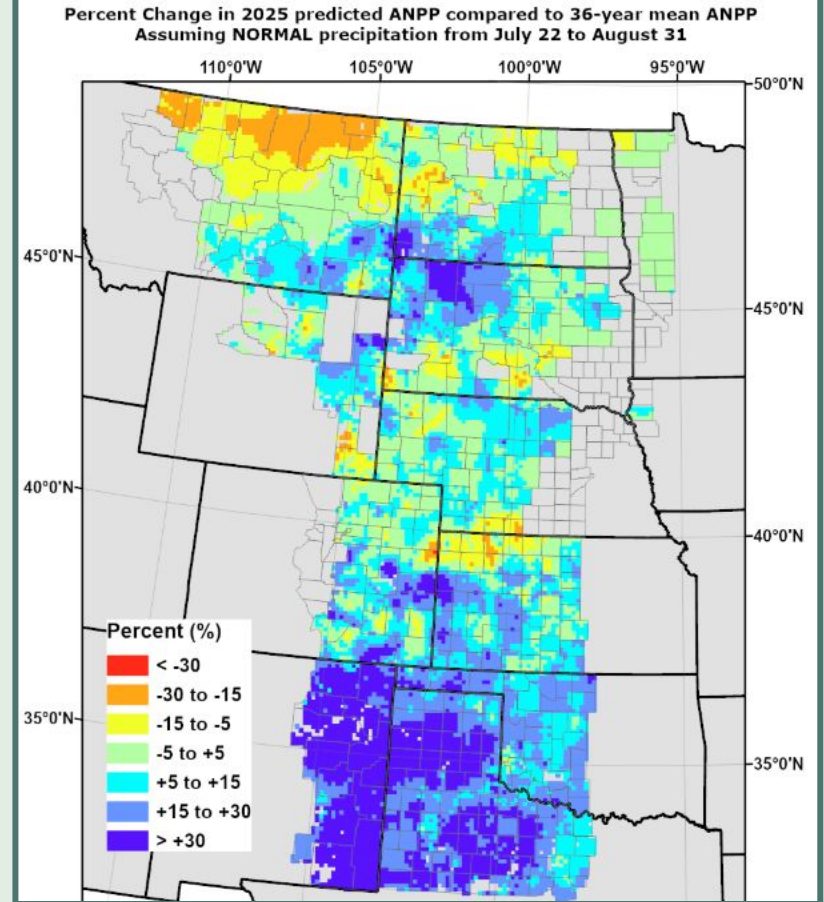
# Grass-Cast: The Grassland Productivity Forecast

National Drought Mitigation Center, NRCS, USDA

- Predicts percent change in total production (lbs/acre) compared to historical average (1989-2024)
- Not available in areas with <36 years of data

**\*new maps released  
April - August**

[grasscast.unl.edu](http://grasscast.unl.edu)

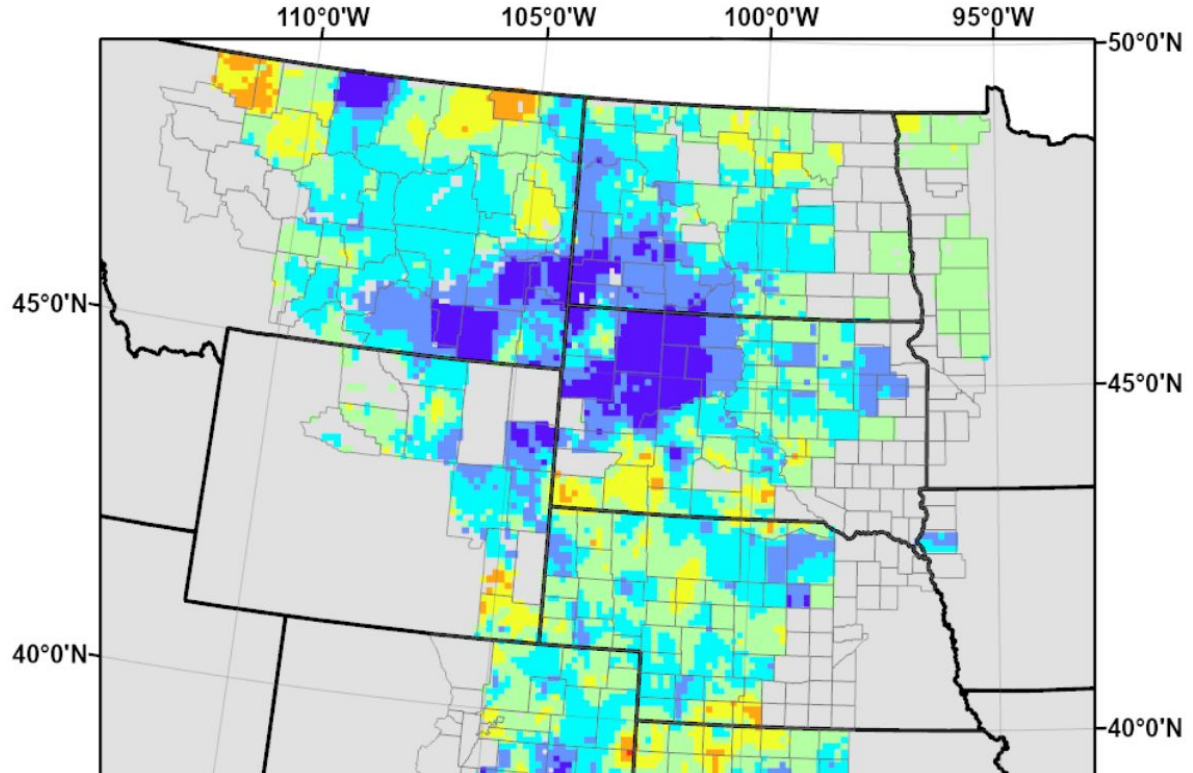


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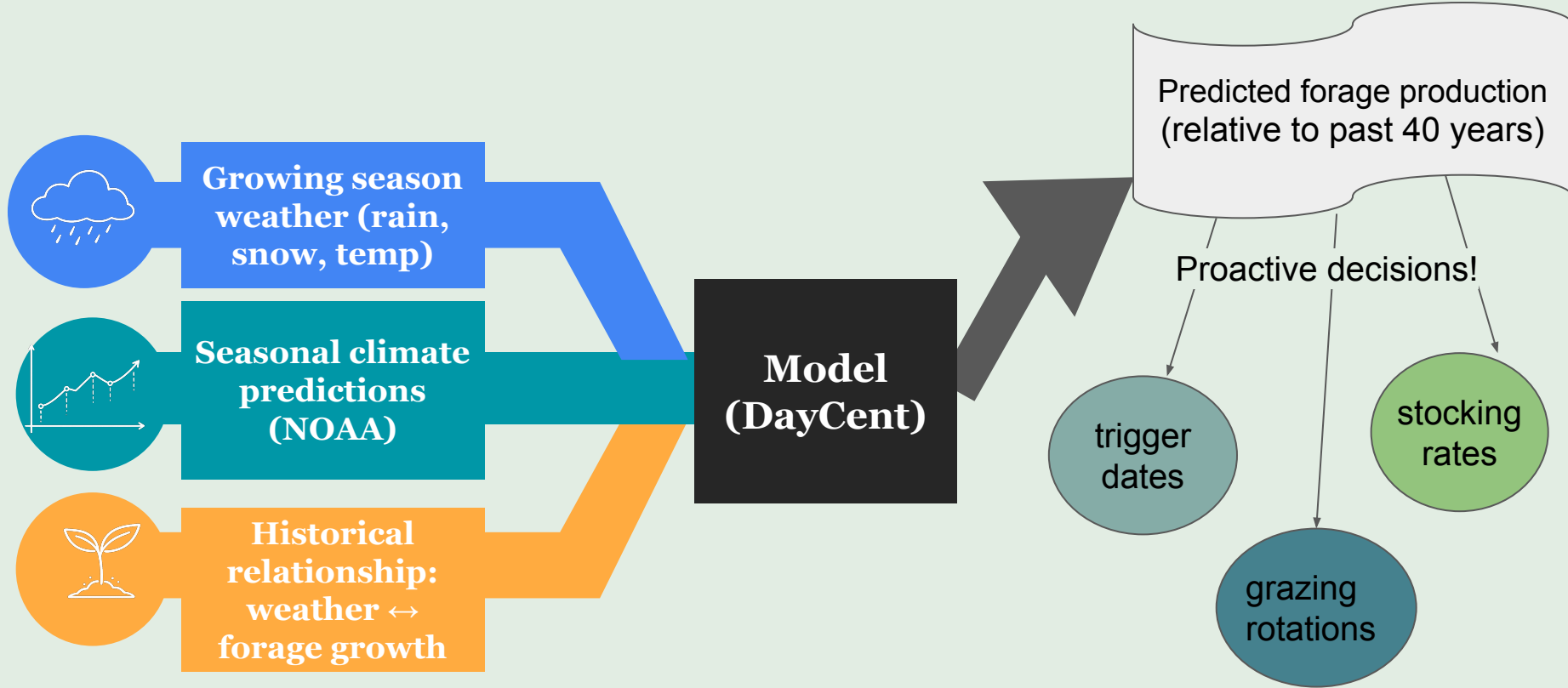


Percent Change in 2025 predicted ANPP compared to 36-year mean ANPP  
Final 2025 forecast



# Grass-Cast: The Grassland Productivity Forecast

National Drought Mitigation Center, NRCS, USDA



# **Grass-Cast:** The Grassland Productivity Forecast

National Drought Mitigation Center, NRCS, USDA

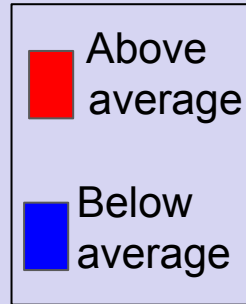
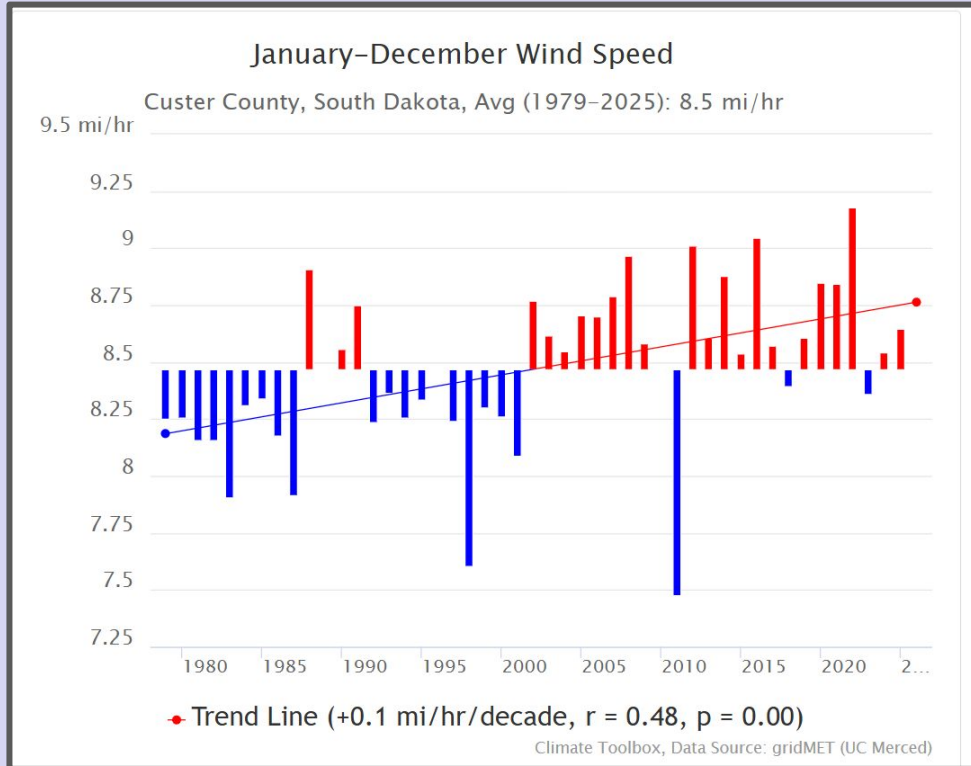
## Things to keep in mind

- Model predicts vegetation production for each 6x6 mile grid cell (NOT just grass)
- Most accurate in cells dominated by grasses
  - Forested ecosystems not as applicable
- Predictions improve over the course of the growing season
  - Updates every 2 weeks
- Should be used in combination with other decision making processes (not a standalone tool)

# Historical Climate Tracker

Western Water Assessment, NOAA, UC Boulder

## Have the Black Hills (Custer County) been getting windier?

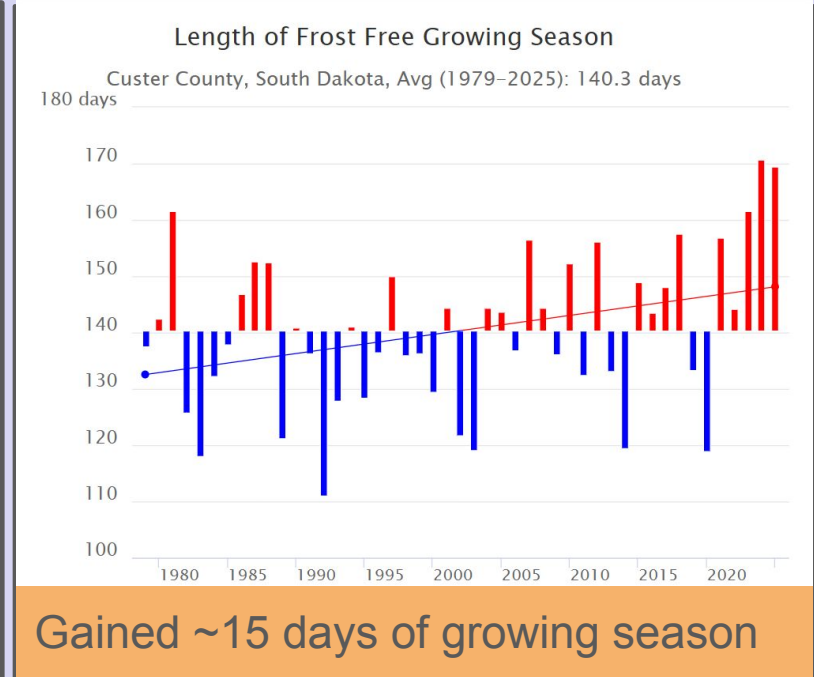
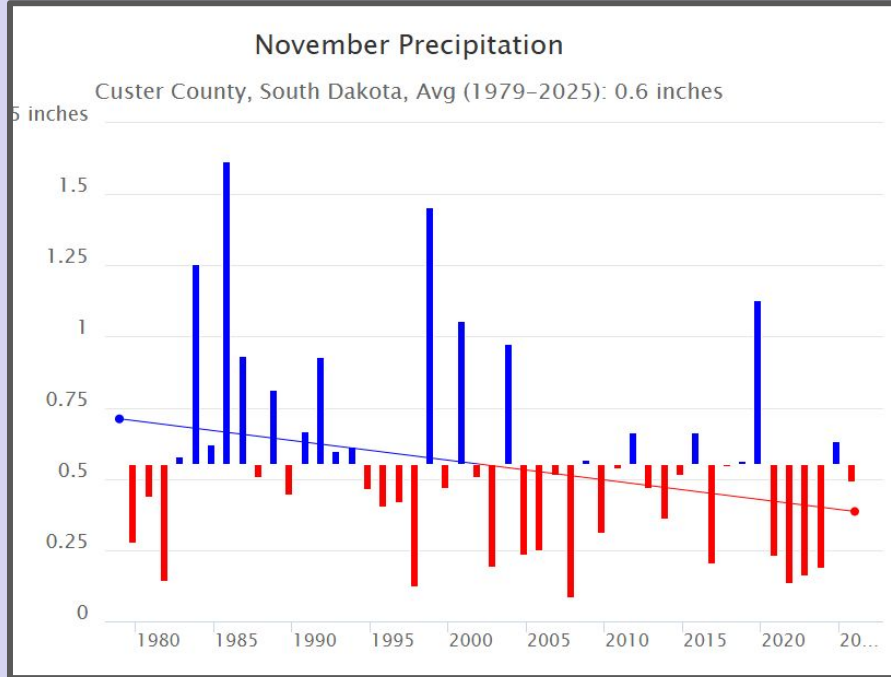


[climatetoolbox.org/tool/  
Historical-Climate-Tracker](https://climatetoolbox.org/tool/Historical-Climate-Tracker)

# Historical Climate Tracker

Western Water Assessment, NOAA, UC Boulder

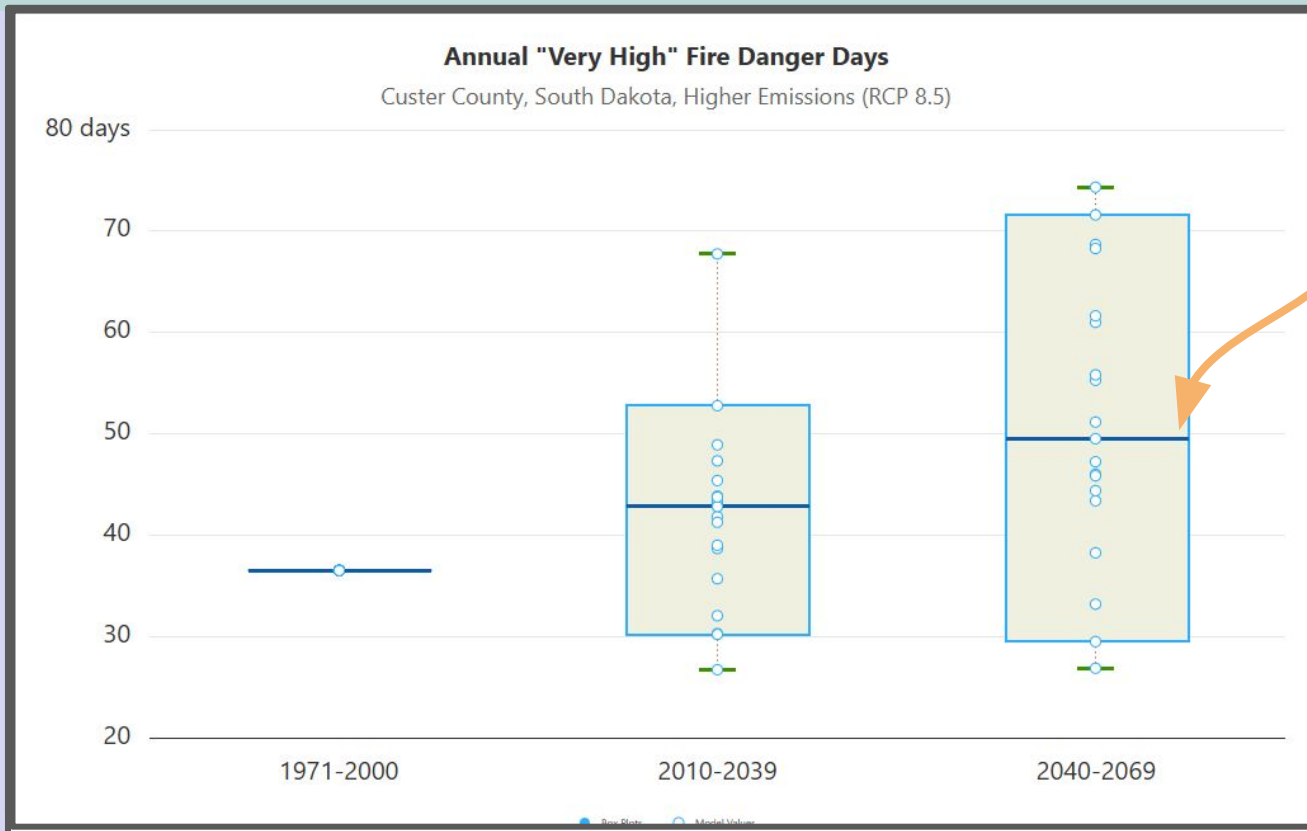
## Has rainfall been changing in Custer County?



# Future Boxplots

Western Water Assessment, NOAA, UC Boulder

## What will the future look like?



Different  
climate  
models: ○ ○ ○ ○

~8 more  
High Fire  
Danger days

[climatetoolbox.org/  
tool/future-boxplots](http://climatetoolbox.org/tool/future-boxplots)

# Climate Tracker Activity: looking back

## What climate trend have you noticed in your area? In what season?

- Min, Max or Mean Temperature
- Humidity
- Wind
- Potential evapotranspiration
- Date of last spring / first fall freeze
- Drought severity

1. Go to [climatetoolbox.org/tool/historical-climate-tracker](https://climatetoolbox.org/tool/historical-climate-tracker) (click “go to tool”)
2. Set your location and season on the left (for yearly, choose Jan - Dec)
3. Choose variable
4. Click “add best-fit line”

## What did you find?

Choose Location ▾

US County Area ▾

CHOOSE LOCATION

Choose Data ▾

Calendar Time Period:

Start Month: January ▾

End Month: December ▾

Variable:

Max. Temperature ▾

Units: °F ▾

Change Graph ▾

Plot Type:

Bar Chart about Average ▾

Add Best-Fit Line

Download ▾

# Climate Tracker Activity: Looking forwards

Climate Toolbox APPLICATIONS ▾ TOOLS ▾ DATA ▾ VIDEOS C/

ation in the contiguous USA.

Variable Lookup  
Historical & Future Climate Mapper

1. Tools (at top) → Future Boxplots
2. Set your location and calendar time period
3. Choose variable

**What did you find?**

Choose Location ▾

US County Area ▾

CHOOSE LOCATION

Choose Data ▾

**Calendar Time Period:**  
Start Month: January ▾  
End Month: December ▾

**Variable:**  
Max. Temperature ▾

Units: °F ▾

Change Graph ▾

**Plot Type:**  
Bar Chart about Average ▾

Add Best-Fit Line

Download ▾

## Breakout Room Discussions

1. What ideas do you have for using these tools in your work?
2. If predicted trends (temperature, precipitation, hail, etc.) for your region occur, what ecosystem management actions would you need to take to adapt now (next the 1 - 5 years)?

Thank you!

**Questions or ideas? Please reach out!**

**Hannah Rodgers**, *Extension Specialist &  
Climate Hub Coordinator*

University of Wyoming  
[hrodger3@uwyo.edu](mailto:hrodger3@uwyo.edu)

**Callie Surber**, *Extension Educator*

University of Wyoming  
[csurber@uwyo.edu](mailto:csurber@uwyo.edu)



**Give us feedback  
and download our  
slides here:**

[https://uwyo.sjc1.qualtrics.com/jfe/form/SV\\_9tN70hvLBhI2Qke](https://uwyo.sjc1.qualtrics.com/jfe/form/SV_9tN70hvLBhI2Qke)



# Projected shifts in tree habitat suitability

**Forest Management Workshop: Managing Today's  
Forests for Tomorrow's Challenges**

**Katie Nigro, ORISE Postdoc**

**Rocky Mountain Research Station**

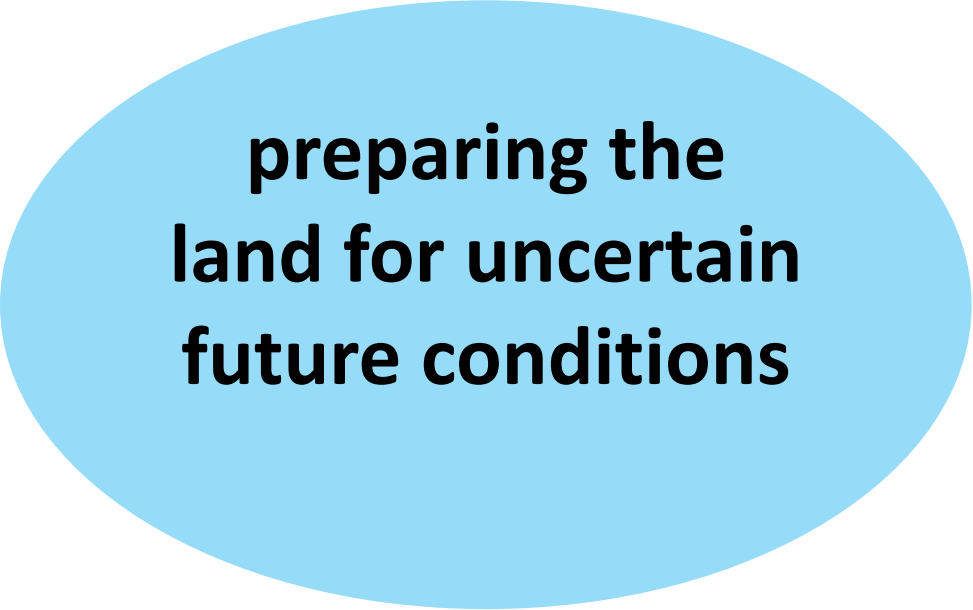
**Northern Plains Climate Hub**



# Management goals

A green oval containing text.

**restoring  
ecological  
function &  
structure**

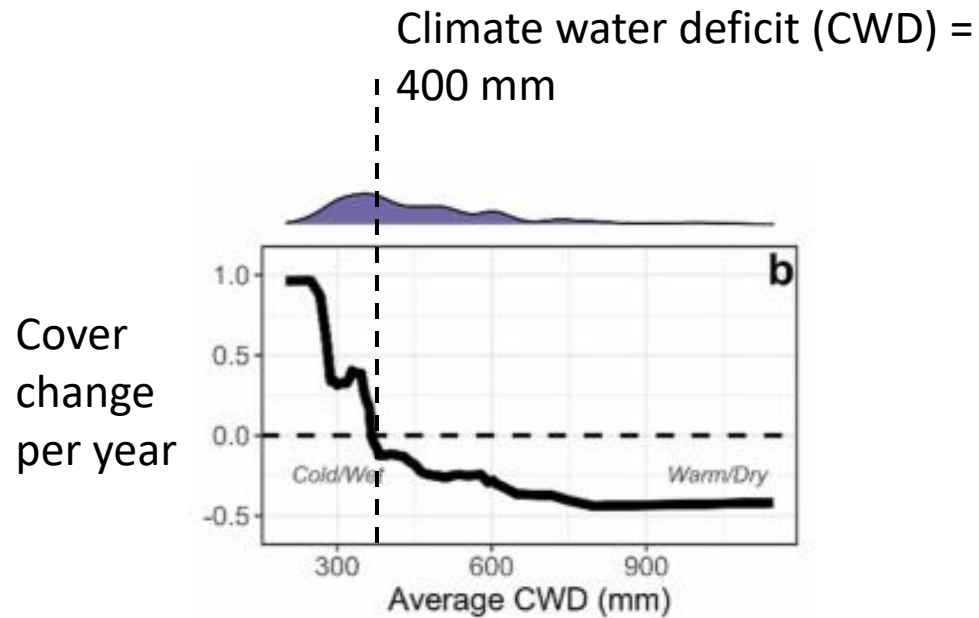
A blue oval containing text.

**preparing the  
land for uncertain  
future conditions**

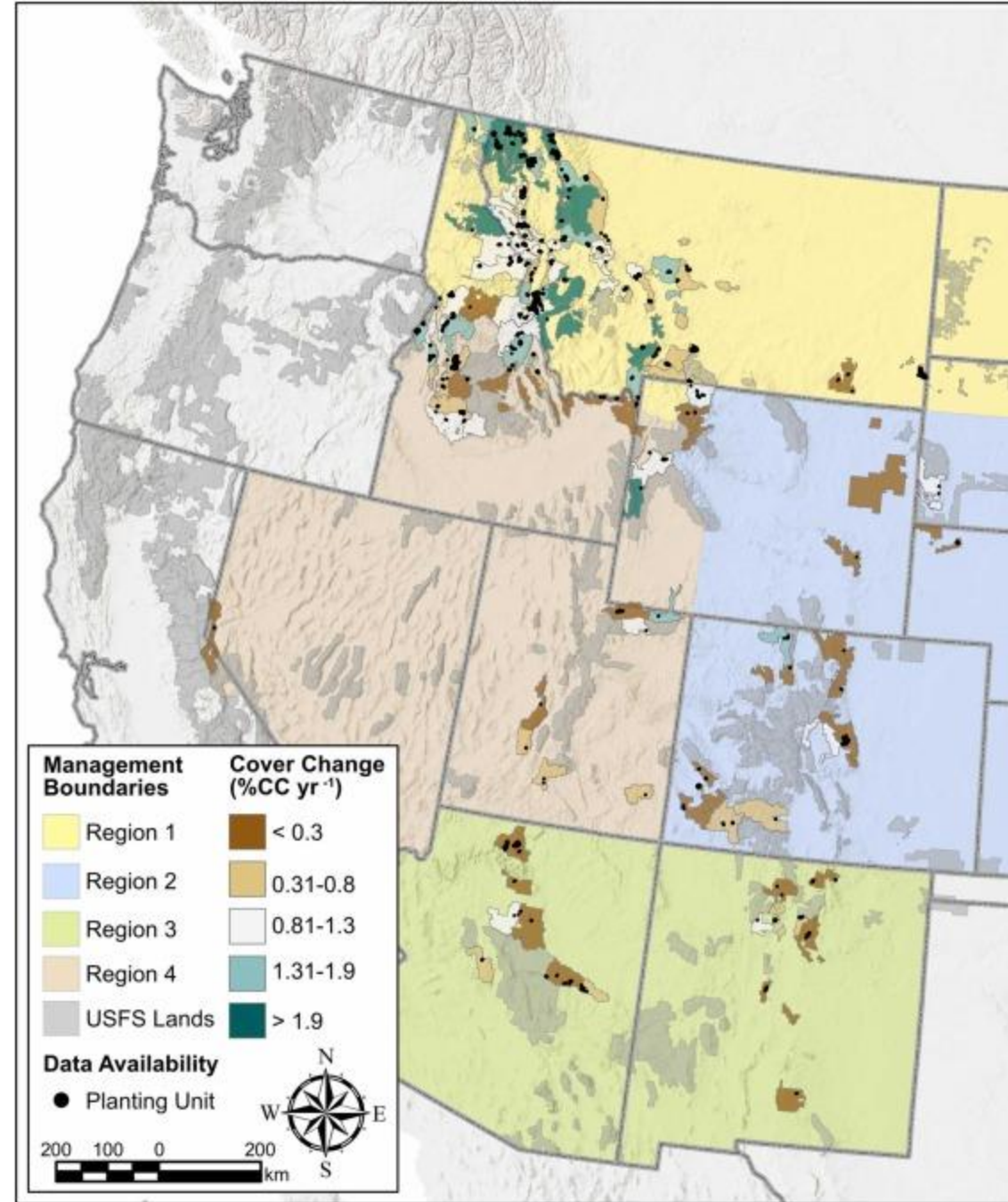
An aerial photograph of a vast, dense coniferous forest. The trees are packed closely together, creating a textured, green landscape. The lighting is soft, suggesting an overcast day or early morning/late afternoon. The colors range from deep forest green to lighter, yellowish-green, indicating different tree species or stages of growth. The overall impression is one of a healthy, undisturbed natural environment.

# Restoring ecological function & structure

# Seedlings grow best in cold/wet environments

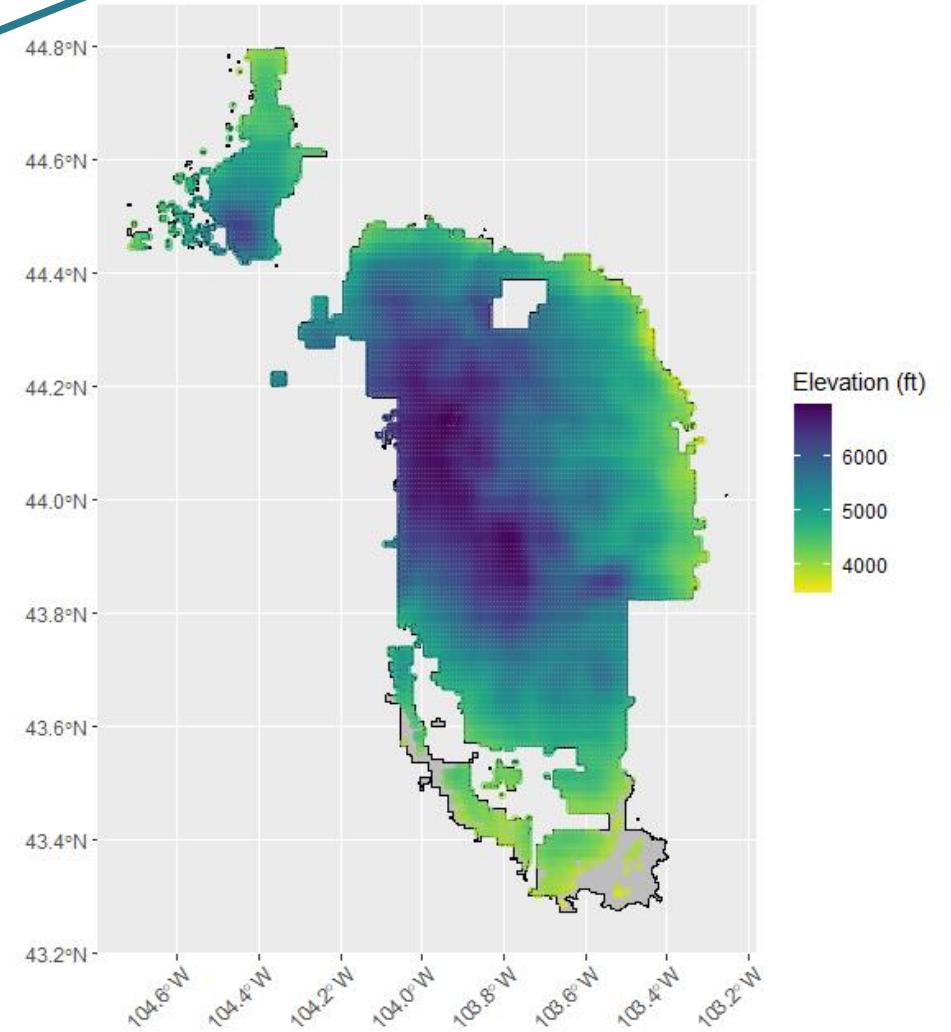
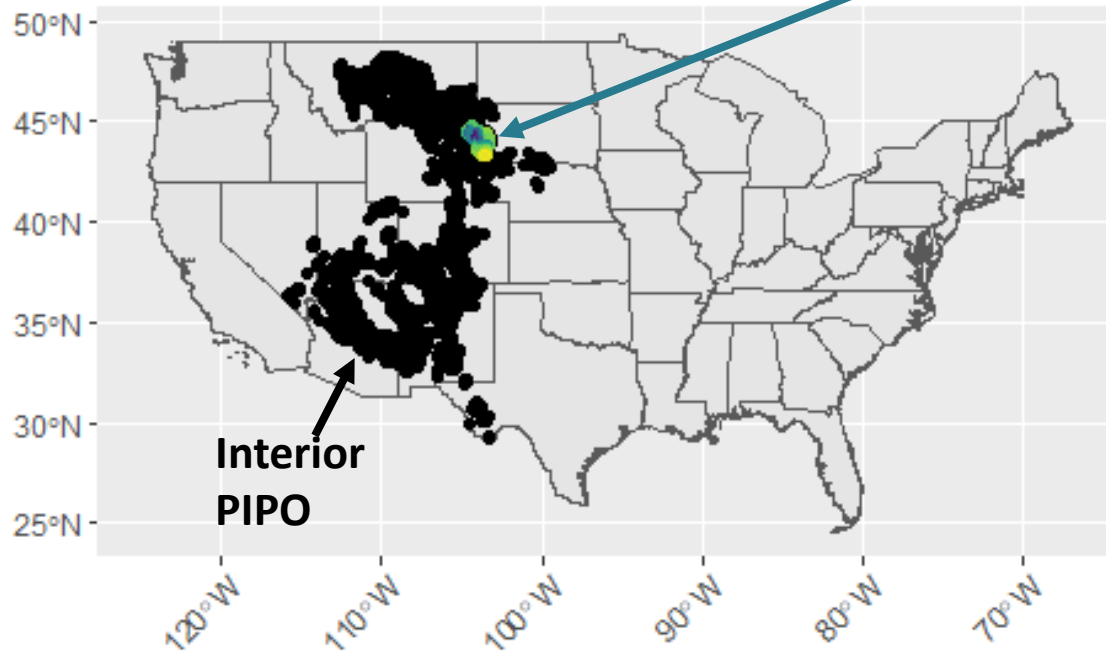


CWD = Amount of additional water plants and soil would evaporate, if it were available

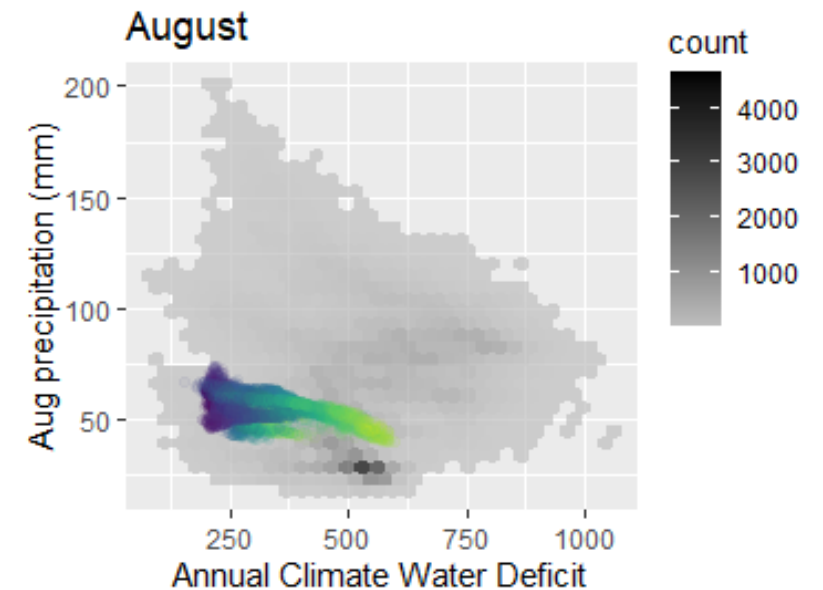
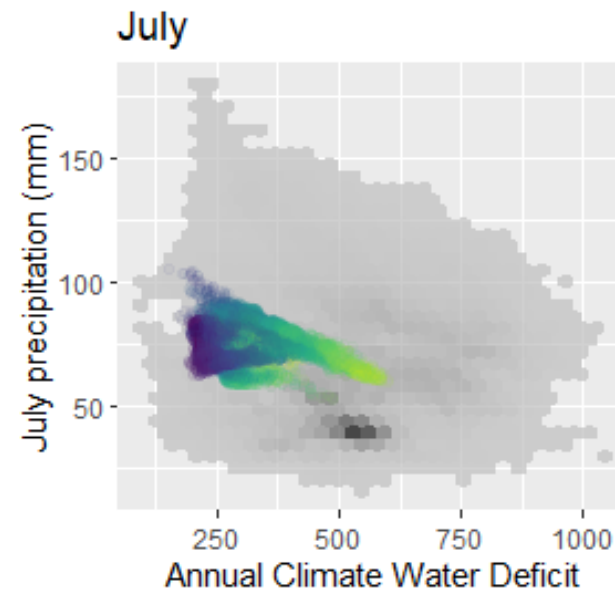
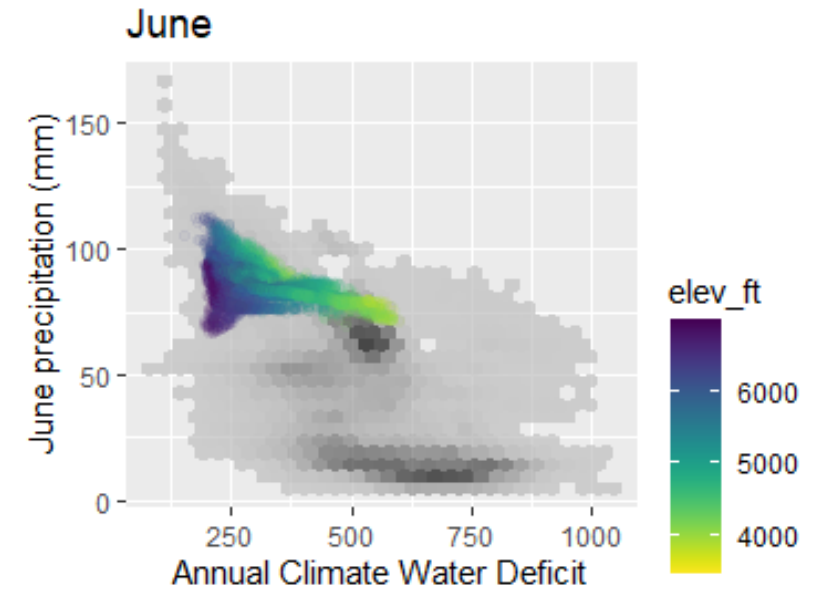
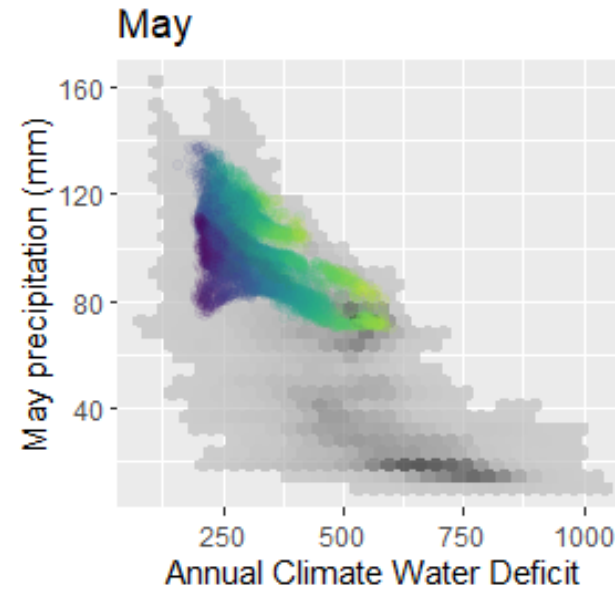
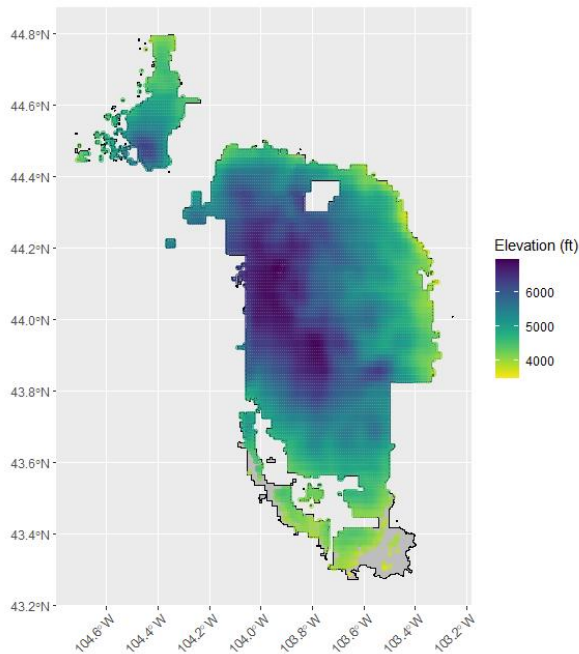


# Interior ponderosa pine

Black Hills

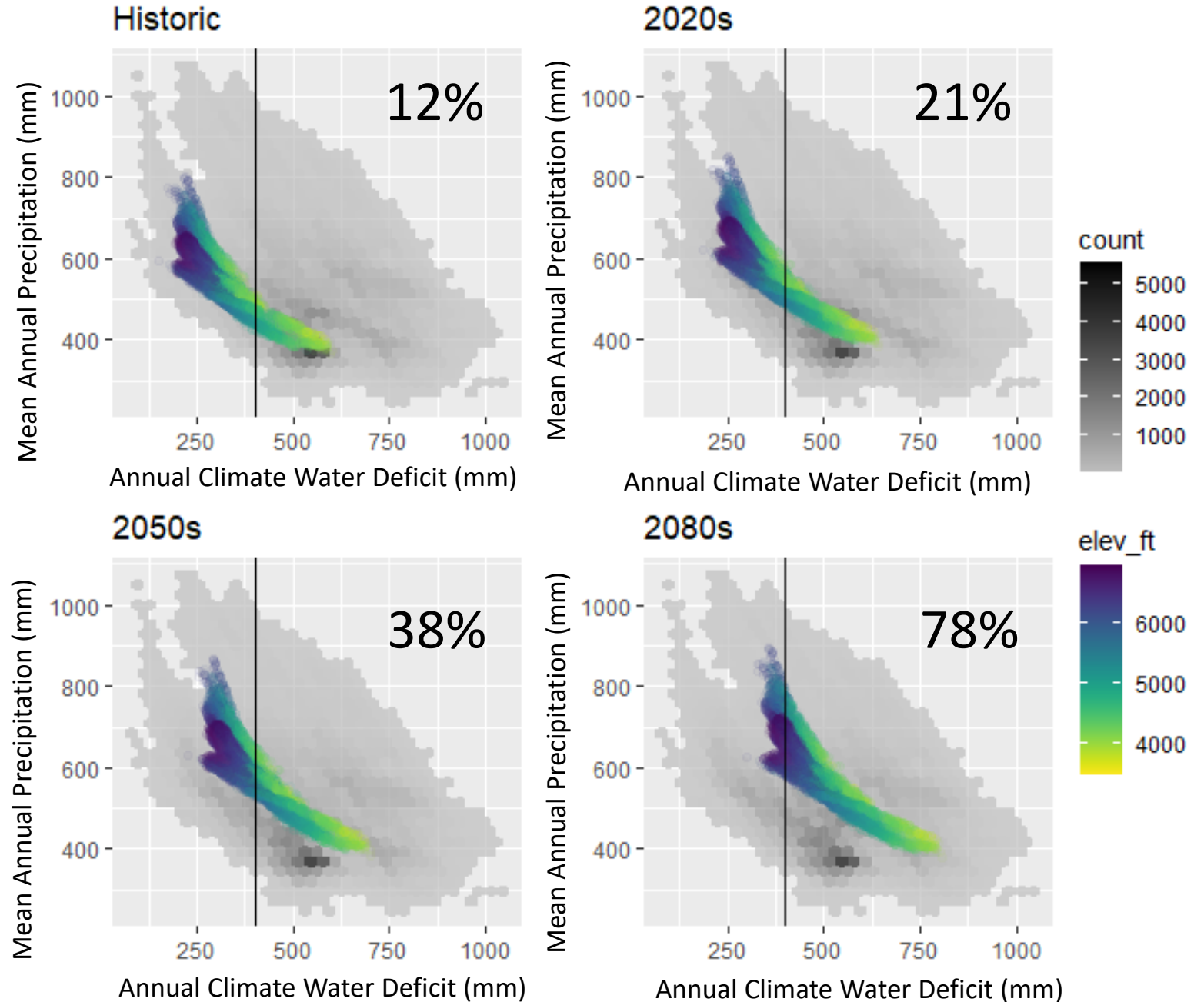


# Black Hills is relatively cool and wet for ponderosa pine



# Future Black Hills climate in ponderosa pine's range

- By the end of the century, the majority of ponderosa's current range in the Black Hills is expected to exceed the 400mm CWD threshold



**Preparing the land for  
uncertain future conditions**

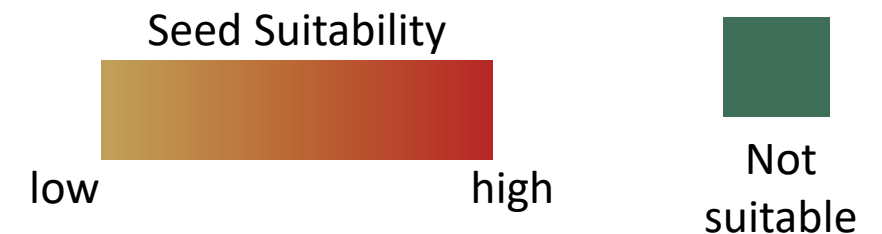
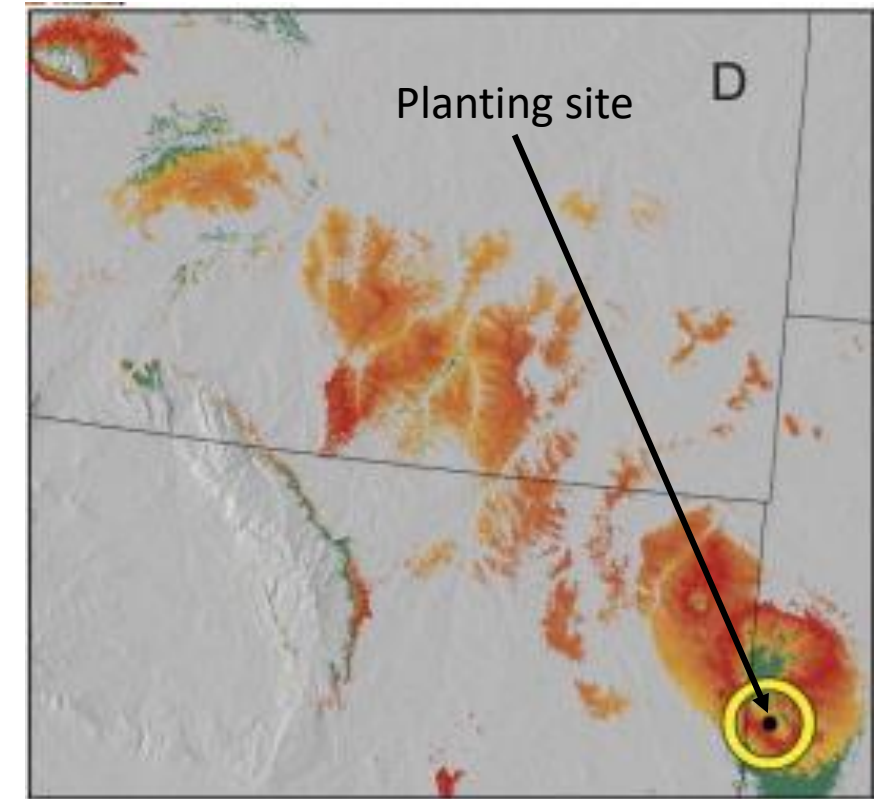


# Future population suitability

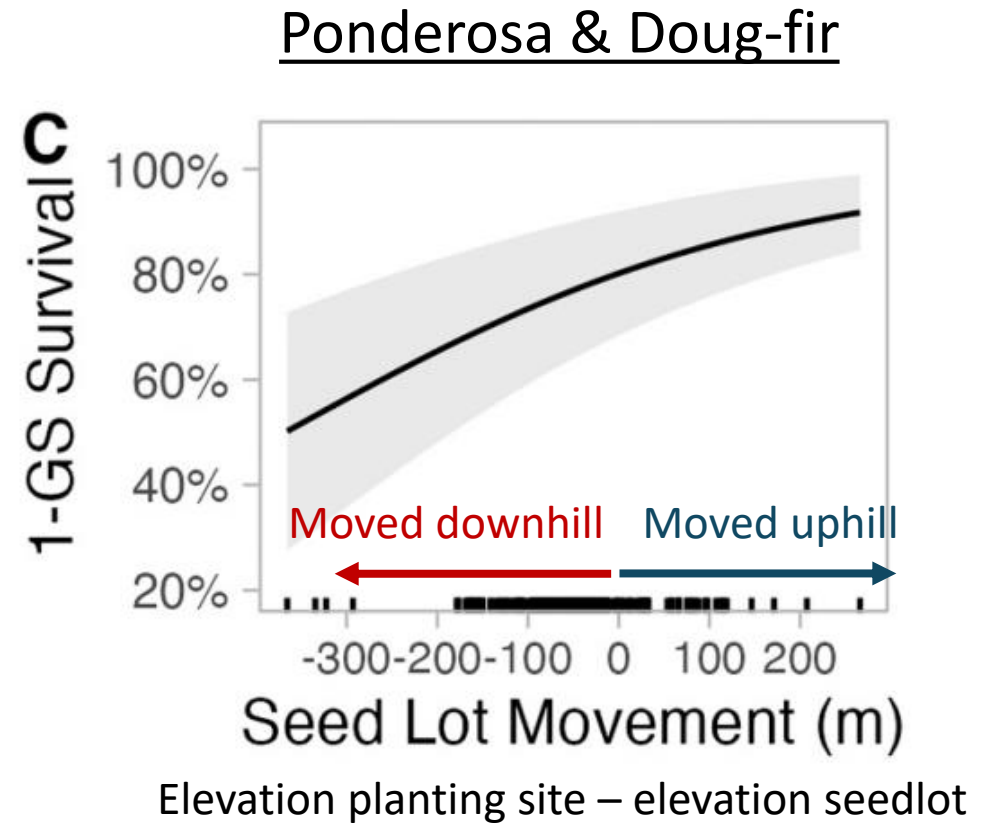
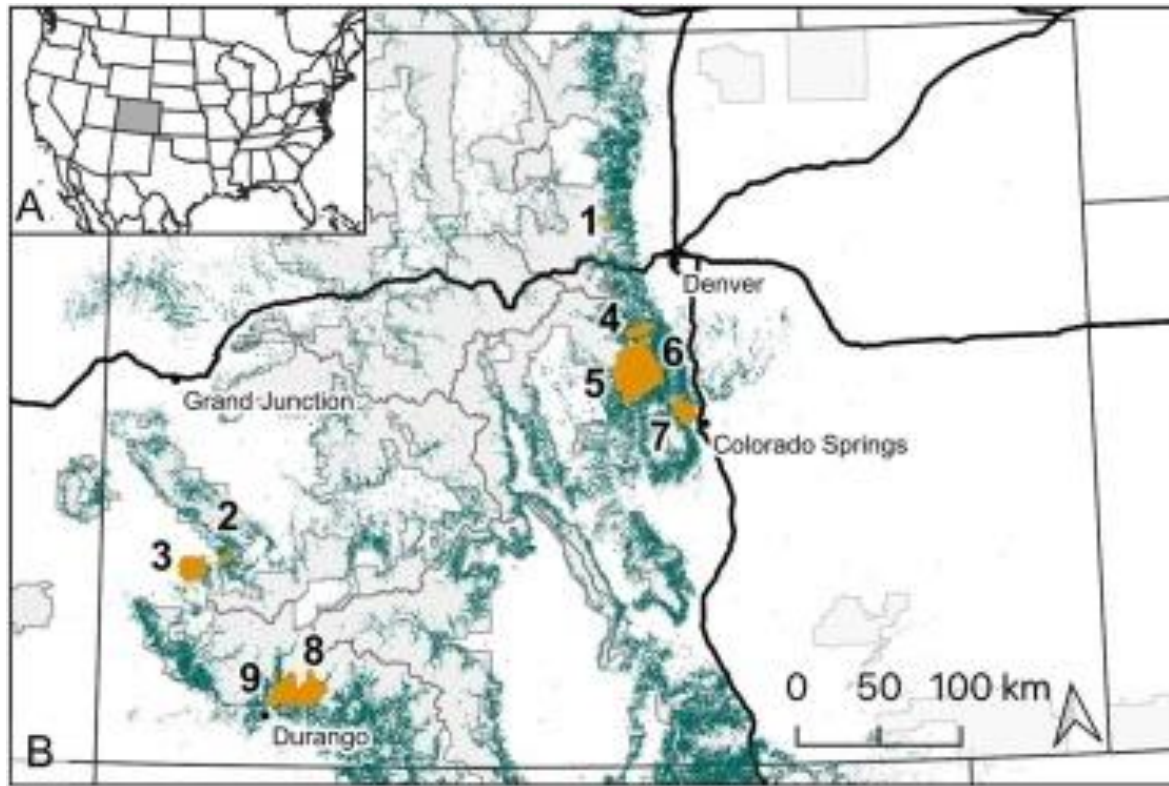
Planting site: 6,700ft elevation

The population currently inhabiting the site should still be suited to the 2060 climate.

The **optimal source** of seed is ~500 ft lower in elevation.



# Moving seedlots uphill increases survival



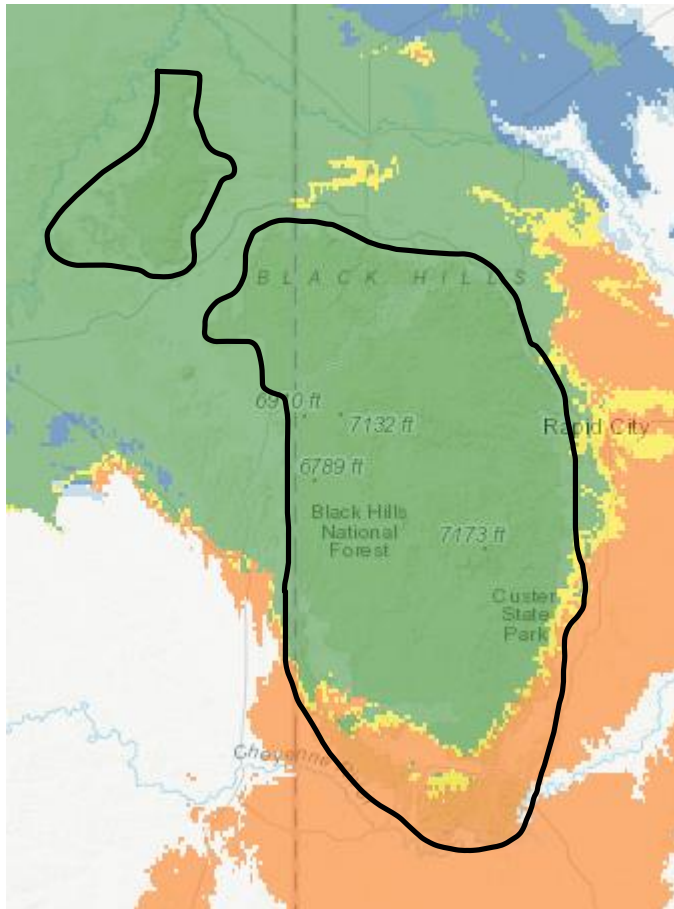
\*Plantings occurred between 2005-2018

# Species Potential Habitat Tool

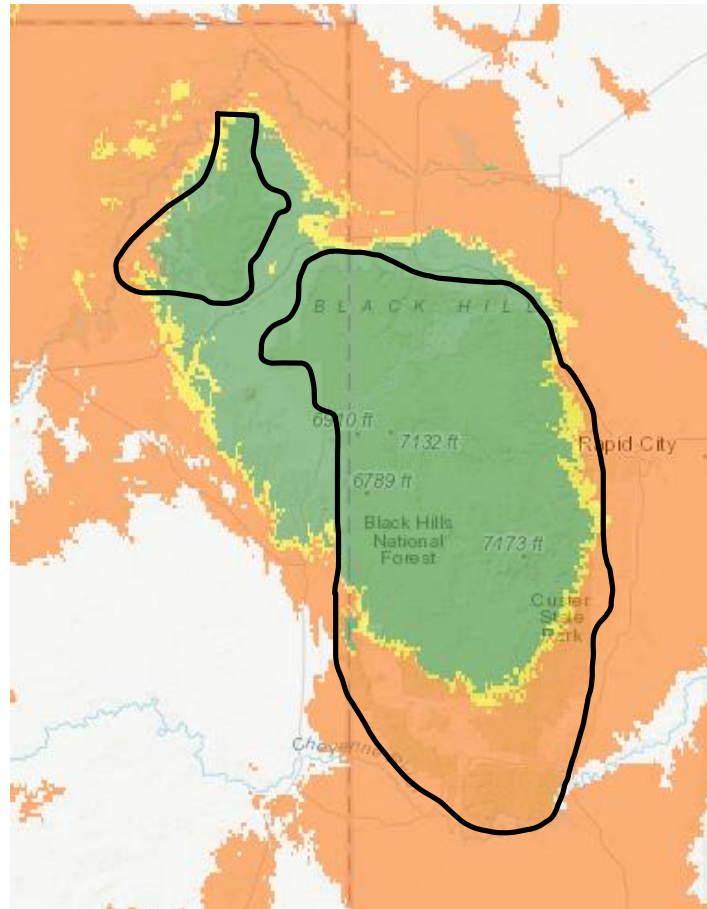
Emissions scenarios: ssp370 (upper-middle) vs ssp585 (upper end)

- Habitat lost
- Habitat kept (1 scenario)
- Habitat kept (2 scenarios)
- Habitat gained (1 scenario)
- Habitat gained (2 scenarios)

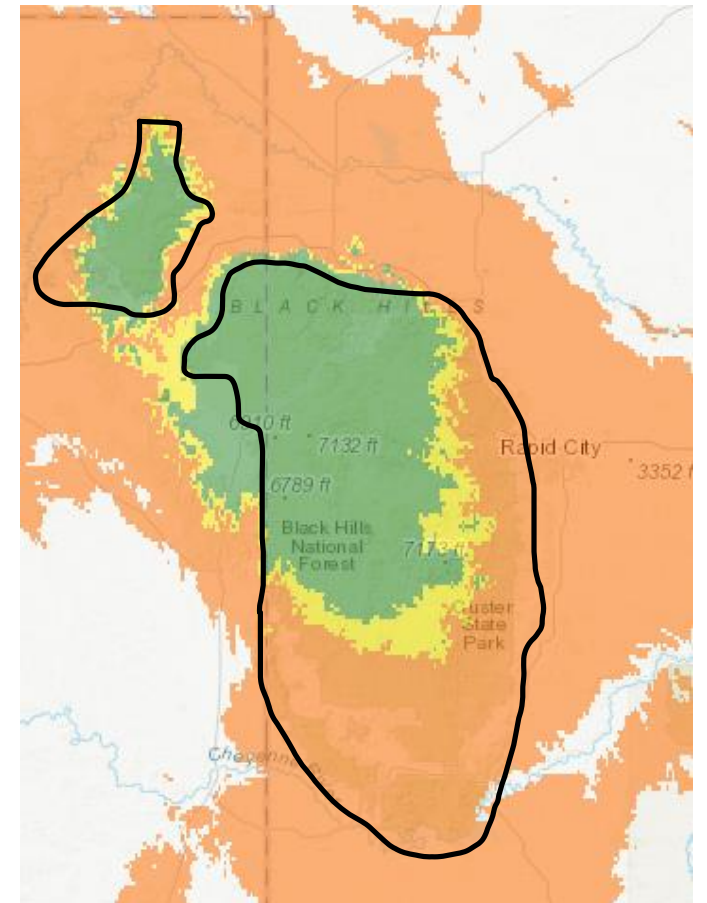
## 2011-2040



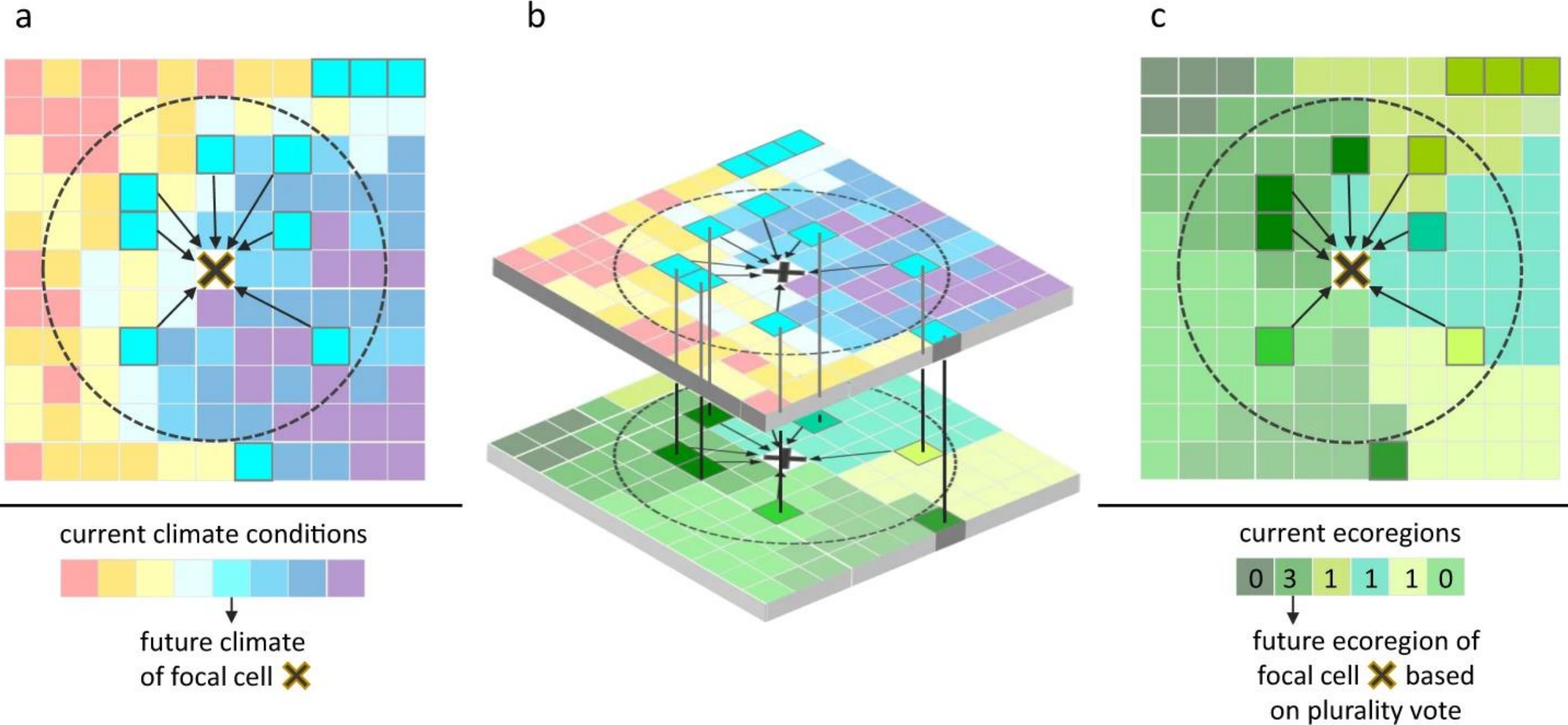
## 2041-2070



## 2071-2100



# Vegetation Futures Tool



# Vegetation Futures Tool

- +2°C future (roughly mid-century)
- Based on LANDFIRE biophysical settings vegetation types (**climate suitability**)
  - Shows *what vegetation types the land could support* based on the current and future climate NOT what it currently is or necessarily will become (that depends on management decisions! And disturbances...)

# Report for Black Hills NF area

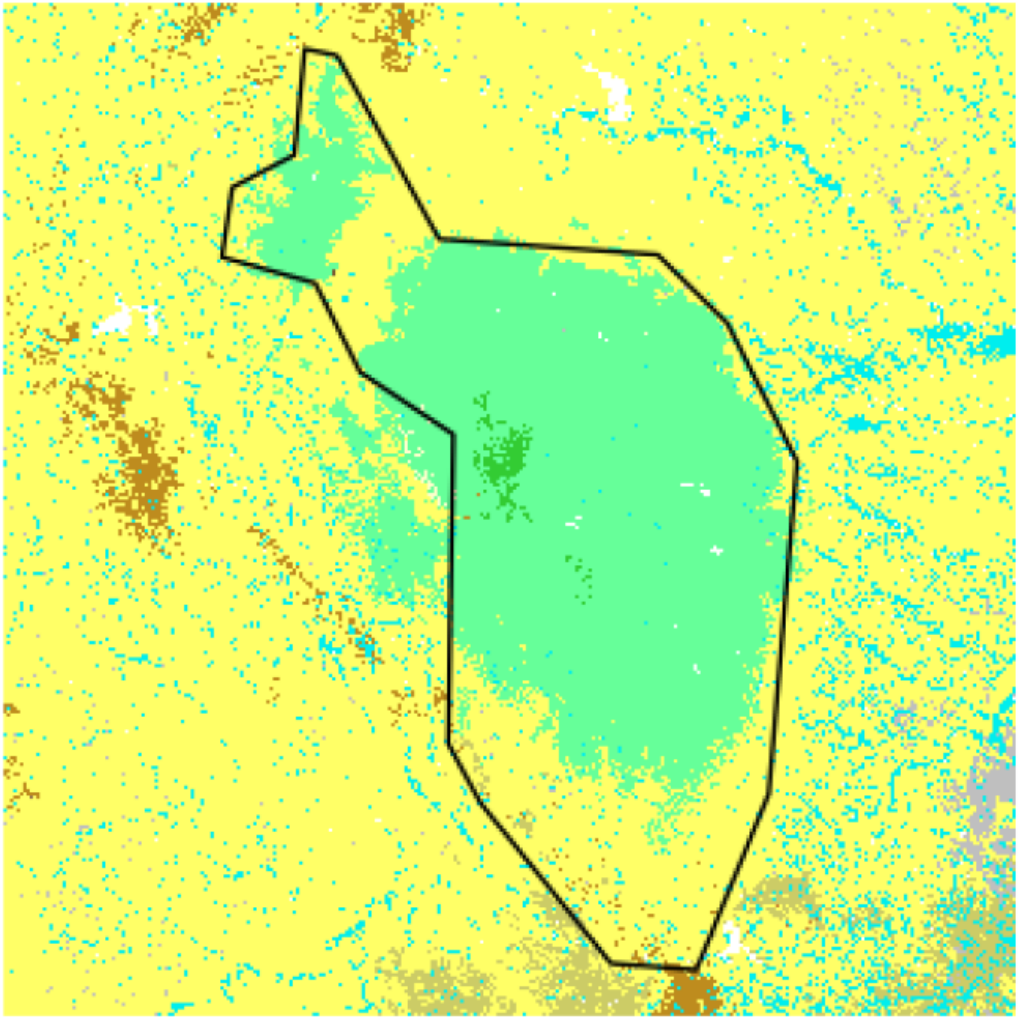


Figure 2. Vegetation type supported by current climate conditions.

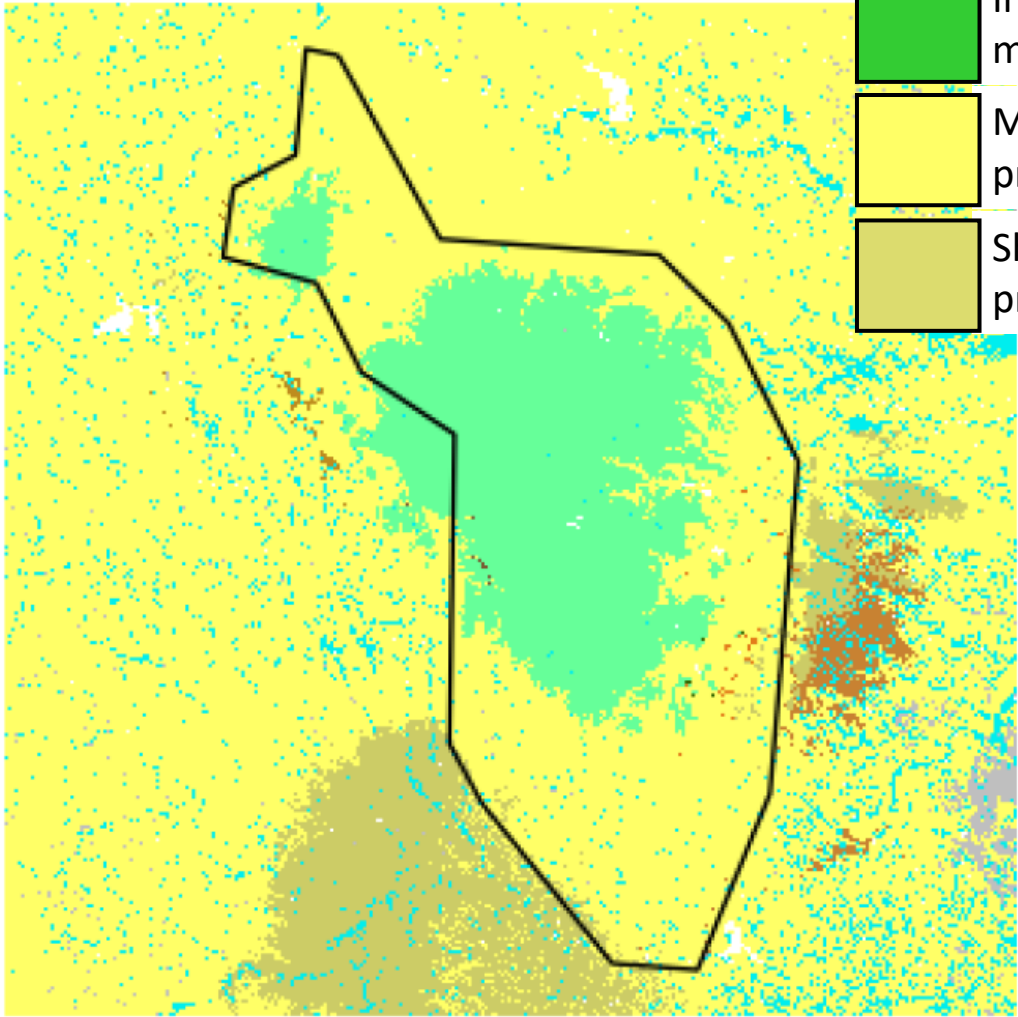
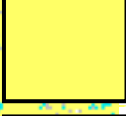


Figure 3. Vegetation type supported by future climate conditions, based on the most prevalent vegetation type among analogs.

-  Pine woodland and savanna
-  Interior aspen-mixed conifer
-  Mixedgrass prairie
-  Shortgrass prairie

# Report for Black Hills NF area

- 29% of the area's vegetation is likely to transition to another type

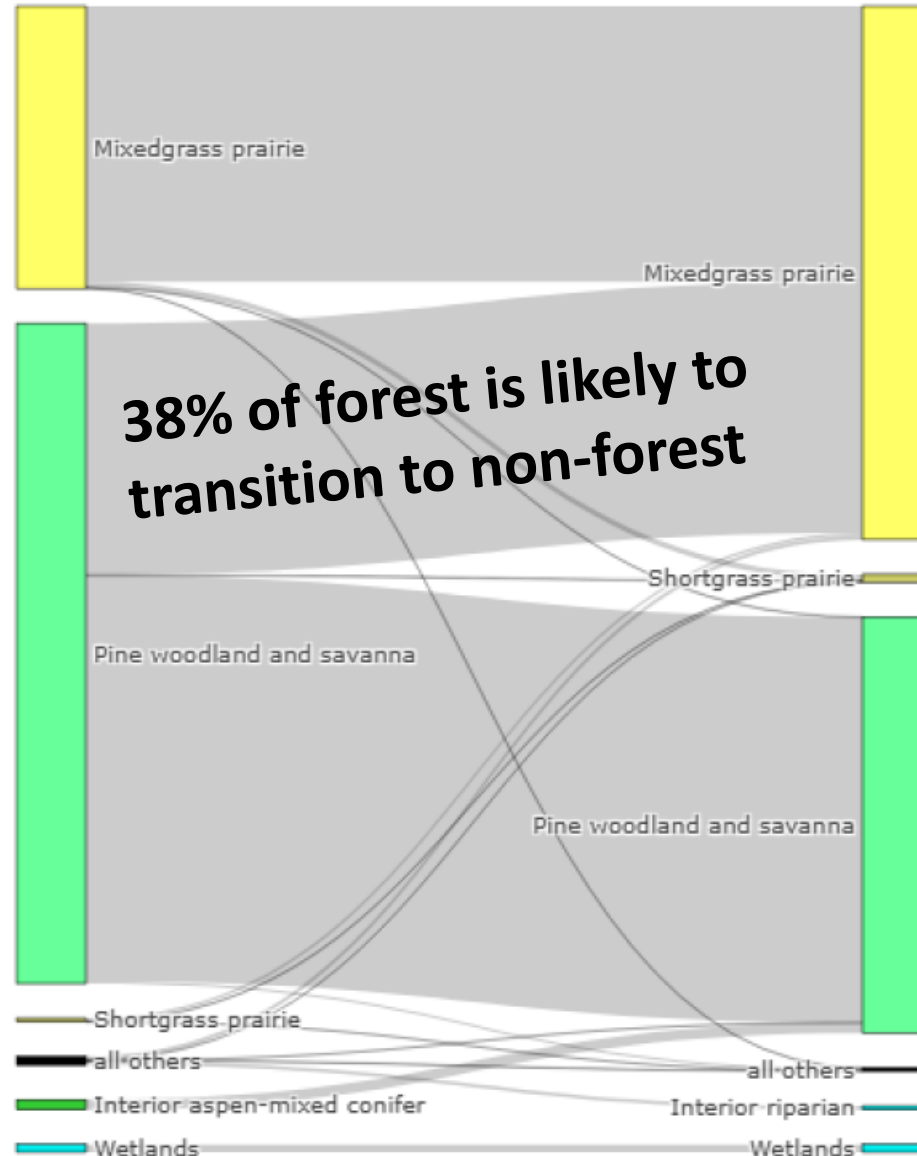


Figure 1. Projected changes in area suitable for different types of vegetation between current (left column) and future (right column) climate conditions within the area of interest. The flows show changes for each individual pixel through time, while the height of the bars indicate the proportion of the landscape with climate suitable for each vegetation type.

## Map Legend

- Pine woodland and savanna
- Mixedgrass prairie
- Interior aspen-mixed conifer
- Wetlands
- Shortgrass prairie
- Interior riparian
- Basin and Wyoming big sagebrush
- barren
- Montane shrubland
- Great Plains Dry Shrubland

# Report for Black Hills NF area

clim var	current	+2c	delta
aet	441	461	20
def	531	573	42
tmax	27.30	29.60	2.30
tmin	-12.29	-8.91	3.37

Vegetation projection results (ac)

veg type	current	+2c
Pine woodland and savanna	3,498,663	2,202,419
Mixedgrass prairie	1,523,237	2,854,597
Interior aspen-mixed conifer	53,743	26
Wetlands	42,698	42,698
Shortgrass prairie	20,794	43,782
Interior riparian	20,398	20,398
Basin and Wyoming big sagebrush	19,658	26
barren	3,224	3,224
Interior montane-subalpine grassland	898	0
Mountain big sagebrush	581	1,823
Interior Dry Mixed Conifer Forest	211	0
Tallgrass prairie	26	0
Mixed dwarf sagebrush shrubland	26	0
Great Plains Dry Shrubland	0	2,510
Montane shrubland	0	11,071
Gambel Oak shrubland	0	1,585

# Report for Black Hills NF area

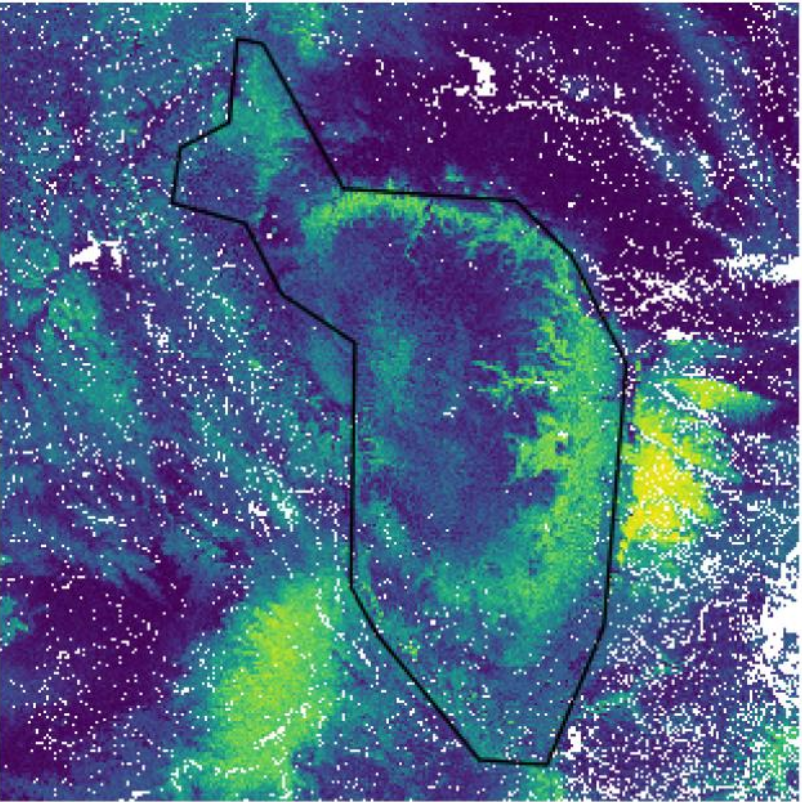


Figure 4. Vegetation vulnerability to transformation. Vulnerability is based on the similarity between vegetation types supported by current and future climate.

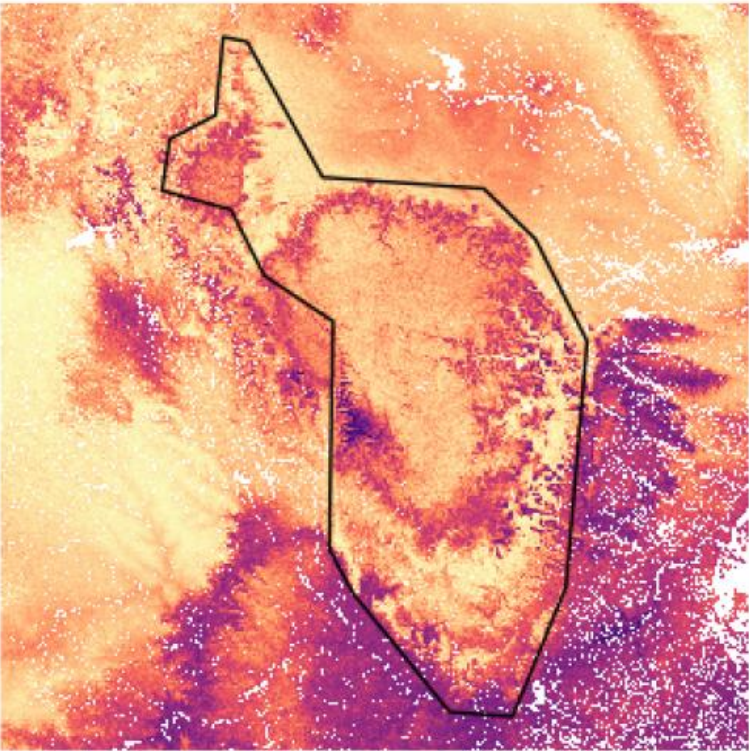
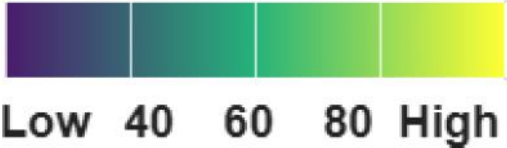
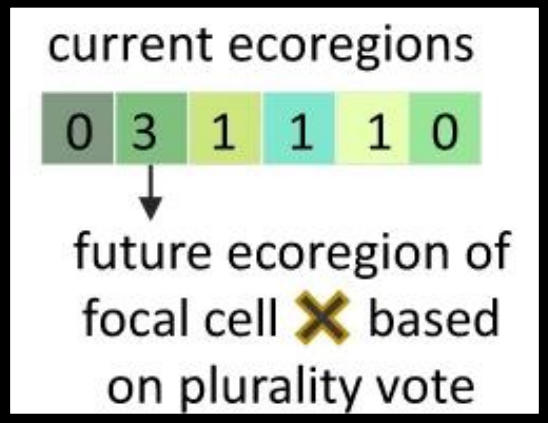


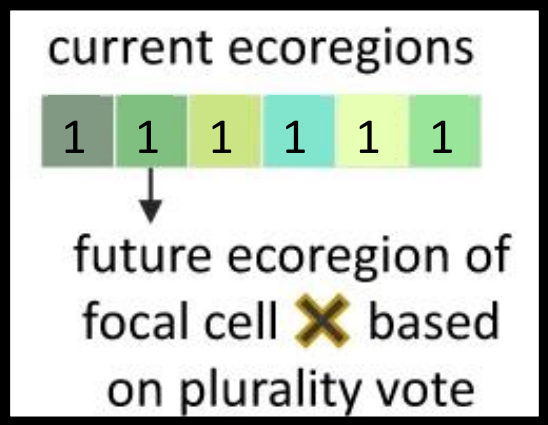
Figure 5. Vegetation projection agreement. High values mean one vegetation type was projected by most analogs. Low values indicate higher variability in projected vegetation types and that multiple future vegetation types are plausible given projected climate conditions.



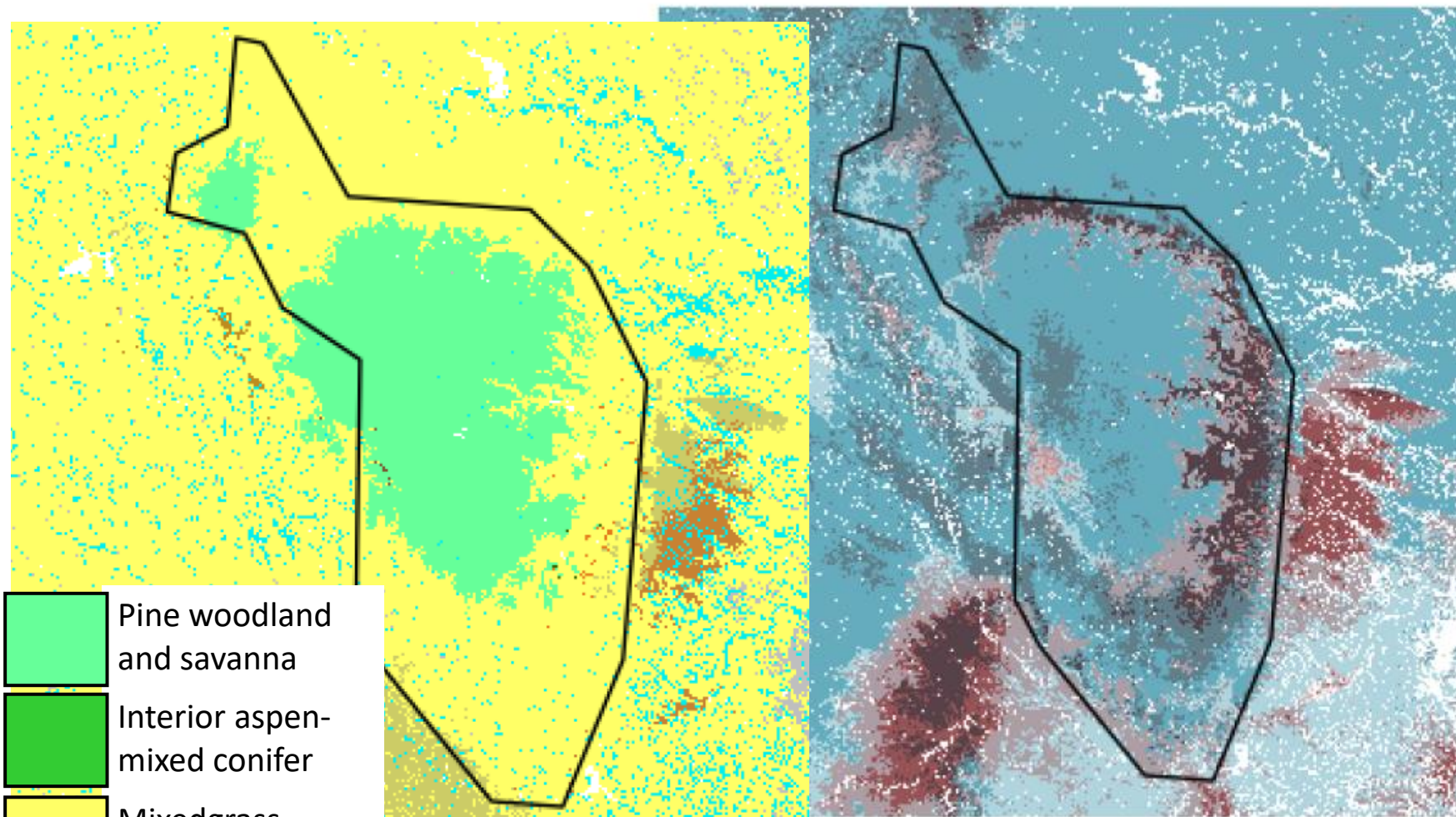
## High agreement



## Low agreement

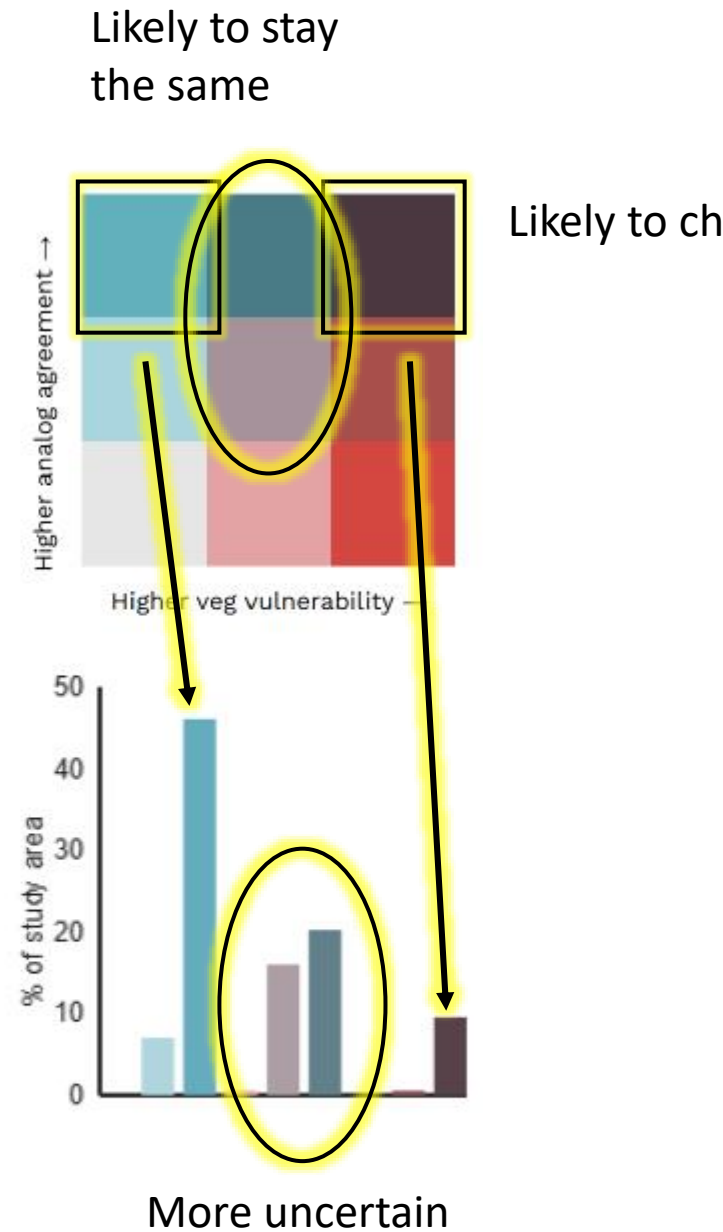


# Report for Black Hills NF area

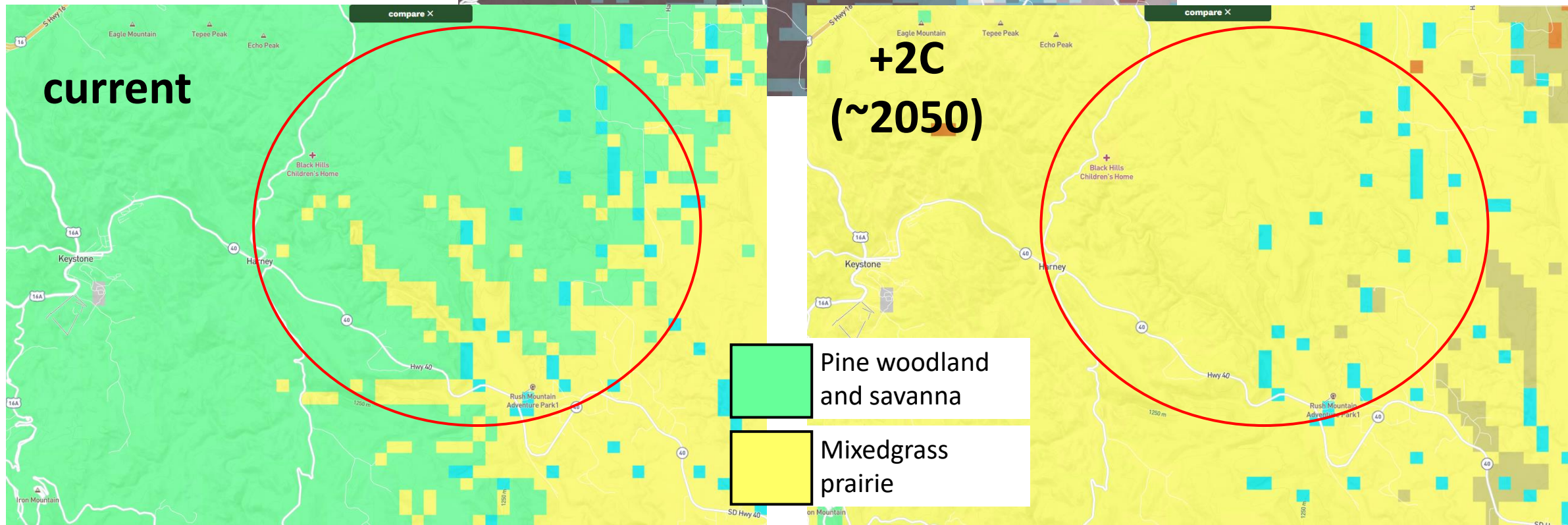
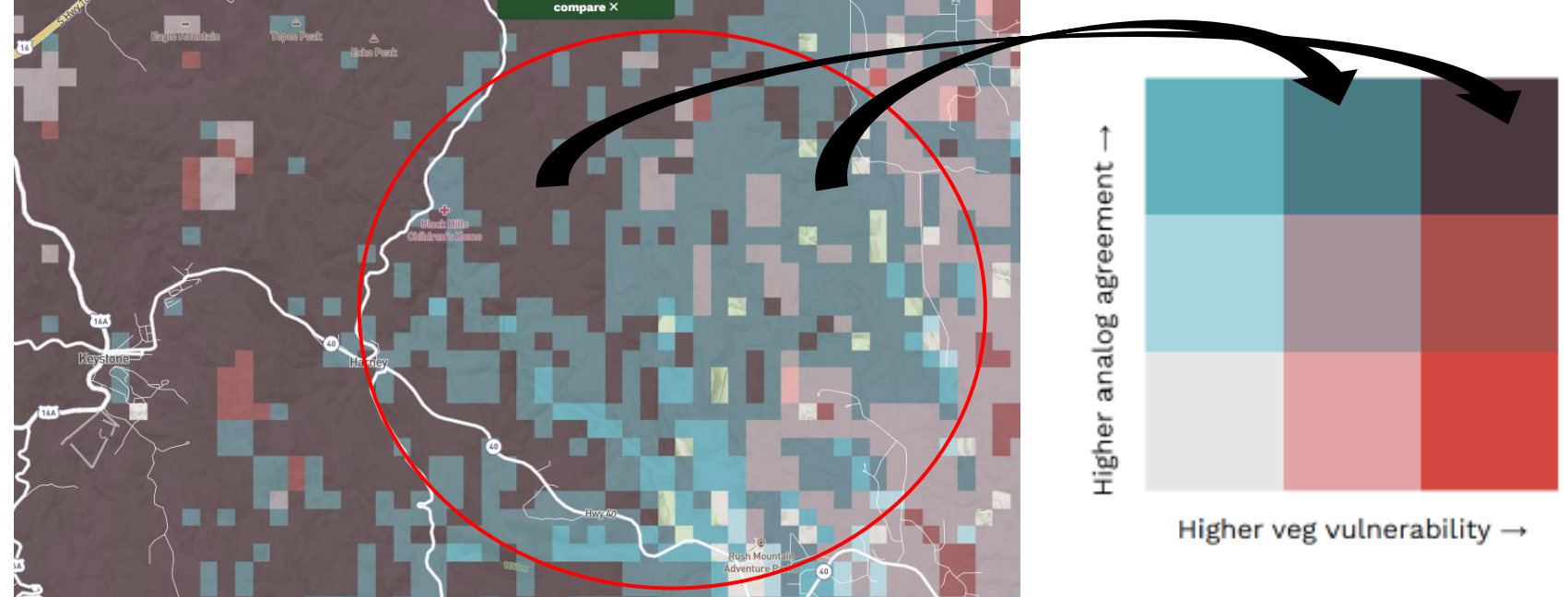


- Pine woodland and savanna
- Interior aspen-mixed conifer
- Mixedgrass prairie
- Shortgrass prairie

Figure 6. Index combining vegetation vulnerability to transformation (Fig. 4) and vegetation projection agreement (Fig. 5).



# Greyhound Fire



# Thanks!



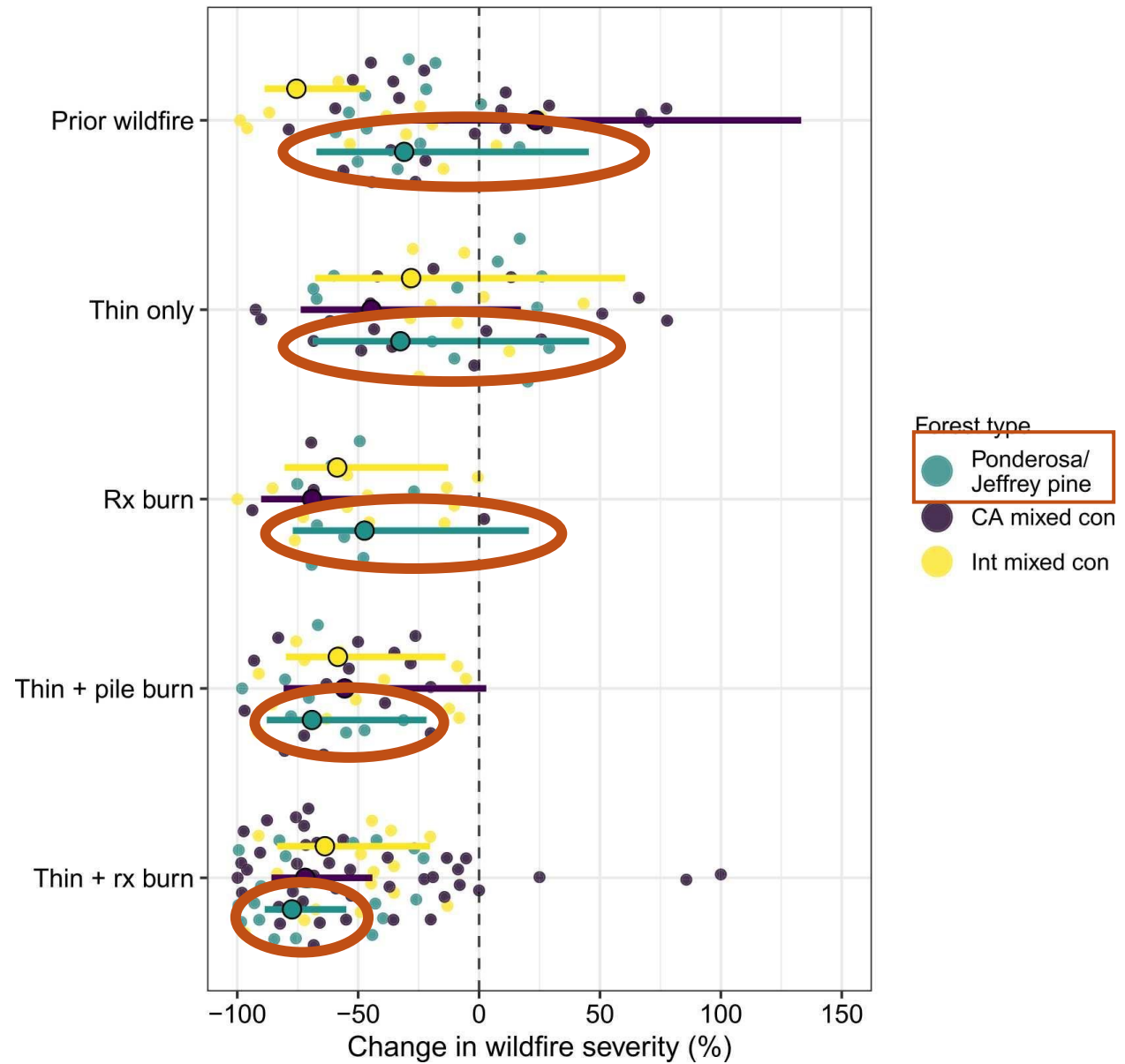
Questions?

[Katherine.nigro@usda.gov](mailto:Katherine.nigro@usda.gov)



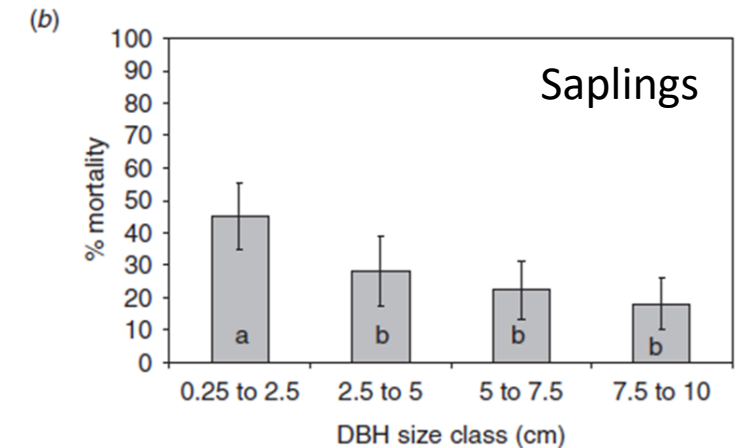
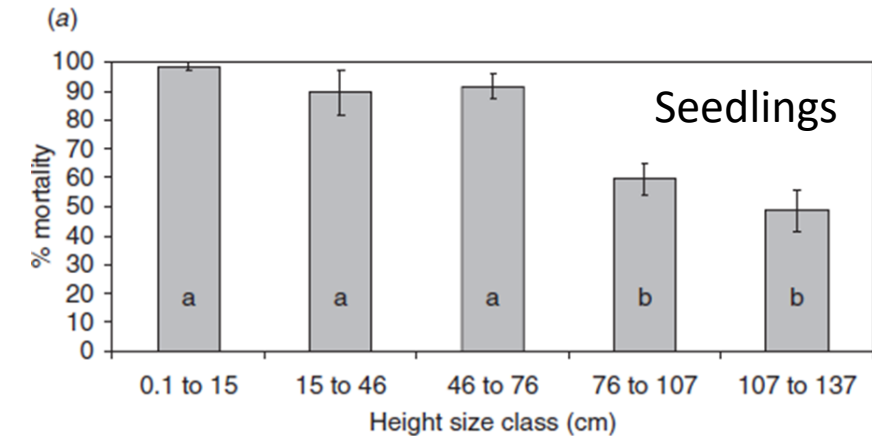
**Reducing wildfire risk  
and other disturbances...**

# Thin + Rx burn reduces wildfire severity the most



# Battaglia et al., 2008 & 2009

- Rx fire kills:
  - ~90% ponderosa seedlings < 1 ft tall
  - ~50–60% seedlings 1 – 4.5 ft tall
  - ~18-46% saplings
- Need repeated treatments
  - **10 years post-Rx fire:** most regen still less than 1m
  - **20 years post-Rx fire:** ladder fuels present
  - **30 years post-Rx fire:** crown fire likely



# Wider spacing = bigger trees & more drought tolerance

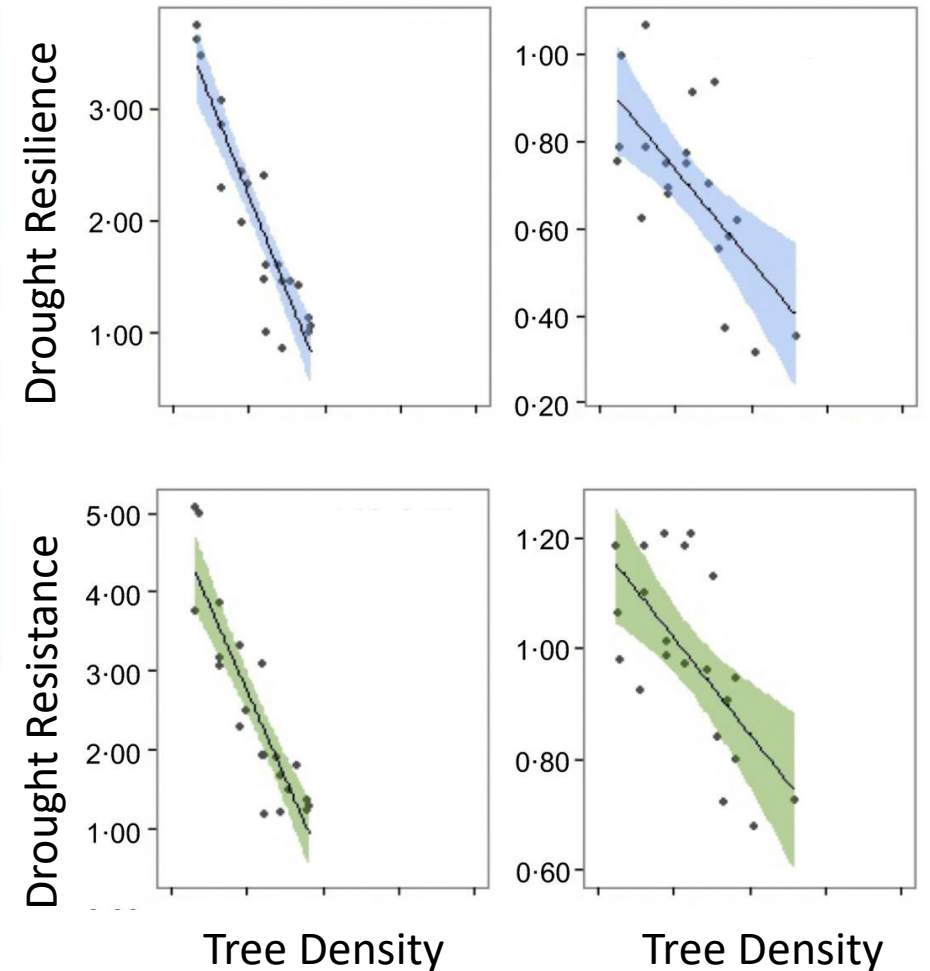


Figure 1—Aerial view of a Nelder plot on the Black Hills Experimental Forest around 1970.

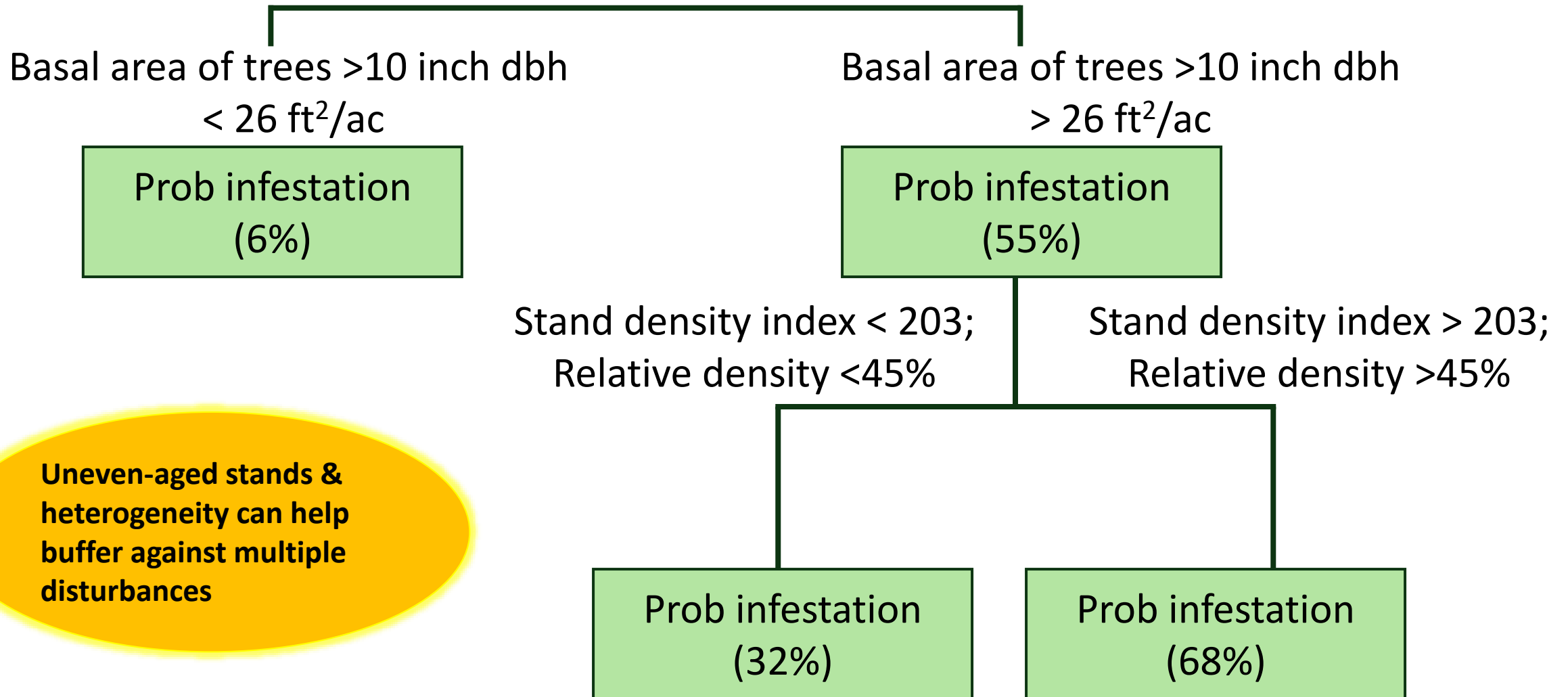


Figure 2—Cross-sections at d.b.h. of the ponderosa pine trees grown at different spacings in the Nelder plots after 45 years.

## Black Hills Experimental Forest



# Mountain pine beetle infestation




Uneven-aged stands & heterogeneity can help buffer against multiple disturbances

# More regeneration closer to live trees and in cooler/wetter microsites

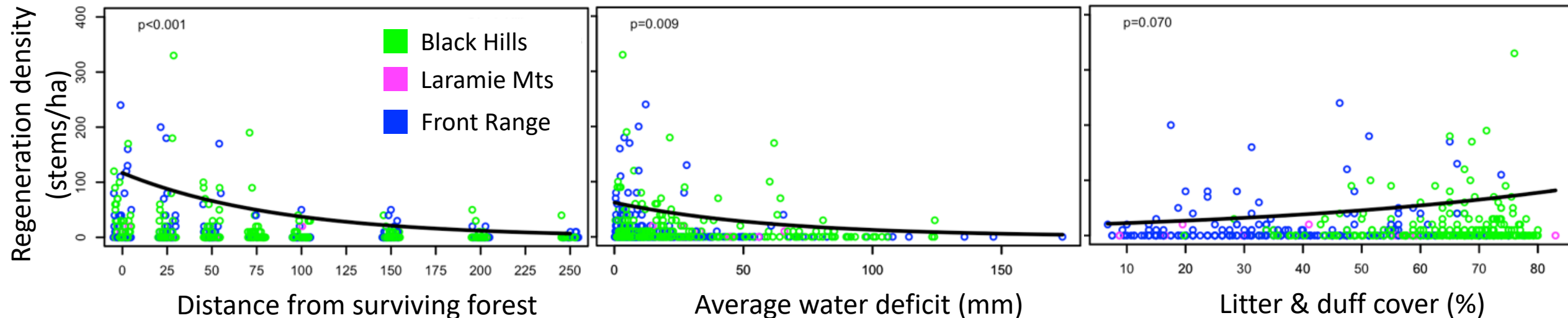


## Bonnet et al., 2005 (Jasper fire)

- Closer to burn edge
- Scorched needles on mineral soil
- Less herbaceous cover

 More seedlings

## Chambers, Fornwalt, et al., in prep



# Preparing for the Workshop



# Game Plan

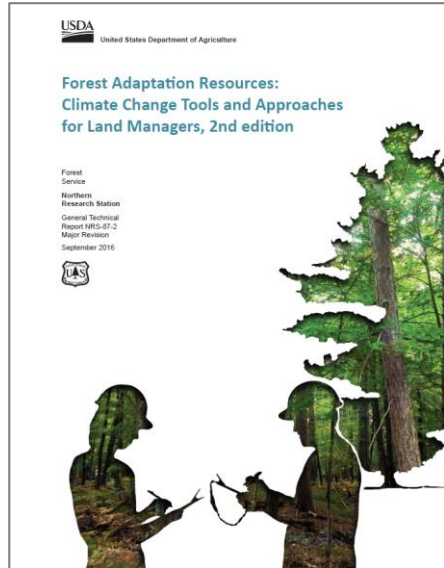
- Workshop Location:
  - Outdoor Campus – Rapid City South Dakota Game, Fish, and Parks
  - 4130 Adventure Trail, Rapid City, SD 57702
- 8 A.M. – 4 P.M.
- Lunch on your own (we will have a 1-hour break)



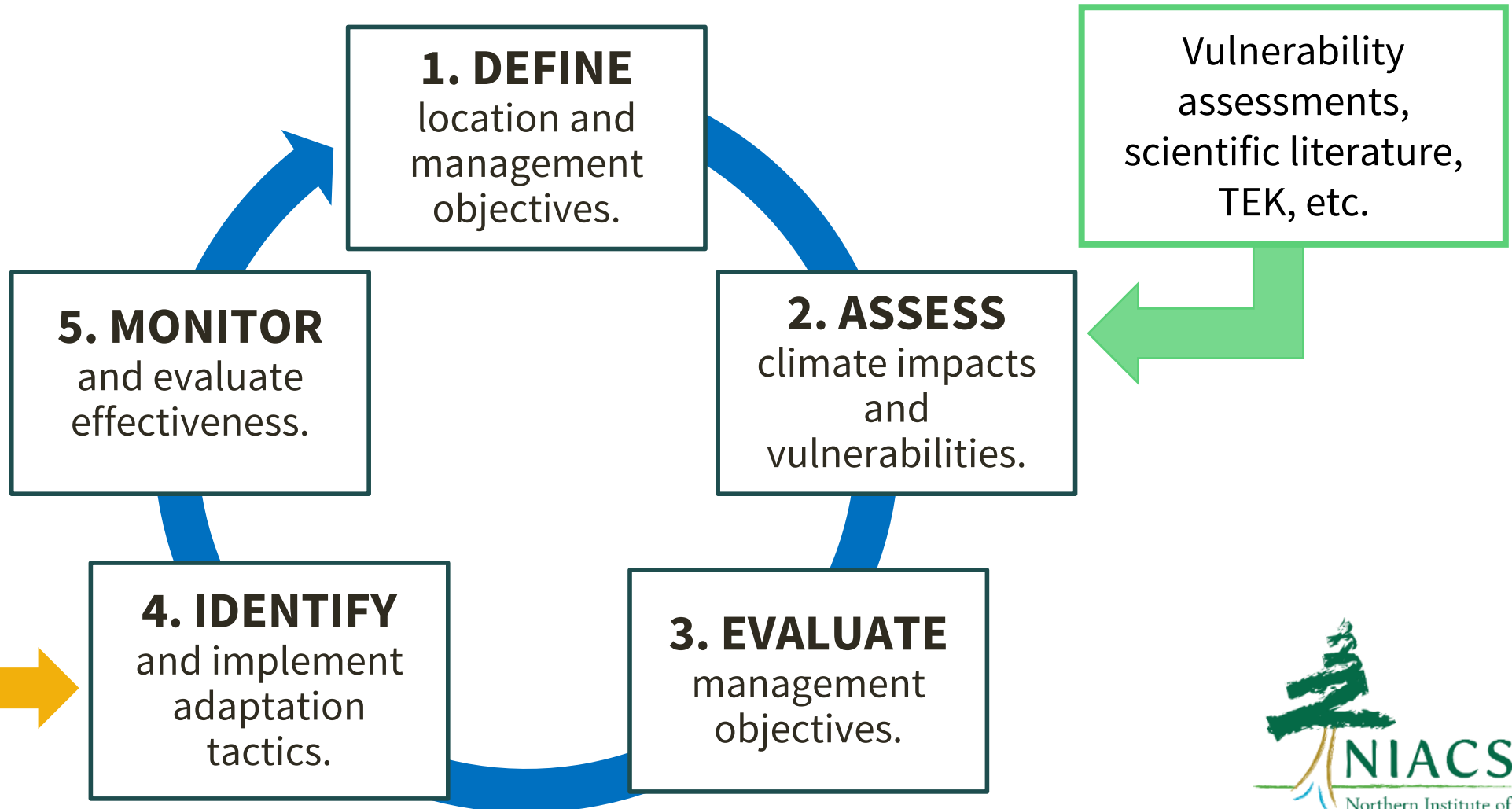
# Pre-Work Request

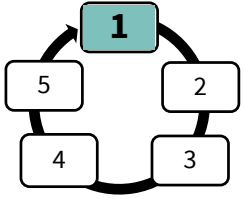
- Review the project summary information and climate change impacts handouts for your assigned breakout group
  - **Battle Creek** (Stuart Adrian, Scott Adrian, Mike Beck, Lilly DeLange, Sterling Smith, Doak Nickerson)
  - **Friendshuh Game Production** (David Mallett, Kylie Hammett, Karen Brammer, Jerry Brammer, Rayma Daigle)
  - **Greyhound Fire Restoration** (Lee Imrey, Shamlala Imrey, Ken Kuhle, Kat Rowe, Harrison Brookes, Ian Lilya)
  - **Rankin Ridge Grassland Restoration** (Ian Torrence, Jessica Sunderland, Nina Steinmetz, Nina Wajrowski, Mike Baldwin, Dick Terry)
  - **Boxelder Creek** (Mike Ray, Jamie Dedic, Scott Guffey, Robert Burns, Laura Bosworth, Gabe Dirksen)
- Skim the reading by Larson and Churchill on *Ecological Silviculture for Interior Ponderosa Pine and Dry Mixed-Conifer Ecosystems*

# Adaptation Workbook



Adaptation Strategies and Approaches





# **Step 1: DEFINE location, project, and time frames.**

1. Where are you working?
2. What are your management goals and objectives for this area?



Photos: Dixie National Forest, USDA Forest Service

# Key Definitions

- **Location:** Describe the geographic location and unique features of your project area.
- **Management Topics:** List the major management topics for your project which could include major ecosystem types, management topics, or other relevant categories (e.g. dry-mixed conifer forest, wildlife habitat, fire adaptation, insect and disease management, etc.)
- **Management Goals:** a broad, general statement, usually not quantifiable, that expresses a desired state or process to be achieved
- **Management Objectives:** a concise, time-specific statement of measurable planned results that correspond to pre-established goals in achieving a desired outcome
- **Time Frames:** List approximate time frames for implementing management actions and for achieving goals and objectives

# Step 1 Prep

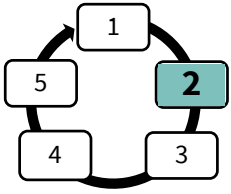
Project leads provided management goals and objectives for your breakout group.

Resource Areas	Goals (examples)	Objectives (How/ where/ how much?)
Fire Adaptation	<ul style="list-style-type: none"><li>Maintain fire in fire-adapted ecosystems</li></ul>	<ul style="list-style-type: none"><li>Implement a prescribed burn every 15 years to reduce stand competition and remove ladder fuels</li></ul>
Wildlife Habitat/ Grassland Restoration	<ul style="list-style-type: none"><li>Improve habitat for bison, elk, mule deer, prairie dogs, black-footed ferrets, and Western bumblebee</li></ul>	<ul style="list-style-type: none"><li>Increase native grass and forb cover; increase prairie area to historic extent</li></ul>
Recreation	<ul style="list-style-type: none"><li>Improve visitor safety and experience</li></ul>	<ul style="list-style-type: none"><li>Reduce visual, line-of-sight barriers, especially along Highway 87</li></ul>

# Goals & Objectives - Tips

- ✦ Goals and objectives can be developed from your existing Management Plan or similar projects as a starting point.
- ✦ Goals and objectives do not need to be climate-informed! The Adaptation Workbook process will help you meet your goals in a climate-informed way.





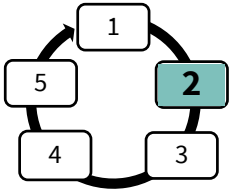
## Step 2: ASSESS climate change impacts and vulnerabilities

**Purpose:** Consider how climate change may specifically affect the project area

### Key Questions:

- How might the area be uniquely affected by climatic change and subsequent impacts?
- How might regional impacts be different in the project area?
- What are the climate impacts in the area if no action is taken?





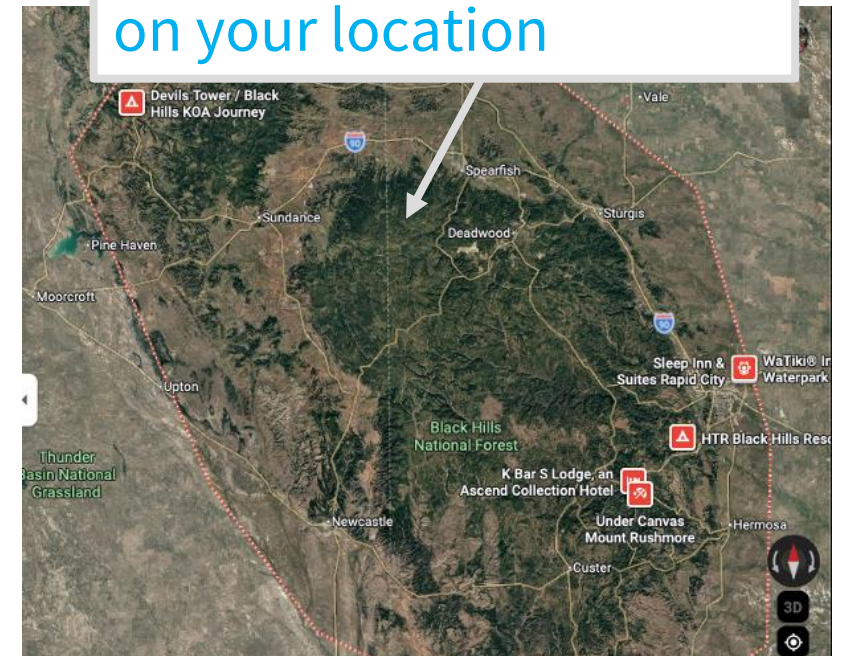
## Step 2: ASSESS climate change impacts and vulnerabilities

### Regional Impacts:

- Warmer temperatures
- Longer growing season
- Less snow and shorter winters
- Altered seasonal precipitation and streamflows
- Increased summer moisture stress and drought
- More frequent heavy precipitation events
- Less suitable habitat for northern & alpine species
- More suitable habitat for southern species
- Increases in insect pests and forest pathogens
- Increases in non-native plants
- Potential changes in wildfire regimes

**How will my site be uniquely affected???**

List of impacts is based on your location

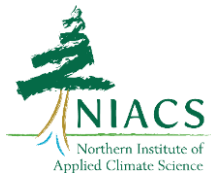


# Questions?



# Thank you!

See you on March 24<sup>th</sup> ready to go at 8:00 A.M.!



Climate Hubs  
U.S. DEPARTMENT OF AGRICULTURE



United States  
Department of  
Agriculture  
Natural Resources Conservation Service

