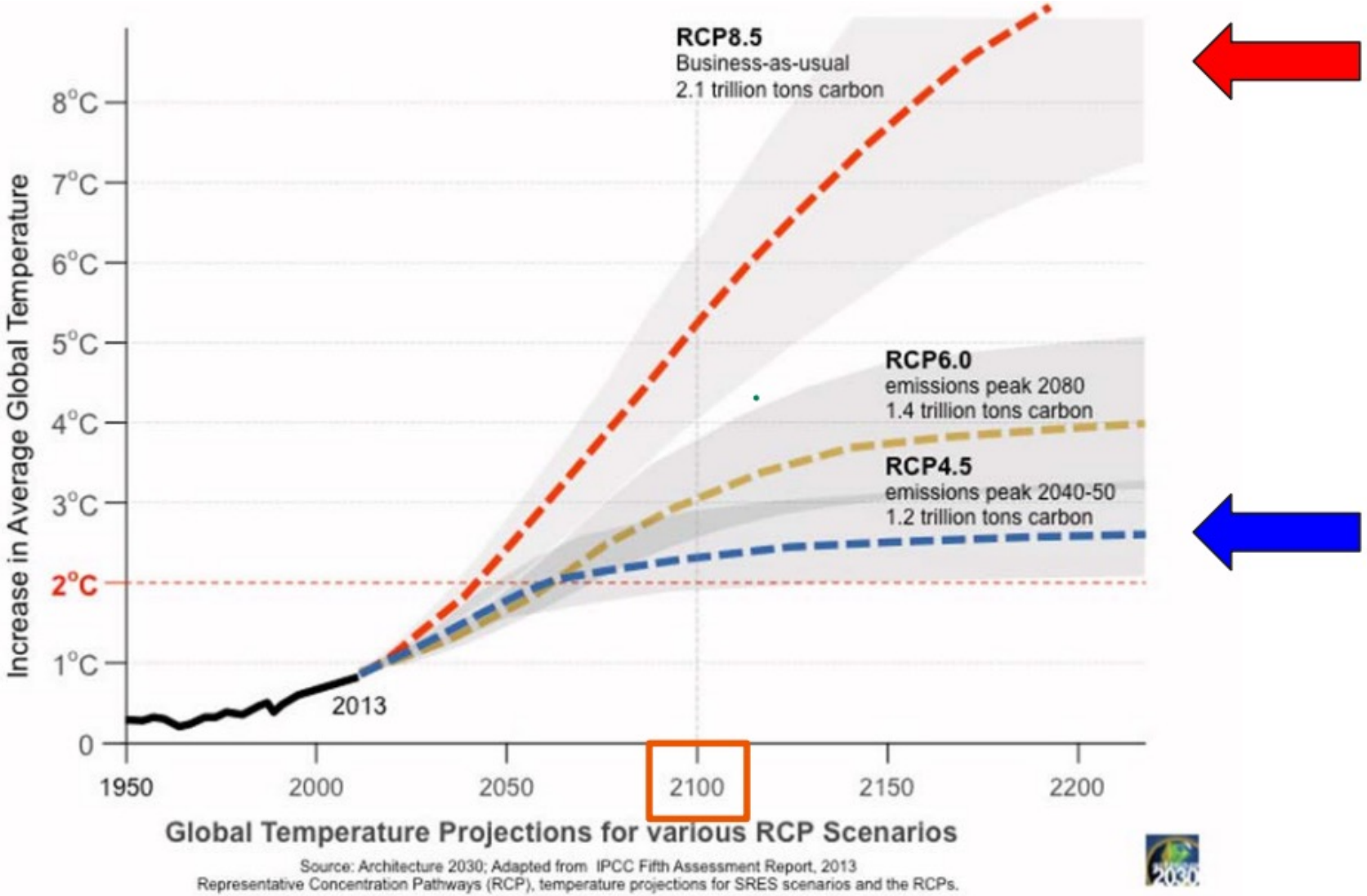
The Climate of the Rio Grande National Forest

Future Projections

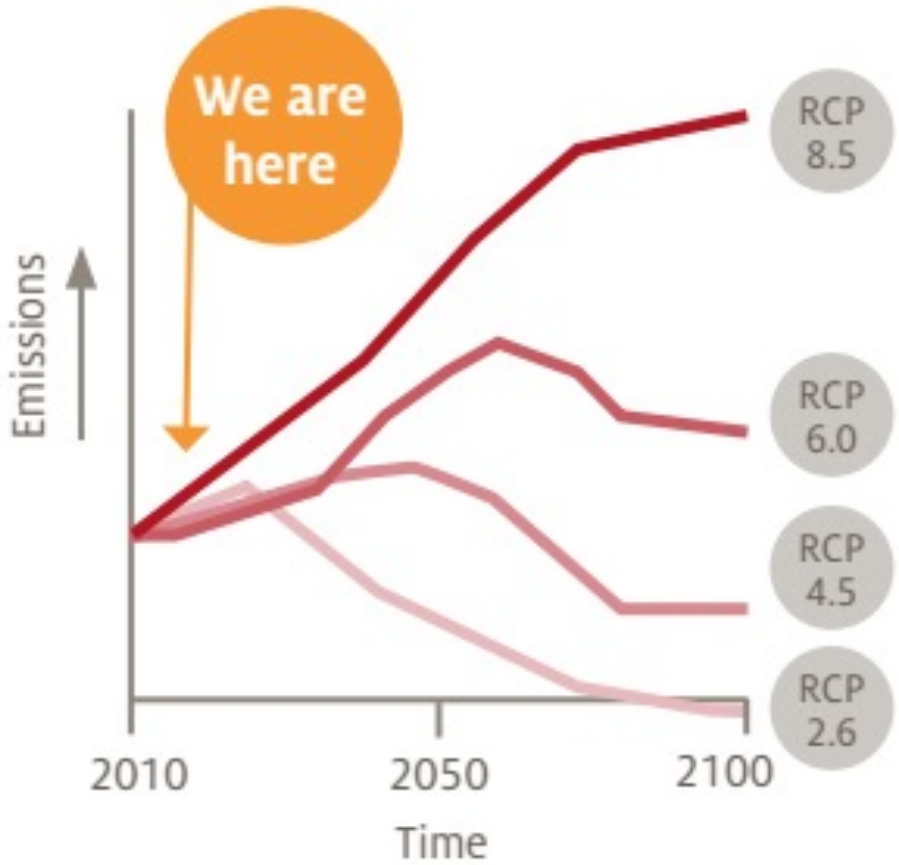
Future Emission Scenarios



IPCC Fifth Assessment Report (2013)

We can use the RCPs to plan for the future

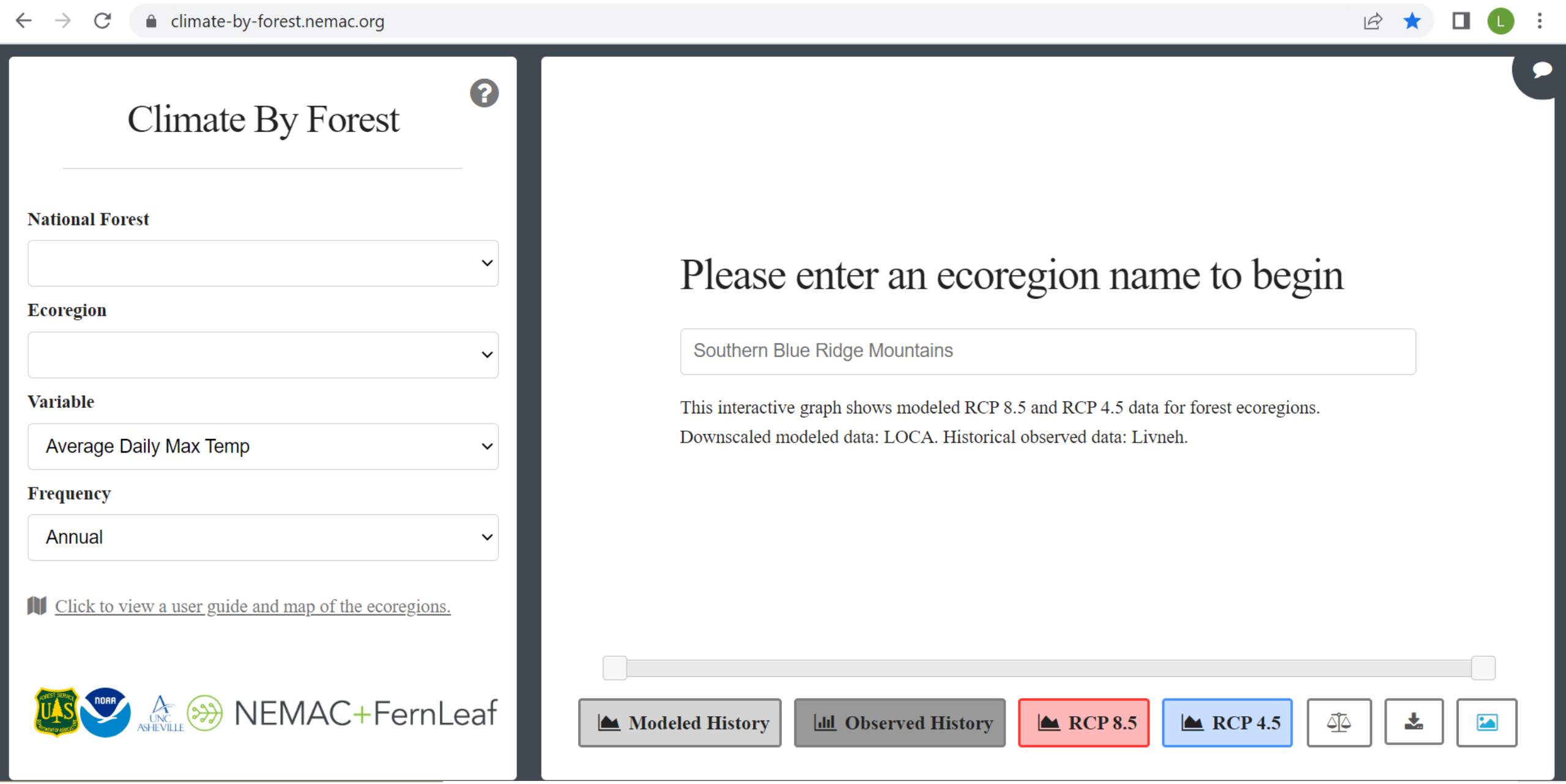
Scientists use the RCPs to model climate change and build scenarios about the impacts. You can use these scenarios to plan for the future.



If we follow the RCP 8.5 pathway, **more adaptation** will be needed.

If we follow the RCP 2.6 pathway, **less adaptation** is needed.

RCP 8.5 leads to much greater temperature increases, and this means greater impacts and greater costs. To adapt to these changes will also cost more. A balance must be struck between the cost of impacts and the cost of adaptation.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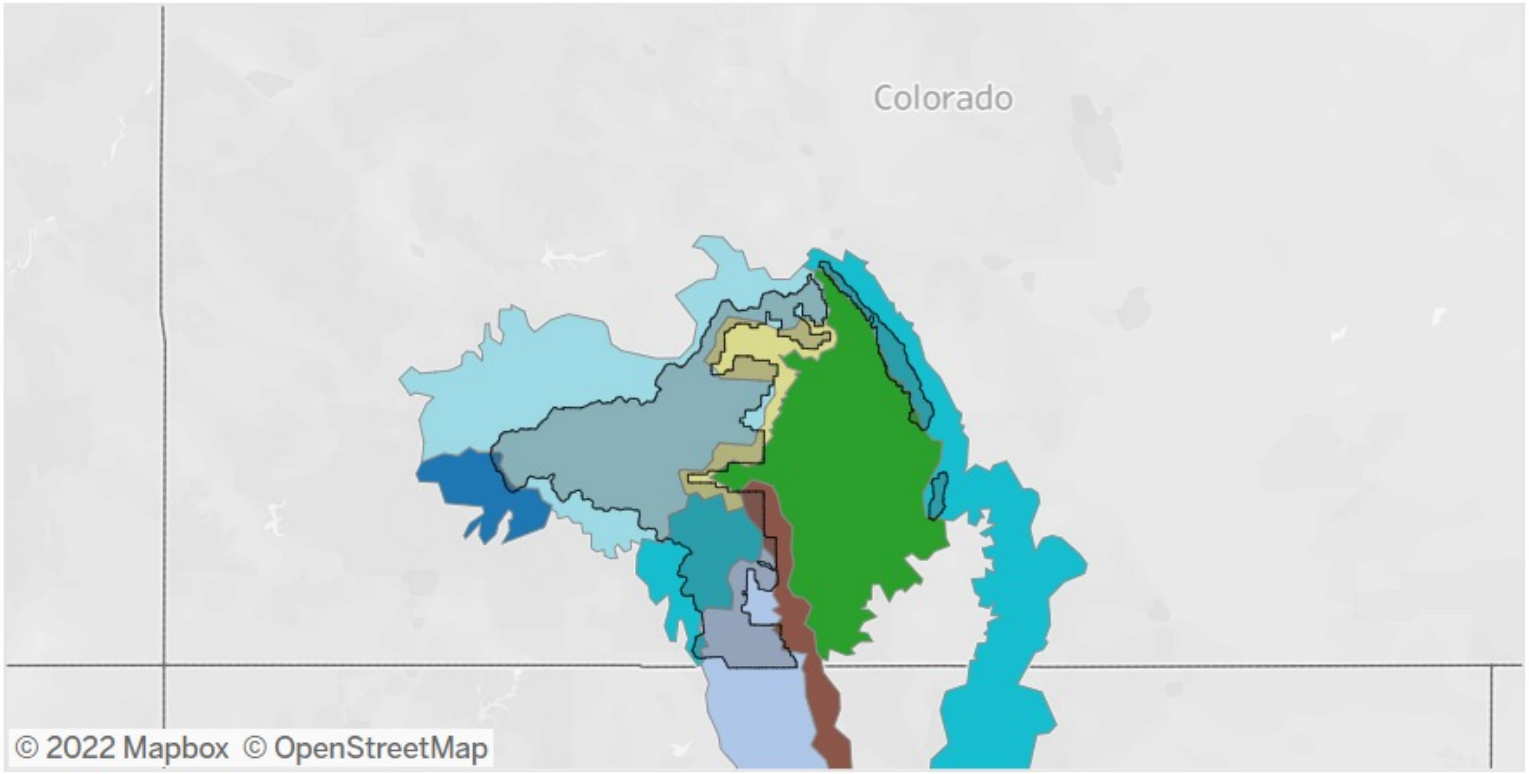
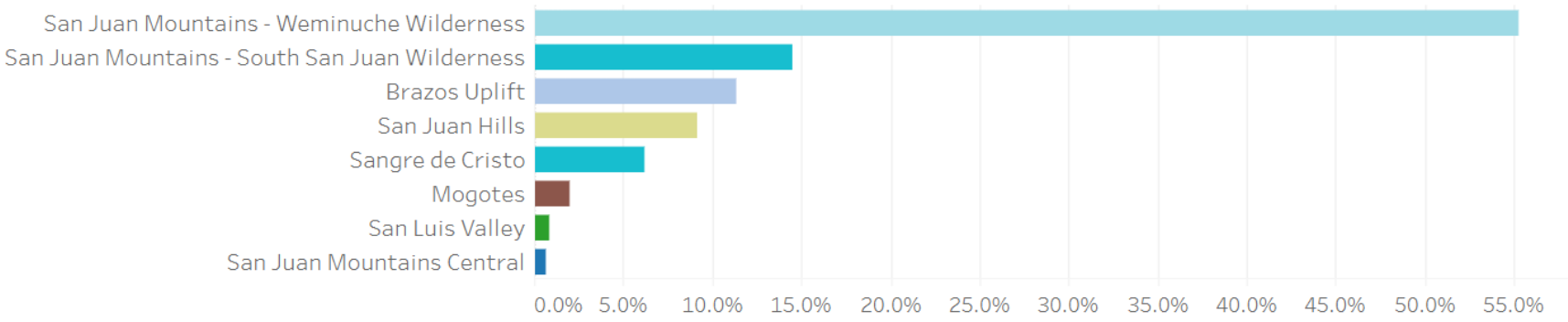
Climate By Forest
National Forest
Ecoregion
Variable
Average Daily Max Temp
Frequency
Annual
Click to view a user guide and map of the ecoregions.
NEMAC+FernLeaf
Please enter an ecoregion name to begin
Southern Blue Ridge Mountains
This interactive graph shows modeled RCP 8.5 and RCP 4.5 data for forest ecoregions.
Downscaled modeled data: LOCA. Historical observed data: Livneh.
Modeled History
Observed History
RCP 8.5
RCP 4.5

Rio Grande National Forest Ecoregions





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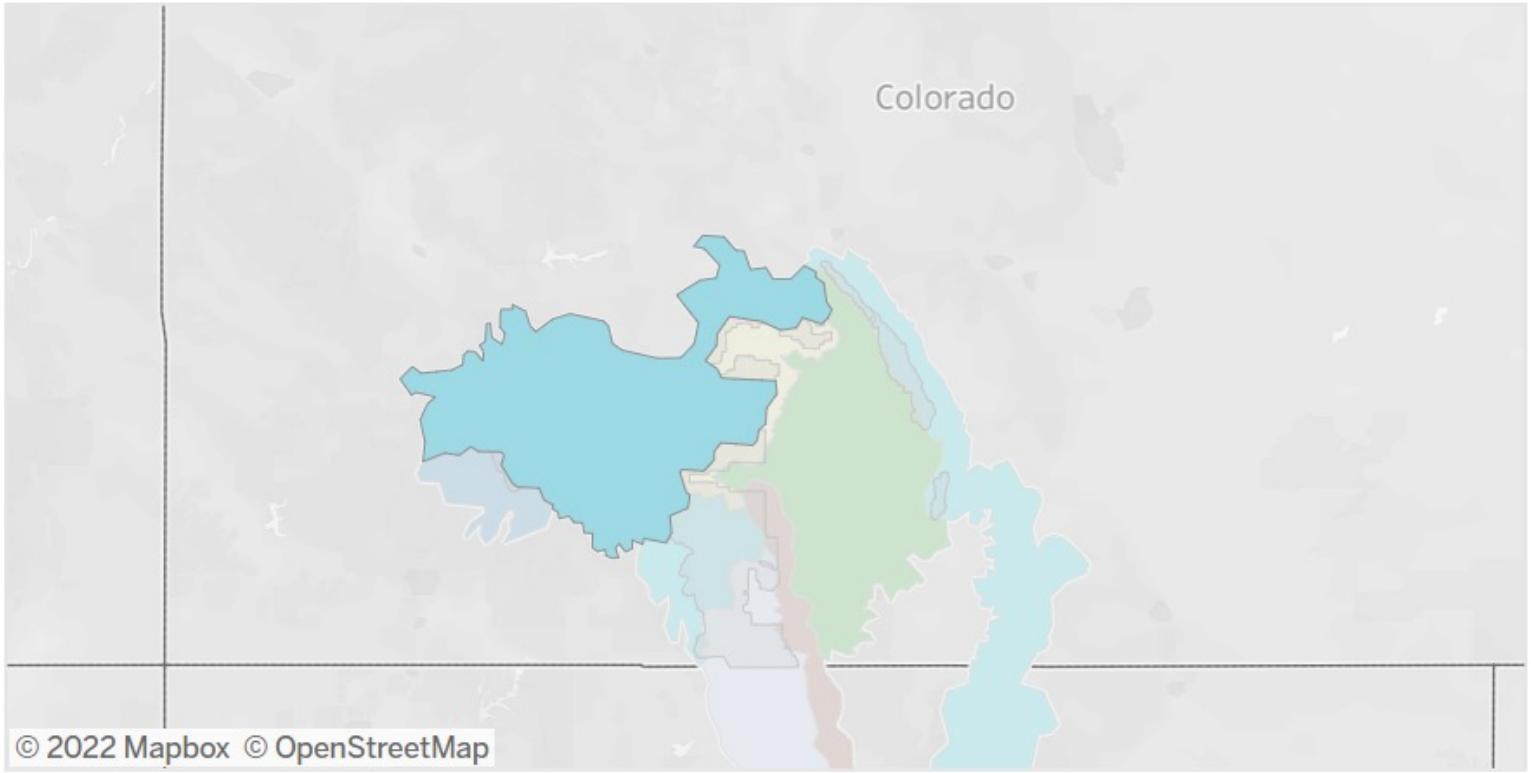
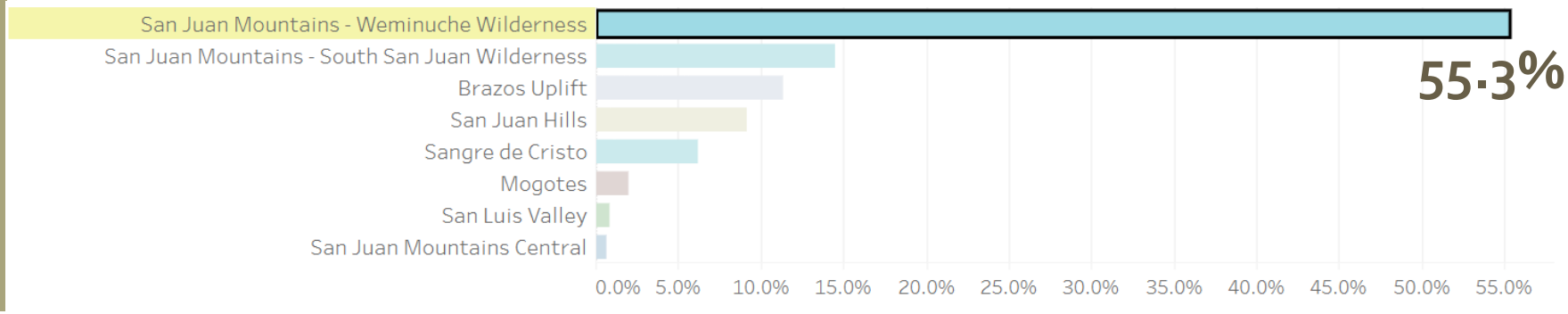
San Juan Mountains – Weminuche Wilderness





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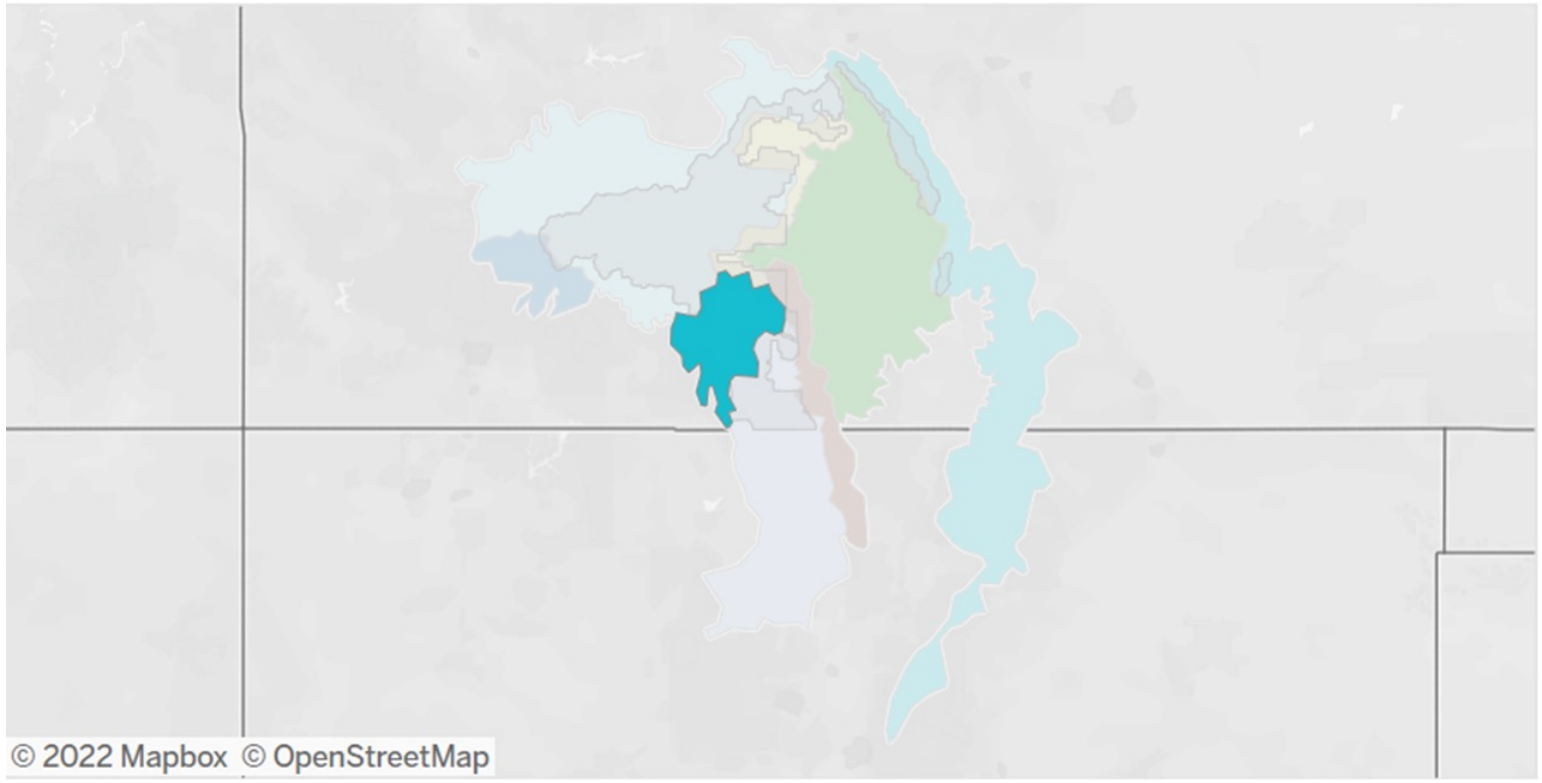
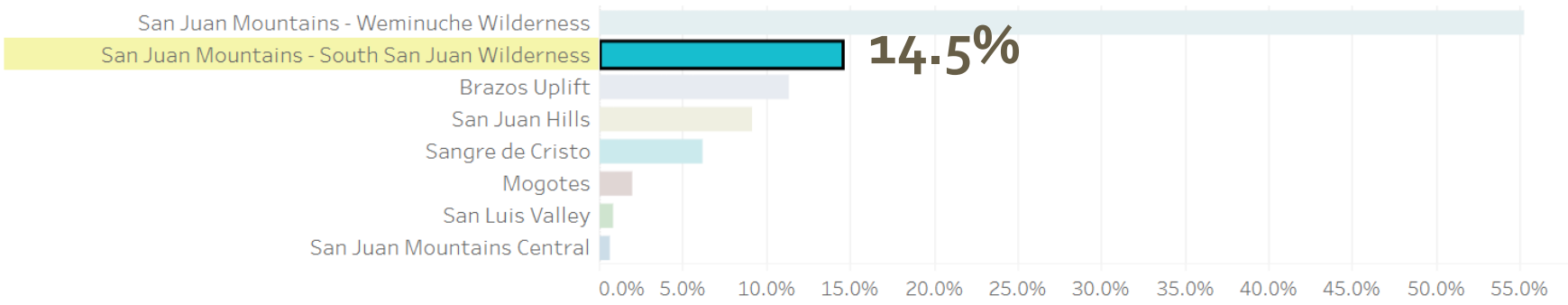
San Juan Mountains – South San Juan Wilderness





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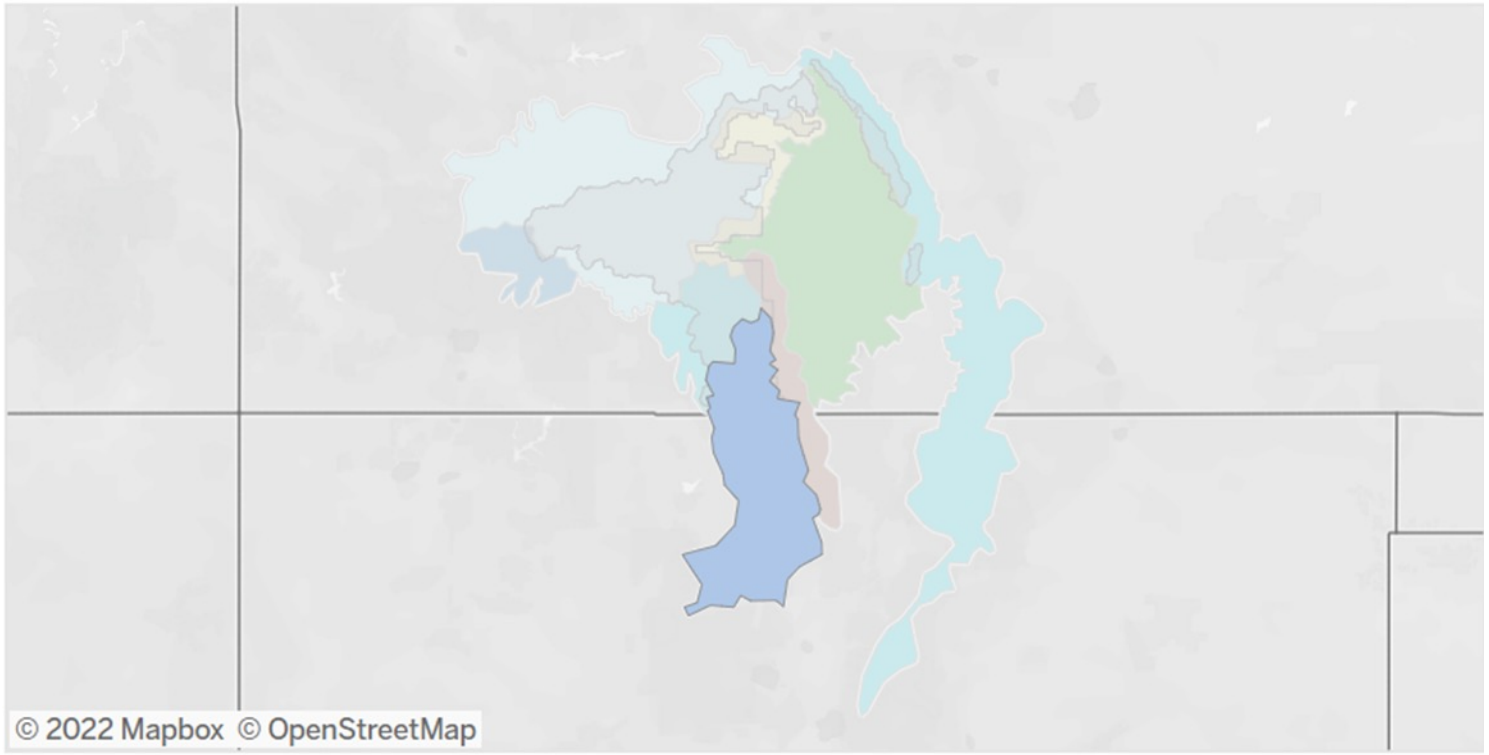
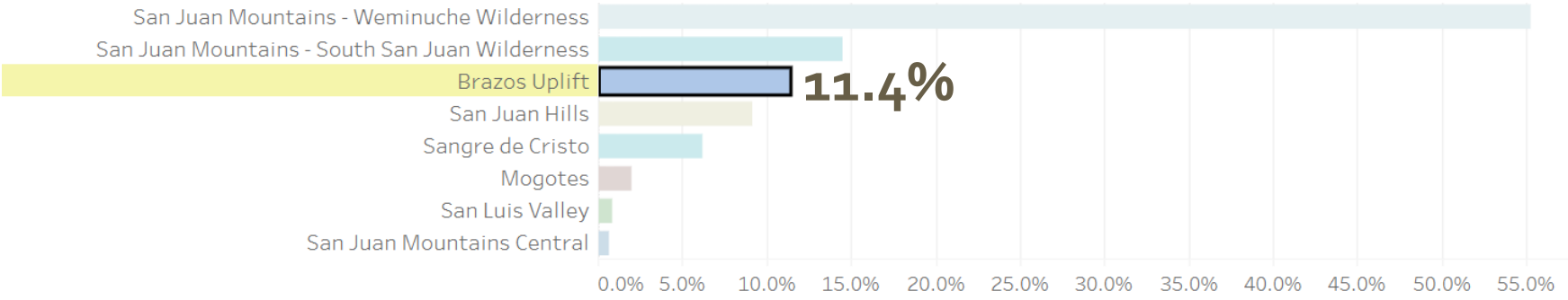
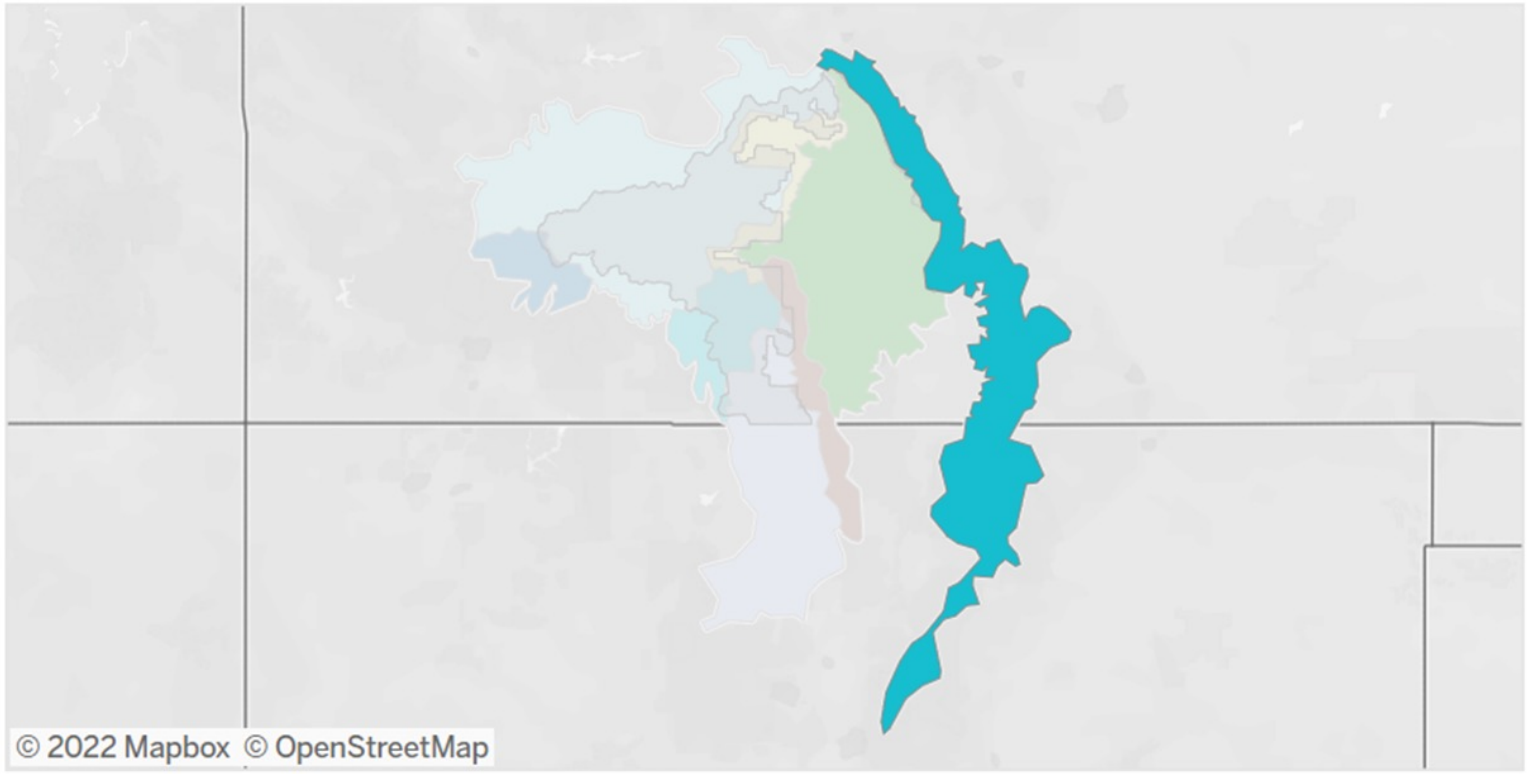
Brazos Uplift

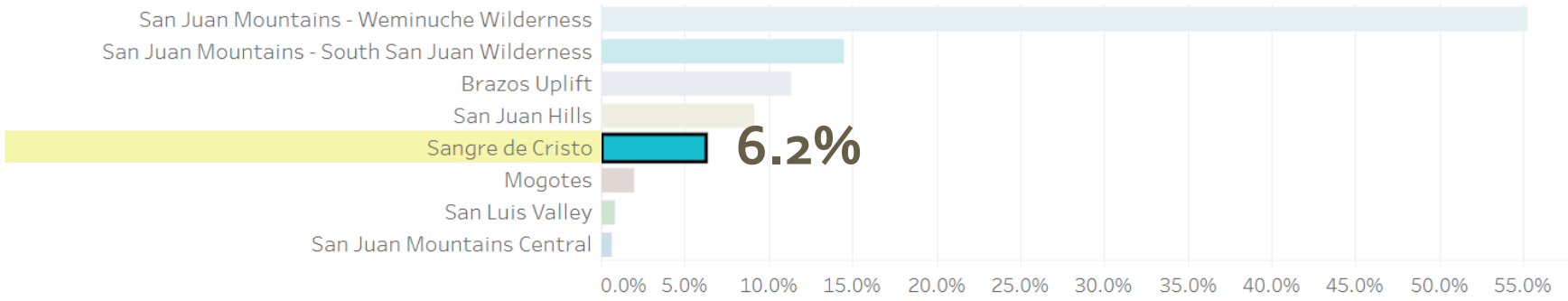




https://climate-by-forest.nemac.org/

Sangre de Cristo





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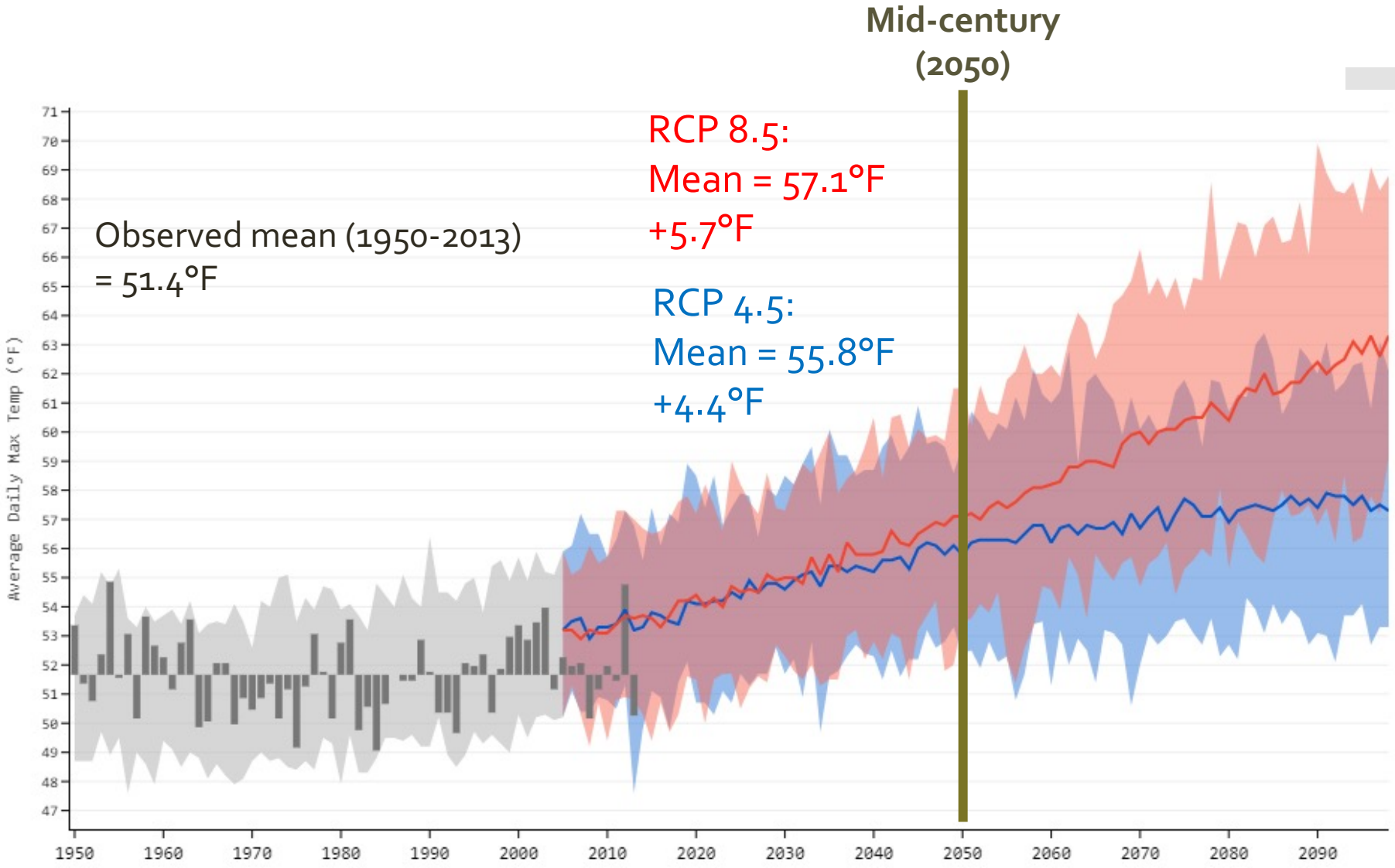
Projected Average Daily Maximum Temperature



Projected Average Daily Max Temp (°F)
in the San Juan Mountains – Weminuche Wilderness Ecoregion

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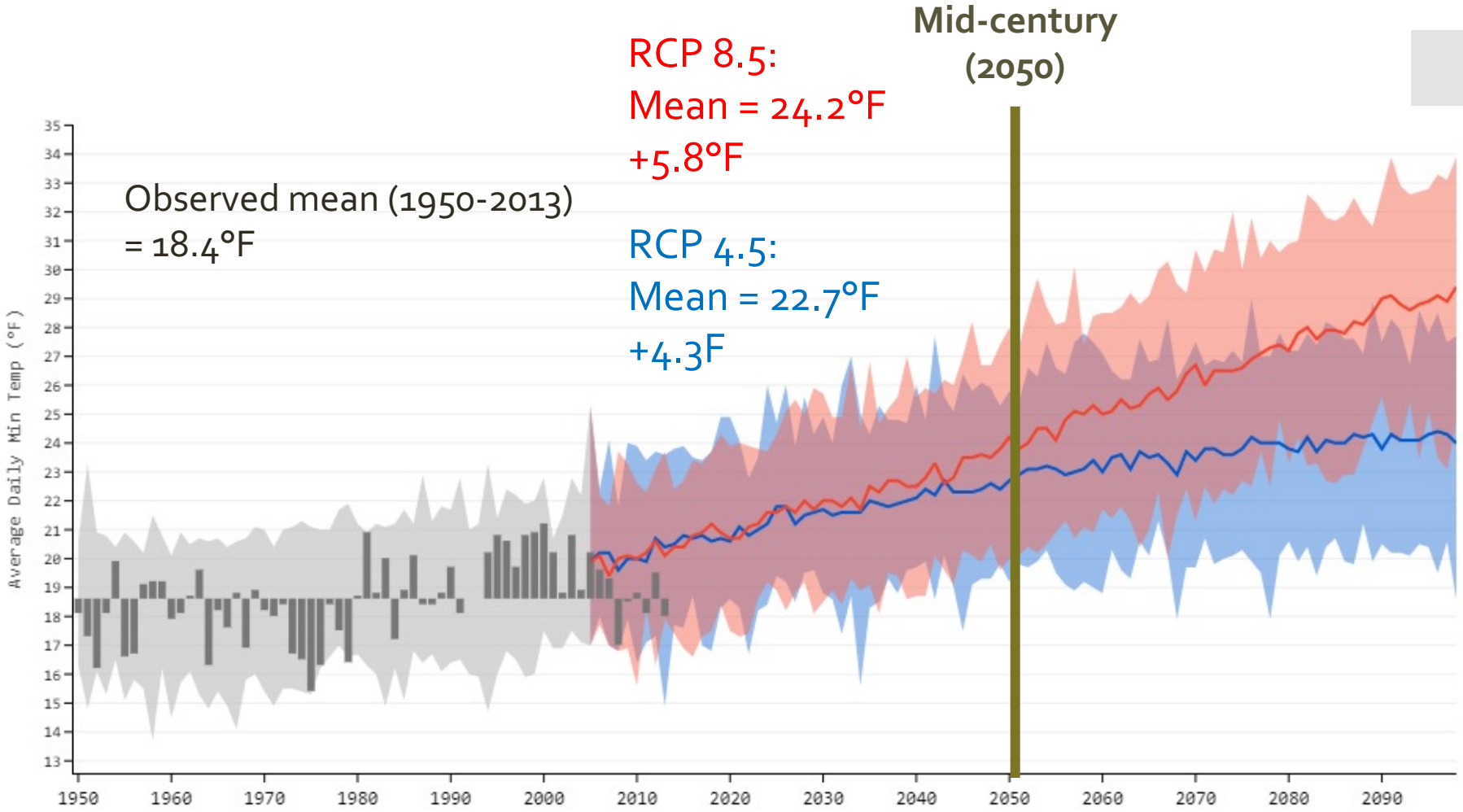
Projected Average Daily Minimum Temperature



Projected Average Daily Min Temp (°F)
in the San Juan Mountains – Weminuche Wilderness Ecoregion

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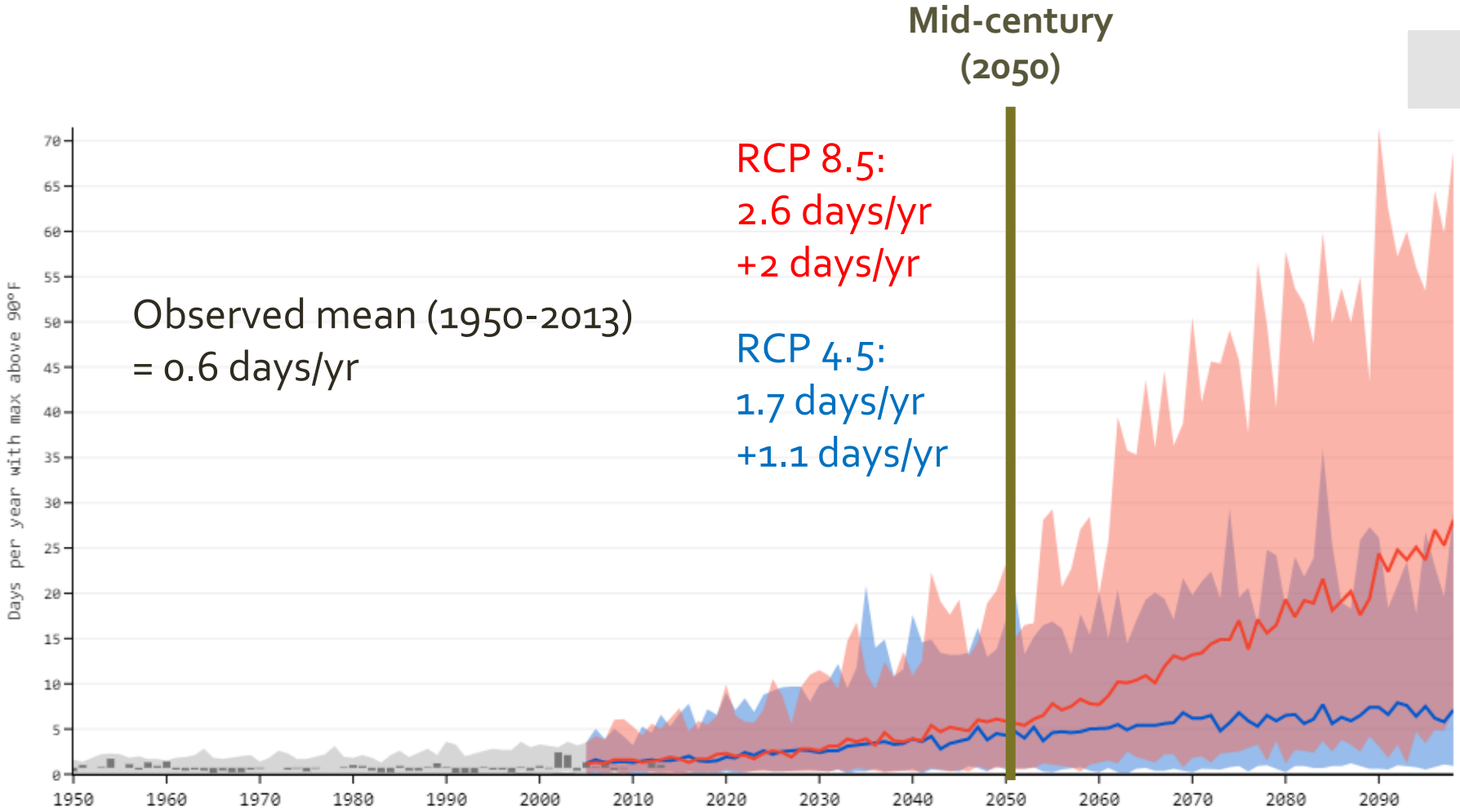
Projected Days per Year with Maximum Temperature Above 90° F (Heat Days)



Projected Days Per Year with Max Above 90°F
in the San Juan Mountains – Weminuche Wilderness Ecoregion

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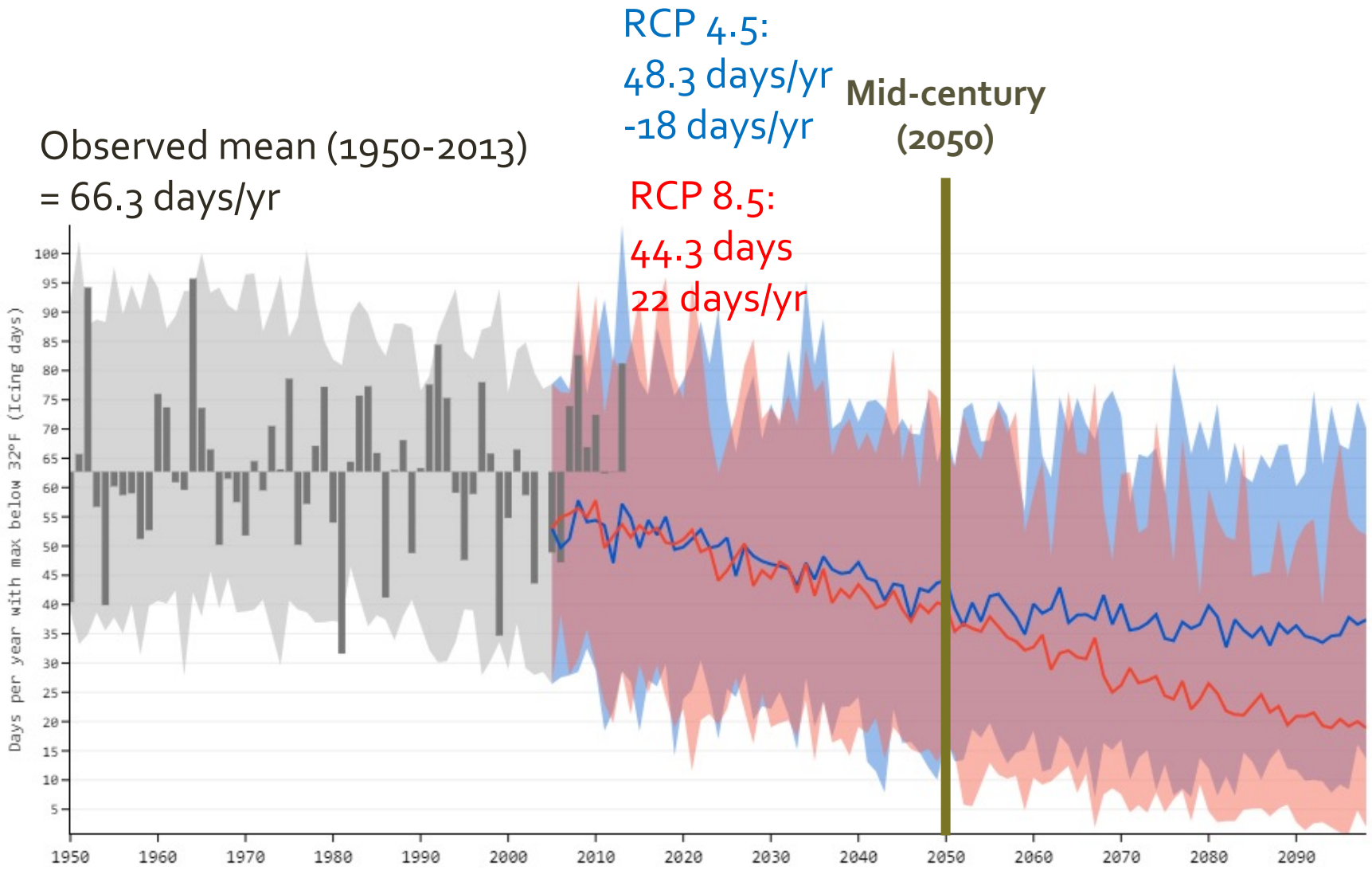
Projected Days per Year with Maximum Temperature Below 32° F (Icing Days)



Projected Days Per Year with Max Below 32°F (Icing Days)
in the San Juan Mountains – Weminuche Wilderness Ecoregion

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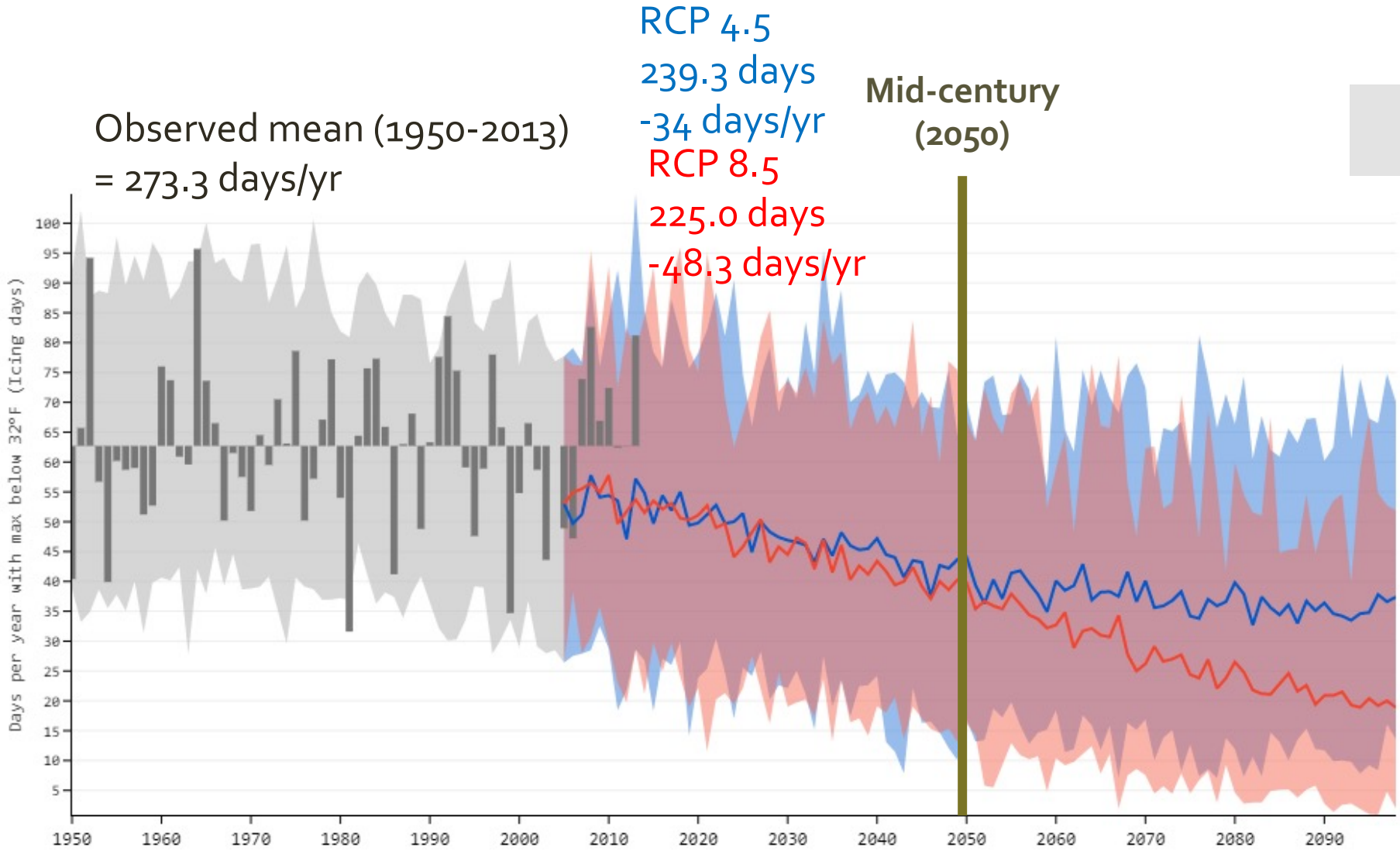
Projected Days per Year with Minimum Temperature Below 32° F (Frost Days)



Projected Days Per Year with Min Below 32°F (Frost Days)
in the San Juan Mountains – Weminuche Wilderness Ecoregion

https://climate-by-forest.nemac.org/

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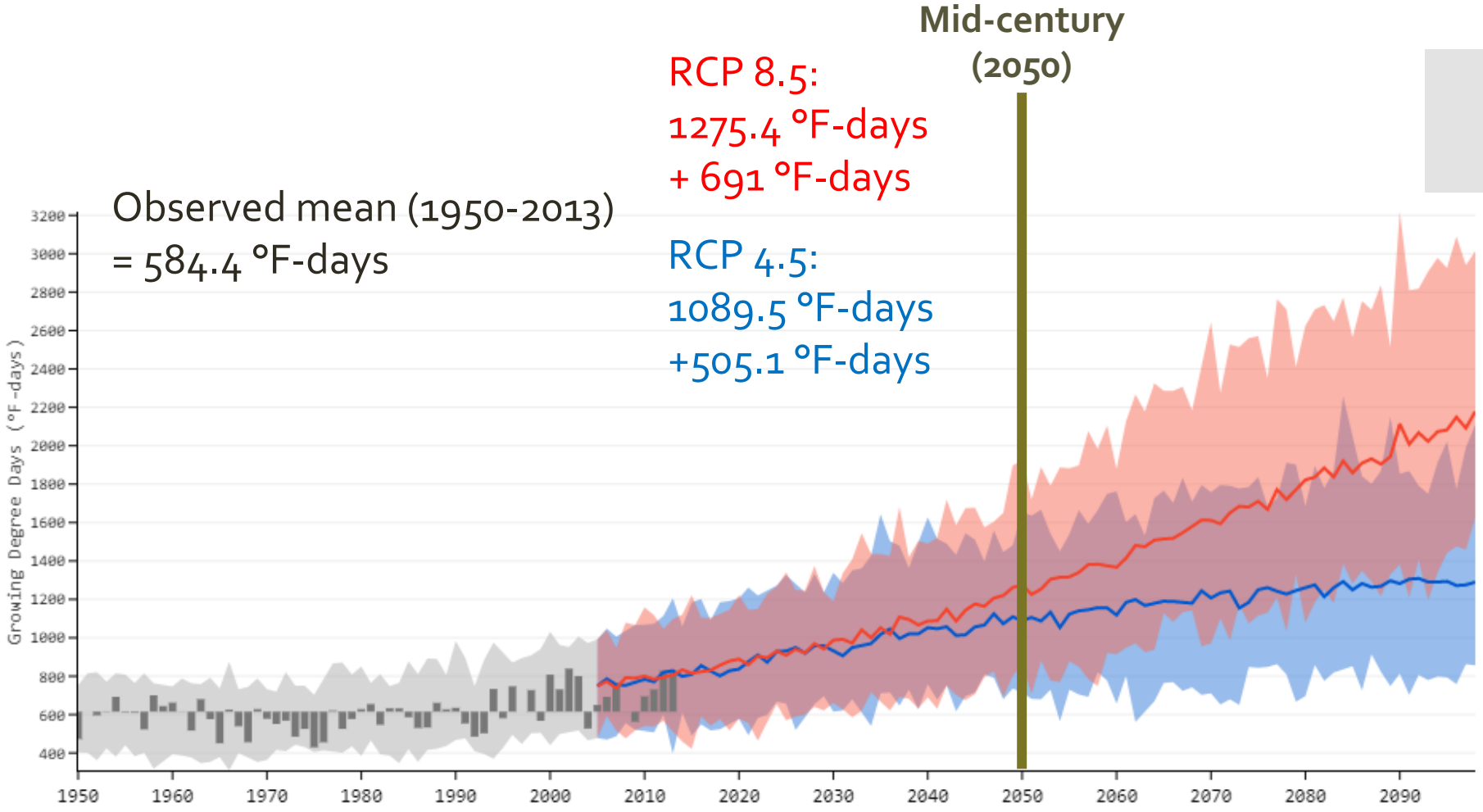
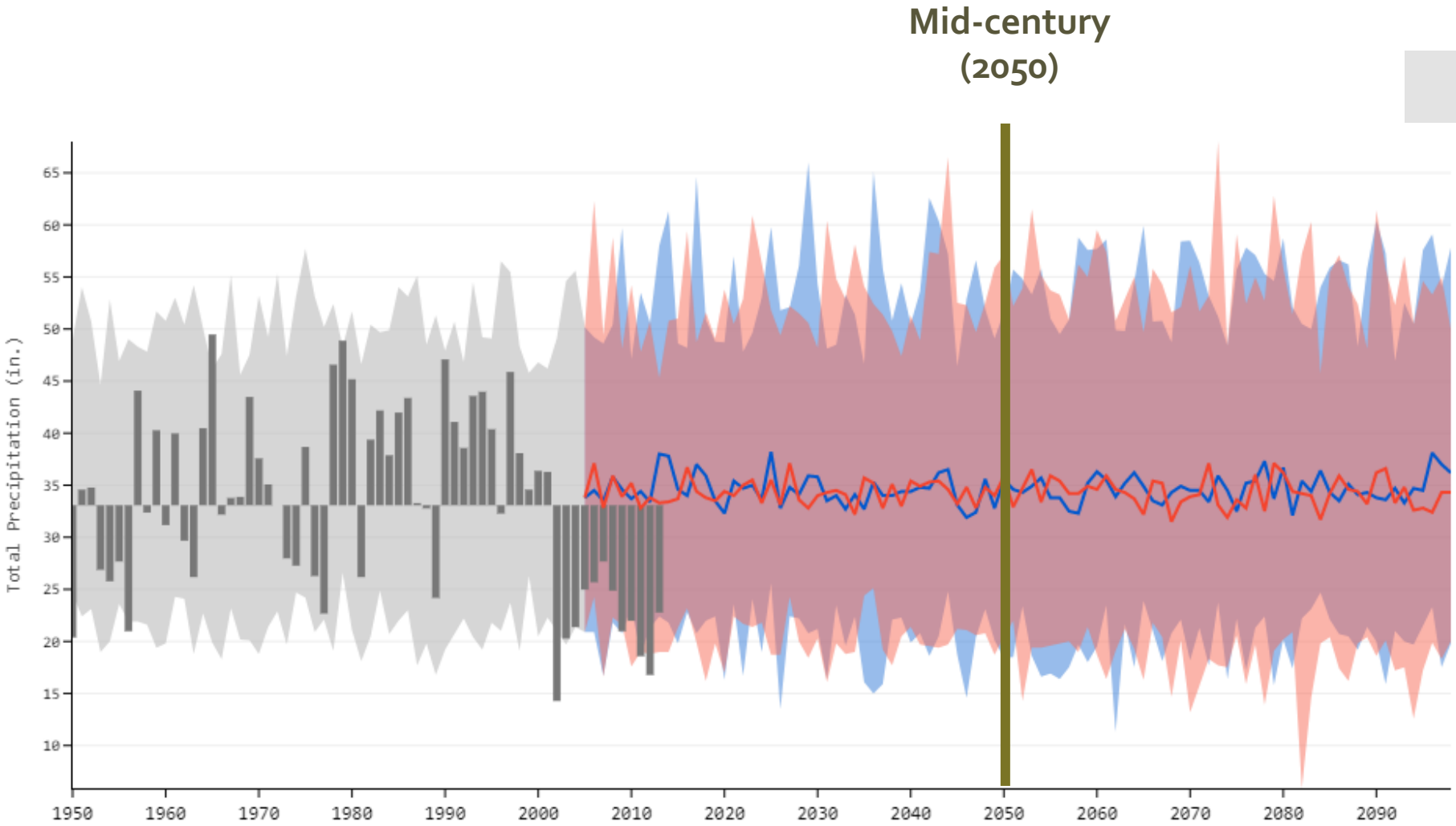
Projected Growing Degree Days (GDD)



Projected Growing Degree Days
in the San Juan Mountains – Weminuche Wilderness Ecoregion

Projected Precipitation



Projected Total Precipitation
in the San Juan Mountains – Weminuche Wilderness Ecoregion

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Overview: Projected changes for the San Juan Mountains – Weminuche Wilderness Ecoregion

By the mid-21st century…

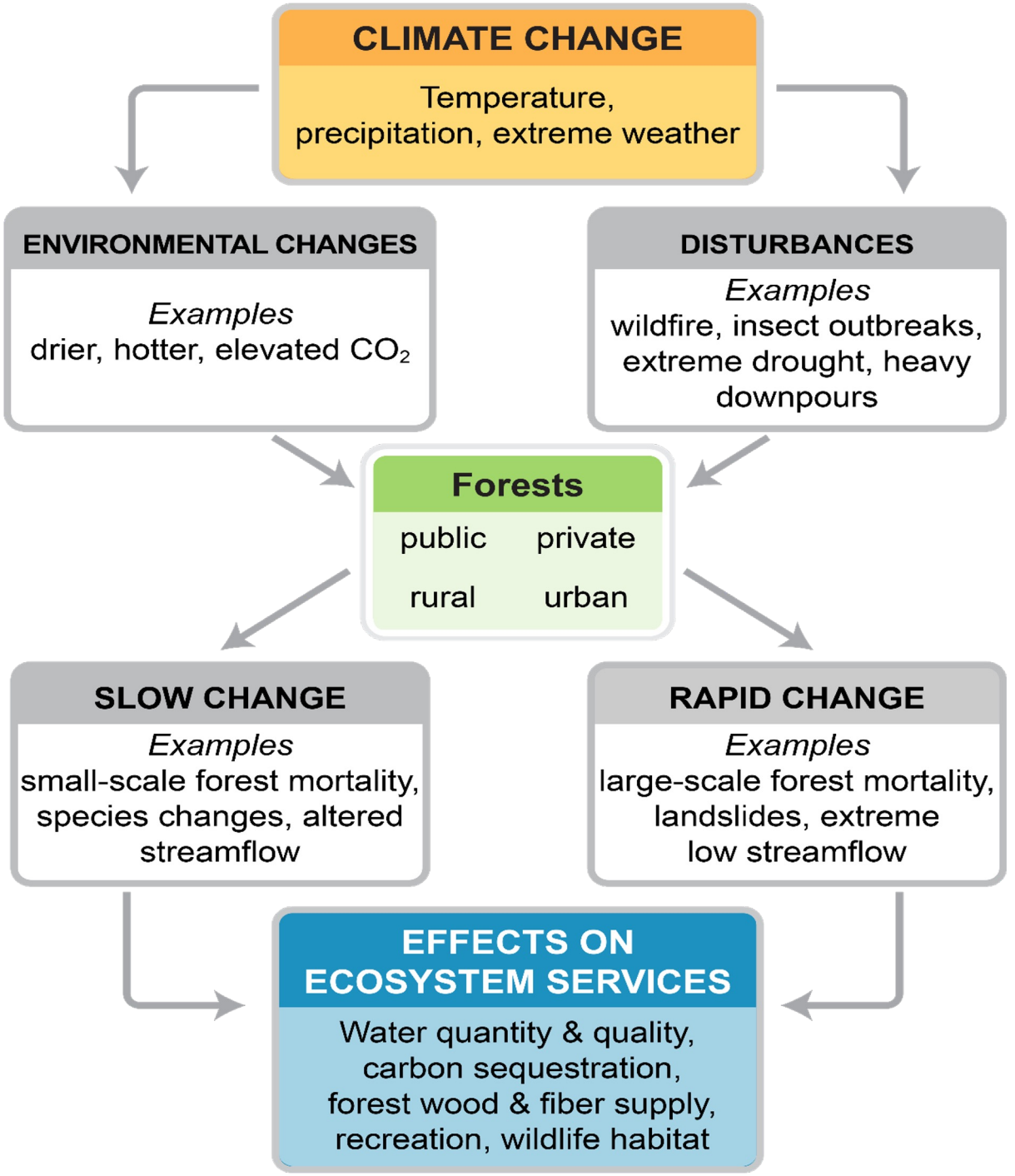
- **Daily Max Temp:** +4.4°F to +5.7°F
- **Daily Min Temp:** +4.3°F to +5.8°F
- **Heat Days** (max > 90°F): 1.1 days/yr to 2 days/yr
- **Icing Days** (max < 32°F): 18 days/yr to 22 days/yr
- **Frost Days** (min < 32°F): 34 days/yr to 48.3 days/yr
- **Growing Degree Days**: +505.1°F-days to +691°F-days
- **Precipitation** projections are highly variable with the likelihood of more extreme events occurring

By the end of the 21st century…

- **Daily Max Temp:** +6.1°F to +6.9°F
- **Daily Min Temp:** +3.5°F to +4.5°F
- **Heat Days** (max > 90°F): 13.3 days/yr to 19.3 days/yr
- **Icing Days** (max < 32°F): 24.8 days/yr to 44 days/yr
- **Frost Days** (min < 32°F): 42.6 days/yr to 80.6 days/yr
- **Growing Degree Days:** +513.1 °F-days to +675.7 °F-days
- **Precipitation** projections are highly variable with the likelihood of more extreme events occurring

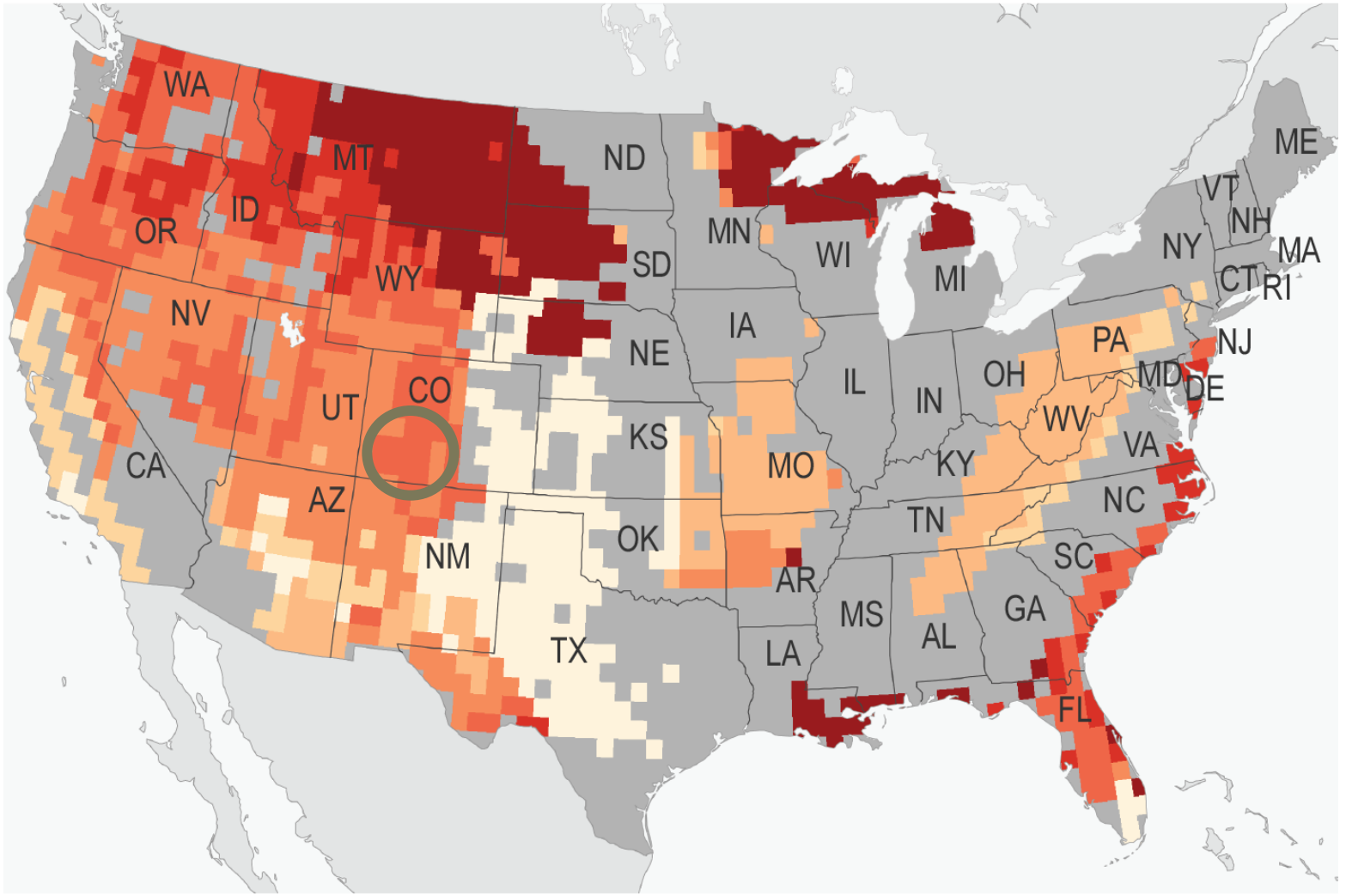
Forest Implications

How climate change will affect the forest



Projected Increase in Risk of Very Large Fires by Mid-Century

Fire



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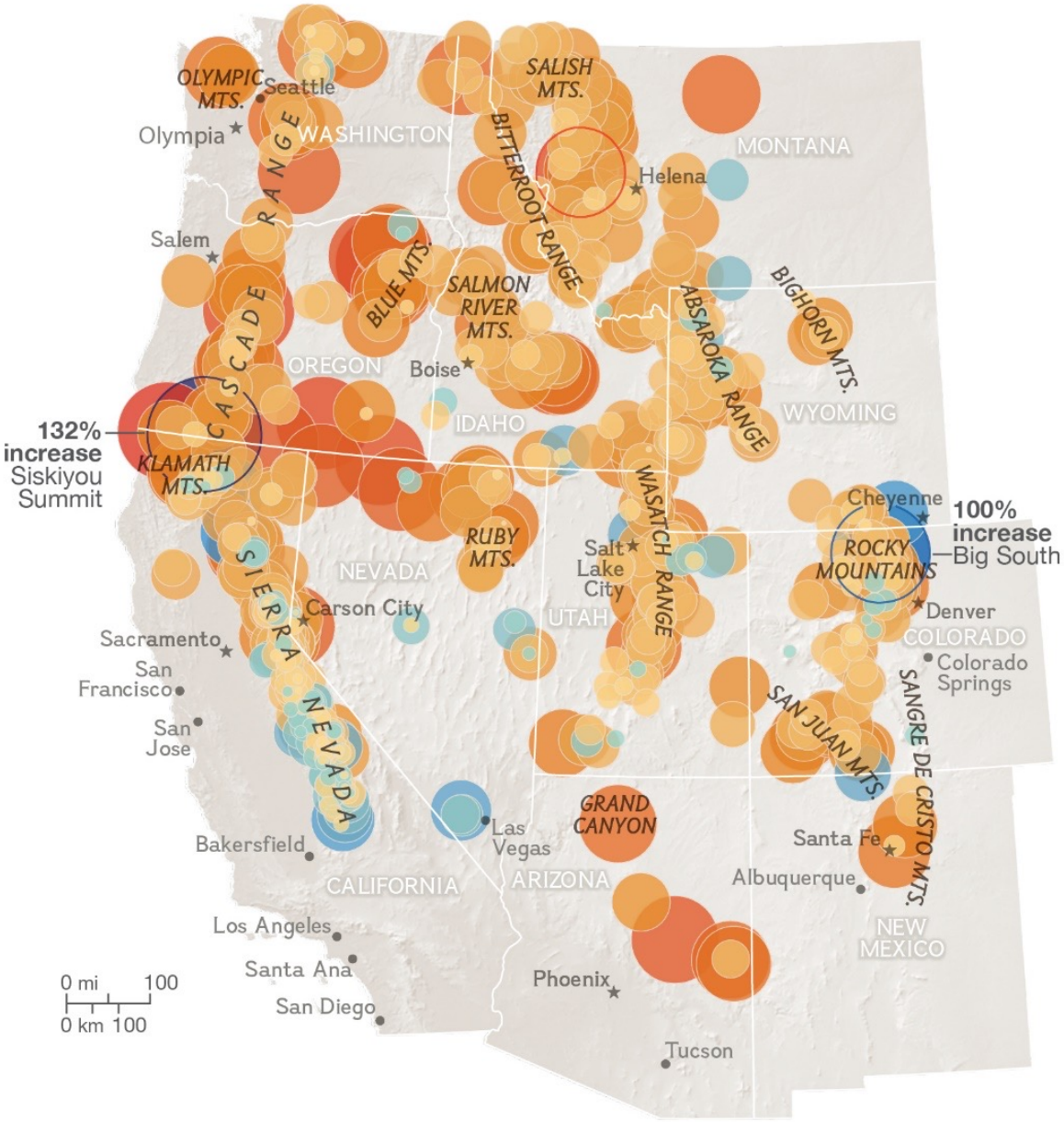
Snowpack

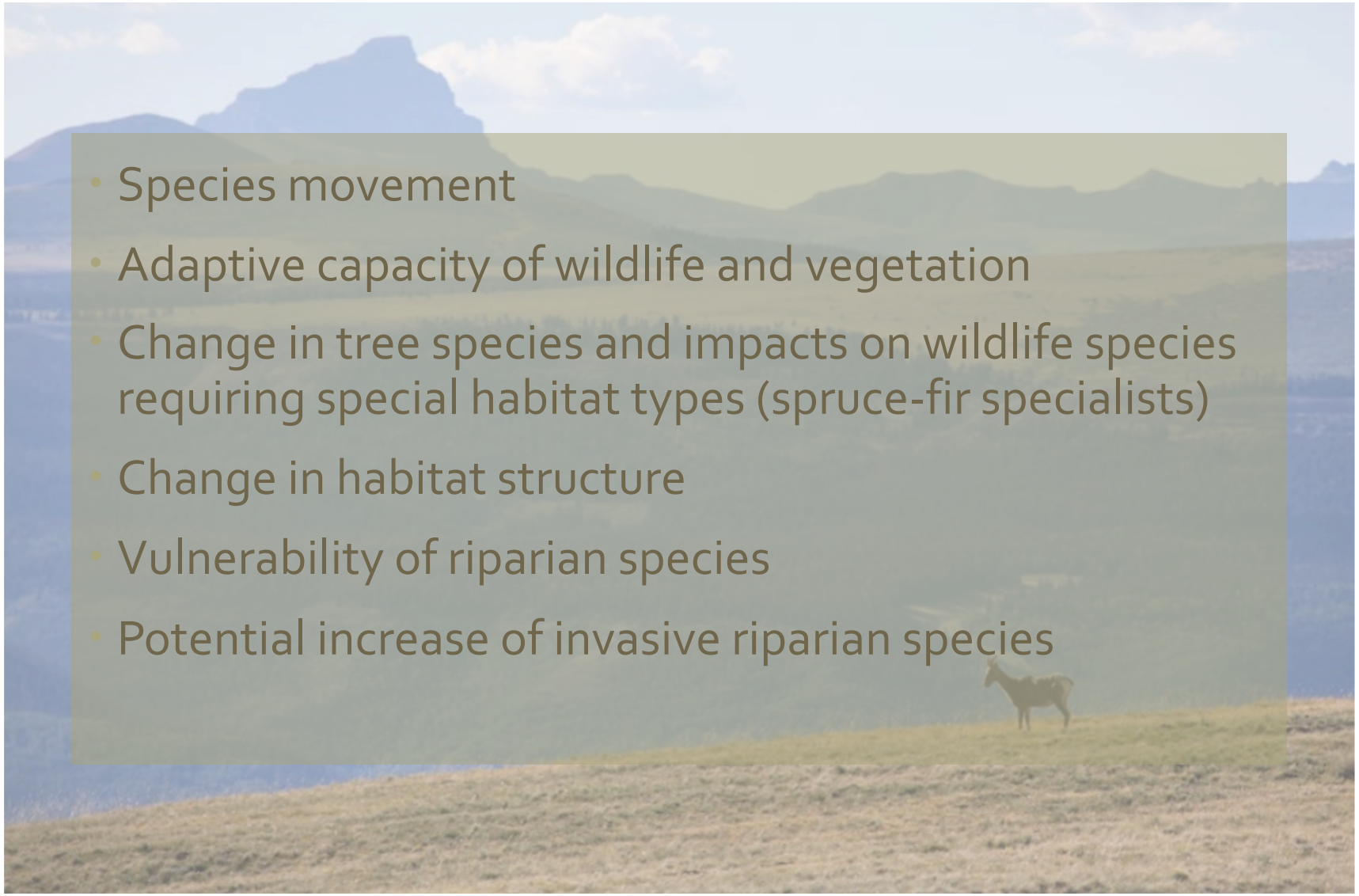


VIRGINIA W. MASON AND KELSEY NOWAKOWSKI, NGM STAFF. SOURCES: NATURAL RESOURCES CONSERVATION SERVICE; CALIFORNIA DEPARTMENT OF WATER RESOURCES; DARRIN SHARP AND PHILIP MOTE, OREGON STATE UNIVERSITY

Hydrology

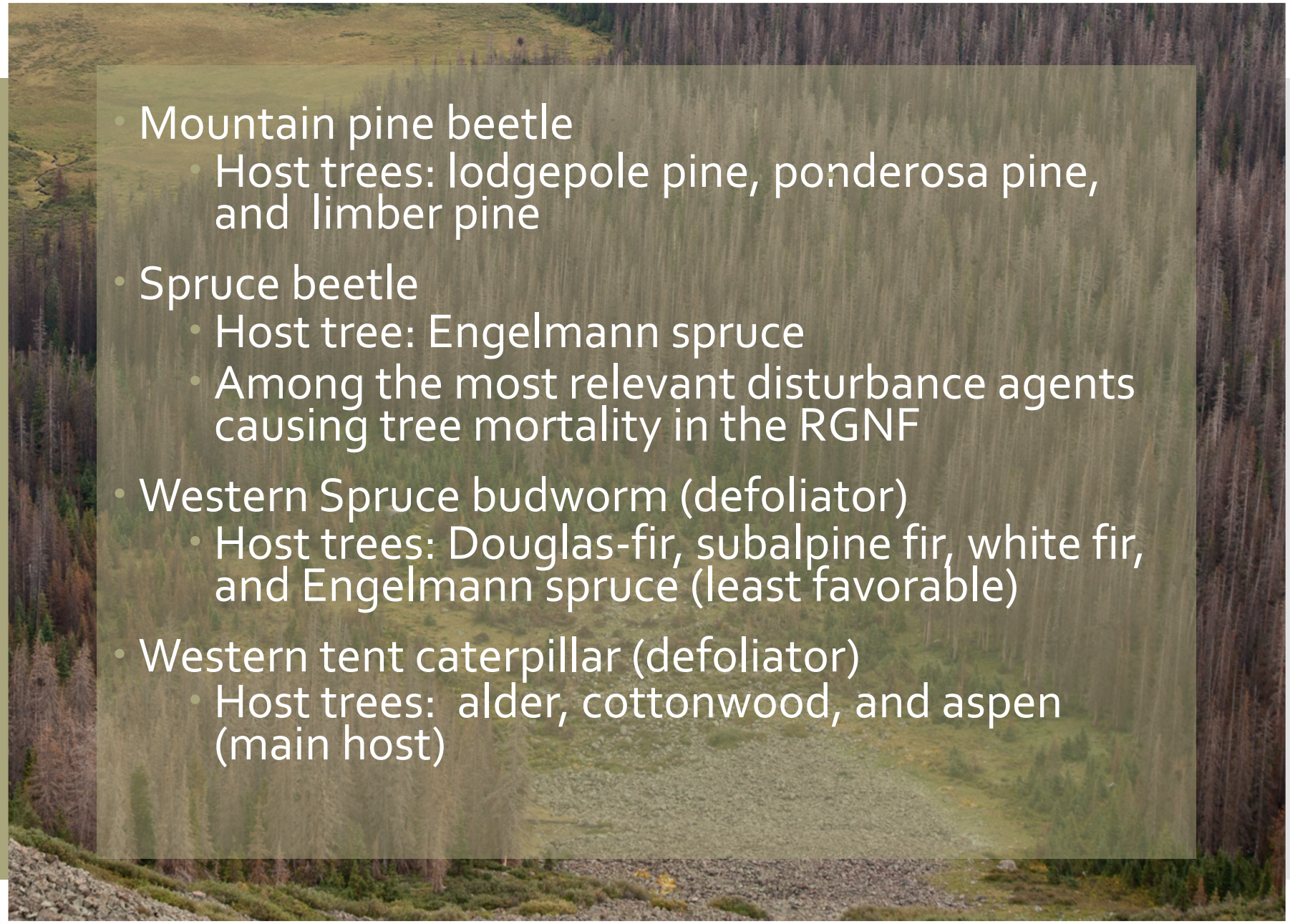
Declining snowpack, heavy rainfall, and summer droughts are increasing the risk of winter flooding, low summer streamflow, and reduced water quality

Wildlife



- Species movement
- Adaptive capacity of wildlife and vegetation
- Change in tree species and impacts on wildlife species requiring special habitat types (spruce-fir specialists)
- Change in habitat structure
- Vulnerability of riparian species
- Potential increase of invasive riparian species

Insects



- Mountain pine beetle
  - Host trees: lodgepole pine, ponderosa pine, and limber pine
- Spruce beetle
  - Host tree: Engelmann spruce
  - Among the most relevant disturbance agents causing tree mortality in the RGNF
- Western Spruce budworm (defoliator)
  - Host trees: Douglas-fir, subalpine fir, white fir, and Engelmann spruce (least favorable)
- Western tent caterpillar (defoliator)
  - Host trees: alder, cottonwood, and aspen (main host)

"Climate Change and Selected Forest Insect and Pathogens in the Rio Grande National Forest" (Negrón 2019)

Pathogens

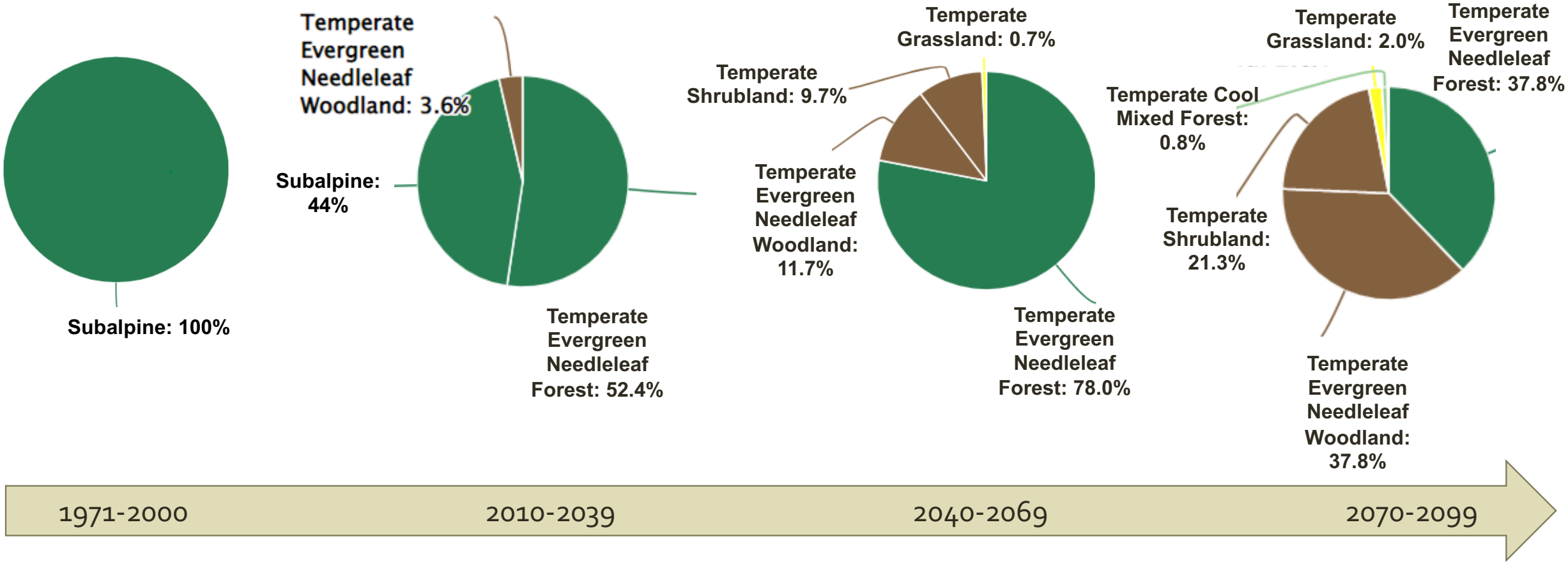
- Dwarf mistletoes
- Armillaria root disease
- White Pine Blister Rust
- Sudden Aspen Decline


White Pine Blister Rust (USFS)


Dwarf mistletoe (Colorado State Forest Service)

"Climate Change and Selected Forest Insect and Pathogens in the Rio Grande National Forest" (Negrón 2019)

Climate-Driven Shifts in Vegetation Cover



Shifts in modeled vegetation class under RCP 8.5,
with fire suppression

https://climatetoolbox.org/tool/Future-Vegetation

Thank you!

Lauren Kramer:
Lauren.Kramer@usda.gov

https://www.climatehubs.usda.gov/hubs/southwest

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References

- The Climate Toolbox https://climatetoolbox.org/
- Climate by Forest https://climate-by-forest.nemac.org/
- Box folder “climate_change_workshop”