WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

# Eastern Washington SHC
# Vegetation Ecotypes and Climate Change

*A Presentation to the Board of Natural Resources*

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April 4, 2023

# Agenda

- Creating vegetation ecotypes using climate variables
- Future ecotypes shifts
- How it may be used in the EWA SHC

# Forested Vegetation Zones in eastern WA

*Identifying Old Trees and Forests in Eastern Washington, Van Pelt 2008*

- Forested vegetation zones based on dominant tree species (Figure 3)
- Each forested vegetation zone is subdivided into plant associations
- Plant associations group plant species across the landscape based on environmental tolerances
  - Each reflects different temperature and precipitation regimes
  - Tree species organize along environmental gradients (Figure 4)

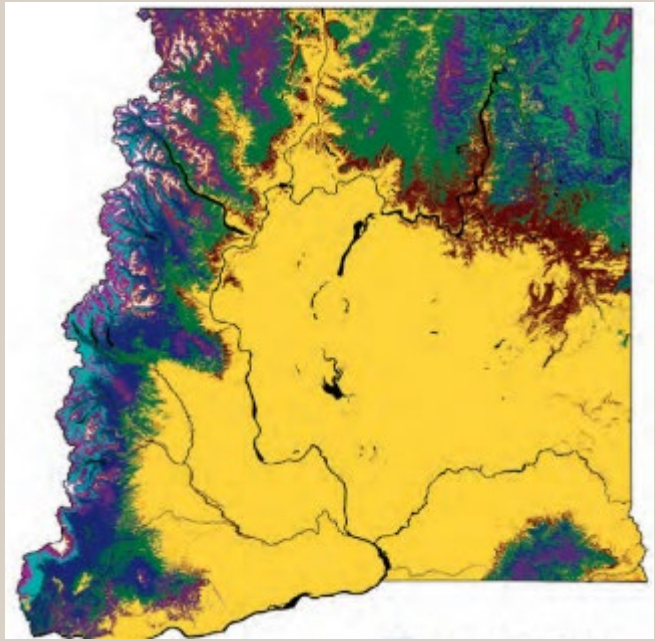


*Figure 3: Forested Vegetation Zones*

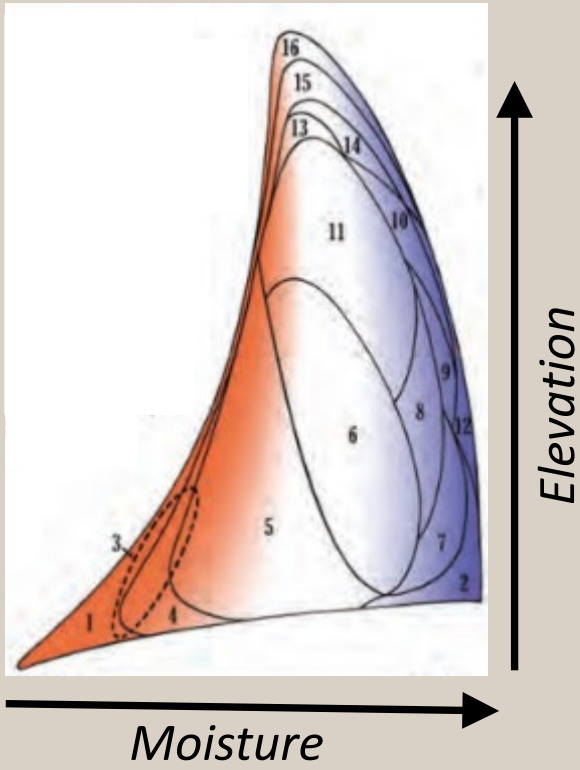



*Figure 4: Environ Gradients*

# Eastern WA DNR Forest Types

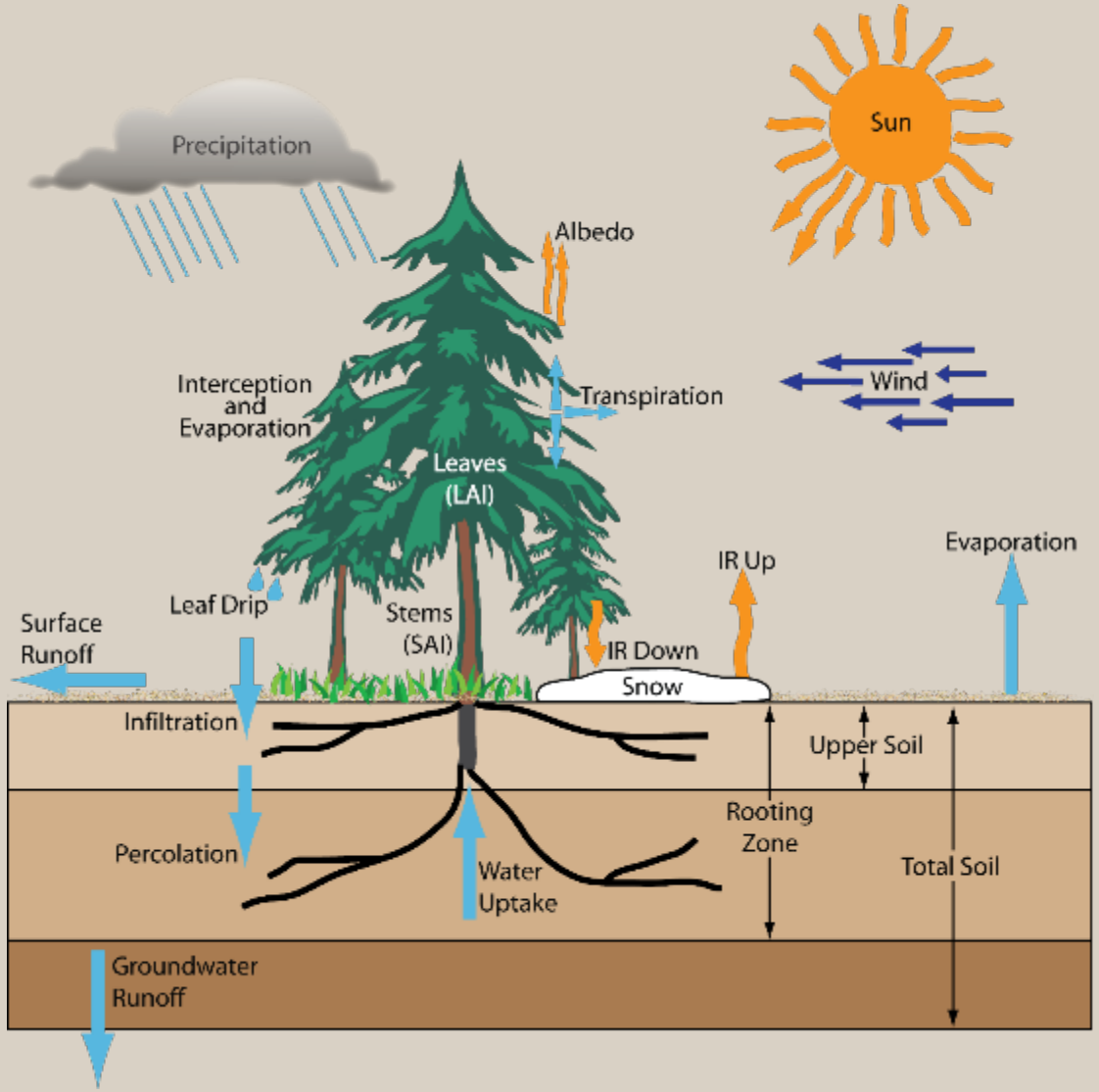
Forested vegetation ecotypes on DNR eastern trust lands

1) Subalpine
2) Cool Moist Mix Conifer
3) Warm Moist Mix Conifer
4) Dry Mix Conifer
5) Ponderosa-Douglas fir
6) Ponderosa
7) Non-commercial Ponderosa; Oregon Oak

*Can we use climatic data to create vegetation ecotypes?*

# Climatic Water Deficit

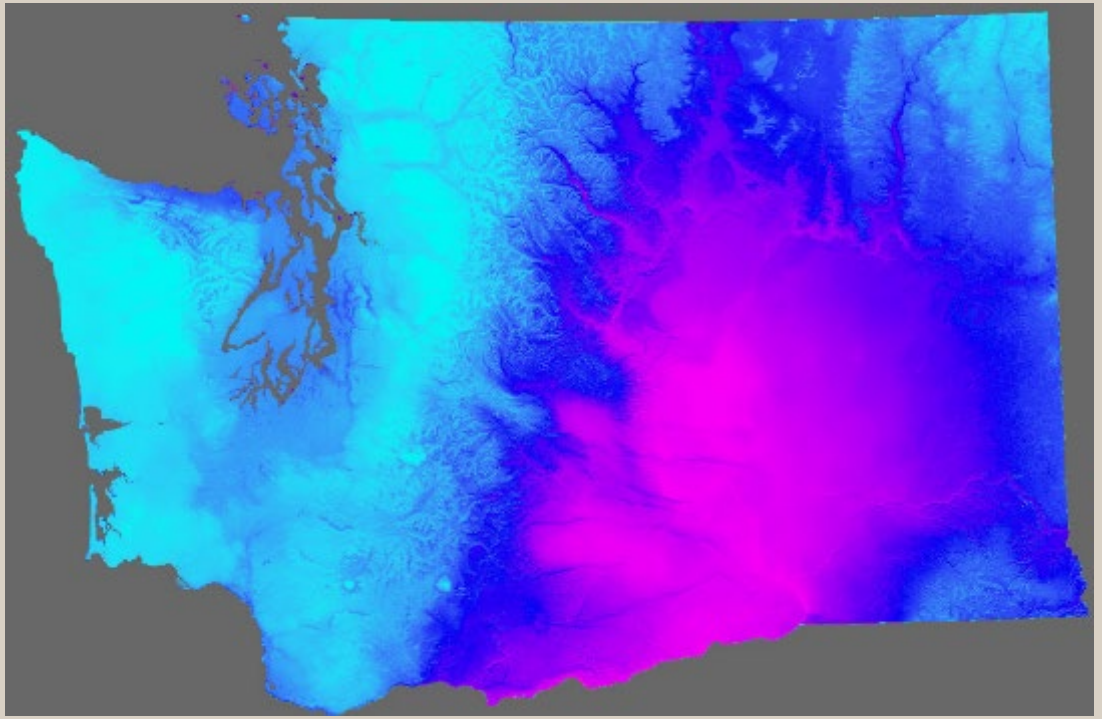
- Deficit is the amount of drought stress due to lack of water when solar radiation is high
- Examines the difference between potential evapotranspiration and actual evapotranspiration
- Captures the moisture and temperature variability



# Creating Vegetation Ecotypes

Organize the seven vegetation ecotypes along the climatic water deficit gradient

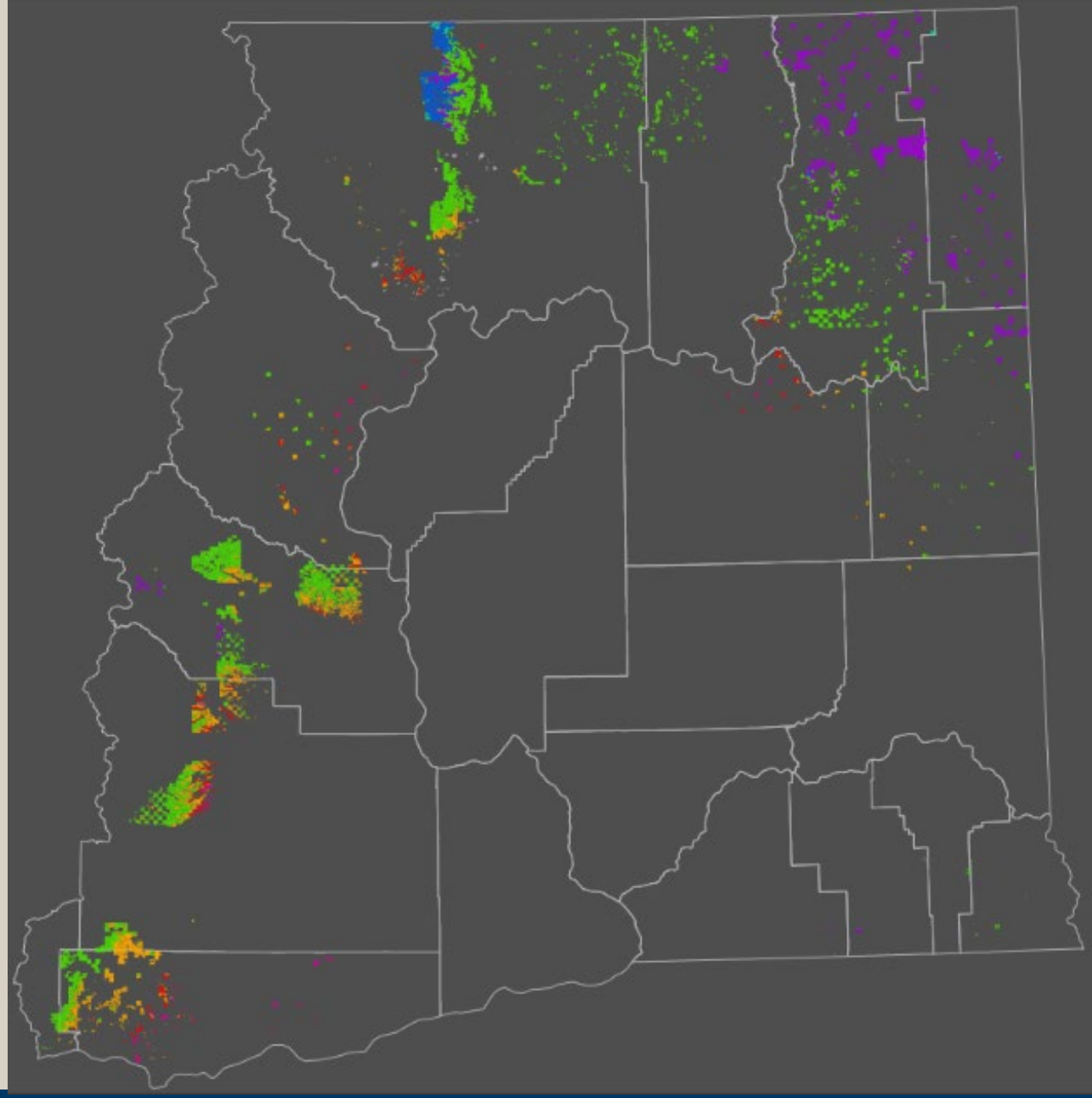
| Moisture Deficit | Vegetation Ecotypes |
|---|---|
| Low | Subalpine |
| | Cool Moist Mix Conifer |
| | Warm Moist Mix Conifer |
| | Dry Mix Conifer |
| | Ponderosa-Douglas Fir |
| High | Ponderosa |
| | Non-commercial |



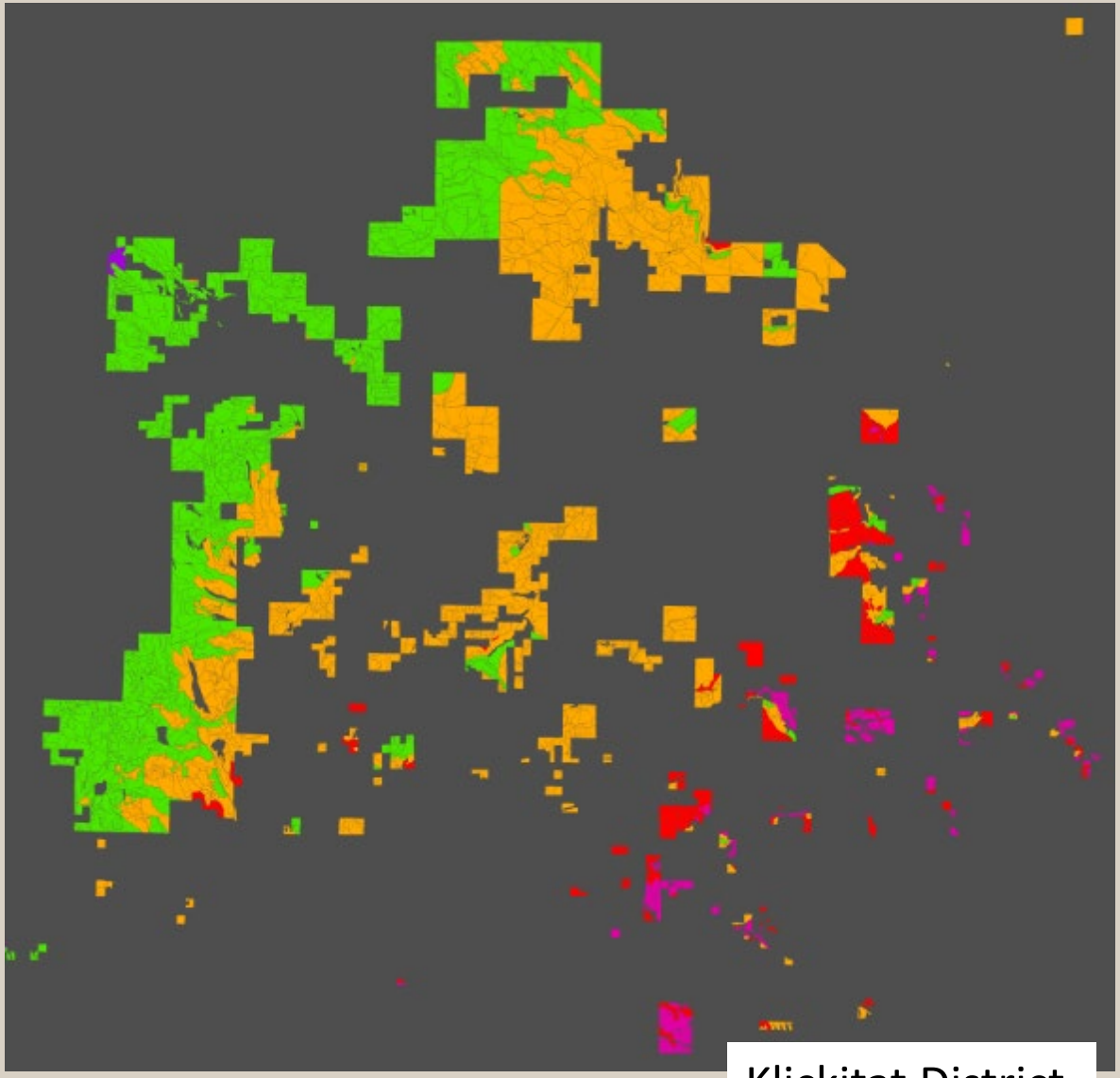
Climatic water deficit raster thanks to:
Sean Jeronimo (Resilient Forestry) and
Derek Churchill (DNR Forest Resilience)

# Vegetation Ecotypes

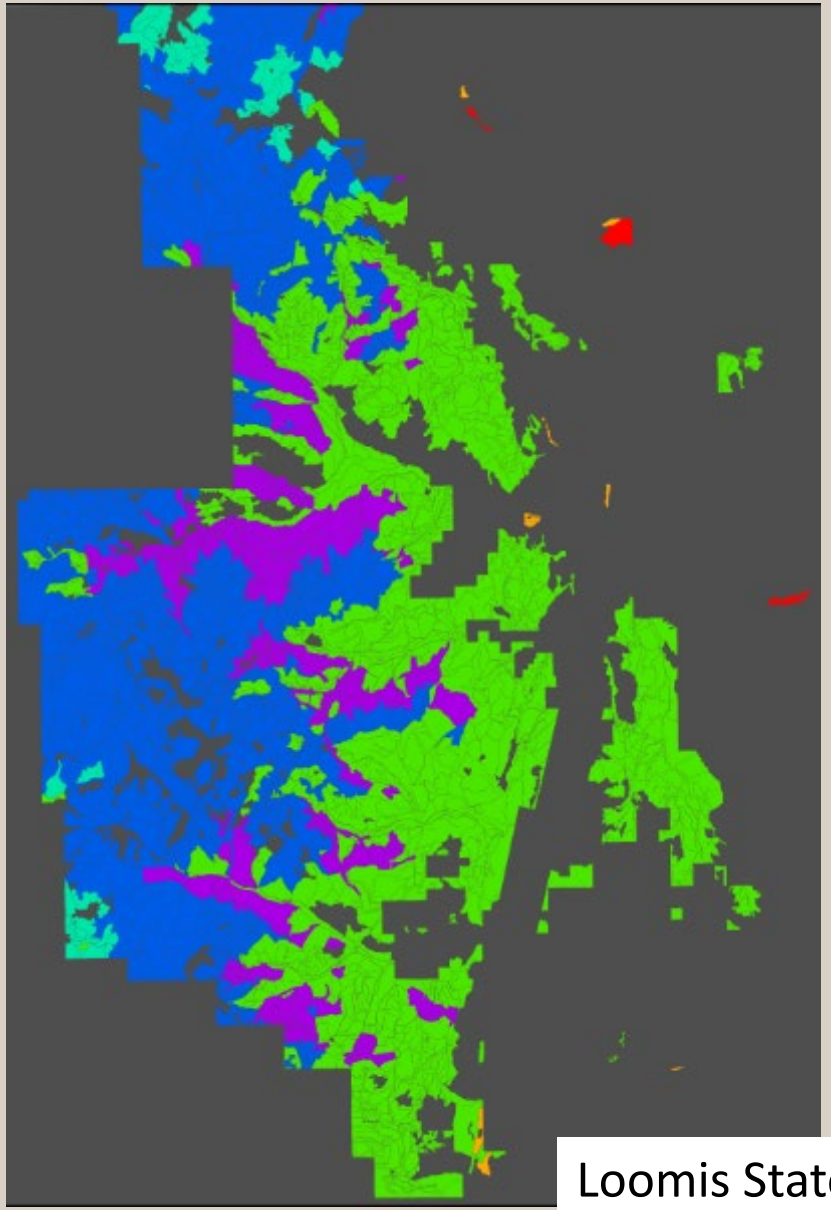
| Vegetation Ecotype | %* |
|---|---|
| Subalpine | 0.5 |
| Cool Mix Moist Conifer | 6 |
| Warm Moist Mix Conifer | 19.5 |
| Dry Mix Conifer | 50 |
| Ponderosa-Douglas Fir | 18.5 |
| Ponderosa | 4 |
| Non-commercial | 1.5 |



**Draft Assignment - subject to change*



Klickitat District



Loomis State Forest

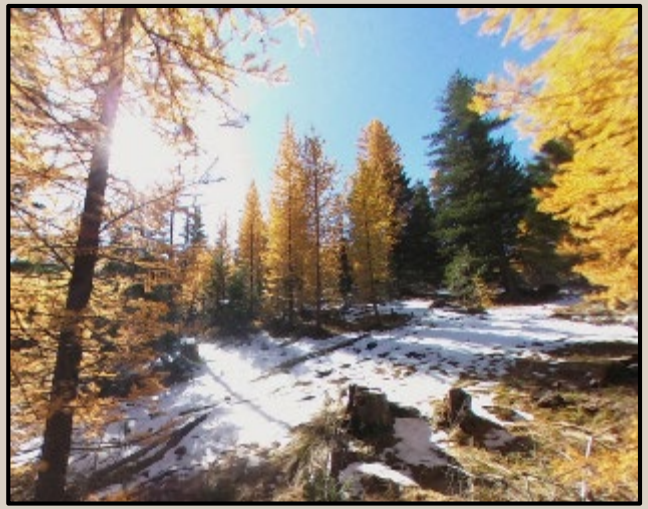
# Vegetation Ecotypes

**Subalpine**

**Cool Moist Mix Conifer**

**Warm Moist Mix Conifer**

# Vegetation Ecotypes



**Dry Mix Conifer**

**Ponderosa – Douglas Fir**

# Vegetation Ecotypes

**Ponderosa**

**Non-Commercial**

# Representative Concentration Pathways

- RCP 8.5 – “worse case” scenario
  - Greenhouse gas emissions continue to rise in 21st century
  - Pathway used in the 20-year Forest Health Plan
- RCP 4.5 – “intermediate” scenario
  - Greenhouse gas emission peak in 2045 then decrease
- Predicted climate data for both scenarios was used to recreate vegetation ecotypes into the future

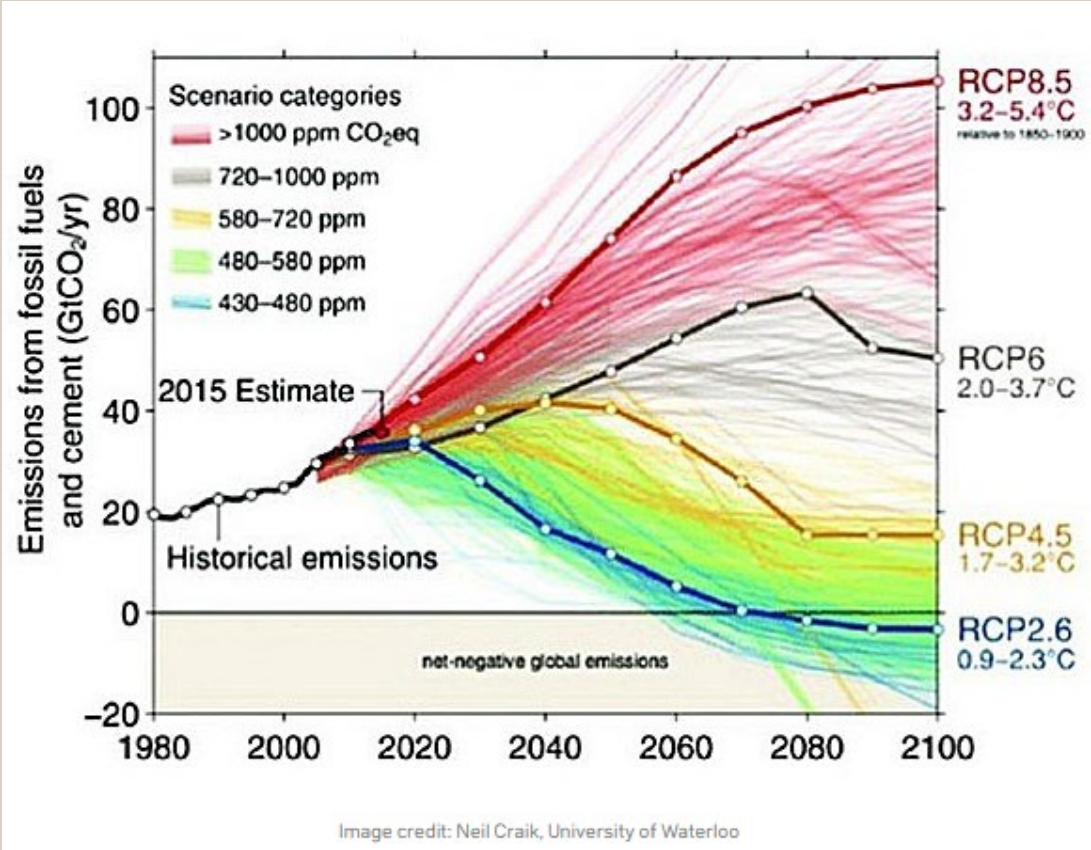
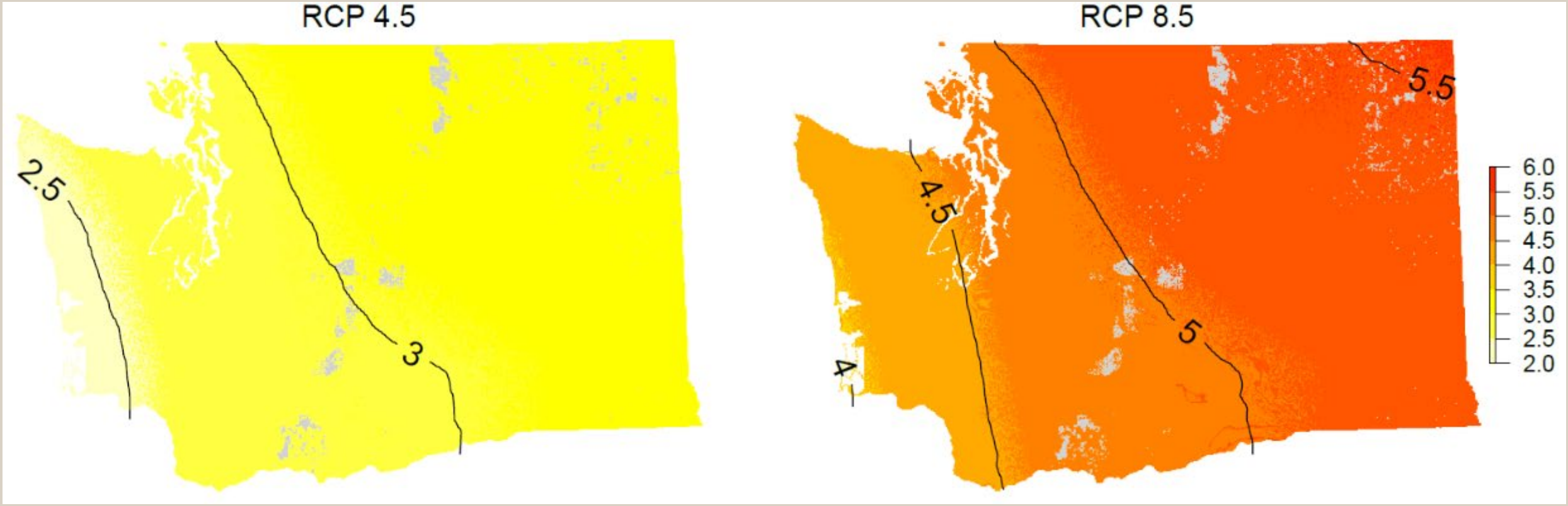


Image credit: Neil Craik, University of Waterloo

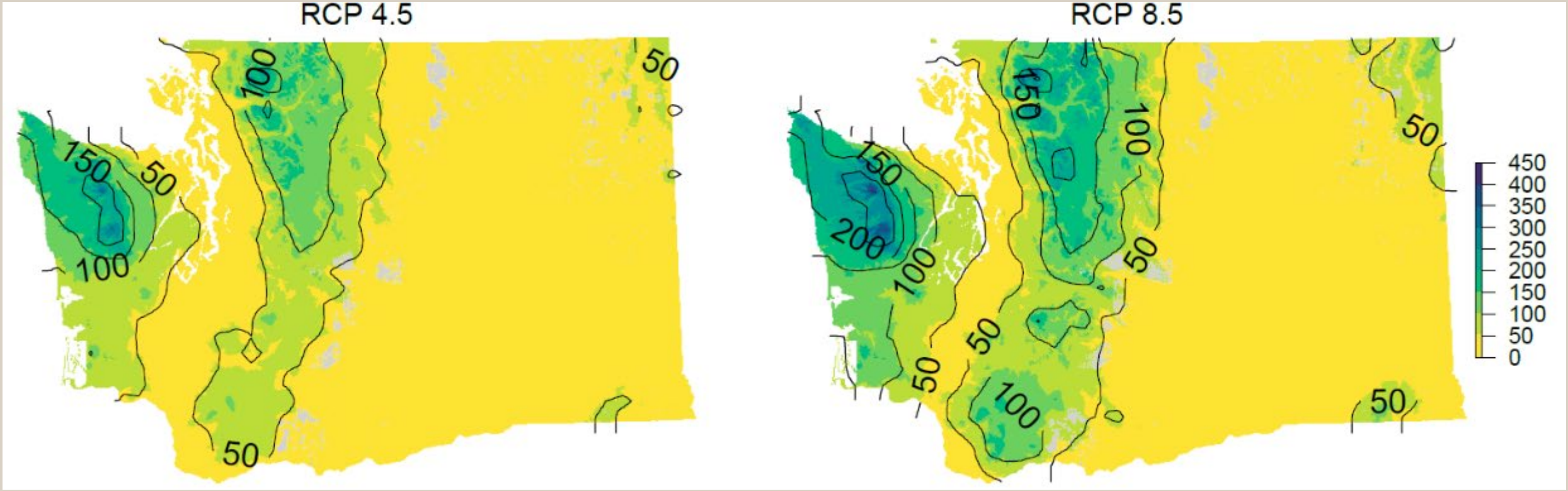
# Differences in Climate Predictions

Mean Annual Temperature 2085 – 1981 (degrees C)



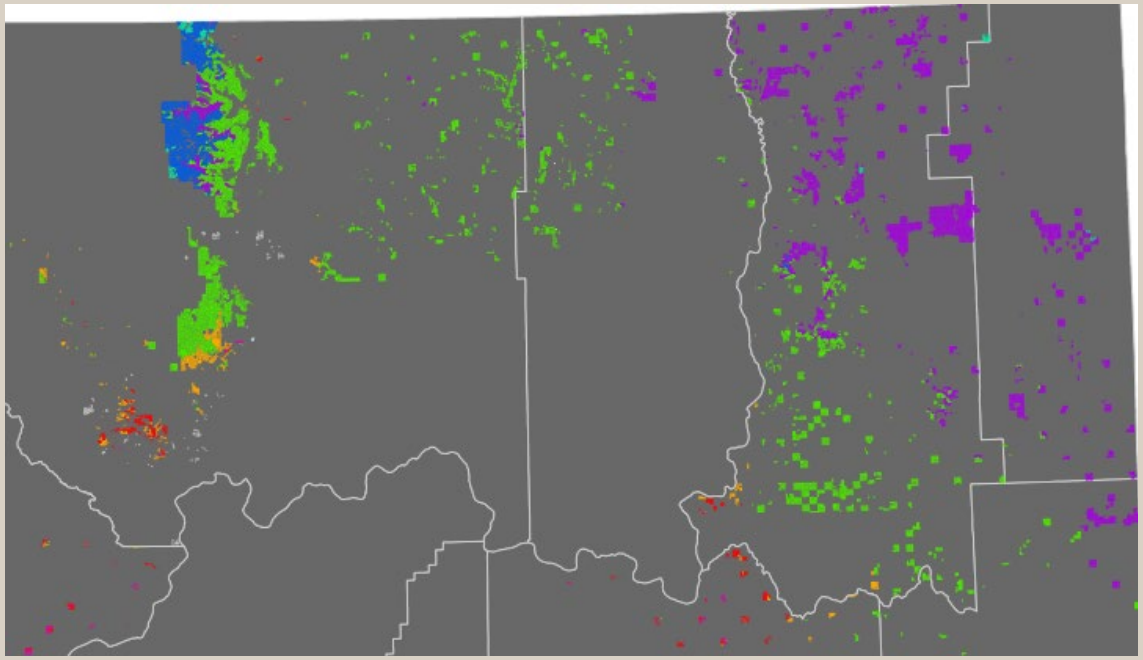
# Differences in Climate Predictions

Mean Annual Precipitation 2085 – 1981 (mm)

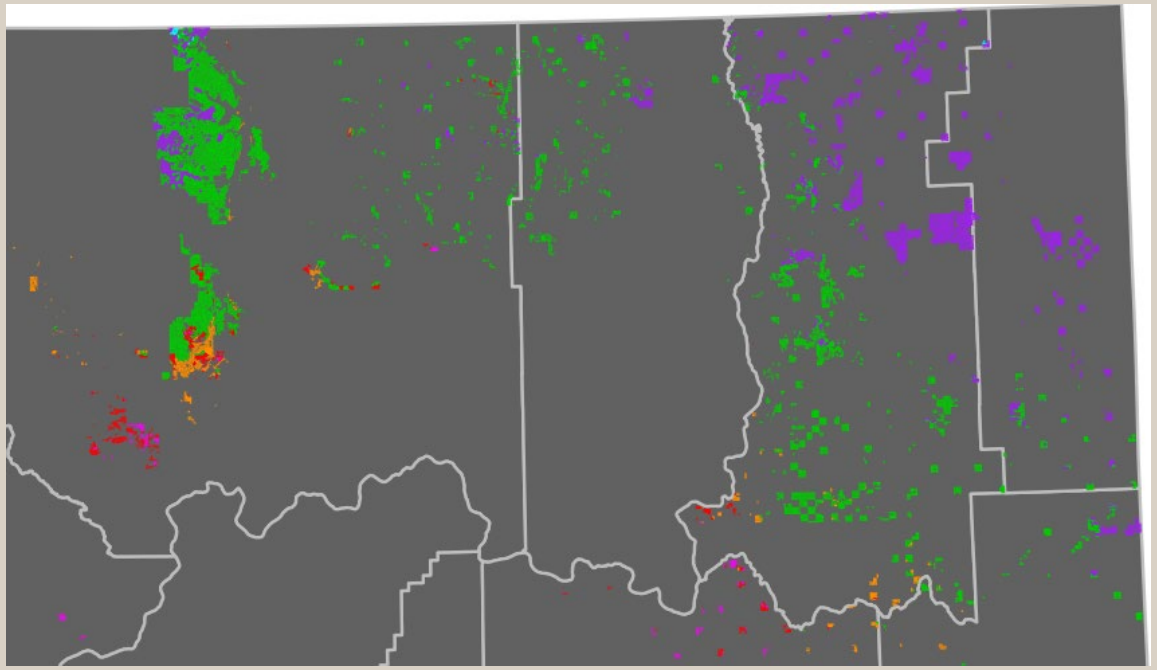


# Changes in Vegetation Ecotype

DNR Forested Trust Lands in NE Region



Current



2120 RCP4.5

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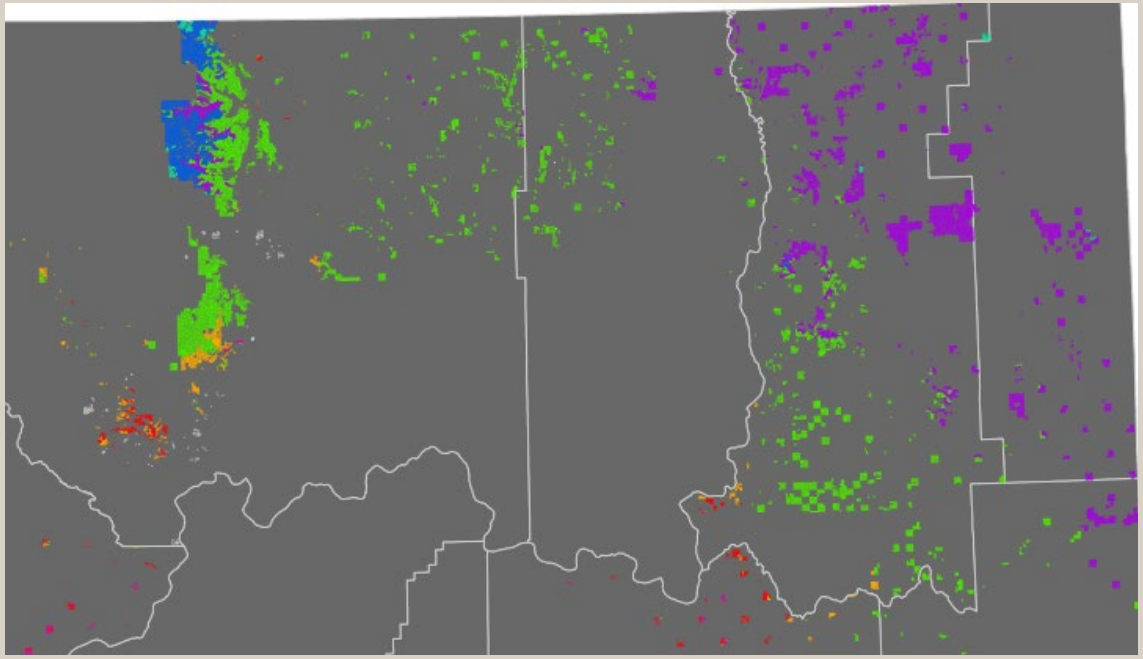

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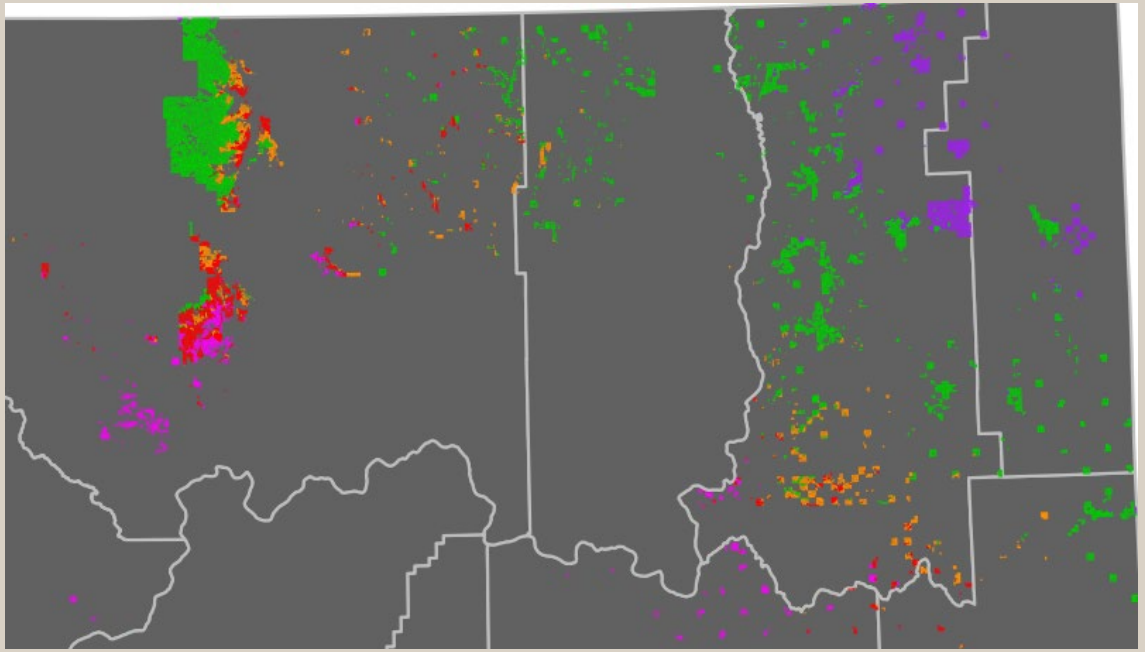
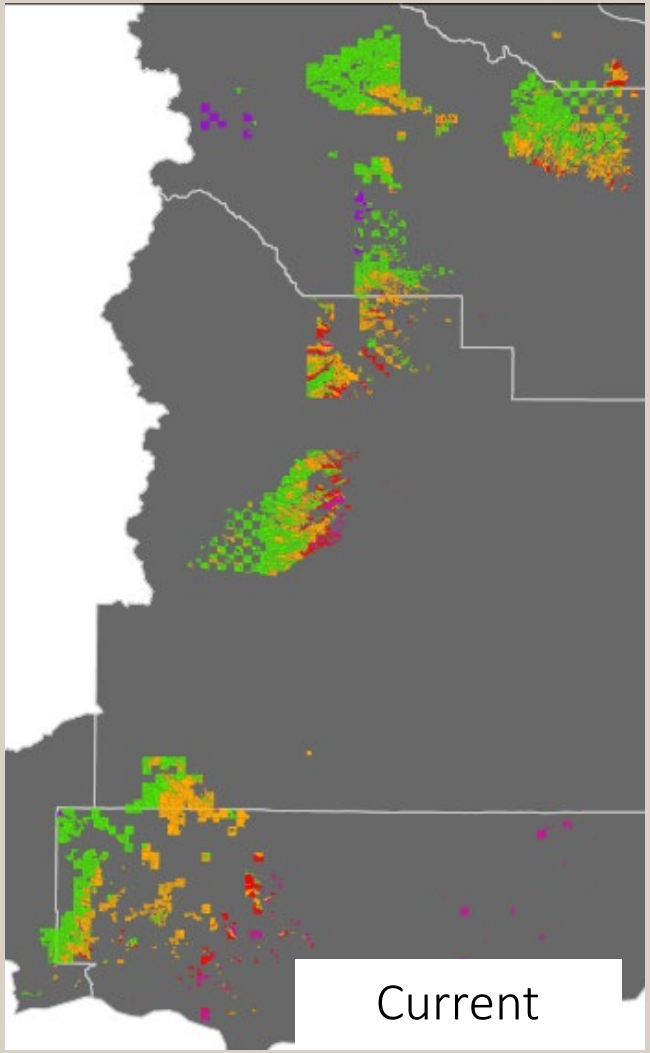
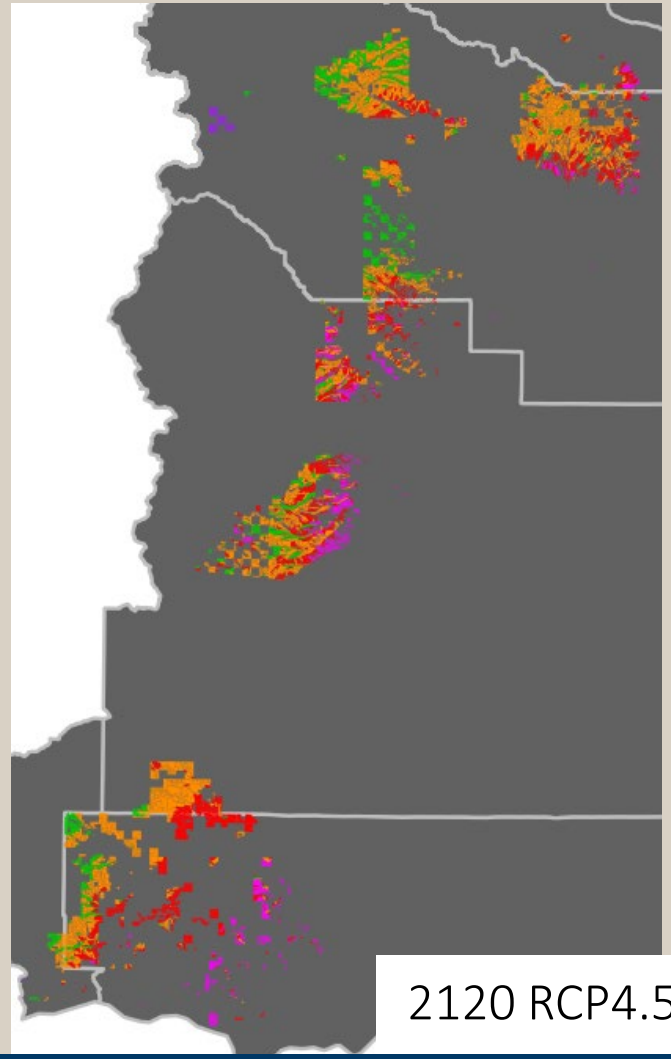


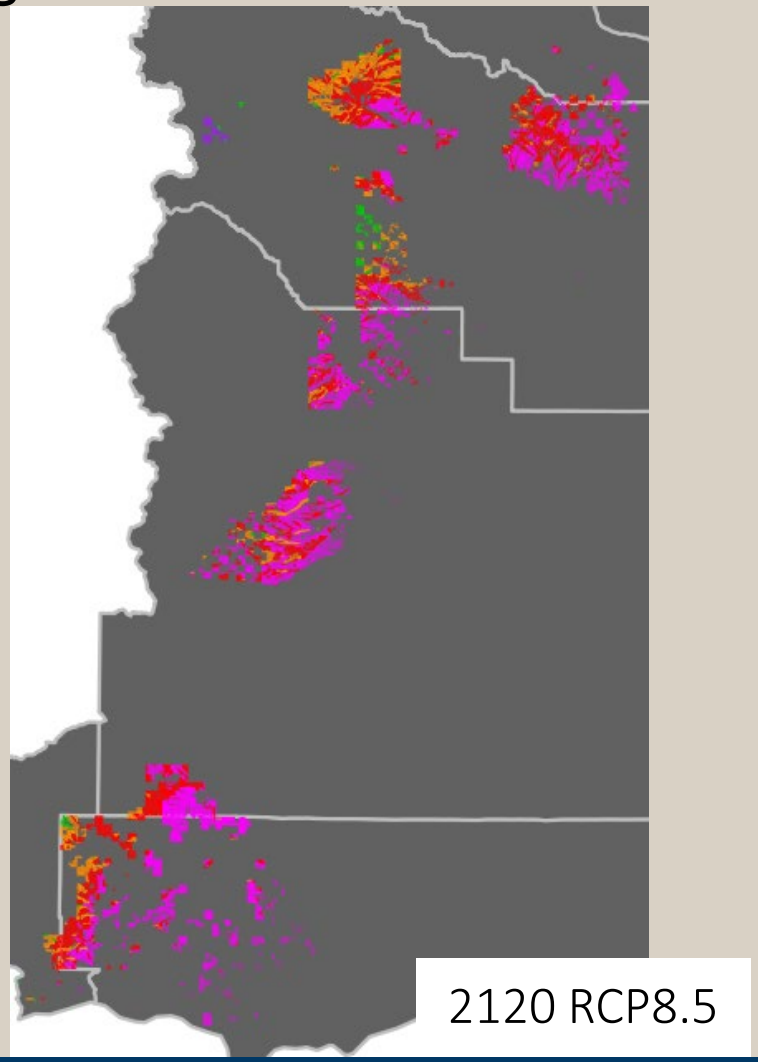
2120 RCP8.5

# Changes in Vegetation Ecotype

## DNR Forested Trust Lands in SE Region



# Vegetation Ecotypes in the SHC

## Use of current ecotypes in the yields

- Silvicultural approaches: harvest intensity and planted mix vary by ecotype
- Ecotypes dictate natural regeneration modeled
- Ecotypes impact the calculation of forest resiliency scores

## Use in the Forest Estate model for the SHC

- The timing of future vegetation ecotype shifts could be part of an action in the model. Proactive management vs reactive.
- Future ecotypes impact future forest resiliency scores
- Integrate into policy direction

# Questions?

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