

# An Introduction to VegOut

Dr. Tsegaye Tadesse

National Drought Mitigation Center (NDMC)

University of Nebraska-Lincoln

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# What is VegOut?

## Possible Perception (Definition 1)

Veg Out is proud to serve vegetarian and vegan cuisine, Maui style.



**Veg Out Salad**



**Muffalata Sandwich**



**Old Mexico Entrees  
Tacos**



**Pad Thai Noodles**



**Pesto- Goat Cheese pizza**

Ref. <http://www.veg-out.com/>

# What is VegOut?

Another similar Definition 1b.



**Veg Out! Austin...where herbivores eat out in central Texas**

Ref. DailyKos Covers Veg Dining in Austin,  
<http://vegoutaustin.com/>



**Nachos at Mother Egan's**



**Thali at Swad Vegifood**



**TinTinNio pappardelle**



**Tino's Greek Cafe veggie plate**



**Pizza at Manolo's Italian Cafe**



**Soy Nuggets with Broccoli at NuAge Cafe**

# What is VegOut?

## Movie Definition

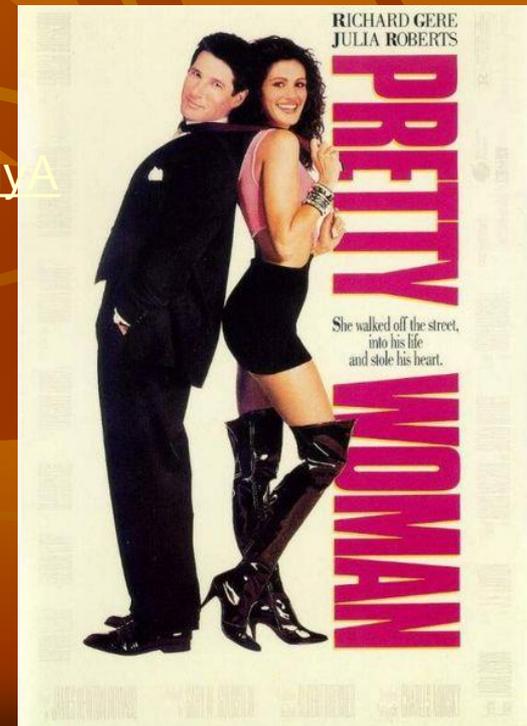
**Veg out (Meaning):** Relax in a slothful and mindless manner.

- This phrase derives from the association of vegetables with mental ineptitude; in the way that mentally disabled people are sometimes referred to as 'crazy as a vegetable'. 'Couch potato' comes from the same notion.
- The term originated in the 1990s. Most of the early uses came from the London literary elite, although the earliest I've found is in a 1991 film

**Pretty Woman.** In that, Julia Roberts' character says this line: "Let's watch old movies all night. I'll veg out in front of the TV." The Phrase Finder

Ref. <http://www.phrases.org.uk/meanings/veg-out.html>

Pretty woman: <http://www.youtube.com/watch?v=NMmj7dWmiyA>  
(Youtube)



**Our VegOut definition is totally different!!!**

# What is VegOut?

National Drought Mitigation Center–RMA Partnership Agreement Projects



## Vegetation Outlook (VegOUT)

Dr. Brian Wardlow, Dr. Tsegaye Tadesse, Dr. Michael Hayes, and Mark Svoboda, NDMC/UNL; Jun Li, NDMC/HPRCC; Ian Cottingham, CSE/UNL; and Karin Callahan, CALMIT/UNL

**A new experimental tool to provide future outlooks of general vegetation conditions (seasonal greenness) based on an analysis of information that integrates climate, satellite, biophysical, and oceanic data.**

- the term suggested by Mark Svoboda, Climatologist at NDMC



## *VegOut Products:*

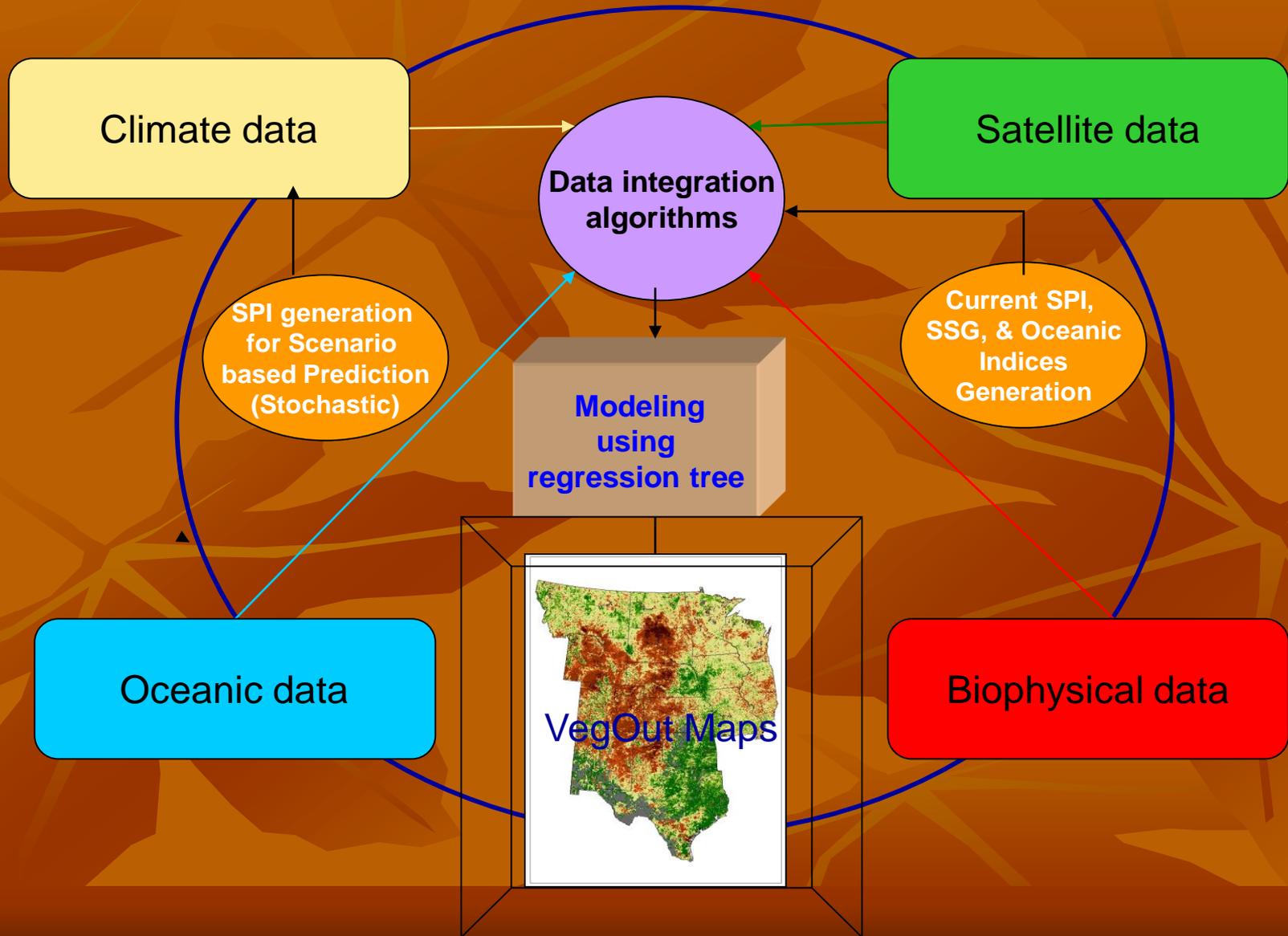
Series of maps depicting future outlooks of general vegetation conditions at a 1-km<sup>2</sup> spatial resolution that are updated every 2 weeks.

- 1) 2-week Vegetation Outlook map
- 2) 4-week Vegetation Outlook map
- 3) 6-week Vegetation Outlook map

\* Release of initial semi-operational VegOut products is planned to be in Spring 2009.



# Methodological approach



# Input data

- **Climate indices**
  - PDSI and SPI
- **Satellite data**
  - SG, PASG, & SSG
- **Biophysical variables**
  - land cover type,
  - ecoregion type,
  - irrigation status, and
  - soil available water capacity
  - Elevation (DEM)

## **Eight oceanic indices**

1. **Multivariate ENSO Index (MEI)**
2. **The Southern Oscillation Index (SOI)**
3. **Sea Surface Temperature Anomaly (SST)**
4. **The Pacific Decadal Oscillation (PDO) Index**
5. **North Atlantic Oscillation (NAO) Index**
6. **Pacific/North American (PNA) index**
7. **Atlantic Multidecadal Oscillation (AMO)**
8. **The Madden-Julian Oscillation**
  - MJO\_RMM1(Real-time Multivariate MJO)
  - MJO\_RMM2

# Types of Vegetation Outlooks

1) Historical-pattern (time-series relationships) – outlooks based on series of historical records

*EX - if the current climate, vegetation, and oceanic conditions are similar to previous drought years (e.g., 1989, 2002, etc), then the following 2-, 4-, and 6-week would have similar drought patterns as those drought years.*

2) Scenarios - outlooks based on implementation of the model using percentage(s) of precipitation expected over the specific outlook period.

*EX. – 50% of normal precipitation over the next 2 week period used to calculate the 2-week VegOut map*

- Multiple scenarios using different %
  - 0%, 50%, 100%, and 150% of normal precipitation
- Scenarios can be done over the different time intervals
  - 2-weeks, 4-weeks, and 6-weeks

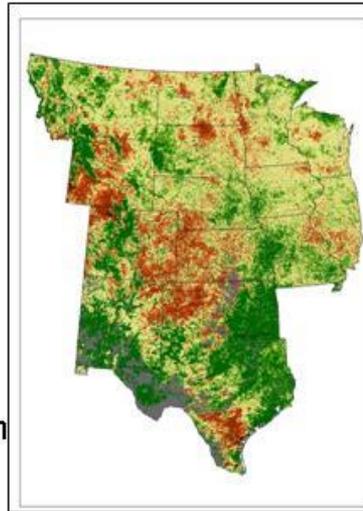


# Time-series relationship model (Historical Pattern)

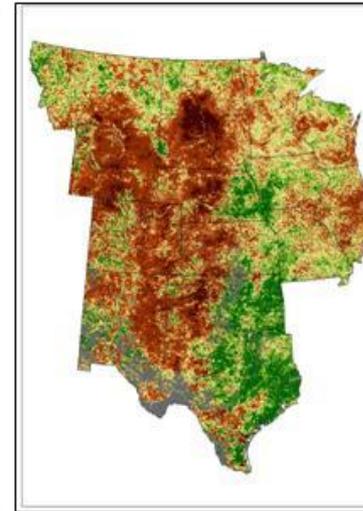
## Model

- Method: Given the current independent variables listed, what would be the value in the following 2 week based on the historical pattern? (the next 4 and 6 week?)
- **The original VegOut modeling approach:**
  - $\text{VegOut}_{t=2\text{ wk}} = f_{t=0}(\text{SSG}) + f_{t=0}(\text{SPI}, \text{MRLC}, \text{Eco\_R}, \text{Per\_Irrig}, \text{AWC}, \text{SoS\_anom},) + f_{t=\text{priorMonth}}(\text{MEI}, \text{MJO\_RMM1}, \text{NAO}, \text{PDO}, \text{SOI}, \text{AMO}, \text{SSTA}, \text{PNA})$

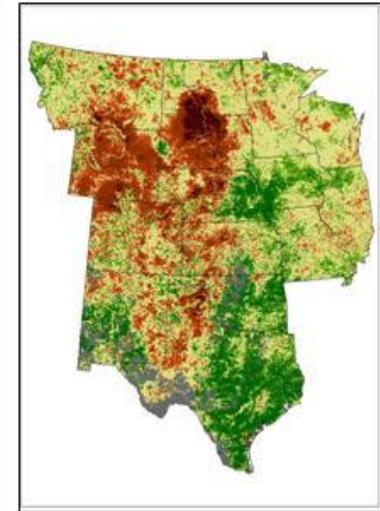
## Vegetation Condition



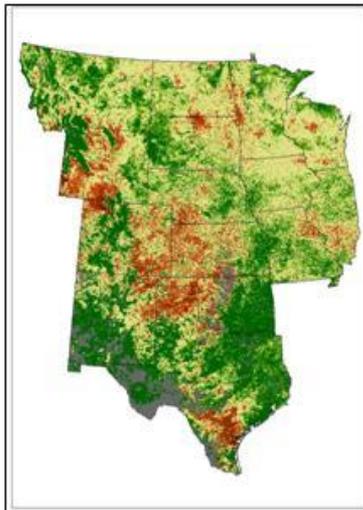
(a) Predicted Period 11



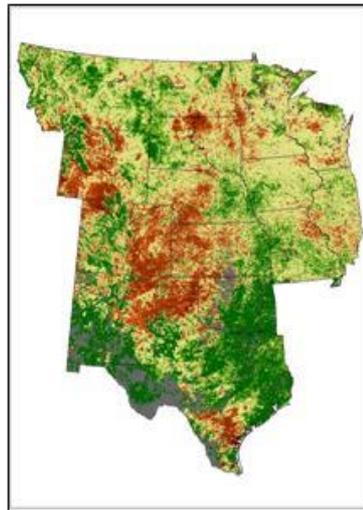
(b) Predicted Period 16



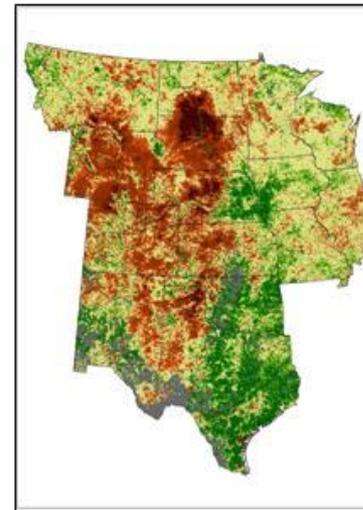
(c) Predicted Period 18



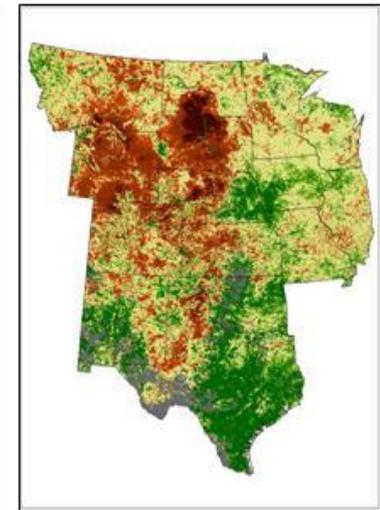
(d) Observed Period 10



(e) Observed Period 11



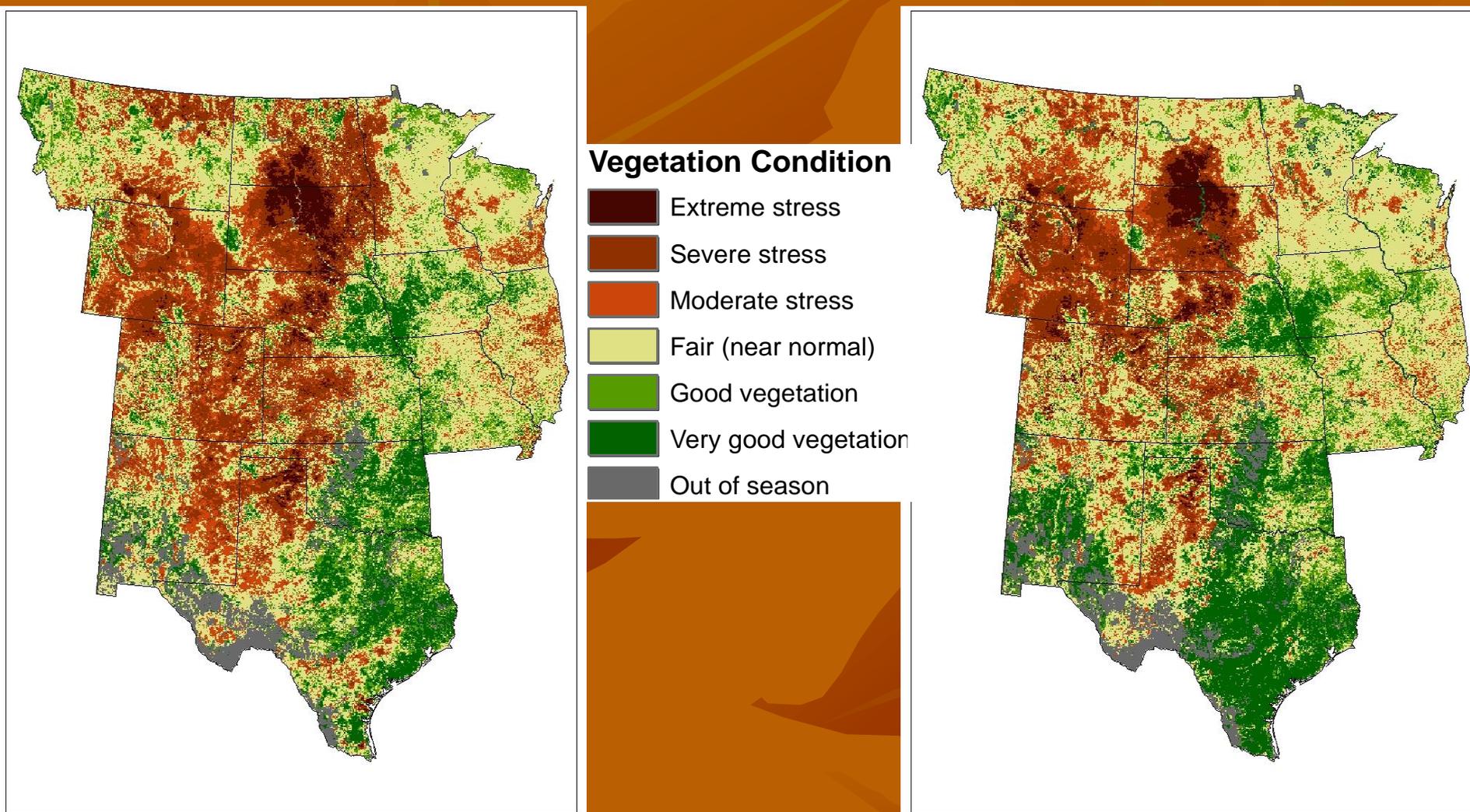
(f) Observed Period 16



(g) Observed Period 18

Two-week Vegetation Outlooks (VegOut) in 2006 growing season for (a) spring (period 11), (b) mid-summer (period 16), and (c) fall (period 18) seasons; (d) observed Seasonal Greenness (SSG) for period 10 (early growing season); (e) to (g) are observed SSG that correspond to the predictions of period 11, 16, & 18 respectively.

# Evaluation: Comparison of Six-week Outlook & Observed SSG

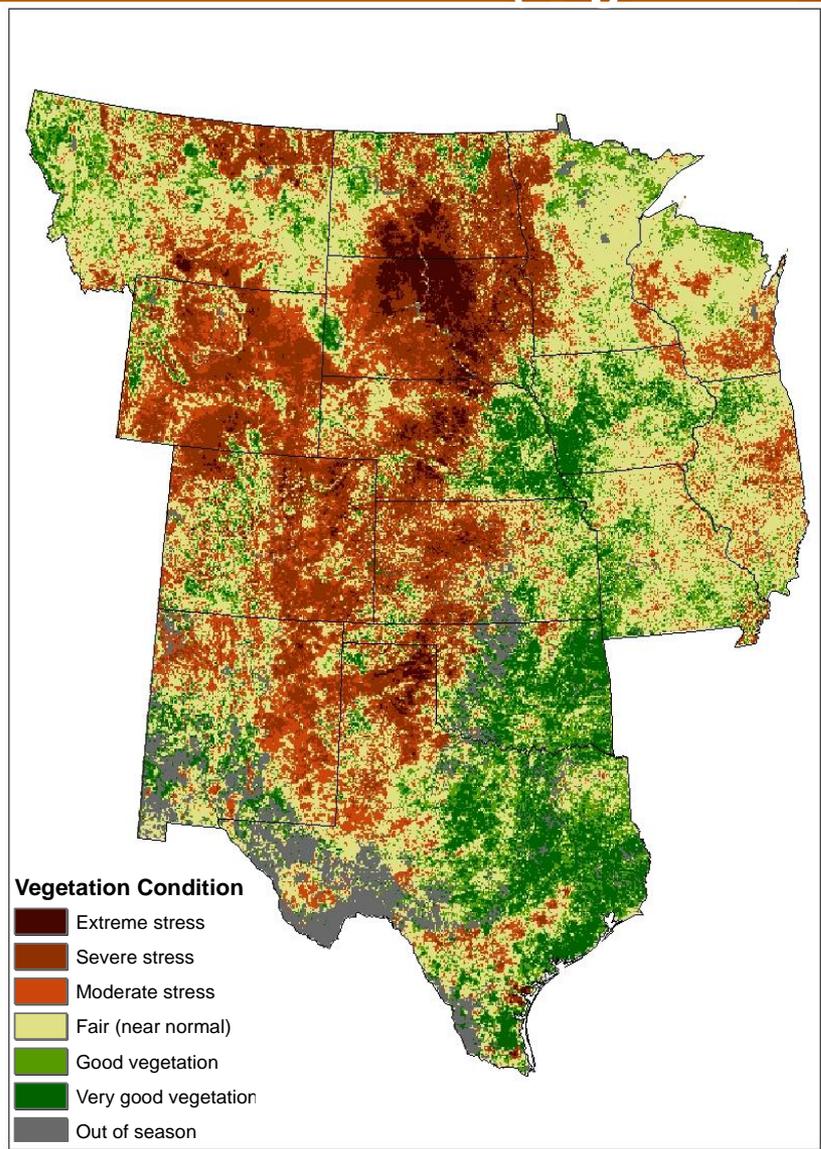


(a) 6-week outlook (for Period 18)

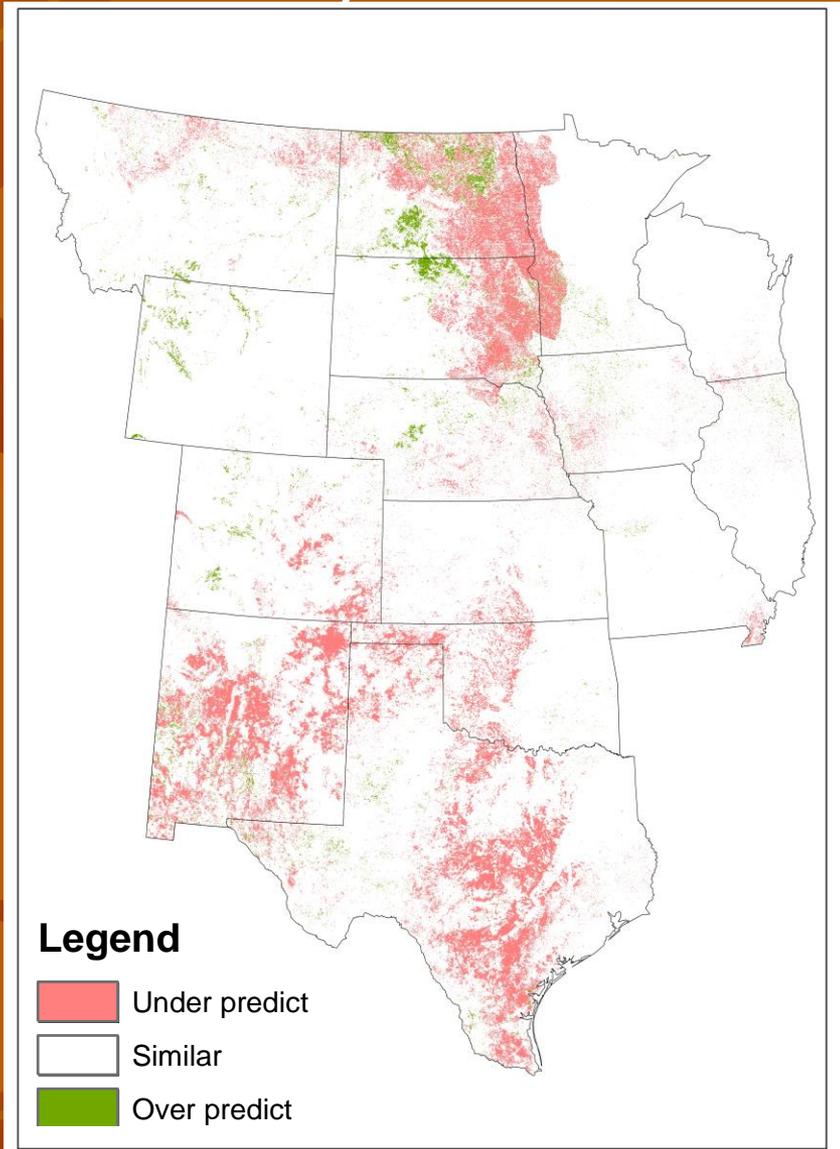
(b) Observed SSG (Period 18)

Figure 1. (a) Six-week Vegetation outlook (VegOut) map that was predicted for the period ending September 4, 2006; (b) Bi-weekly Standardized Seasonal Greenness (SSG) observed for the period ending September 4, 2006.

# The Difference Map: Comparing six-week outlook with actual observation (VegOut minus the observed SSG)

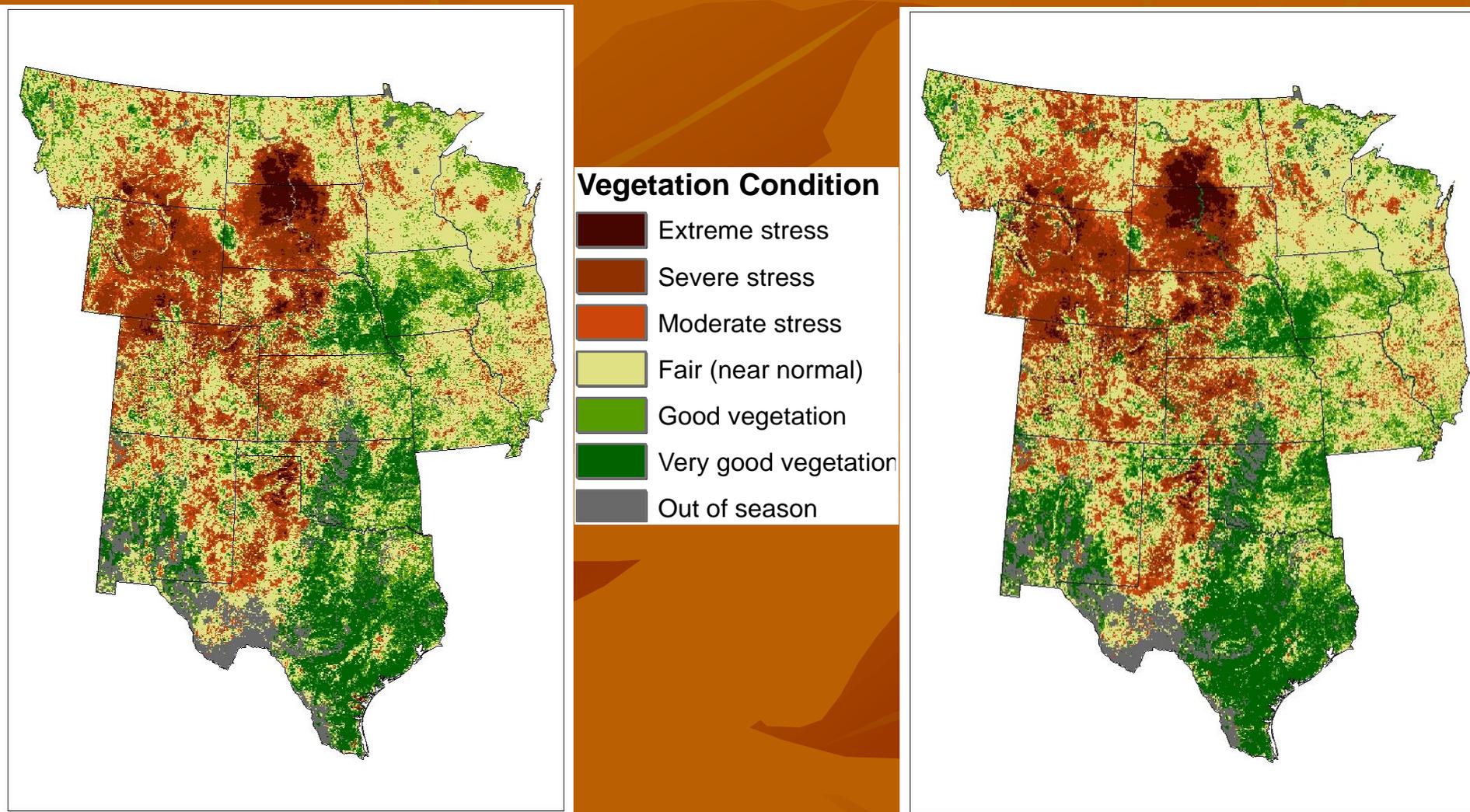


(a) VegOUT (6-week outlook for Period 18)



(b) Difference Map of Period 18

# Evaluation: Comparison of Two-week Outlook & Observed SSG

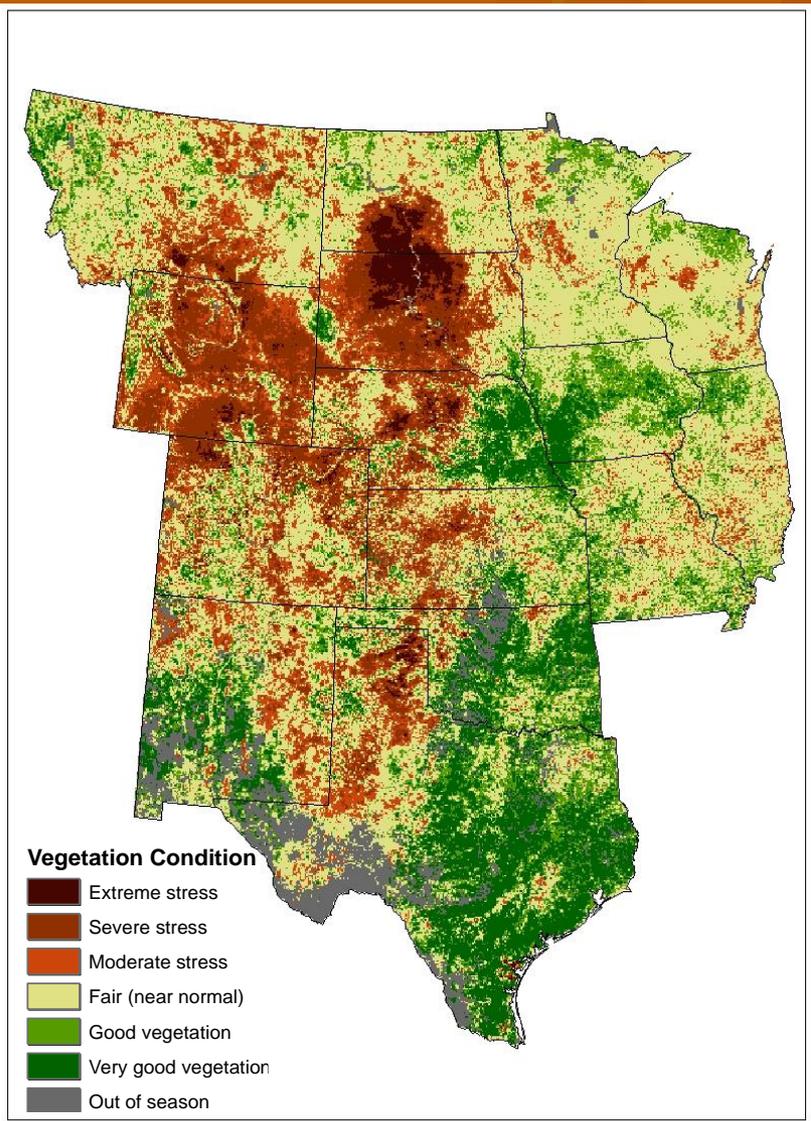


(a) 2-week outlook (for Period 18)

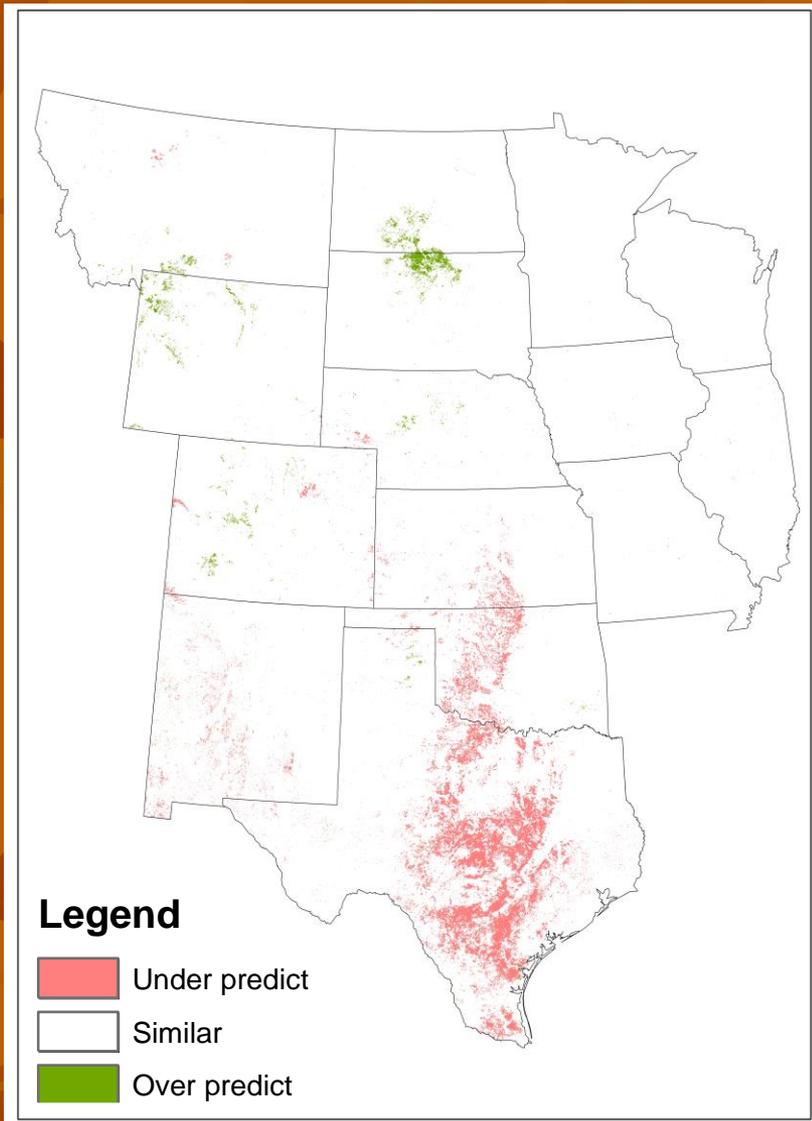
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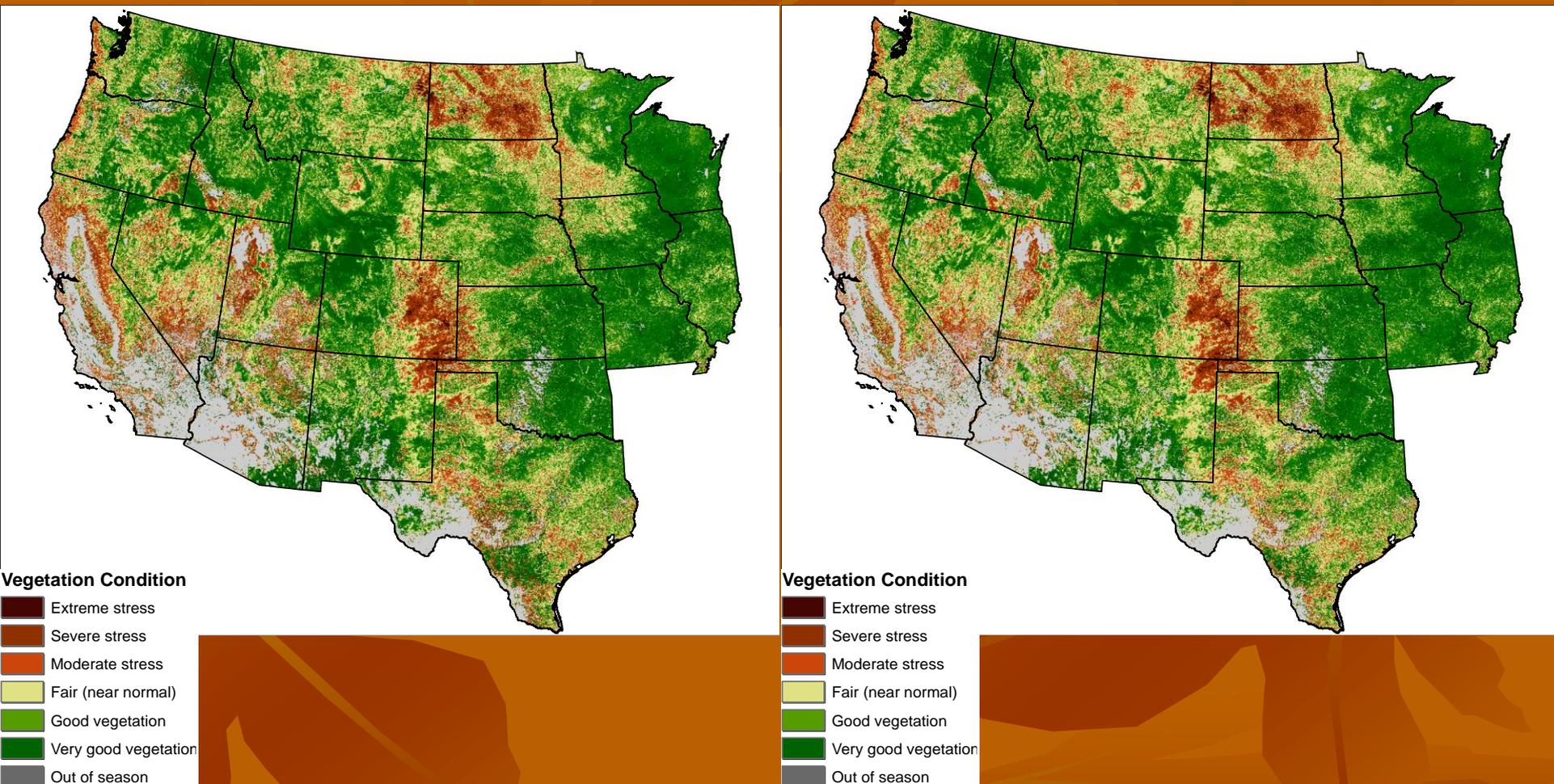


(a) VegOUT (2-week outlook for Period 18)



(b) Difference Map of Period 18

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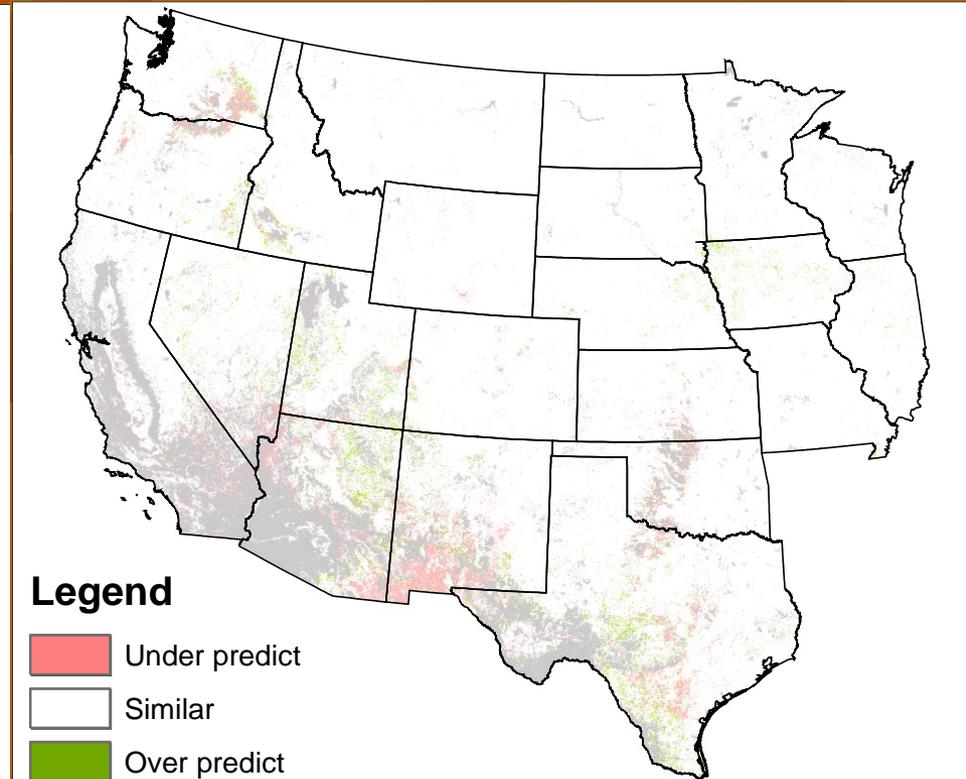
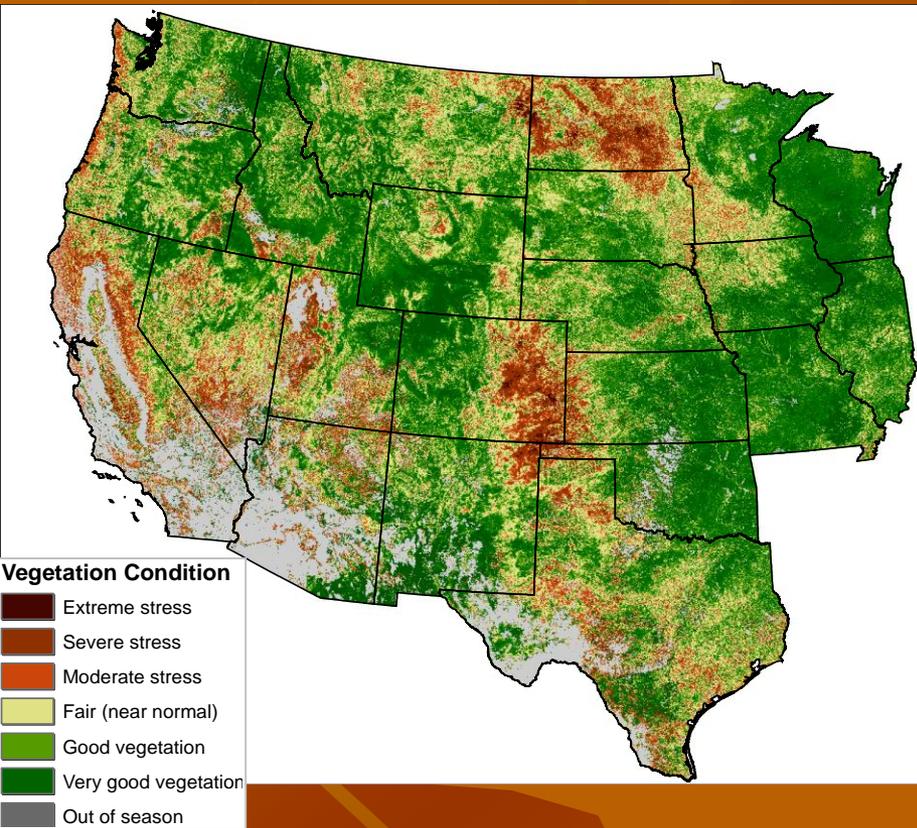


(a) 2-week outlook (for Period 16)

(b) Observed SSG (Period 16)

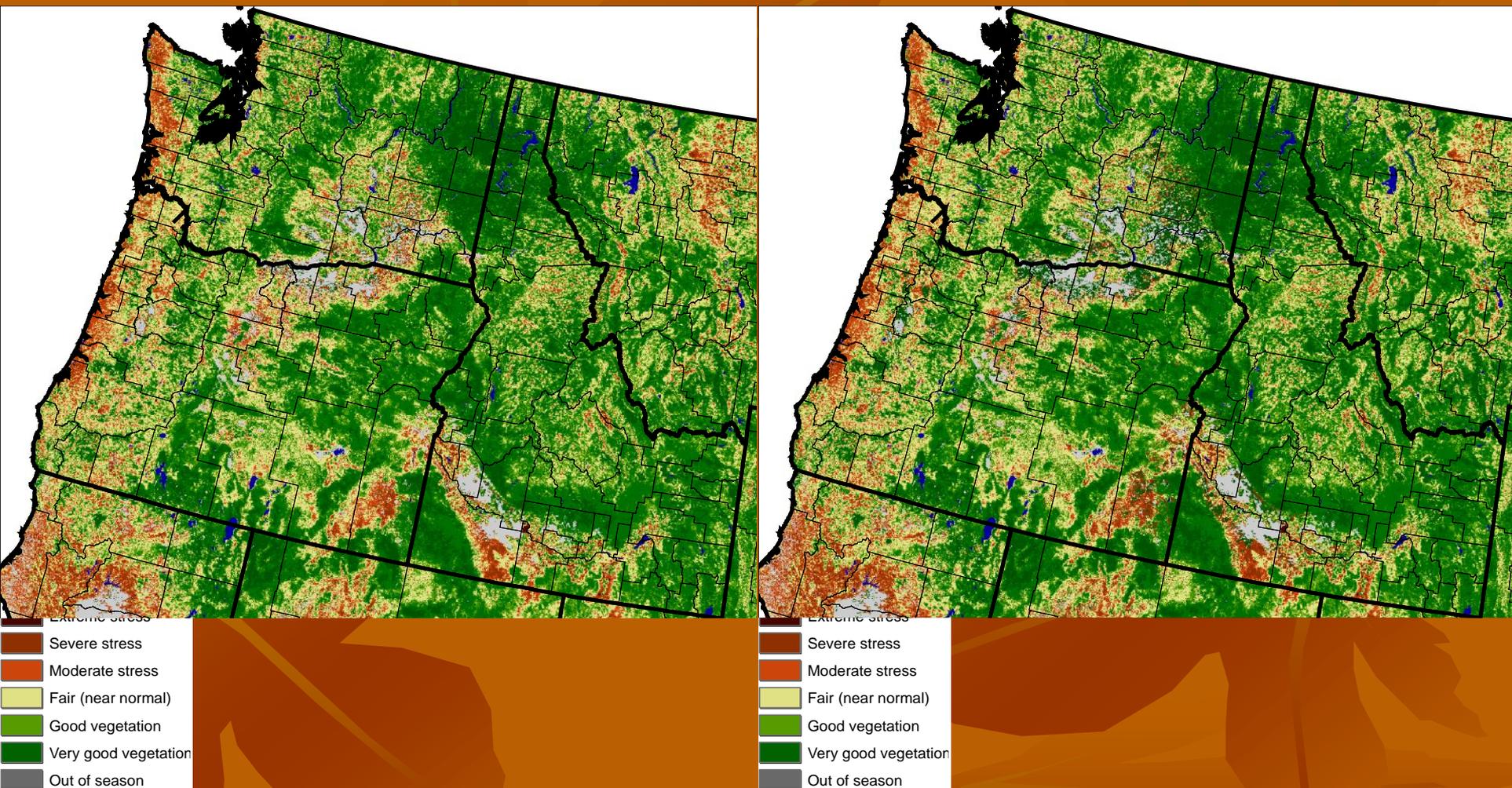
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# The Difference Map: Comparing two-week outlook with actual observation (VegOut minus the observed SSG)



(a) VegOUT (2-week outlook for Period 16, 11 Aug, 2008 based on 28 Jul, 2008 observed variables)  
(b) Difference Map (predicted minus observed) of Period 16

# Evaluation: Comparison of Two-week Outlook & Observed SSG

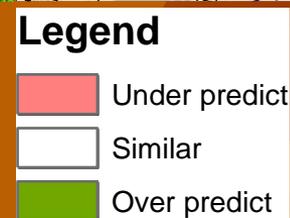
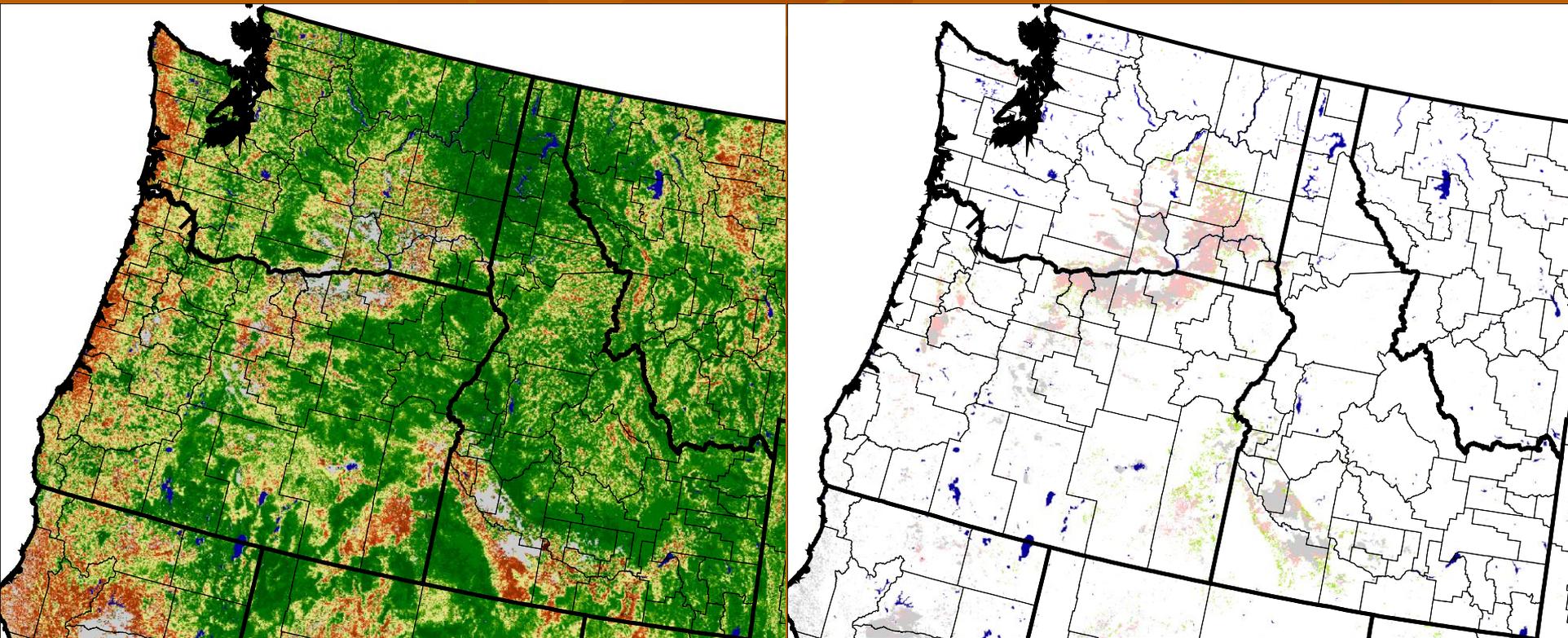


(a) 2-week outlook (for Period 16)

(b) Observed SSG (Period 16)

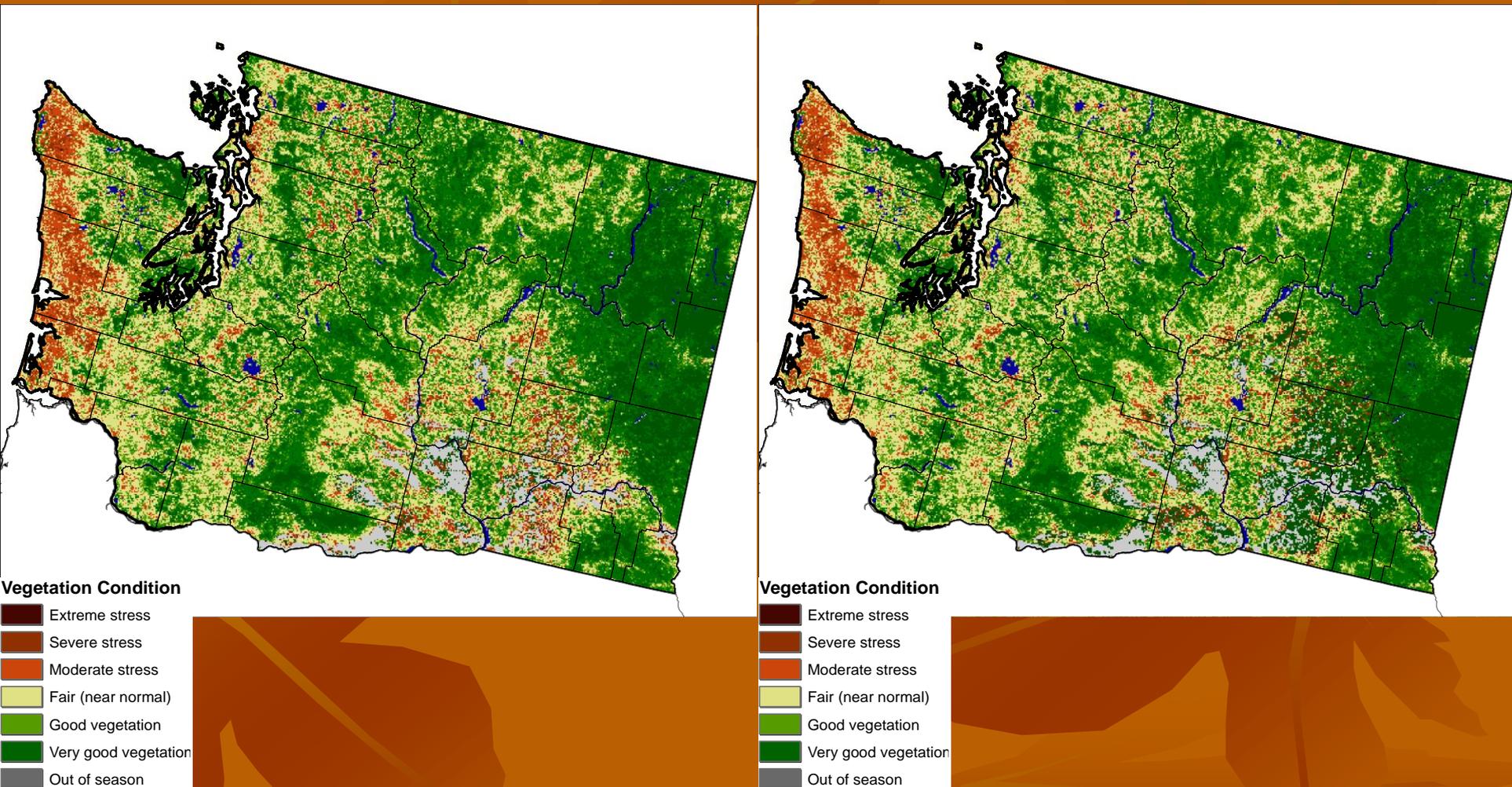
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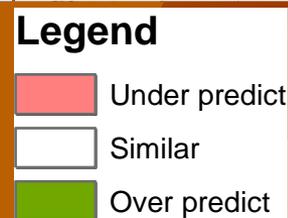
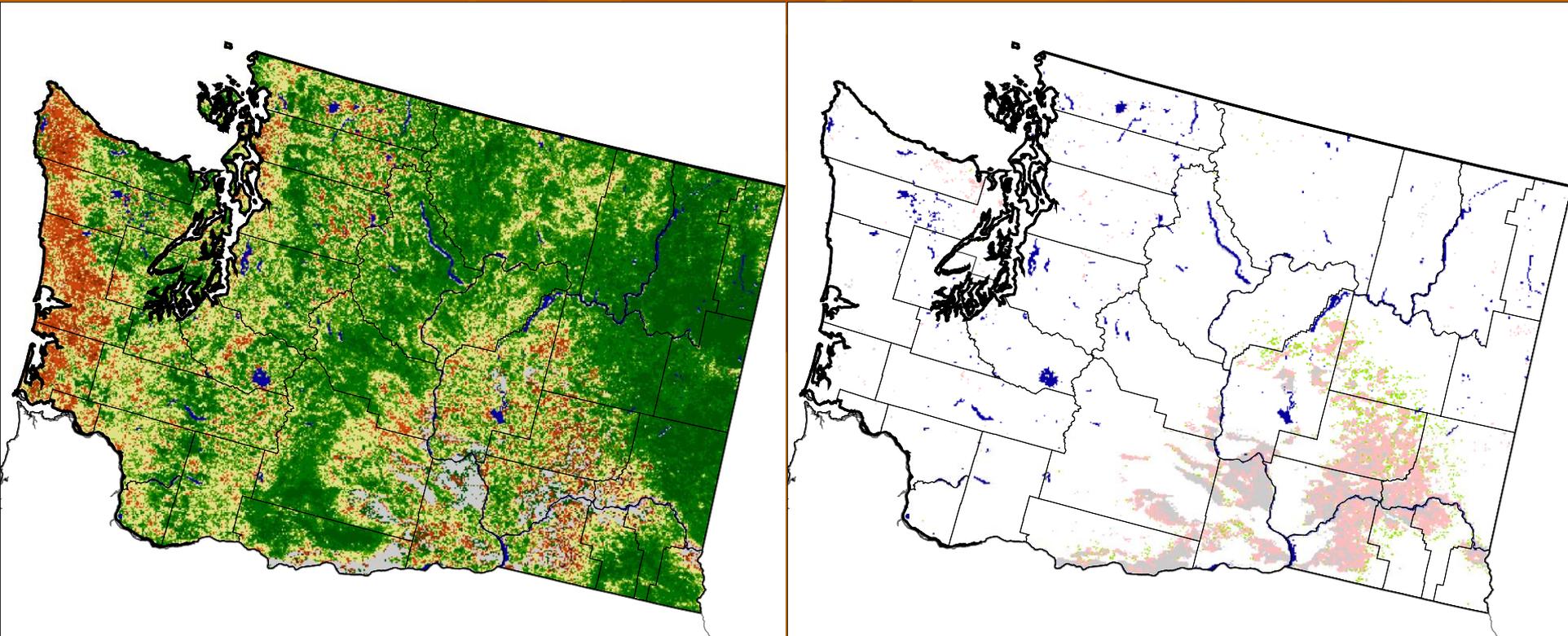


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(a) VegOUT (2-week outlook for Period 16, 11 Aug, 2008 based on 28 Jul, 2008 observed variables)  
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# VegOut- Scenario model

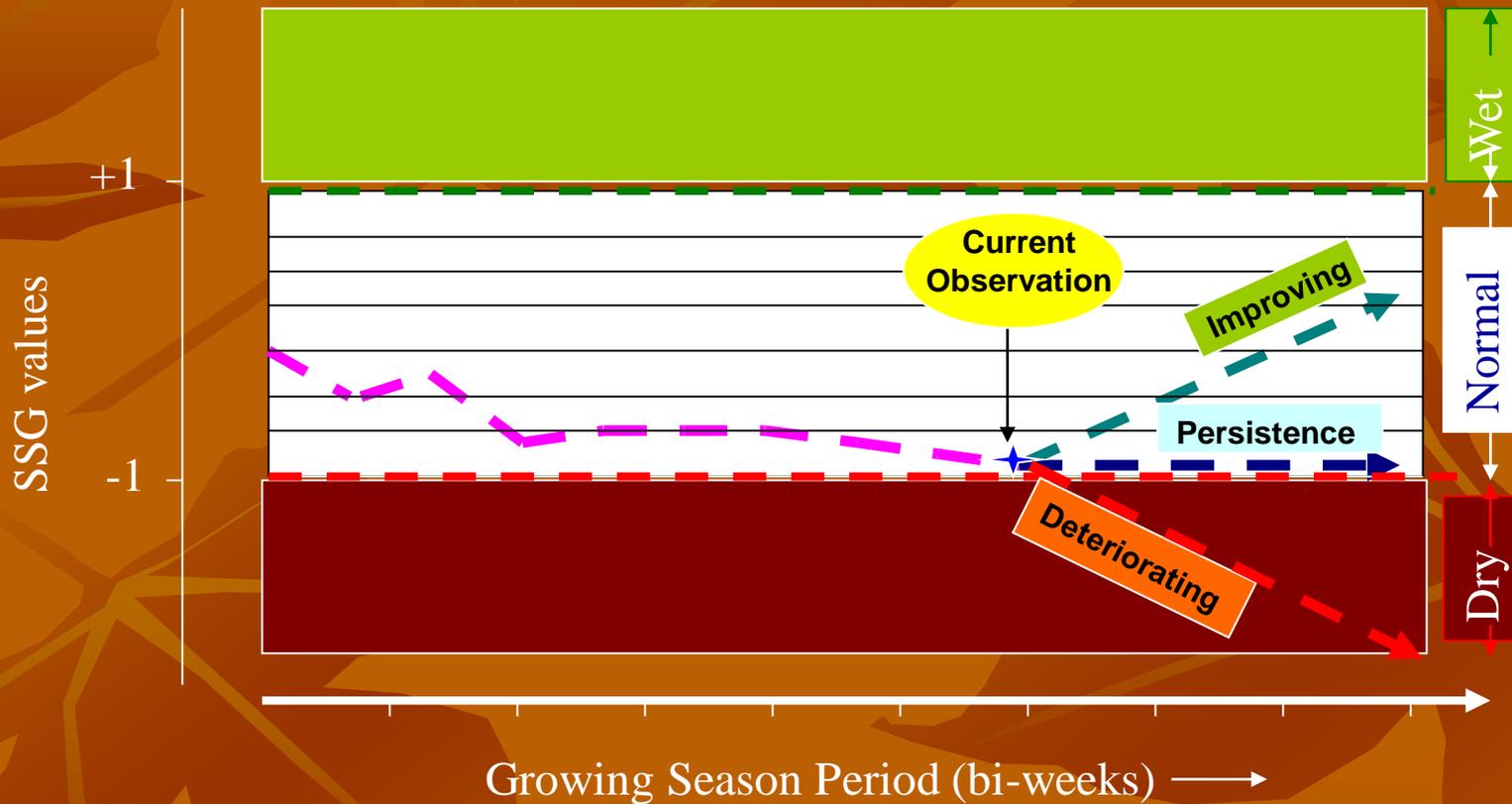
## Model

- Method: Given the current independent variables listed, what would be the value in the following 2 week based on the dry, wet, and normal precip scenarios?
- $$\text{VegOut}_{t=2 \text{ wk}} = f_{t=0} (\text{SSG, MRLC, Eco\_R, Per\_Irrig, AWC, SoS\_anom}) + f_{t=\text{bestCorrelated}} (\text{MEI, MJO\_RMM1, NAO, PDO, SOI, AMO, JAM, ONI, PNA}) + f(\text{SPI}_{t=2\text{wk\_scenario}})$$
- Where  $\text{VegOut}_{t=2 \text{ wk}}$  is two-week prediction of SSG based on the historical pattern identified by the regression tree model;
- $\text{SPI}_{t=2\text{wk\_scenario}}$  is:
  - Scenario 1 (dry): e.g., precipitation expected to be less than 50 % of normal
  - Scenario 2 (near normal): e.g., precipitation expected to be between 50 & 150 %
  - Scenario 3 (wet): e.g., precipitation expected to be more than 150 % of normal



# E.g., Projected Trends of Vegetation Conditions

## VegOut Trends (“Whisk-broom” method)



# Climate Outlooks Resources

- Expert knowledge
- Climate Prediction Center
  - <http://www.cpc.ncep.noaa.gov/index.htm>
- National Drought Mitigation Center
  - <http://www.drought.unl.edu/dm/forecast.html>



# How do we improve the VegOut model?

- Assess temporal and spatial relationships between
  - Climate & vegetation dynamics
  - Oceanic dynamics & climate
  - Spatial variability of drought indices
- Use this relationships to determine which variables to integrate in modeling the VegOut to improve its accuracy
- Evaluation based on feedback from users & potential users (e.g., ranchers, university extention agents, and managers)

# Future Activities

- Experimental maps will be posted online
- Semi-operational maps planned for the 2009 growing season
- Evaluation needed
  - Expert assessments
  - Users feedback



# Thank You!

Email: [ttadesse2@unl.edu](mailto:ttadesse2@unl.edu)

