

Developing the Vegetation Drought Response Index (VegDRI): *Monitoring Vegetation Stress from a Local to National Scale*

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What is VegDRI?



VegDRI is a new ‘hybrid’ drought index that integrates:

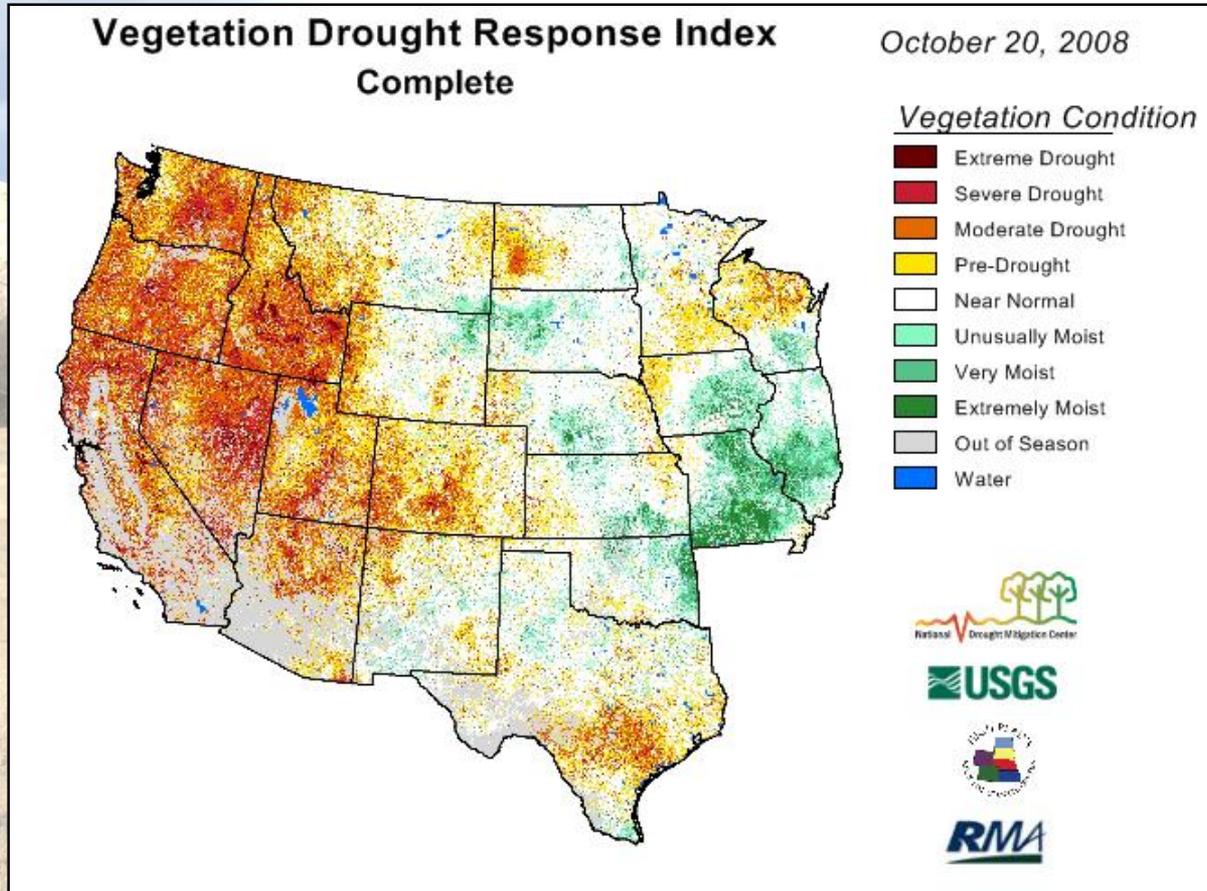
- satellite-based observations of vegetation conditions
- climate-based drought index data
- biophysical characteristics of the environment

to produce 1-km spatial resolution maps that depict

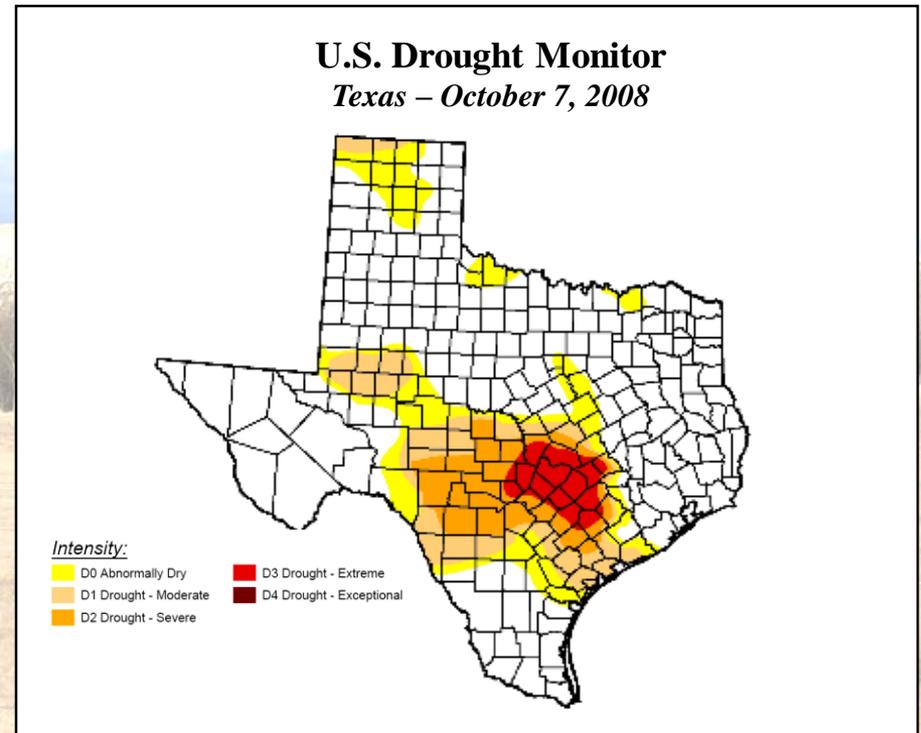
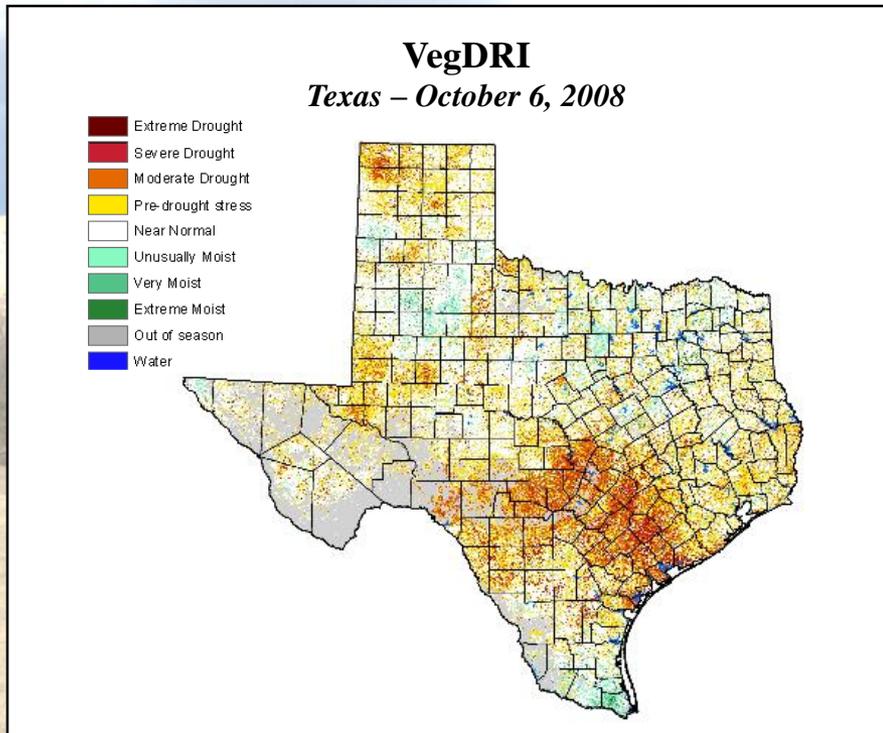
‘*drought-related vegetation stress*’ and are regularly updated (currently at 2-week interval) during the growing season.



What is VegDRI?



VegDRI vs. U.S. Drought Monitor



Goal of VegDRI Tool: *National-level monitoring capabilities with local-scale information* (i.e., county to sub-county level) regarding the level of drought stress on vegetation.

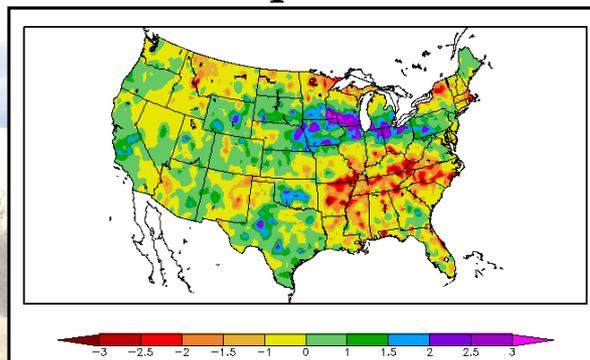
VegDRI - An Integrated Approach

*Remote Sensing
Component*



+

*Climate
Component*



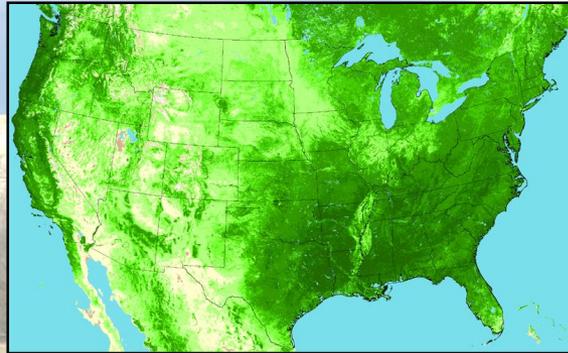
+

*Biophysical
Component*



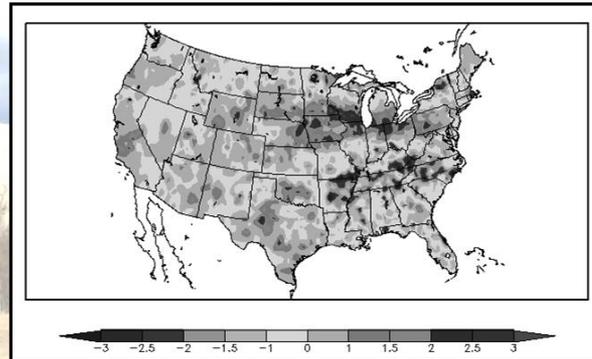
VegDRI - An Integrated Approach

Remote Sensing Component



+

Climate Component



+

Biophysical Component

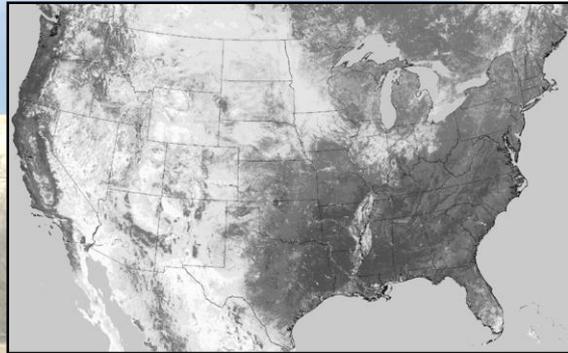


Role: Satellite-based observations provide information on the *spatial distribution and general condition of vegetation*.

- (+) Spatially detailed information about vegetation across large geographic areas.
- (-) Difficult to discriminate drought impacted areas from locations under other types of environment stress (flooding, fire, hail, & pests) or experiencing land use change.

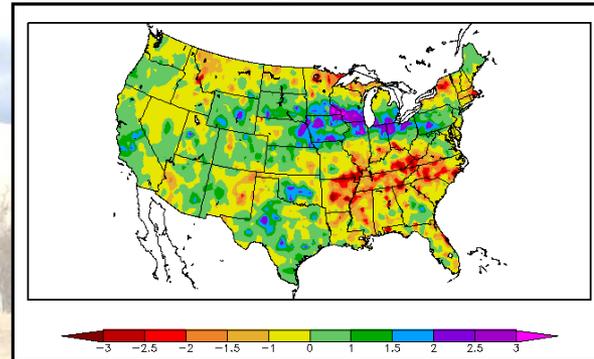
VegDRI - An Integrated Approach

Remote Sensing Component



+

Climate Component



+

Biophysical Component

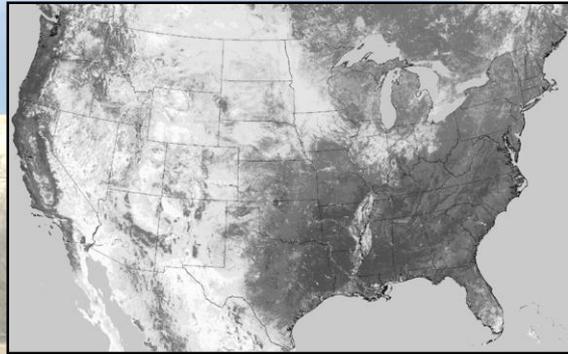


Role: Climate-based drought index maps provide a *'broad-scale' measure of dryness* that can be used for interpretation of the vegetation stress recorded in the satellite observations.

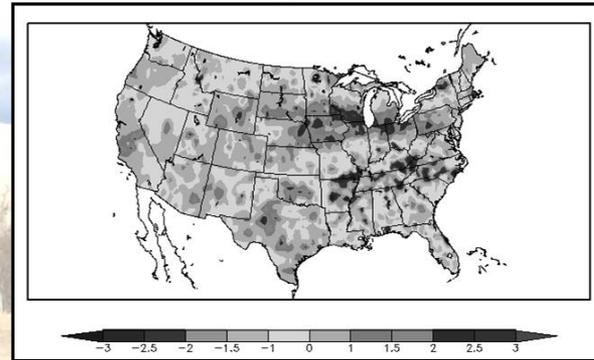
- Drought areas typified by below average vegetation conditions recorded in the satellite data and drier than normal conditions in the climate data.

VegDRI - An Integrated Approach

Remote Sensing Component



Climate Component



Biophysical Component



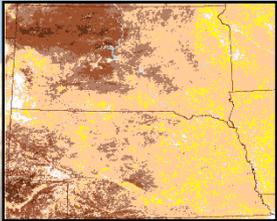
Role: Different characteristics of the environment are considered that influence climate-vegetation interactions.

- land use/land cover type
- irrigation
- soil available water capacity
- elevation
- ecological setting

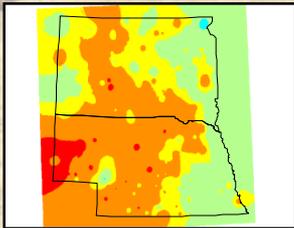
VegDRI Methodology

1. Historical Database Development

Satellite Data



Climate Data



Biophysical Data



Data Input Variables

- 1) Percent Annual Seasonal Greenness (PASG)
- 2) Start of Season Anomaly (SOSA)

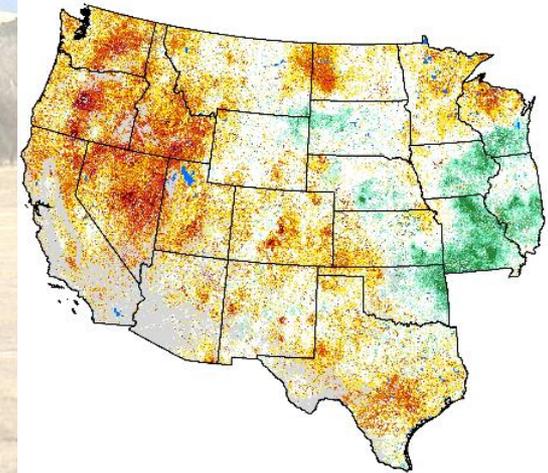
- 1) Palmer Drought Severity Index (PDSI)
- 2) Standardized Precip. Index (SPI)

- 1) land use/ cover type
- 2) soil available water capacity (STATSGO)
- 3) ecoregion type
- 4) irrigation status
- 5) elevation

2. Model Development

Regression
Tree
Model (*)

3. Map Generation

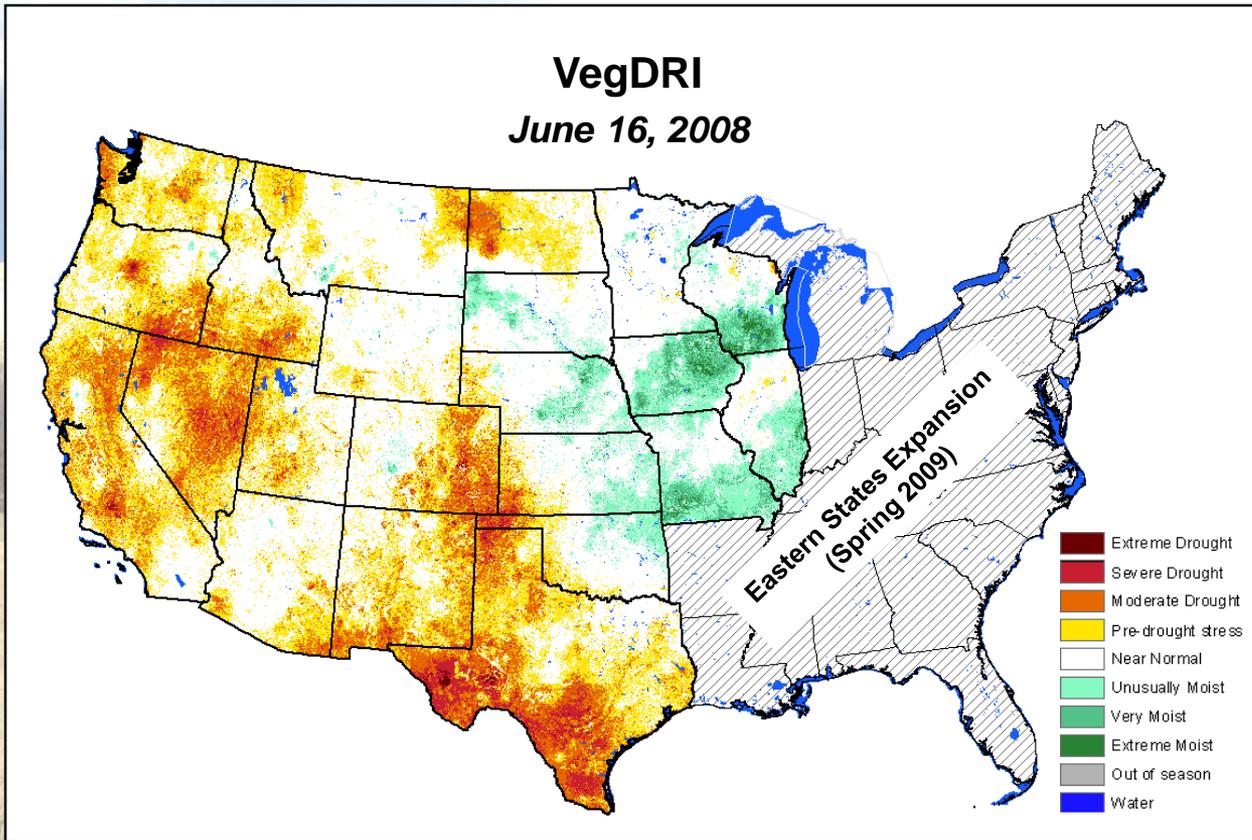


1-km VegDRI Map

(*) Models developed from a 20-year historical record (1989 – 2008) of bi-weekly climate and satellite observations at 2,200+ weather station locations.

Biophysical variables are *static* over time.

VegDRI Expansion Schedule



- Information currently available for Texas:
 - May 2007 & 2008 growing seasons
- Production of a 20-year historical record of VegDRI maps. (1989 – 2008)
- Year-round production & weekly map updates planned in 2009.

(*) Bi-weekly maps currently available.

VegDRI Website and Products

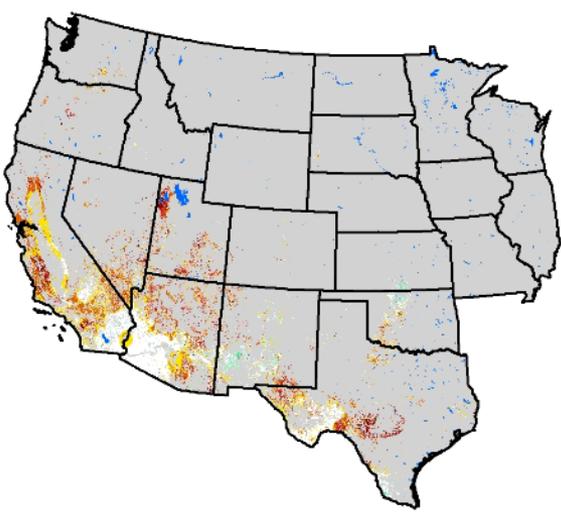
VegDRI products are available at the VegDRI page within the Monitoring section of the NDMC website.

VegDRI | Change | Archive | Experimental Products | Outreach | Evaluation | FAQ | Feedback

Vegetation Drought Response Index

Select map type:

Vegetation Drought Response Index
Complete



January 26, 2009

Vegetation Condition

- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water



To download the image, right-click [here](#) and select "Save target as...".

To download the pdf, right-click [here](#) and select "Save target as...".

What's New!

VegDRI expands coverage over the Western U.S. [more...](#)

[Evaluation](#) and [Outreach](#) sections added

VegDRI presented in Montana and Texas. [more...](#)

The 2006-2007 Archive is currently being updated. New dates will be added as they become available.

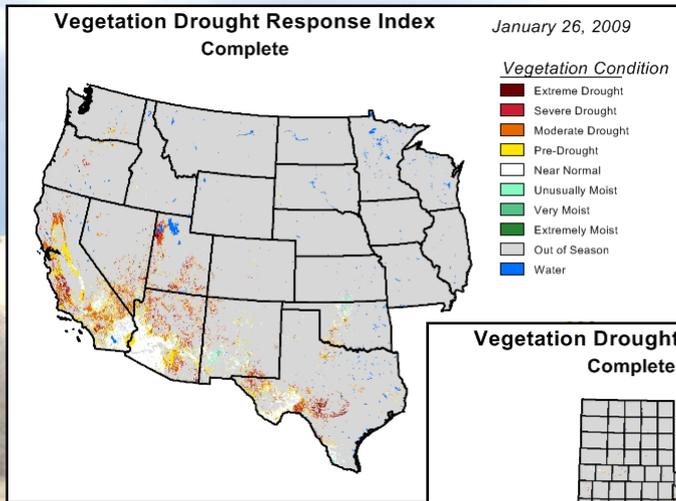
Key features and changes in the VegDRI map for January 26, 2009. For evaluators in these areas, any additional information or observations you can provide would be most helpful.

http://www.drought.unl.edu/vegdiri/VegDRI_Main.htm

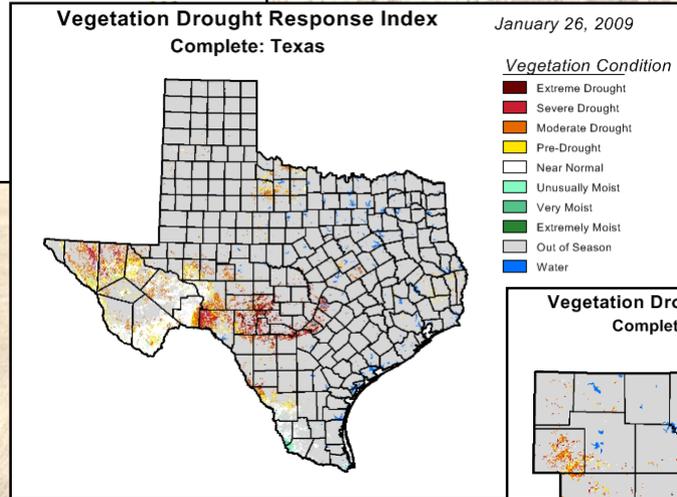


1. VegDRI Quick-View Maps

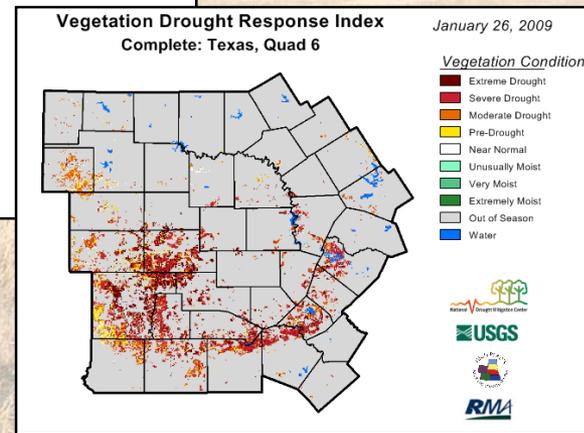
(multiple spatial scales)



Regional-level



State-level

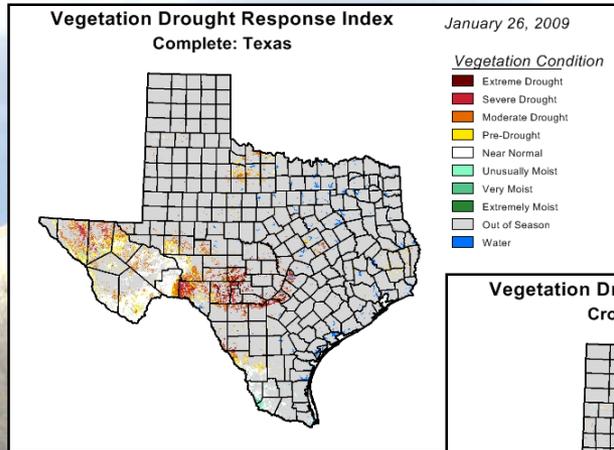


Sub-state level

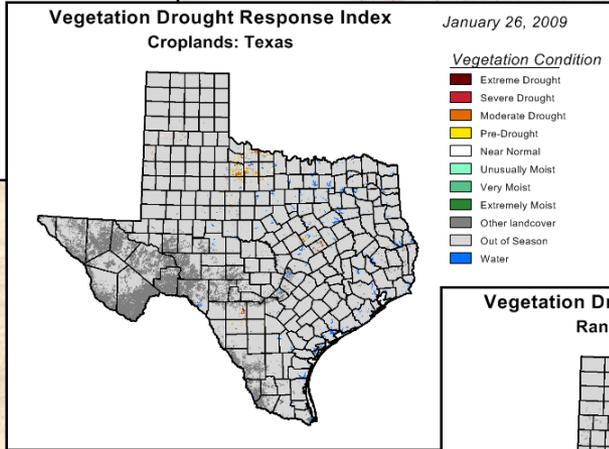


1. VegDRI Quick-View Maps (cont.)

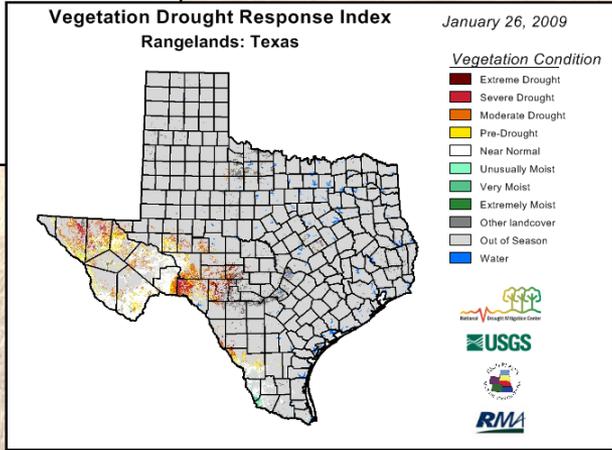
(land cover type)



Complete view



Cropland view



Rangeland view



2. VegDRI Area Statistics (% area) (currently available at state-level only)

Complete	Extreme Drought	Severe Drought	Moderate Drought	Pre-Drought	Near Normal	Unusually Moist	Very Moist	Extremely Moist
Complete								
Rangeland								
Crops								
09/01/26	0.55	1.32	2.12	1.88	5.72	0.24	0.05	0.00
09/01/12	0.55	0.71	1.18	2.30	7.32	0.44	0.19	0.02
08/12/29	0.05	0.62	1.44	1.96	7.46	0.74	0.24	0.17
08/12/15	0.04	0.59	1.44	2.27	7.30	0.64	0.23	0.23
08/12/01	0.72	3.70	11.58	19.35	46.11	3.19	0.71	0.31
08/11/17	0.43	2.51	8.78	16.19	52.36	3.84	1.16	0.33
08/11/03	0.62	3.88	9.90	16.52	49.52	4.03	1.12	0.24
08/10/20	0.35	2.22	7.40	14.31	54.04	5.40	1.50	0.34
08/10/06	0.54	3.04	9.71	19.06	48.32	3.67	0.90	0.28
08/09/22	0.39	2.72	8.46	16.80	52.08	3.76	1.00	0.25
08/09/08	0.48	3.27	11.42	21.57	45.23	2.42	0.66	0.20
08/08/25	0.43	2.77	11.06	21.13	46.51	2.35	0.67	0.14
08/08/11	1.02	6.07	18.24	26.86	31.37	0.92	0.29	0.09
08/07/28	0.74	3.97	16.11	26.36	35.51	1.19	0.30	0.11
08/07/14	0.87	5.24	18.07	27.48	30.67	0.94	0.19	0.07
08/06/30	1.71	9.35	17.84	21.60	28.61	0.93	0.17	0.05
08/06/16	1.38	9.30	20.18	22.78	24.14	0.65	0.14	0.03
08/06/02	1.15	5.99	15.06	23.15	29.10	0.63	0.19	0.04

- Summarize the % area of each VegDRI class for ‘current’ map and all prior dates in the growing season.
- Specific tables available for rangeland and cropland.



3. Change Maps

3 Types:

1) Prior period

ex. - Sep 4, 2007 vs. Sep 10, 2007

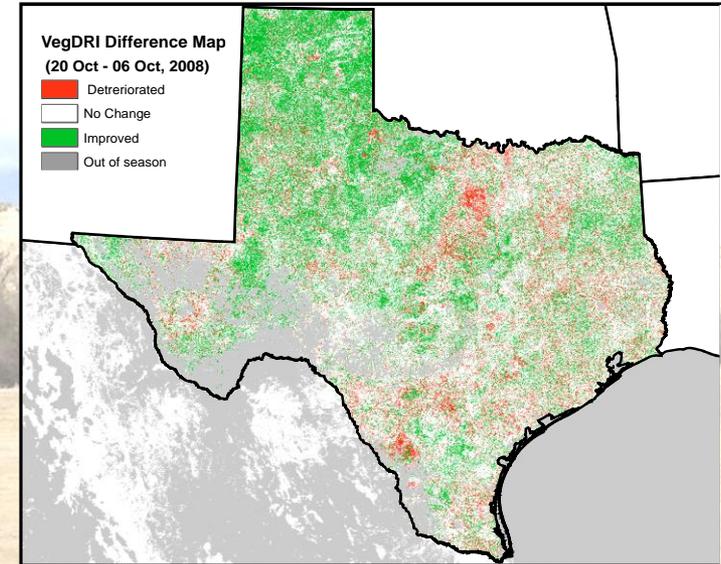
2) Same period from the prior year or a specific year in past

(* currently not available)

ex. - Sep 24, 2007 vs. Sep 24, 2006

3) Historical average (* currently not available)

ex. - Sep 24, 2007 vs. average for Sep 24 (1989
through 2006)

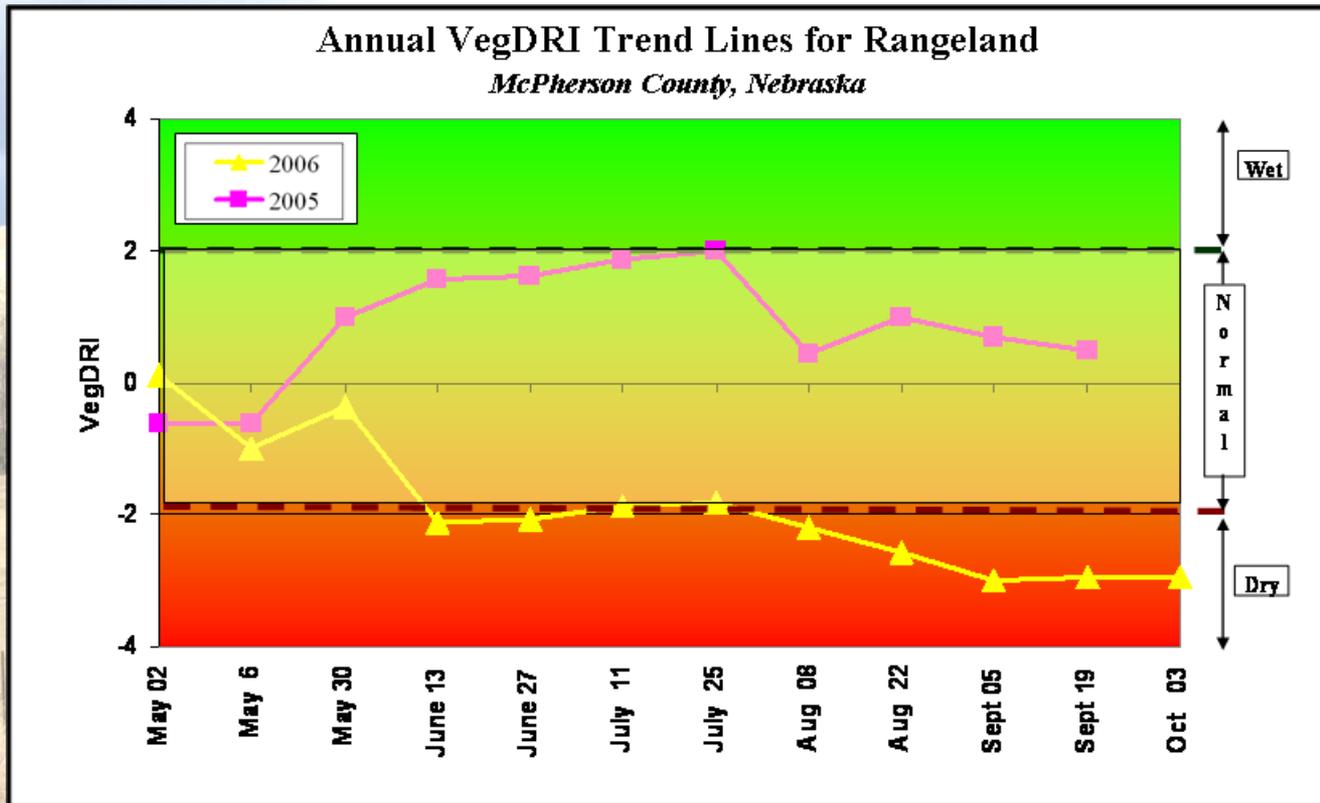


4. Animations

Goal: Visualize spatial and temporal changes in drought patterns across a specific year or multiple years for a state or sub-state region.



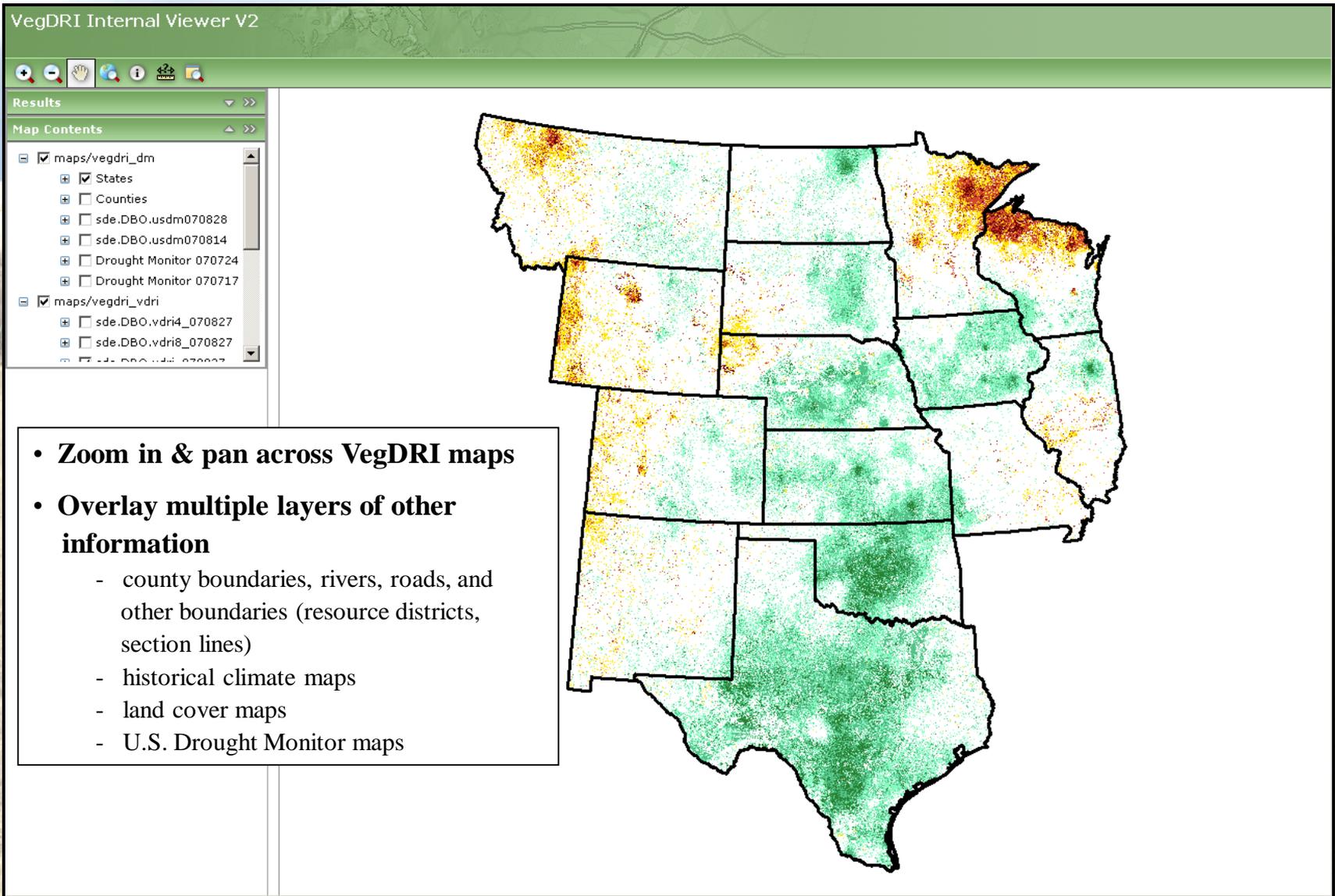
5. Trendlines (in development)



Plots the average VegDRI values over the growing season for a specific geographic area (e.g., county) and land cover type (e.g., cropland and rangeland). Comparisons of VegDRI could be made between specific years and/or the long-term average condition.

6. Dynamic Map Viewer (in development)

VegDRI Internal Viewer V2



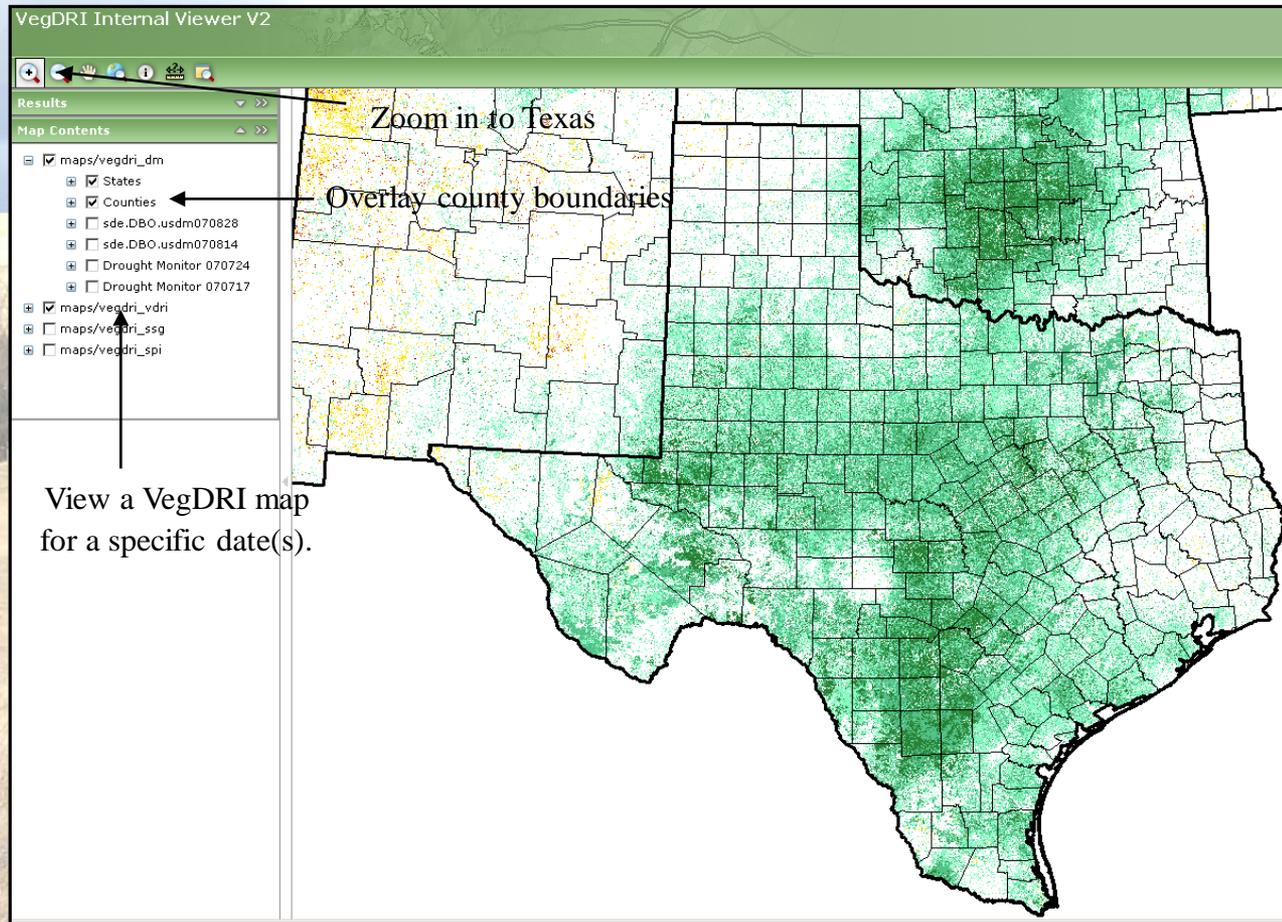
Results

Map Contents

- maps/vegdrv_dm
 - States
 - Counties
 - sde.DBO.usdm070828
 - sde.DBO.usdm070814
 - Drought Monitor 070724
 - Drought Monitor 070717
- maps/vegdrv_vdri
 - sde.DBO.vdri4_070827
 - sde.DBO.vdri8_070827
 - sde.DBO.vdri_070827

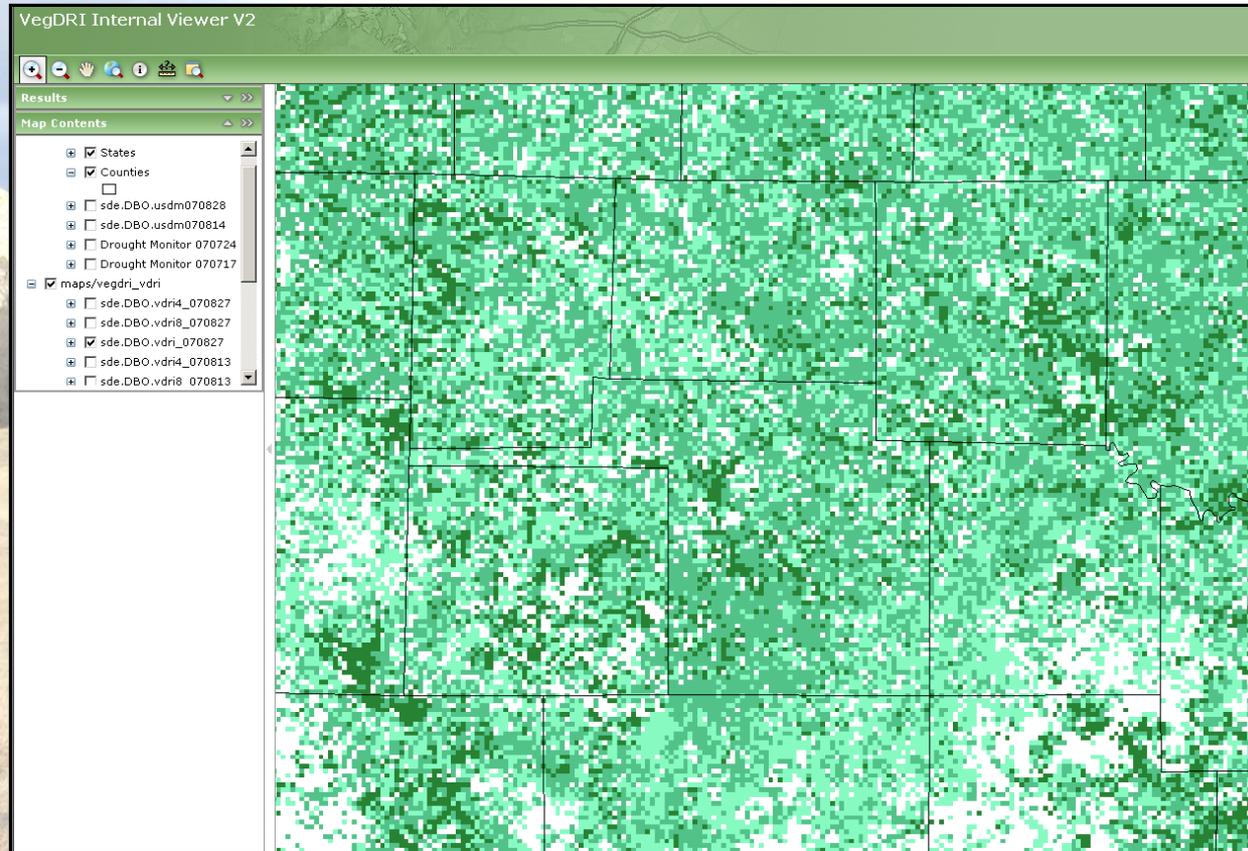
- **Zoom in & pan across VegDRI maps**
- **Overlay multiple layers of other information**
 - county boundaries, rivers, roads, and other boundaries (resource districts, section lines)
 - historical climate maps
 - land cover maps
 - U.S. Drought Monitor maps

6. Dynamic Map Viewer (in development)



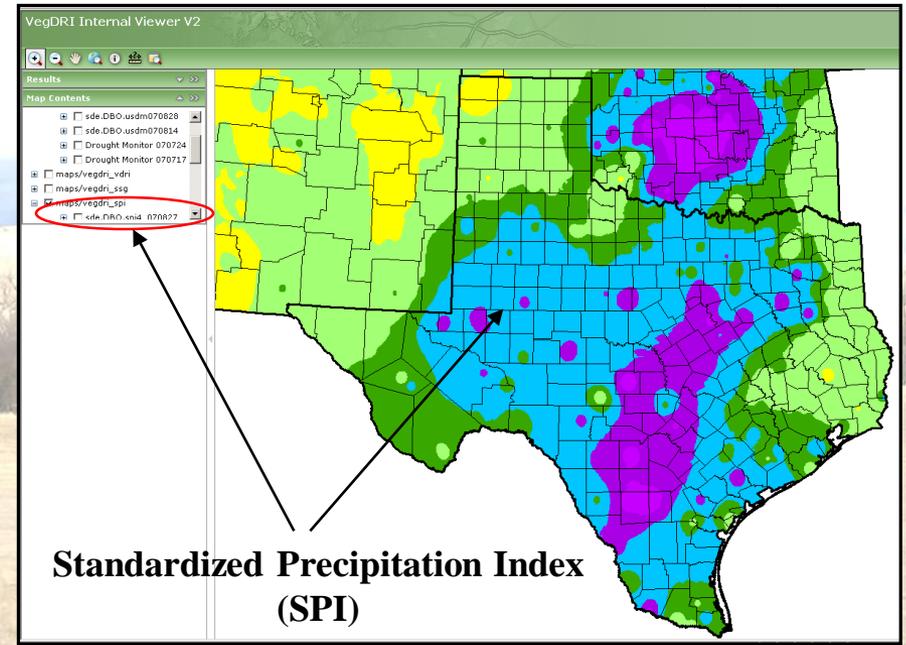
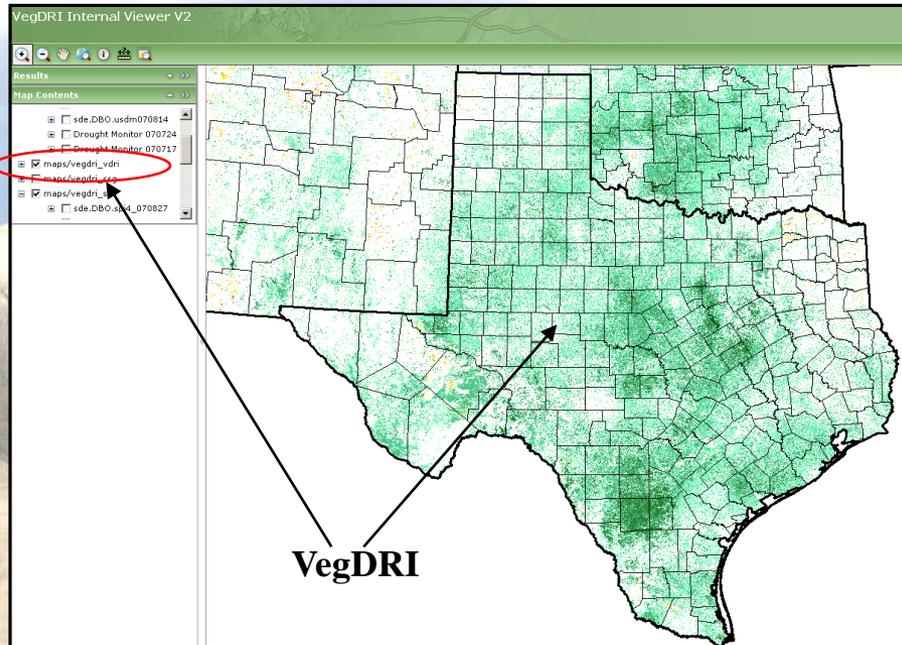
The user customizes the view of the map for their specific needs and interests.

6. Dynamic Map Viewer (in development)



Capability to visualize information at the local level for a county or multiple counties.

6. Dynamic Map Viewer (in development)



View VegDRI maps in combination with other types of maps.

- Examples:*
- climate-based drought indices (SPI and PDSI)
 - U.S. Drought Monitor
 - land use & land cover type



Possible Uses of VegDRI Information by Agricultural Producers:

1. Justify sub-county declarations for the release of CRP lands for emergency grazing for parts of counties that might be severely impacted by drought.





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3. Additional indicator of 'fire risk'.

