Flash Drought
An Alabama Perspective

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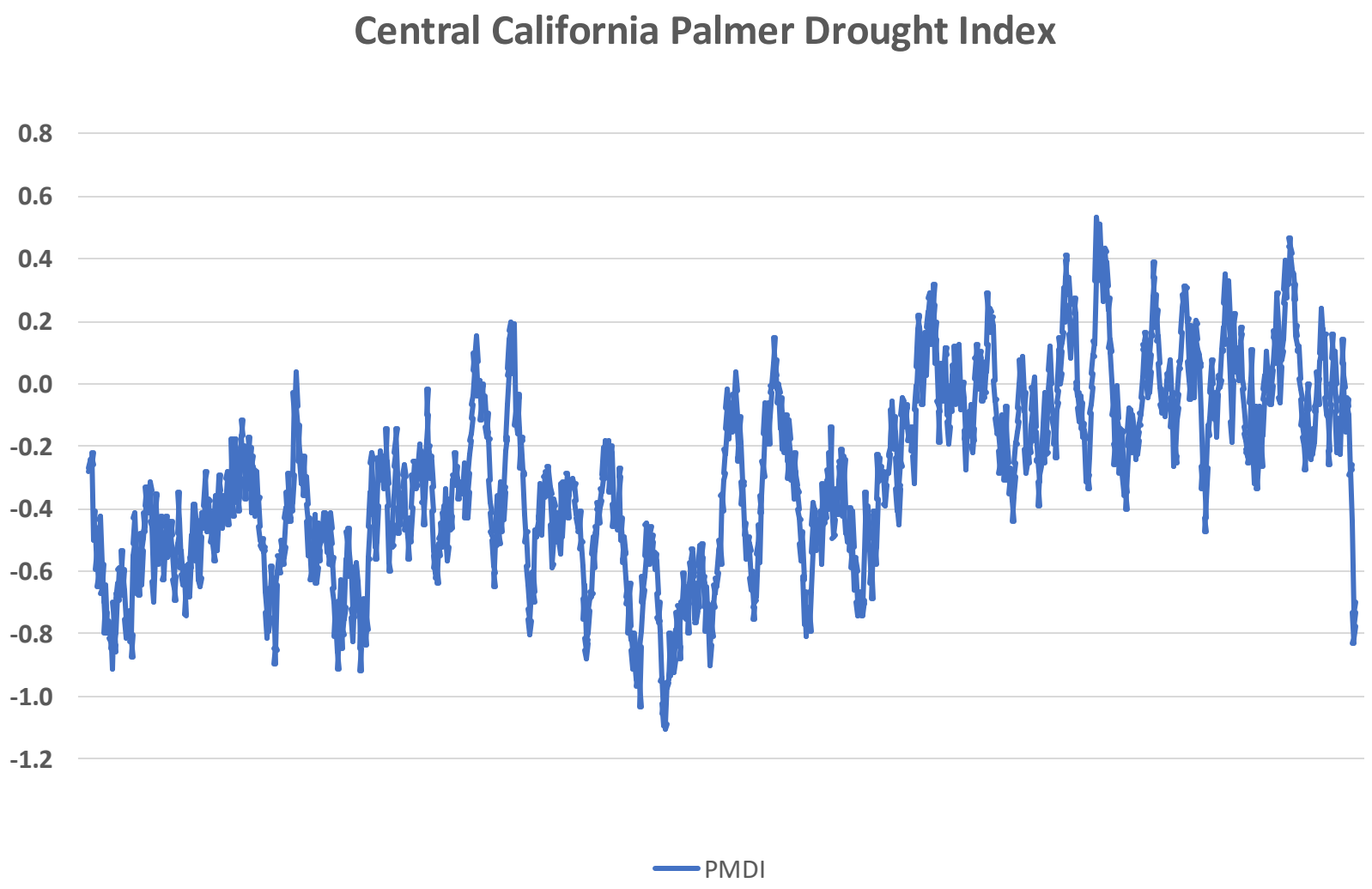
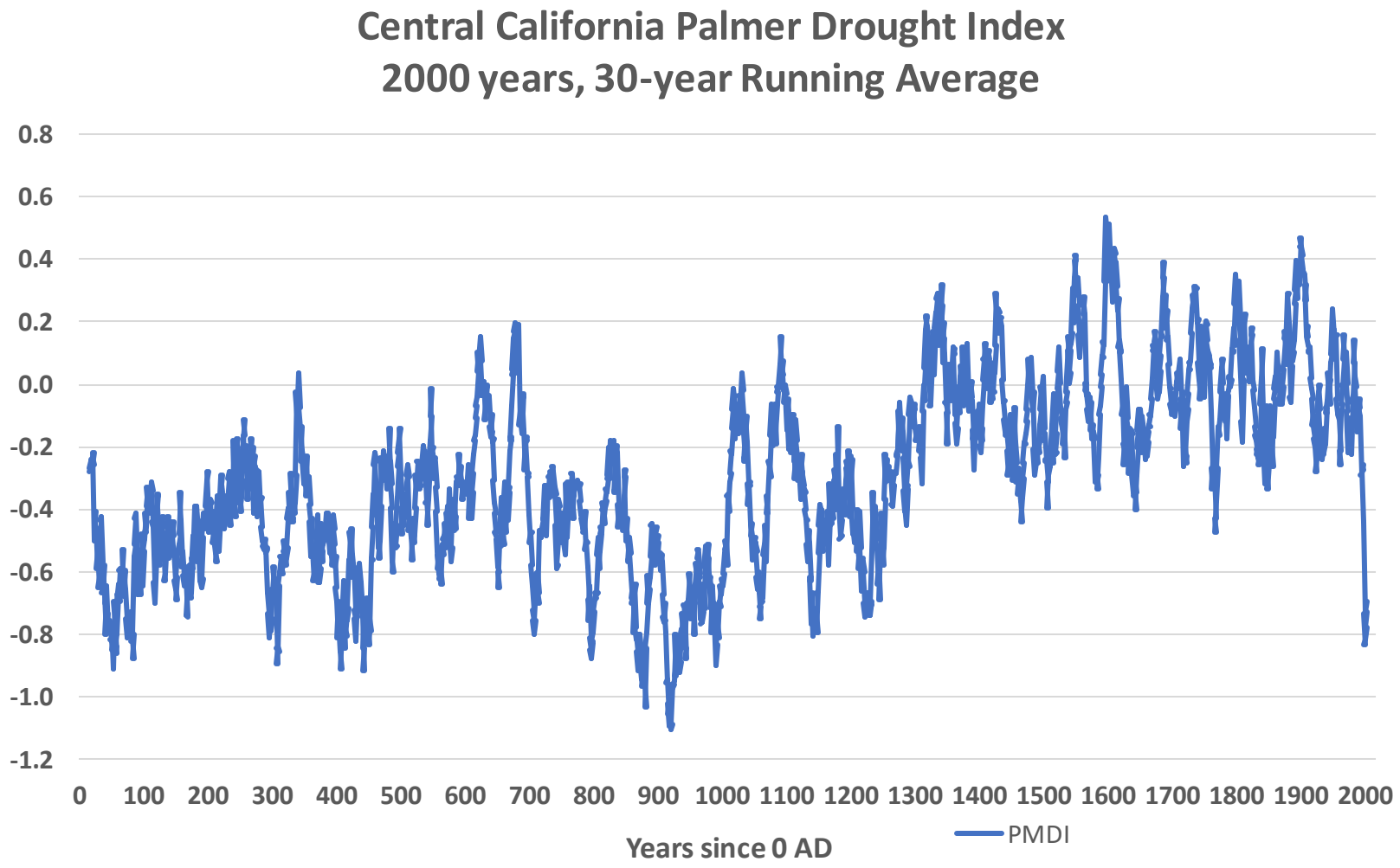
What is a Flash Drought?

A drought that catches you off guard

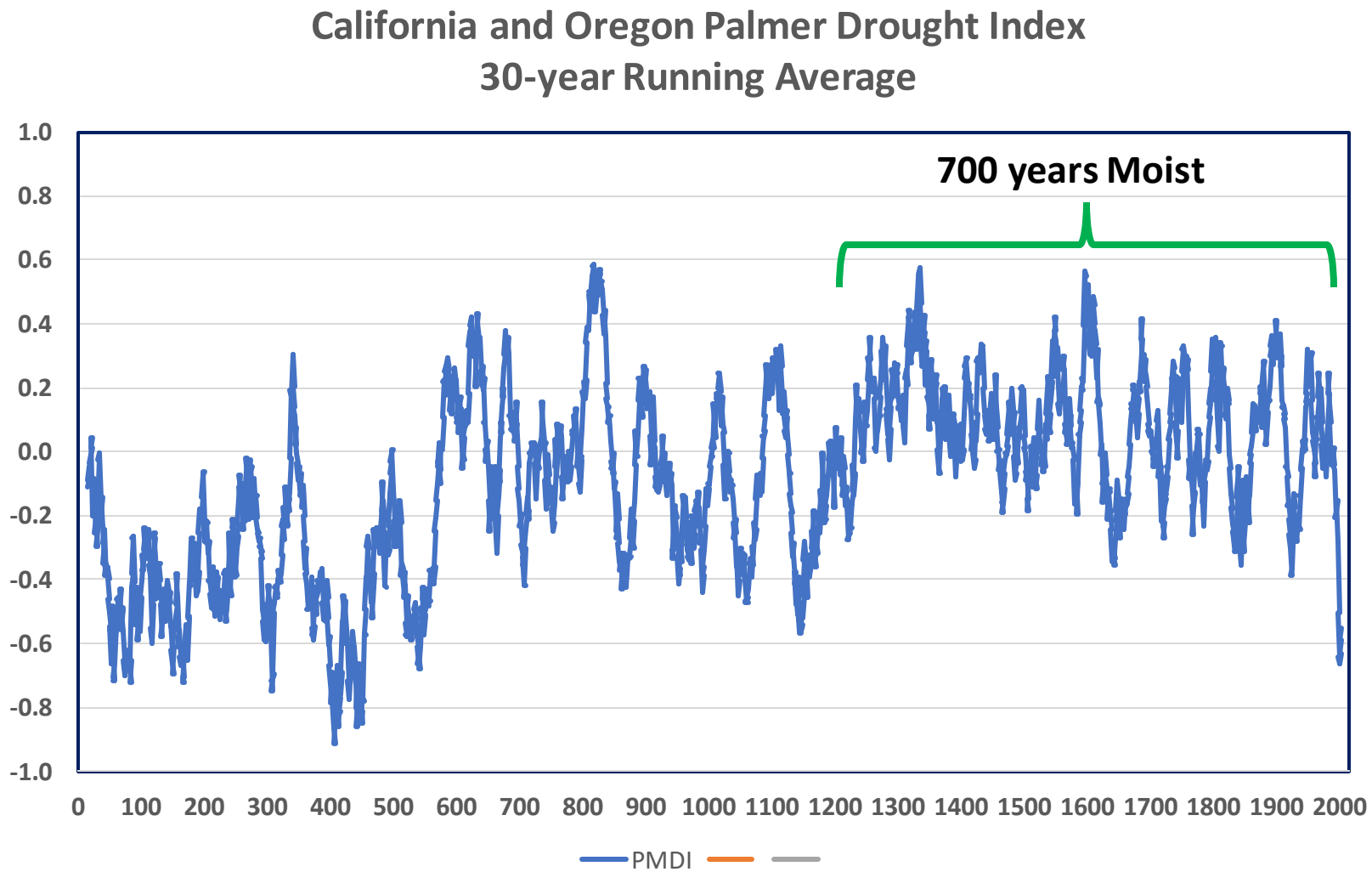
Time Scale of Drought

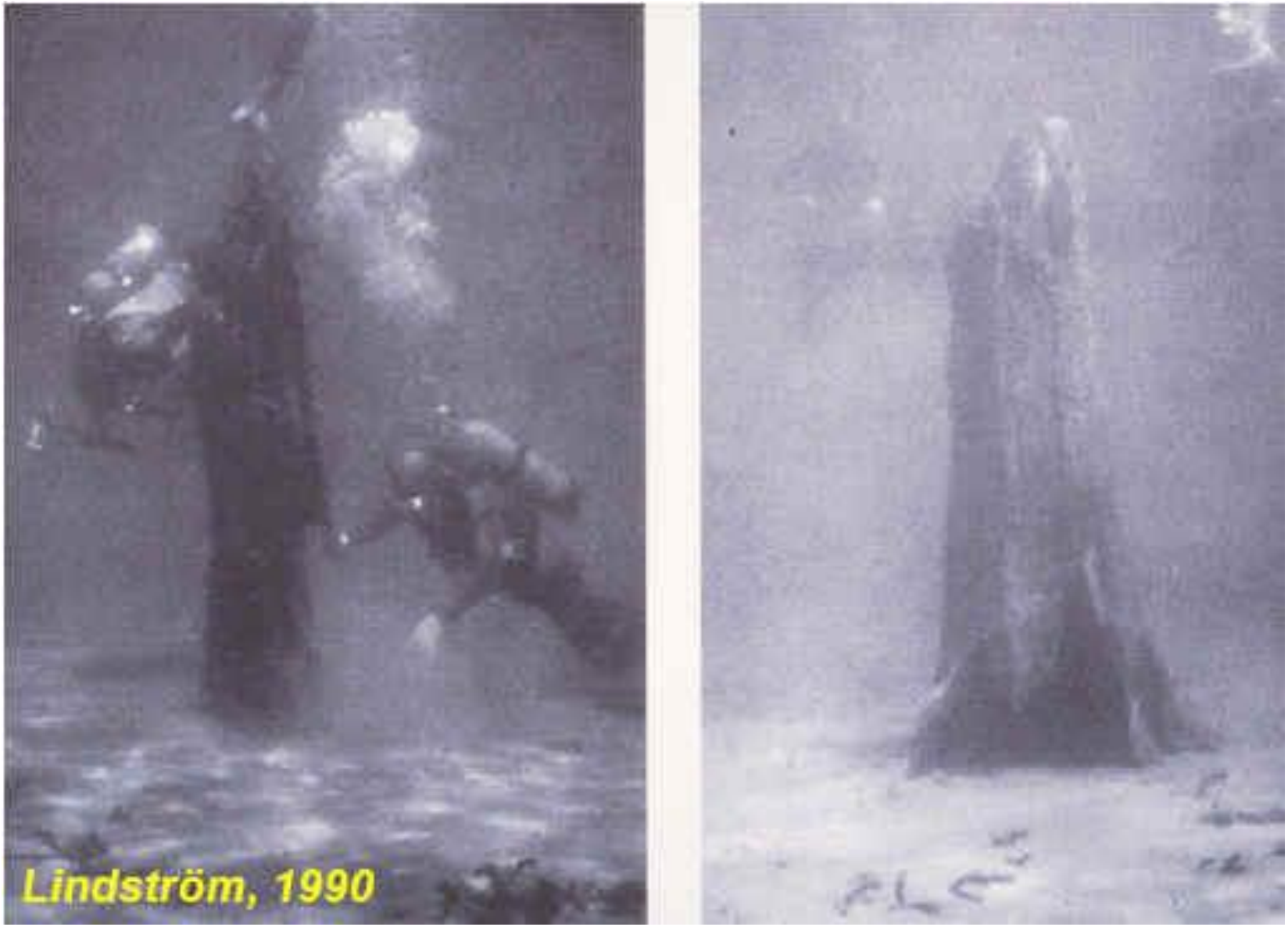


Time Scale of Drought



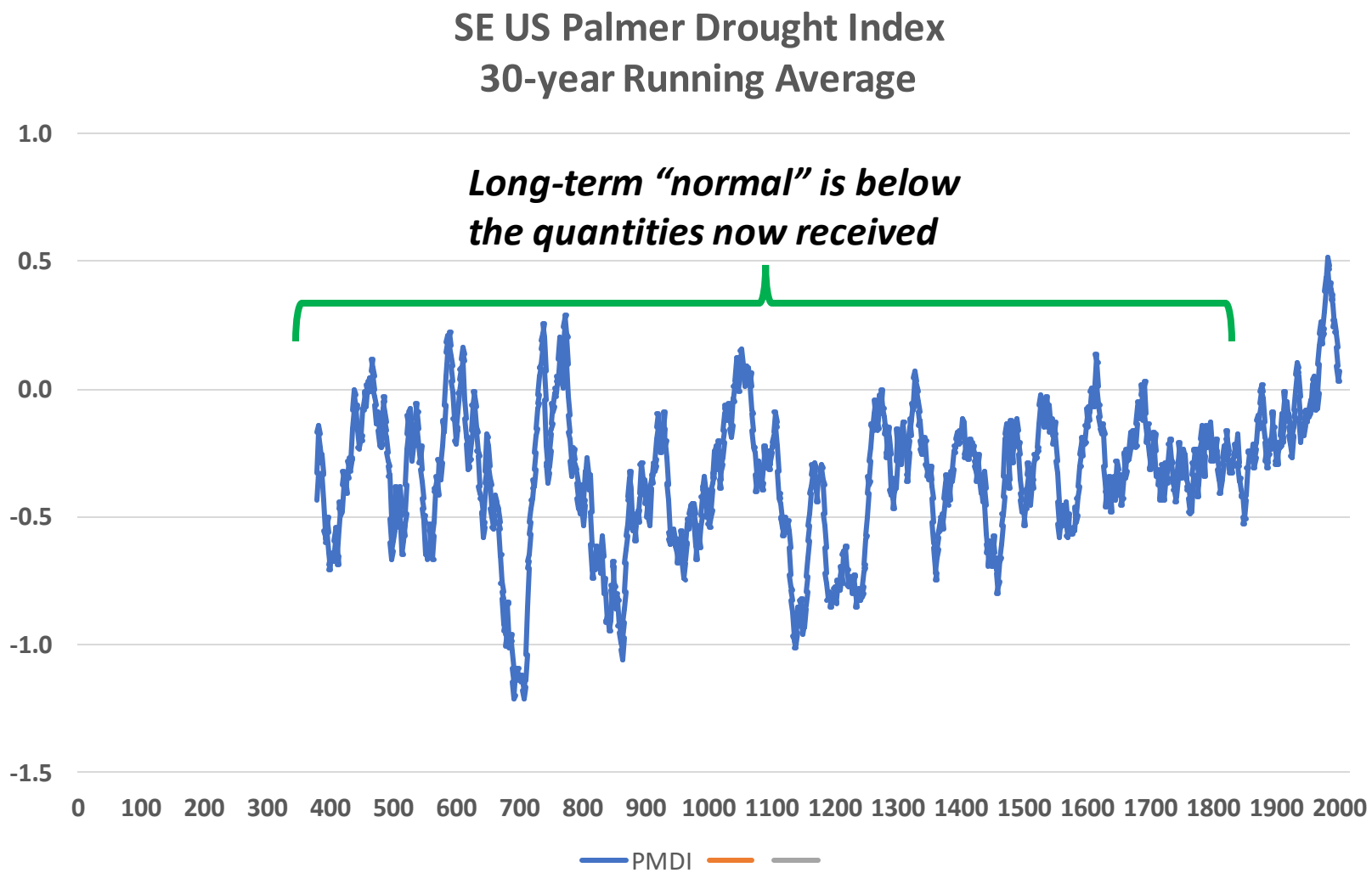
Time Scale of Drought





100-year old trees grew in dry meadows 1000 years ago in what are now Sierra Nevada alpine lakes

Southeast Drought



The context of drought is many-faceted

- Previous centuries were much drier
- 1970s possibly the wettest decade in 2000 years – so society is not aware of long-term, extremely dry periods
- Present periods of dryness are well-within the variations seen in the past 2000 years

The context of drought is many-faceted

- Southeast is heavily vegetated due to abundant rainfall on average
- Most SE soils do not hold water well which is to be expected in a wet environment.
- The combination of high sun-angles in late spring and summer with dense, leafy vegetation causes the hydrologic cycle to become more rapid
- Midwest prairie grasses do not transpire as does leafy vegetation and indeed become dormant when stressed, reducing evapotranspiration to near zero

The context of drought is many-faceted

- As a result of an acceleration in the hydrologic cycle, SE vegetation can dry out soils rapidly in a rainless period of 7-10 days, especially with high temperatures
- Most row crops are shallow-rooted so experience the same, rapid on-set stresses because the soil moisture is vigorously extracted to keep the plants alive and cool
- Midwest soils are deep and high in water-holding capacity, and coupled with vegetation that requires less moisture, will better withstand dry periods

An example of Water Stress changes in the SE during 2012

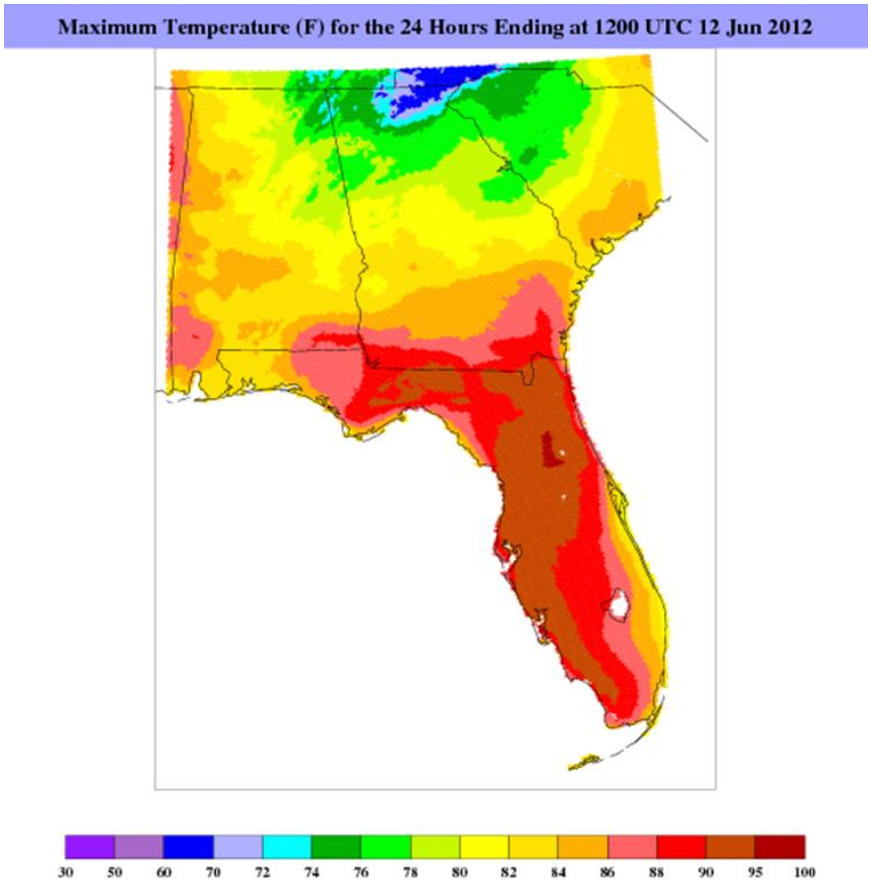
- Mid-June – little to no stress
- Within 2 weeks, water stress for corn reached the maximum damage on the scale
- [Midwest soils are deep and high in water-holding capacity, and coupled with vegetation that requires less moisture, will better withstand dry periods]

June 2012 Huntsville AL

	Max	Rain			Max T	Rain
1	75	0.12		16	88	0.00
2	79	0.00		17	89	0.00
3	87	0.41		18	91	0.00
4	79	0.42		19	91	0.00
5	82	0.06		20	92	0.00
6	84	0.00		21	93	0.00
7	87	0.00		22	97	0.00
8	89	0.00		23	99	0.00
9	87	T		24	101	0.00
10	75	0.14		**25**	**102**	**0.00**
11	86	0.28		26	96	0.00
12	**85**	**0.00**		27	98	0.00
13	91	0.00		28	103	0.00
14	93	0.00		29	106	0.00
15	90	0.00		30	105	0.00

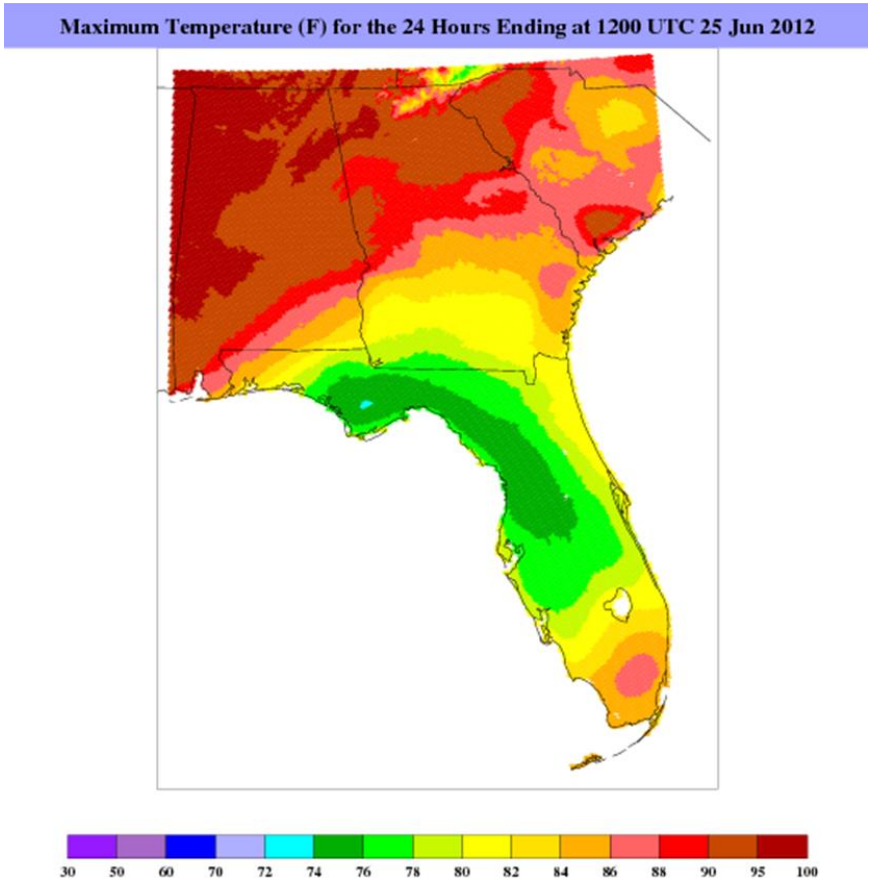
12 June 2012

Max Temperature

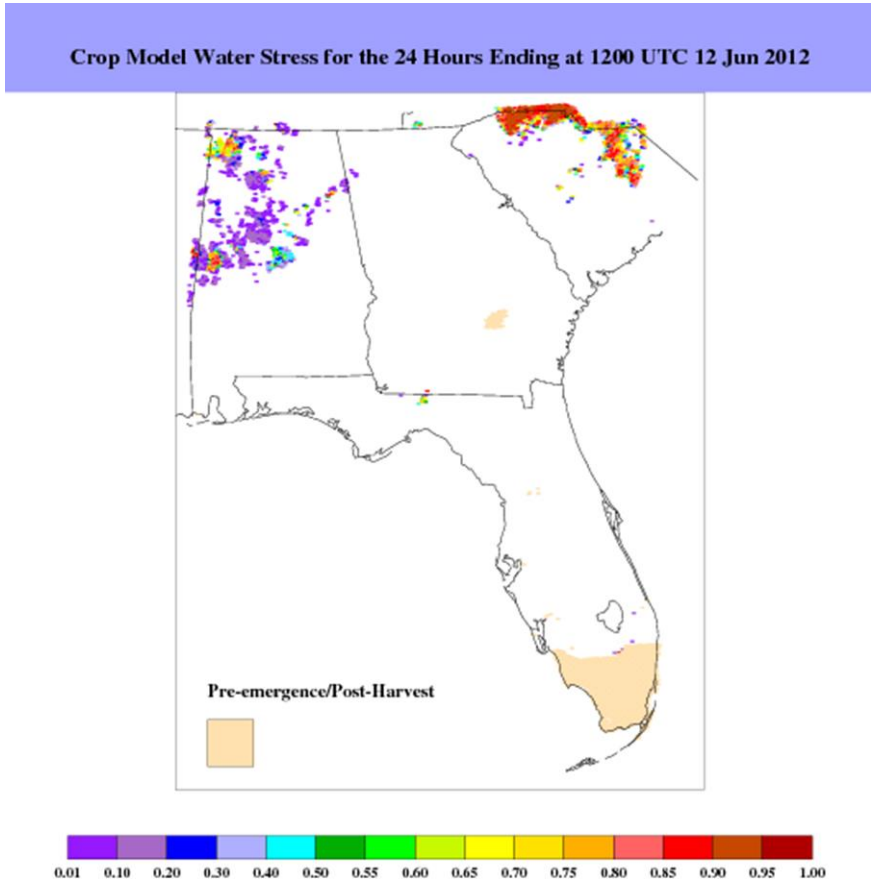


25 June 2012

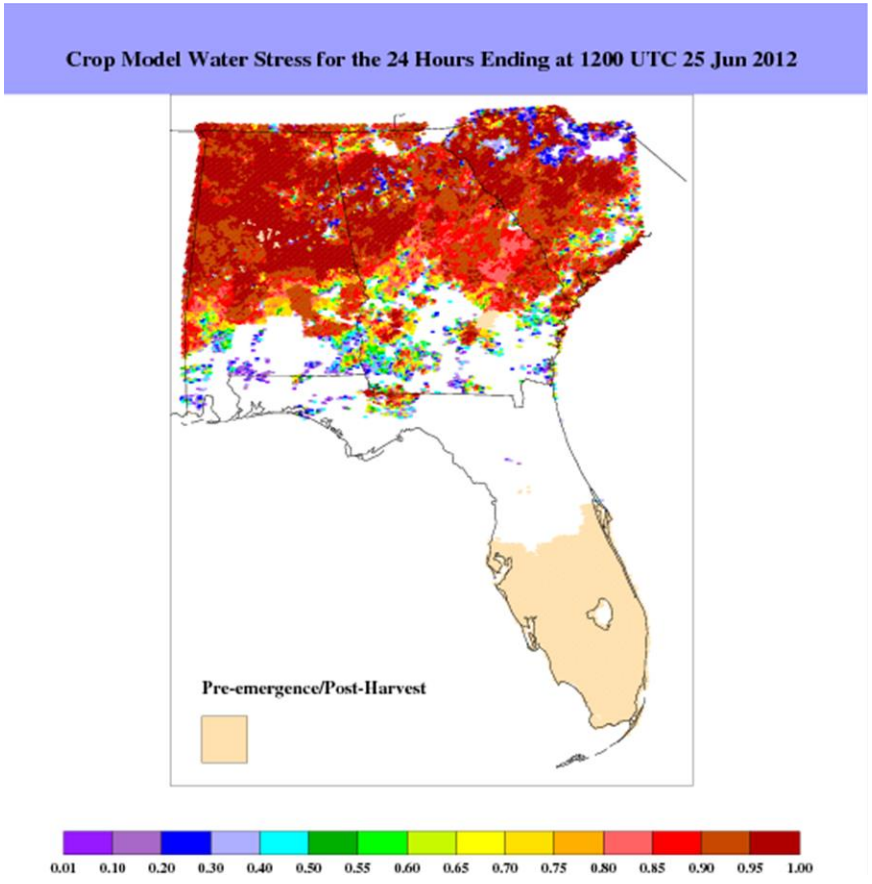
Max Temperature



12 June 2012
Crop Water Stress

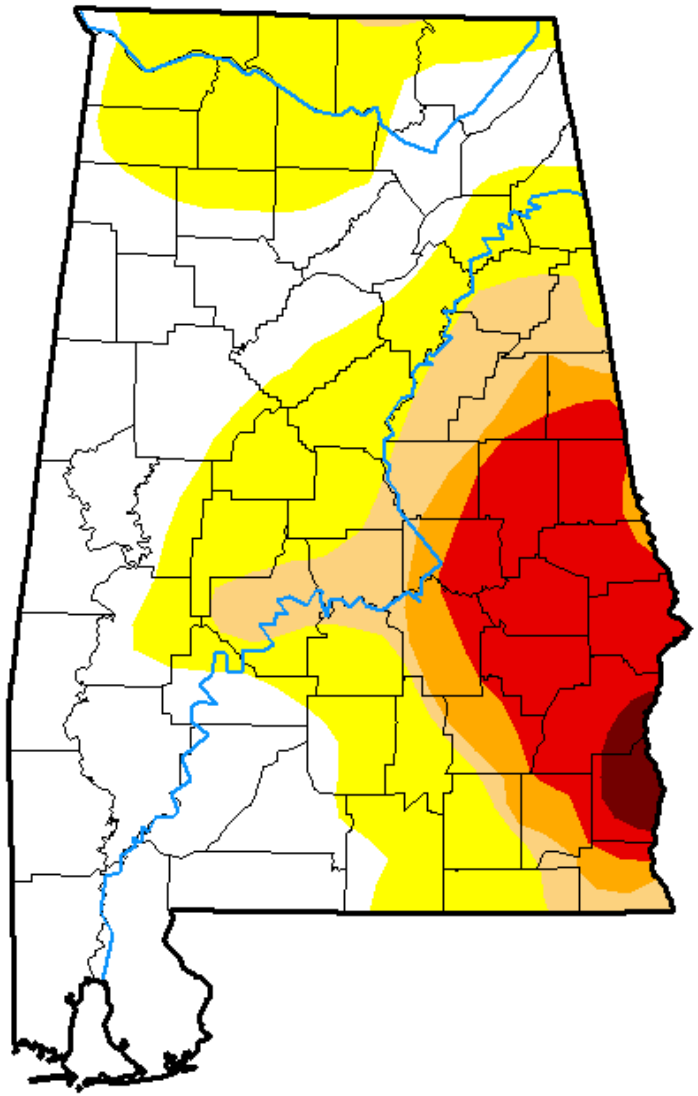


25 June 2012
Crop Water Stress



U.S. Drought Monitor

Alabama



June 19, 2012

(Released Thursday, Jun. 21, 2012)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	42.59	57.41	26.43	17.55	12.58	1.06
Last Week *06-12-2012*	43.86	56.14	26.43	17.55	13.65	1.06
3 Months Ago *03-20-2012*	54.03	45.97	33.05	24.84	17.11	3.98
Start of Calendar Year *01-03-2012*	39.32	60.68	49.64	27.97	14.47	0.00
Start of Water Year *09-27-2011*	52.55	47.45	39.68	29.11	14.38	0.00
One Year Ago *06-21-2011*	3.96	96.04	54.68	41.92	24.95	11.70

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

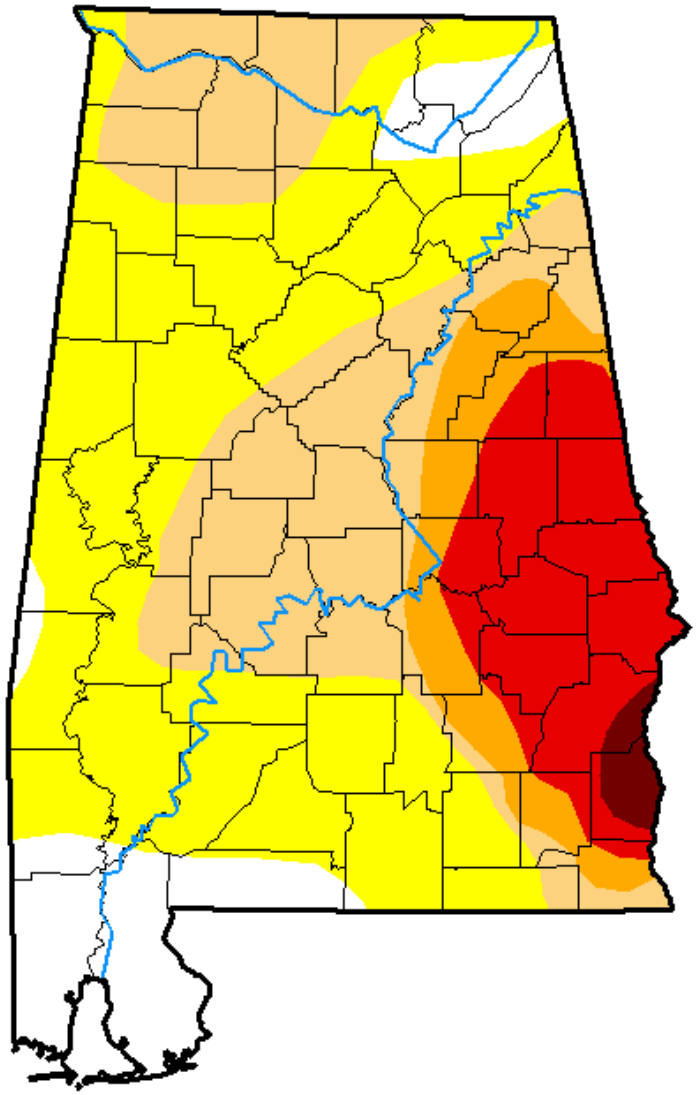
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Richard Heim
NCEI/NOAA

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

Alabama



June 26, 2012

(Released Thursday, Jun. 28, 2012)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	11.31	88.69	46.73	20.59	13.78	1.08
Last Week *06-19-2012*	42.59	57.41	26.43	17.55	12.58	1.06
3 Months Ago *03-27-2012*	57.87	42.13	32.96	24.67	16.85	3.98
Start of Calendar Year *01-03-2012*	39.32	60.68	49.64	27.97	14.47	0.00
Start of Water Year *09-27-2011*	52.55	47.45	39.68	29.11	14.38	0.00
One Year Ago *06-28-2011*	6.39	93.61	57.16	41.92	24.95	11.70

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U.S. Drought Monitor

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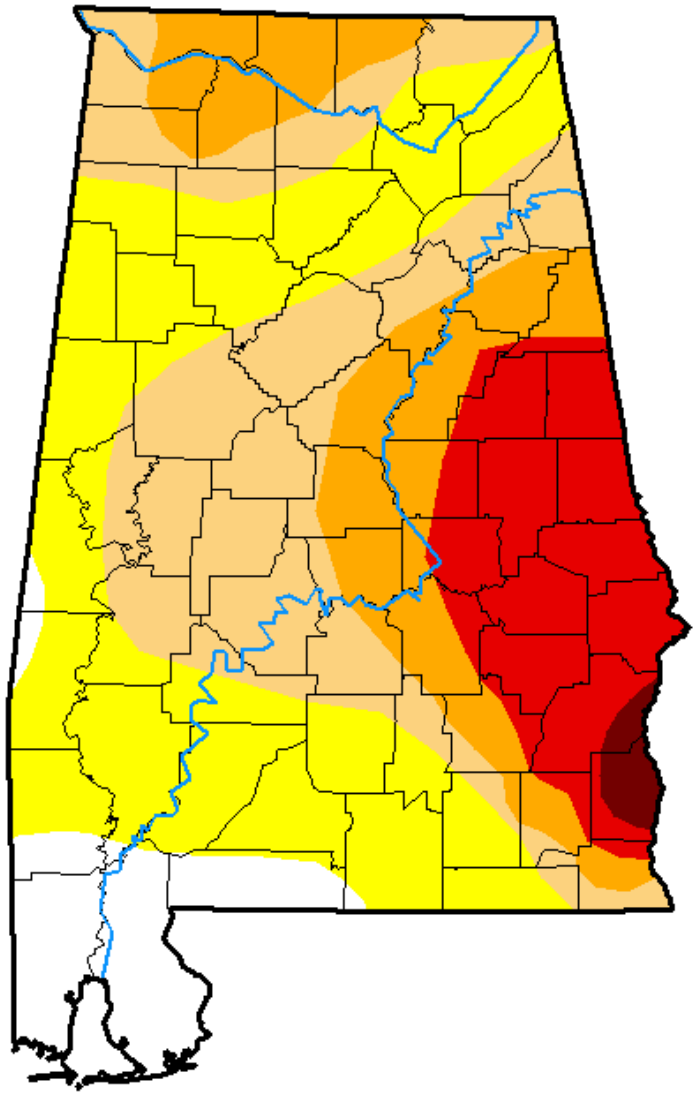

July 3, 2012

(Released Thursday, Jul. 5, 2012)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	8.52	91.48	58.00	31.53	15.64	1.08
Last Week *06-26-2012*	11.31	88.69	46.73	20.59	13.78	1.08
3 Months Ago *04-03-2012*	57.87	42.13	32.96	24.67	16.85	3.98
Start of Calendar Year *01-03-2012*	39.32	60.68	49.64	27.97	14.47	0.00
Start of Water Year *09-27-2011*	52.55	47.45	39.68	29.11	14.38	0.00
One Year Ago *07-05-2011*	10.16	89.84	57.16	41.92	23.88	10.45

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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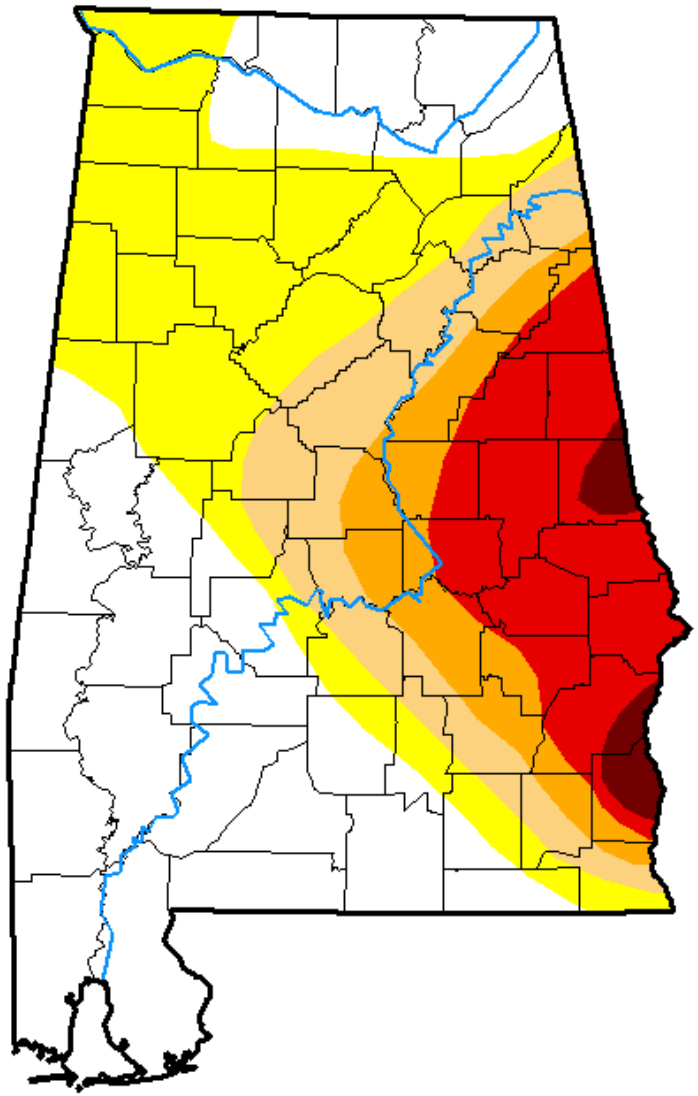
Author:

Richard Tinker

CPC/NOAA/NWS/NCEP

http://droughtmonitor.unl.edu/

U.S. Drought Monitor
Alabama



August 7, 2012
(Released Thursday, Aug. 9, 2012)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	41.17	58.83	33.40	21.99	14.27	1.60
Last Week *07-31-2012*	16.44	83.56	46.74	23.70	14.58	1.74
3 Months Ago *05-08-2012*	9.38	90.62	50.03	27.70	22.69	2.99
Start of Calendar Year *01-03-2012*	39.32	60.68	49.64	27.97	14.47	0.00
Start of Water Year *09-27-2011*	52.55	47.45	39.68	29.11	14.38	0.00
One Year Ago *08-09-2011*	33.04	66.96	56.78	37.72	4.50	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

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Author:
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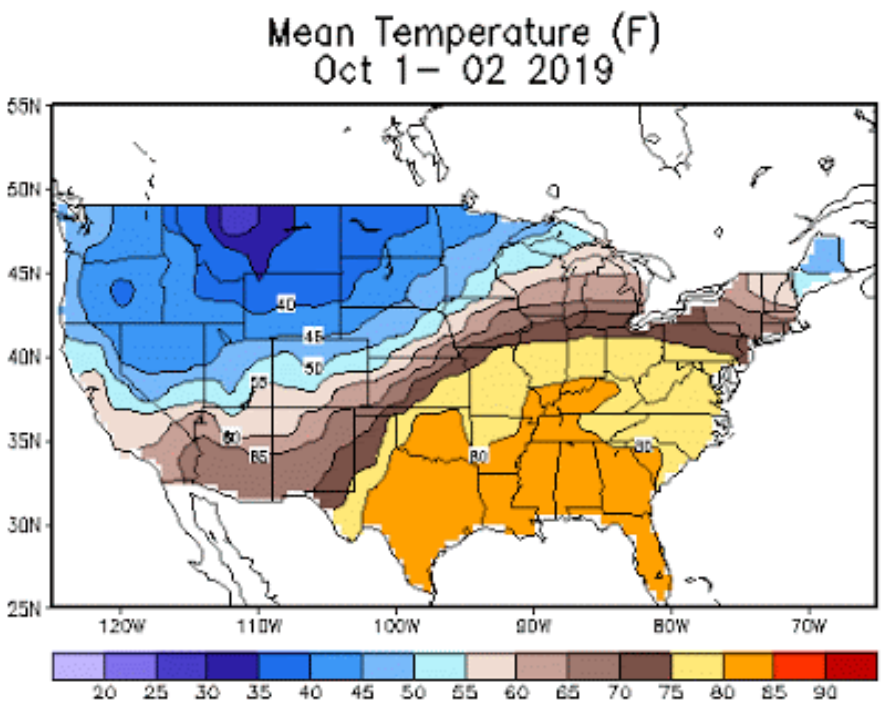
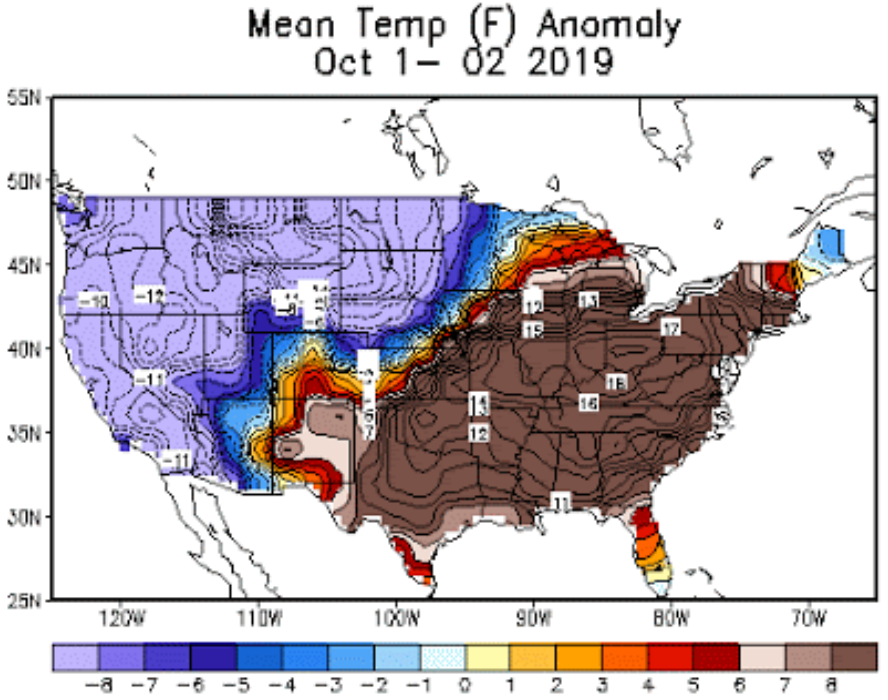
http://droughtmonitor.unl.edu/

Sep-Oct SE Flash Drought 2019

Stagnant pattern –
hot/dry SE,
cold/wet NW.

(Spokane WA received all time record Sept. snowfall with records dating back to 1881.)





Sept - Oct 2019 Montgomery AL

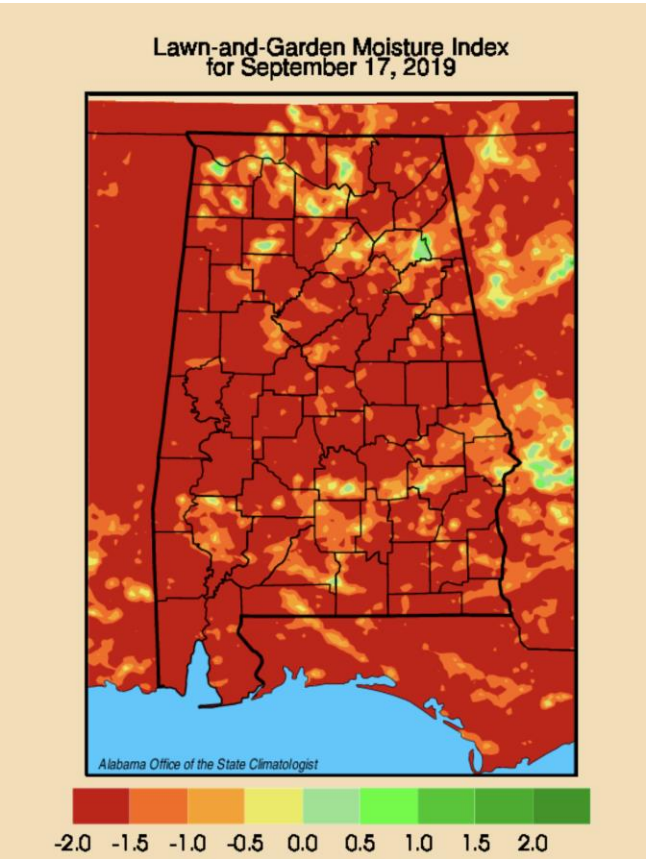
28 Aug to 5 Oct, high Temp 90°F+ every day

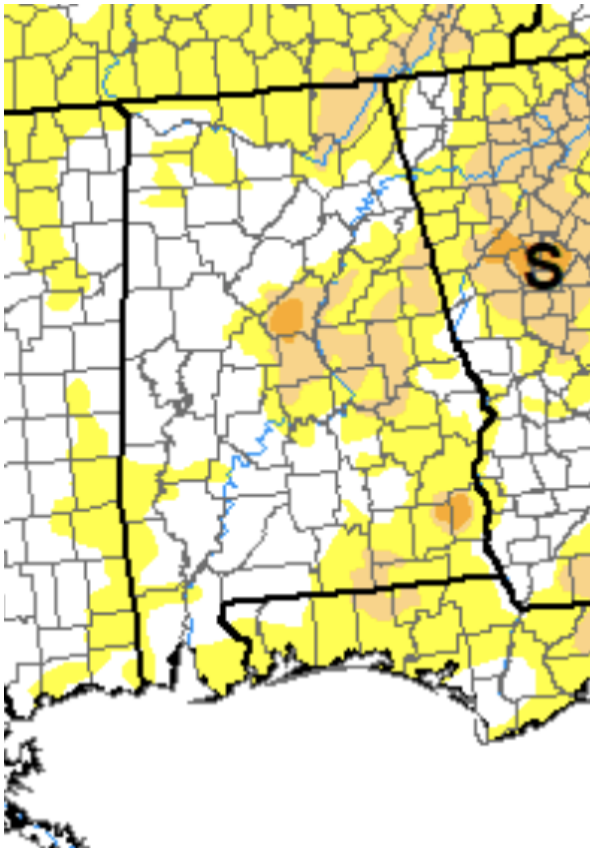
4+ inches rain 19-27 Aug influenced DM

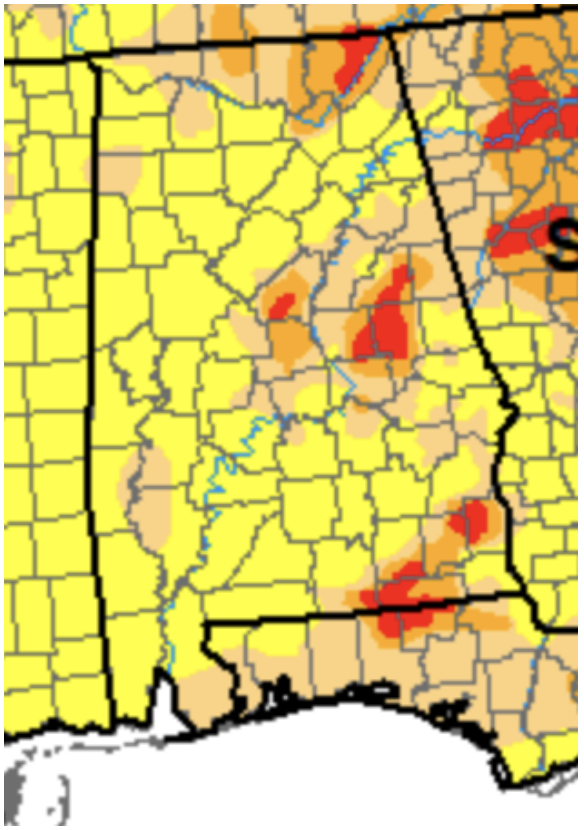
Damage done by 17 September

Statewide AL rainfall was driest in 125 years of records, 3rd highest temperature

	Max T	Rain			Max T	Rain
1	92	0.05		18	103	0.00
2	94	0.00		19	91	0.00
3	98	0.00		20	90	0.00
4	99	0.00		21	91	0.00
5	97	0.00		22	92	0.00
6	96	0.00		23	95	0.00
7	98	0.00		24	97	0.00
8	100	0.00		25	98	0.00
9	98	0.00		26	100	0.00
10	98	0.00		27	99	0.00
11	97	0.00		28	97	0.00
12	100	0.00		29	98	0.00
13	100	0.00		30	98	0.00
14	95	0.00		1	101	0.00
15	96	0.00		2	99	T
16	100	0.00		3	102	0.00
17	103	0.00		4	102	0.00







17 September 2019
Lawn & Garden Index

17 September 2019
Drought Monitor

2 October 2019
Drought Monitor

Damage was done by mid-September 2019
12 Counties Qualified 2 Oct due mainly to D3 classification

These examples illustrate the SE concern for defining Flash Droughts

- Rapidity of moving from no water-stress to the highest level of stress in less than two weeks.
- Mo and Lettenmairer 2016 called these “Precipitation Deficit” droughts (vs. “Heat Wave” droughts) and note these are the type to occur in the South.
- Otkin et al 2018 describe Flash Droughts as needing “several weeks to months” for development.
- Given the soil and vegetation types in the SE, Flash Droughts should be defined on much faster time scales with associated recognition of impacts to agriculture