2022 Dryland Small Grain Trial Siskiyou County

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UNIVERSITY OF CALIFORNIA
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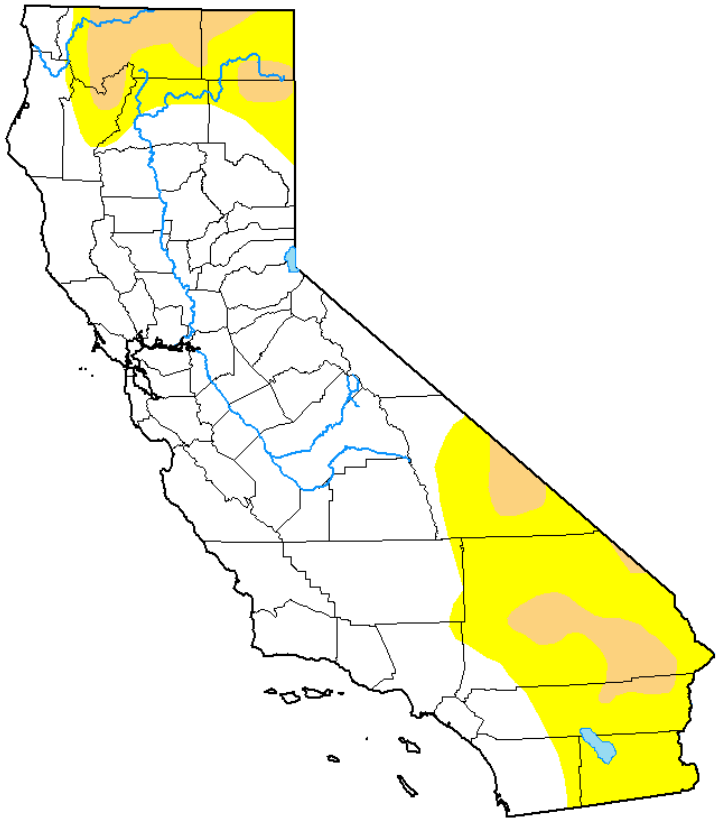
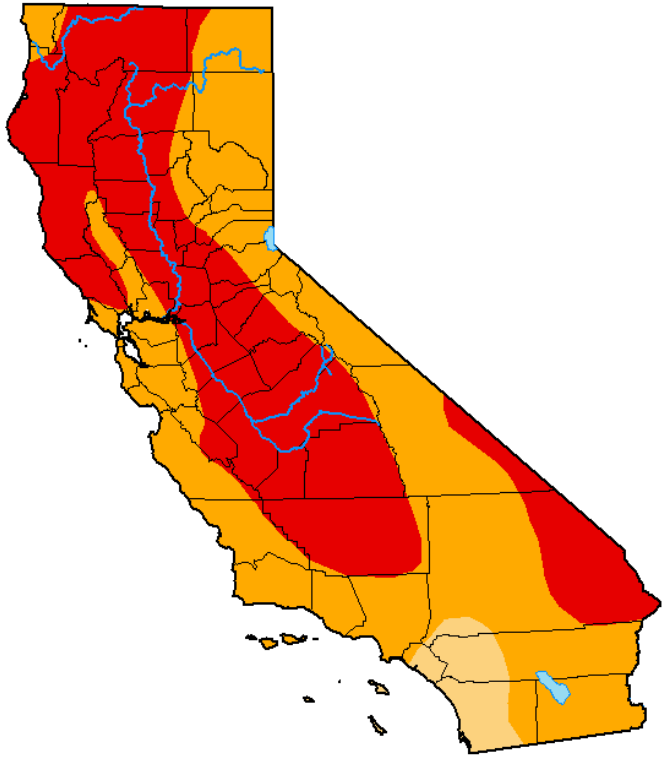
California Drought

April 12, 2023



U.S. Drought Monitor

California



April 12, 2022

(Released Thursday, Apr. 14, 2022)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	95.75	46.87	0.00
Last Week *04-05-2022*	0.00	100.00	100.00	93.65	40.67	0.00
3 Months Ago *01-11-2022*	0.00	100.00	99.25	66.39	1.39	0.00
Start of Calendar Year *01-04-2022*	0.00	100.00	99.30	67.62	16.60	0.84
Start of Water Year *09-28-2021*	0.00	100.00	100.00	93.93	87.88	45.66
One Year Ago *04-13-2021*	0.78	99.22	94.14	76.97	38.68	5.36

Intensity:

- None
- 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. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

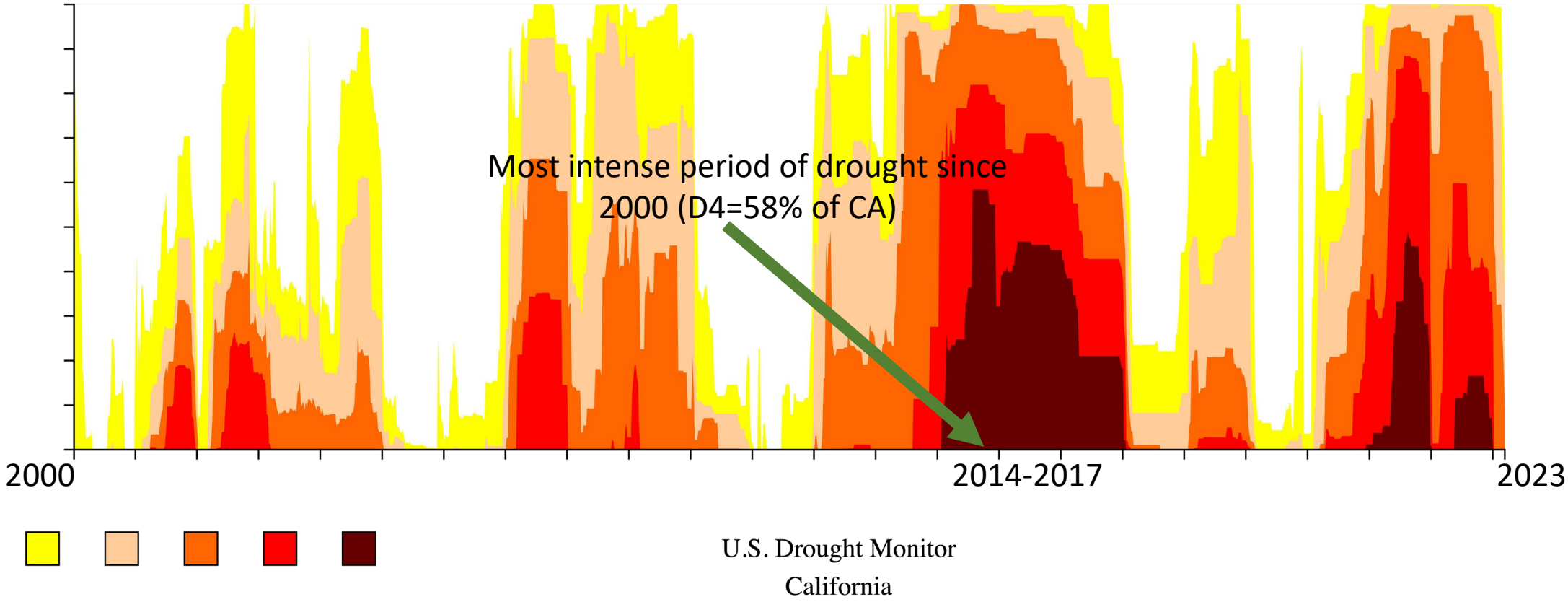
Author:

Richard Tinker

CPC/NOAA/NWS/NCEP

droughtmonitor.unl.edu

Drought in California: 2000 - Present



2021/22 vs 2022/2023 Precipitation

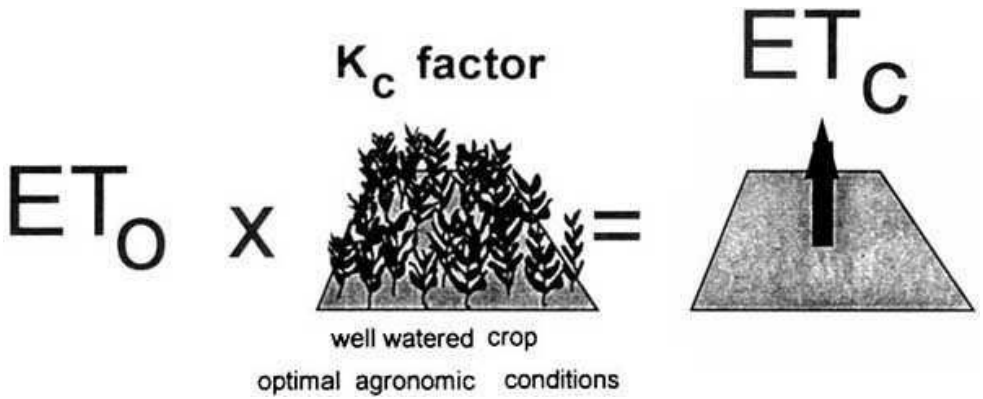
	2021/22		2022/23
October 21th ->	0.11		0
Nov	0.76	**2X**	1.52
Dec	3.95		4.69
Jan	0.53	**5X**	2.85
Feb	0.08	**14X**	1.12
-> Mar 13th	0.43	**4X**	1.67
Sum	5.86		11.85

2021/22 Small Grain Trial

- Field trial planted on October 21st, 2021
- 14 varieties of triticale, wheat, and barley
  - Assessed regarding forage yields (mimic grazing)
- Dryland condition = no irrigation at all
- Collaborator's field in Scott Valley

Some concepts

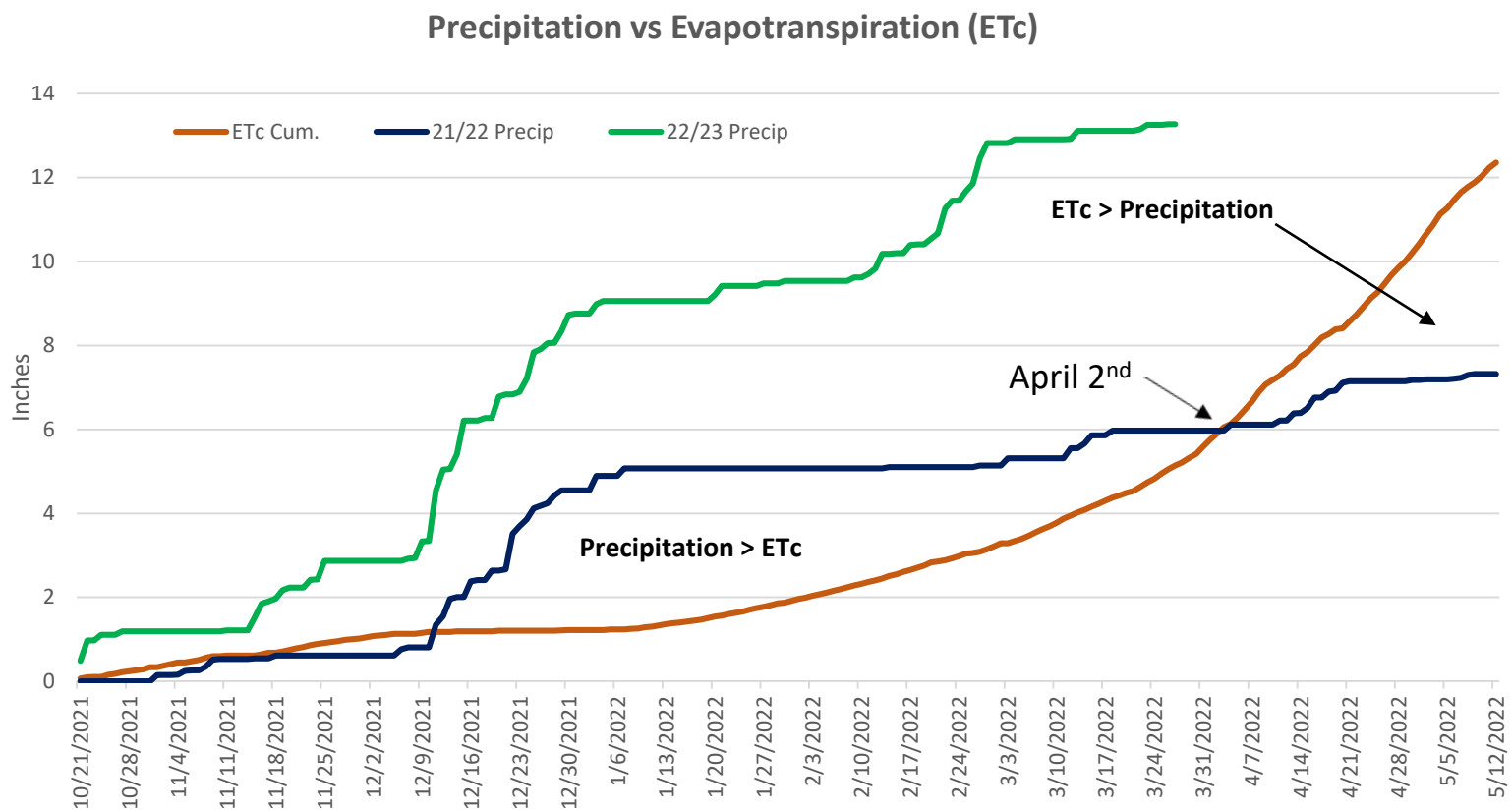
- Crop evapotranspiration (ETc)
  - Combination of water loss by soil (evaporation) and plant (transpiration)



  - Reference evapotranspiration (Eto): the “evaporation power” of the atmosphere
    - CIMIS stations
  - Crop Coefficient (Kc): factor that varies according to crop and its stage of development

April 2nd

Precipitation and Crop Evapotranspiration (ETc)



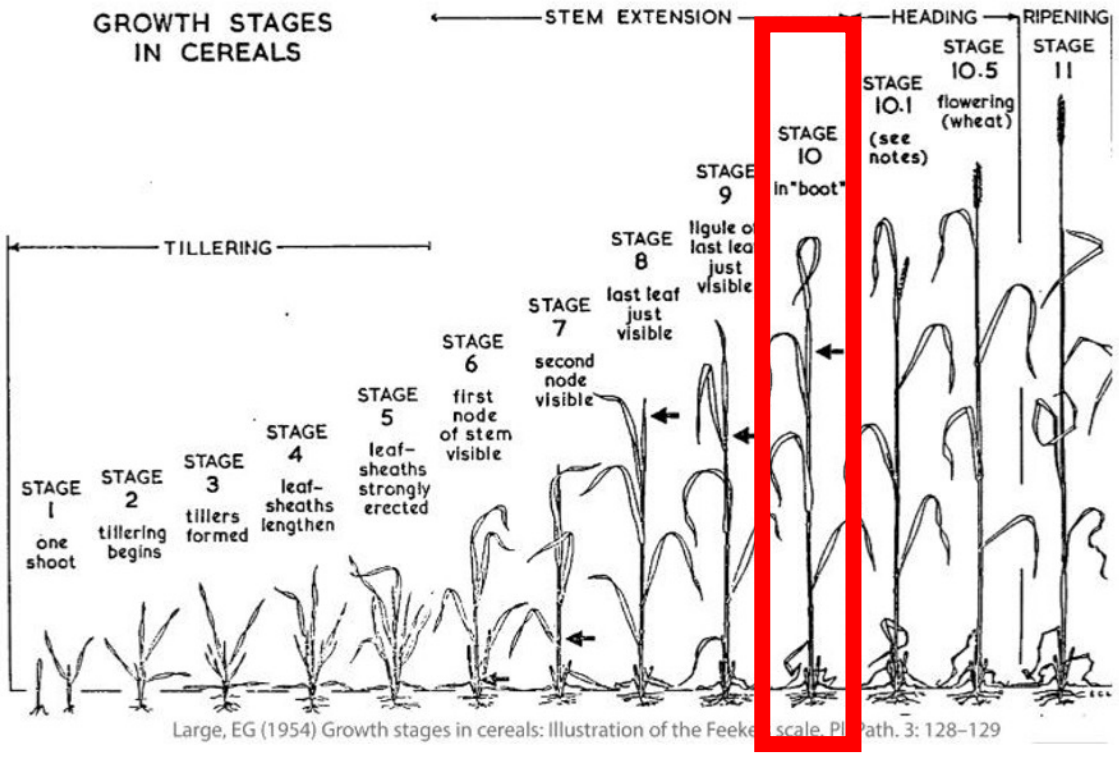
- Location's average precipitation (2016-2021) = 15.2" per year

- Plants became water stressed on April 2nd
  - It should not happen in 2023
- ETc calculated using Kc=0.7 for the first 160 days and Kc=1.15 for the remaining 43 days
- Cumulative ETc =12.35 inches of water
- Precipitation = 7.32 inches
- Dry year
- <u>Precipitation</u>
  - March 2023: 2.64" (until March 16th)
  - March 2022: 0.55" (whole month)

When to Harvest?

- Trial was harvested at boot stage
  - Head enclosed in the flag leaf
  - Best if looking for quality or short on water
  - Highest in crude protein and in-vitro digestible dry matter

- Small grain forage quality decrease as yields increase
  - Boot → Milk → Dough
  - Boot stage yield is 38-42% of yield of that at dough stage



Large, EG (1954) Growth stages in cereals: Illustration of the Feeke scale. Pl Path. 3: 128–129

Yield Results

- Harvested on May 12, 2022
  - Boot stage of development
- DM Yields ranged from 1.5 to 2.7 ton/A
- Triticale performed better than wheat and barley

ton/A								
Variety		**Fresh Weight**	**Dry matter (18%)**					
14401	Triticale	15.2	2.7	A				
Thor	Triticale	13.2	2.4	A	B			
Legend	Triticale	12.2	2.2	A	B	C		
TriMark099	Triticale	11.9	2.2		B	C		
Surge	Triticale	11.8	2.1		B	C		
Merlin Max	Triticale	11.6	2.1		B	C	D	
Forerunner	Triticale	11	2		B	C	D	E
UC3185	Triticale	10.5	1.9		B	C	D	E
Yamhill	Wheat	10.1	1.8		B	C	D	E
Alvena	Wheat	9.1	1.6			C	D	E
Mandala	Wheat	9.1	1.6			C	D	E
Patron + Eureka	Wheat + Barley	8.5	1.5				D	E
Patron	Wheat	8.3	1.5				D	E
Brundage	Wheat	8.2	1.5					E
Mean		**10.8**	**1.9**					
CV%		**21**						

Forage options for a dry future

- Winter Small Grain + Summer crop
  - Triticale + Sorgum?
  - Tricale + Corn?
    - These options could be viable with some irrigation water during growing season
- Cool Season Perennial Grass
  - Plant in the fall
    - Farm for roots

Winter Groundwater Recharge Siskiyou County

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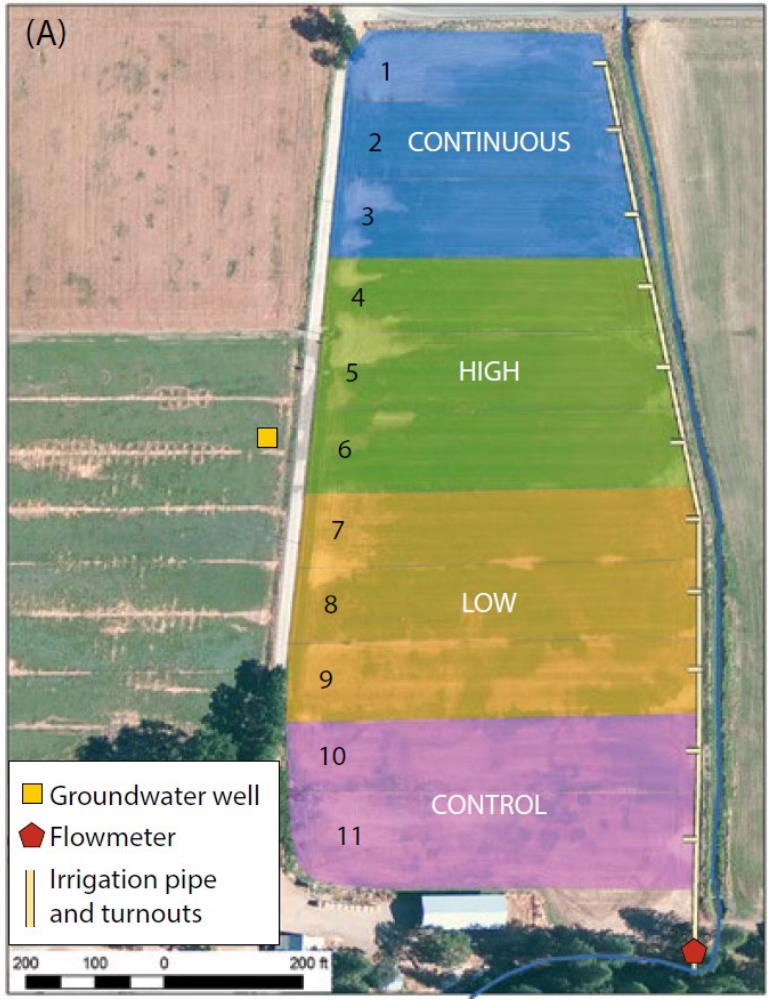
On-farm experiments

- Helen Dahke, Steve Orloff, Andre Brown, Daniel Putnam, Toby O'Geen
- Two on-farm experiments in 2015 and 2016
  - UC Davis
  - Scott Valley
- Experiments evaluation
  - Effects of different water amounts
  - Timing of water application
  - Duration of water application

On-farm experiments

- Scott Valley, Siskiyou County
  - 15 acres
  - 9-yr alfalfa stand
  - Stoner gravelly sandy loam
  - Alfalfa variety: BlazerXL
    - Fall dormancy 3
- Treatments
  - ***Continuous*** – every day
  - ***High*** – 3-5 water applications per week
  - ***Low*** – 1-3 water applications per week
  - **Standard** - no winter water application



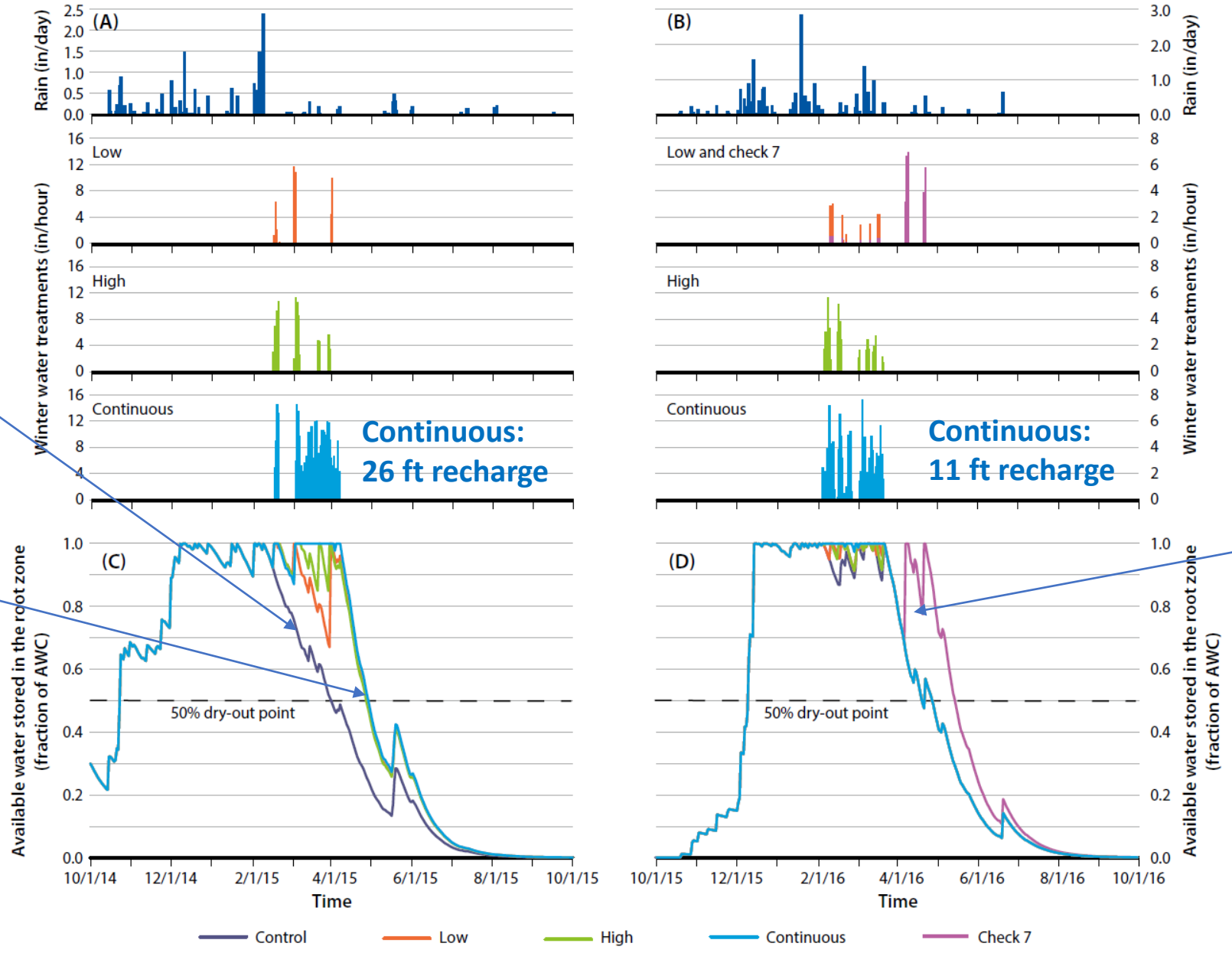
Total Applied Water (ft)

Treatment	Check	Check size	Applied winter water for recharge							
			2014–2015 (Feb 17–Apr 9, 2015)				2015–2016 (Feb 4–Mar 21, 2016)			
			Total	Feb	Mar	Apr	Total	Feb	Mar	Apr
		ac	*ft*				*ft*			
Continuous	1	0.84	30.74	2.50	22.34	5.90	13.52	6.99	6.52	0.00
	2	1.10	AVG= 26.2	3.69	16.68	4.51	AVG= 11.1	5.34	4.98	0.00
	3	1.19	23.38	3.93	15.28	4.17	9.54	4.94	4.61	0.00
High	4	1.18	7.08	2.55	3.70	0.83	4.45	2.83	1.61	0.00
	5	1.35	AVG= 7.2	2.39	3.48	0.68	AVG= 4.1	2.48	1.41	0.00
	6	1.44	8.06	3.17	4.06	0.82	3.86	2.54	1.32	0.00
Low	7	1.41	5.10	0.95	1.94	2.21	12.96	1.06	0.68	11.22
	8	1.51	AVG= 3.9	0.81	2.01	0.72	AVG= 5.4	0.99	0.64	0.00
	9	1.54	3.26	0.80	1.70	0.76	1.60	0.97	0.62	0.00
Standard	10	1.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	11	1.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

* This check received an additional 11.3 ft of water in two irrigation events on April 6–8 and April 21–22, 2016.

2014/15 dry year:

- Total recharge was 135 AF
- Early dry-out in standard plot
- Recharge increases plant available water
- Loss to ET, soil storage is 1-7%



2015/16
Above normal year:

- Total recharge was 107 AF
- Late dry-out
- No benefit for plant available water
- Loss to ET soil storage is 1-2%

Dahlke et al. 2018, CalAg

Water Inputs and estimated Deep Percolation

	Precipitation	Applied winter water	Total annual deep percolation[a]	Deep percolation from winter water application	Deep percolation as percent of applied water	Contribution to soil storage [b]	
	in	in	In	in	%	in	%
		DRY YEAR	SCOTT VALLEY - 2015				
Standard	19.6	0.0	7.8	-	-	-	-
Low	19.6	47.2	51.8	44.0	93%	3.2	6.8%
High	19.6	87.0	91.4	83.6	96%	3.4	3.9%
Continuous	19.6	310.6	314.5	306.8	99%	3.7	1.2%
		WET YEAR	SCOTT VALLEY - 2016				
Standard	23.7	0.0	11.2	-	-	-	-
Low	23.7	19.8	30.9	19.7	99%	0.2	0.8%
High	23.7	48.5	59.6	48.7	100%	0.2	0.3%
Continuous	23.7	130.6	141.7	130.5	100%	0.1	0.1%
Check 7	23.7	155.6	163.8	152.6	98%	3.0	1.9%

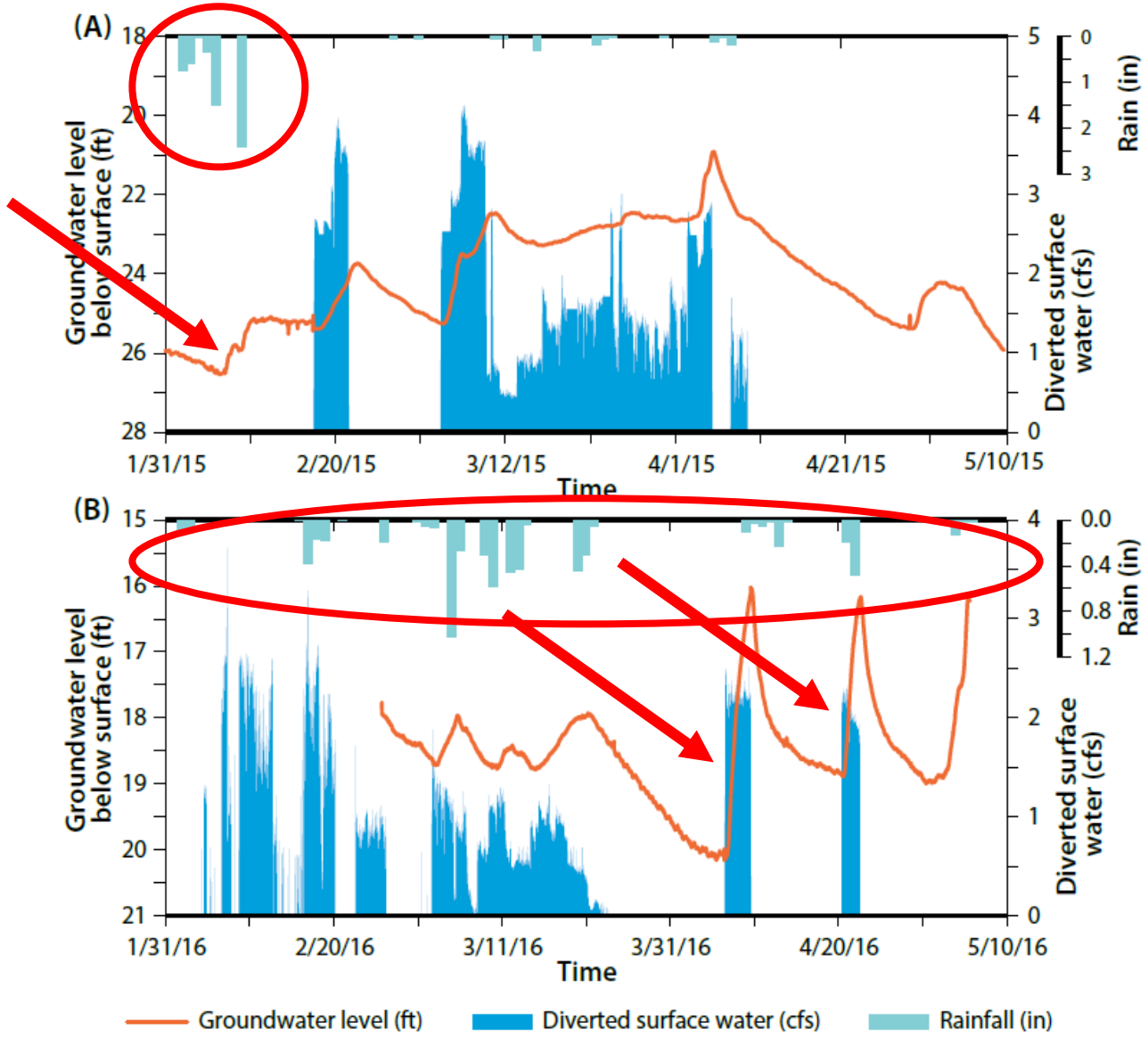
[a] includes deep percolation from precipitation

[b] amount of applied winter water used to bring soil water content to field capacity

1 inch = 2.54 cm

Dahlke et al. 2018, CalAg

Deep percolation estimates – Scott Valley



Dahlke et al. 2018, CalAg

DRY YEAR

- Water table rose up to 6 ft in response to winter recharge

WET YEAR

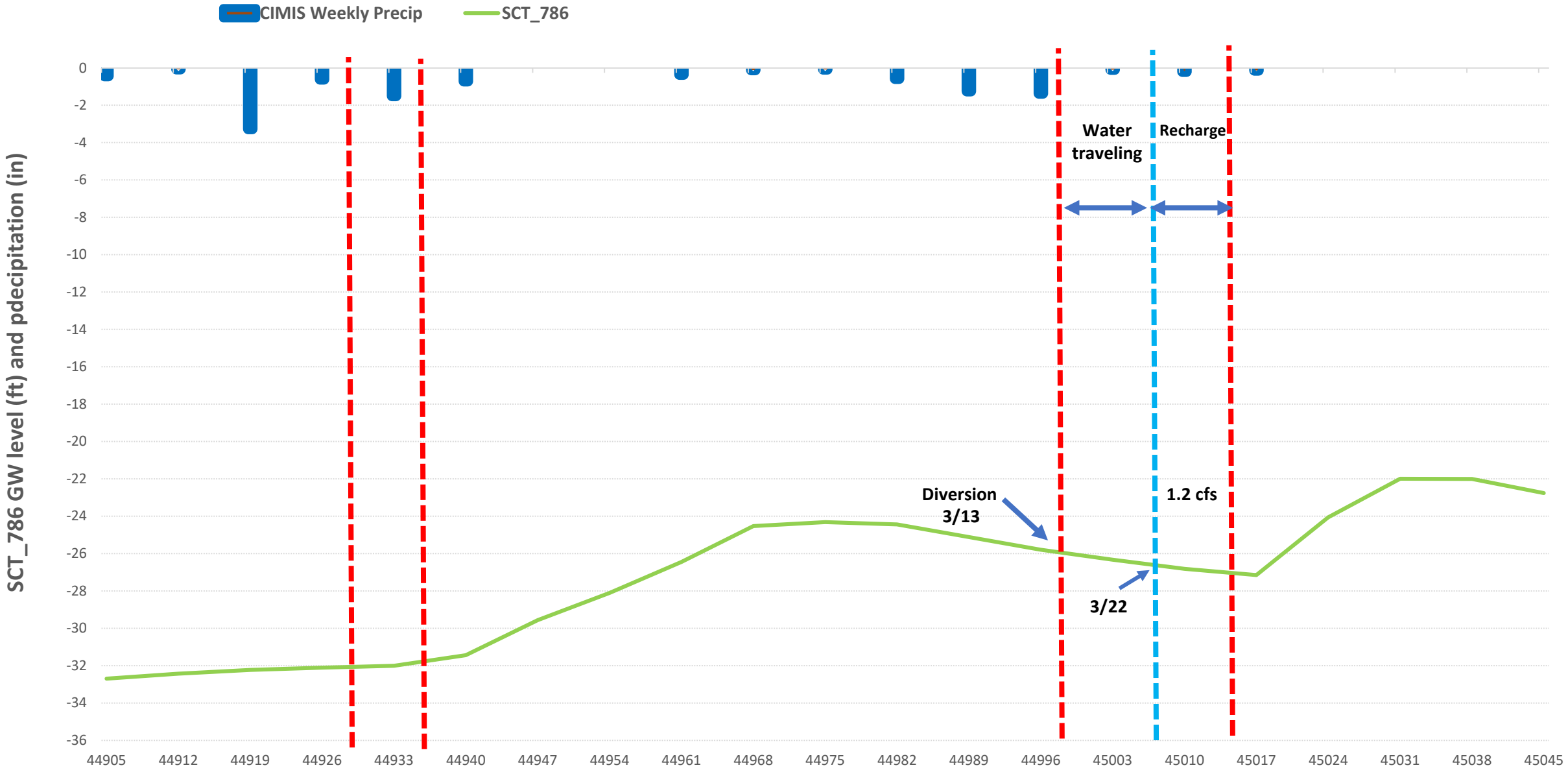
2022/23 Scott Valley Project

- 3 locations
- Permit approved in March 2023
- Grass fields
- Multi-year project

2023

- Diversion started on March 13th
- **Eastside**
  - Water reached 1 week after
  - 1.2 cfs to the field (1 location)
  - Recharge 11 days

- Water samples for isotope analysis
  - ^{2}H and ^{18}O


CIMIS Weekly Precip
SCT_786
SCT_786 GW level (ft) and pdecipitation (in)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
44905
44912
44919
44926
44933
44940
44947
44954
44961
44968
44975
44982
44989
44996
45003
45010
45017
45024
45031
45038
45045
Water traveling
Recharge
Diversion 3/13
1.2 cfs
3/22

Thank You Siskiyou County

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