

**Using California Water
to
Promote Livestock Feed Crop
Production is “Wasteful”
and
Significantly Contributes
to
Global Climate Disruption
(Including Extended Drought in CA)**

(Based Upon Latest Credible Scientific Data)

Land, Water, and Livestock Feed Crop (LFC) Production in the San Joaquin Valley (SJV), California, 2014

- **2.4 mil acres** devoted to (or *resulted* in) LFC production
- **7.5 mil acre-feet of water** devoted to LFC production
- **28 million tons of LFC** produced

Source: Counties of Kern, Tulare, Kings, Fresno, Madera, Merced, Stanislaus, San Joaquin, Mariposa, Tuolumne, and Calaveras, 2014 Annual Crop Reports

Approximately 2.4 million acres were devoted to (or resulted in) livestock feed crop (LFC) production in SJV counties in 2014

2,400,000 acres = 3,750 sq miles (mi²)

Area Comparisons

Shasta County: 3,847 mi²

Los Angeles County: 4,751 mi²

Land Area of Shasta County Approximately 2,500,000 acres



Land Devoted to LFC, Kern and Stanislaus Counties

Kern LFC	Acres
Alm Hull Shr	87,560
Alfalfa, Hay	109,000
Hay, Grain	9,210
Hay, Other	7,400
Pasture, Irr	7,000
Silage, Forage	85,000
Misc	16,700
Subtotal	321,870

Stanislaus LFC	Acres
Almond Hull Shr	82,157
Alfalfa, Hay	29,197
Hay, Oat	30,011
Hay, Other	12,406
Corn, Silage	90,890
Silage, Other	53,390
Silage, Sudan	4,625
Pasture, Irr	32,500
Misc	2,076
Subtotal	337,252

LFC Production in Kern and Stanislaus Counties require more than 1000 square miles of land!

32,000 acres = 50 miles² (7 m X 7 m)

64,000 acres = 100 miles² (10 m X 10 m)

320,000 acres = 500 miles² (22 m X 23m)

640,000 acres = 1000 miles² (31m X 32 m)

Land Attributed to Almond Hull Production, Kern and Fresno

2014	Acres	Alm Meats	Alm Hulls	Alm Shells	Alm AcresBrg
Kern					
Alm Hull Shr	87,560	201,000 T	329,000 T	214,000 T	199,000
Fresno					
Alm Hull Shr	89,965	184,000 T	326,000 T	n/a	170,711

Land Attributed to Almond Hull Production, Merced and Stanislaus

2014	Acres	Alm Meats	Alm Hulls	Alm Shells	Alm AcresBrg
Merced					
Alm Hull Shr	55,910	98598 T	205,013 T	67939 T	101,327

Stanislaus					
Almond Hull Shr	82,157	173000 T	346,000 T	173000 T	164,314

**Approximately 7.5 million acre-feet
of
water devoted
to
SJV LFC production in 2014**

[In 2010, CA Ag plus CA Urban water use: 33 MAF plus 9 MAF]

DWR Bulletin 160 data

1 Acre-Foot of Water = 325,851 gallons

2.36 Million Acre-Feet (MAF) is roughly equivalent to 770 billion gallons of water. It is also equivalent to:

- 2014 Kern and Stanislaus Counties LFC-related combined water usage (2.351 MAF)
- Amount of water sufficient to serve the water needs of >5 million 4-person households/year in CA
- Amount to fill Trinity Lake
- Amount to fill San Luis Reservoir and Castaic Lake Reservoir combined
- **7.5 MAF = >2.3 trillion gallons; >15 million households/yr**

Water Use that Results in LFC Kern County 2014

Kern LFC	AWC	Acre-feet	TAF
Alm Hull Shr	4.54	397,522.4	397.52
Alfalfa, Hay	5.08	553,720.0	553.72
Hay, Grain	1.86	17,130.6	17.13
Hay, Other	2.87	21,238.0	21.23
Pasture, Irr	4.61	32,270.0	32.27
Silage/Forage	3.39	288,150.0	288.15
Misc	2.87	47,929.0	47.92
Subtotal		1,357,960	1,357.94

Approximately **28 million tons of livestock feed crops** were produced from the application of this amount of water to California acreage cultivated in 2014

**28 million tons of forage
could feed
3 million lactating cows
for a full year**

(50 lbs of forage/cow/day X 365 days/yr =
18,250 lbs or 9.125 tons/cow/yr)

28,000,000 tons /9.125 tons/cow/yr =
3,068,493 cows/yr

(Note: Dairy cows also drink 35 gallons of water per day)

Cattle Inventory by Class - California:
January 1, 2015 (USDA-NASS)
(1000 head)

Cattle and calves	5,100
All cows	2,370
Beef cows	590
Milk cows	1,780
Heifers 500 pounds and over	1,040
Beef cow replacement	130
Milk cow replacement	770
Other	140
Steers 500 pounds and over	550
Bulls 500 pounds and over	70
Calves under 500 pounds.....	1,070

Livestock Feed Crop Tonnage Kern County 2014

2014	LFC Unit Value	Tonnage
Kern LFC	in dollars \$	
Alm Hull Shr	170/ton	329,000
Alfalfa, Hay	247/ton	922,000
Hay, Grain	212/ton	47,800
Hay, Other	192/ton	25,200
Pasture, Irr	140/acre	14,000
Silage/Forage	49.8/ton	1,632,000
Misc	178.9/ton	64,640
Subtotal		3,034,640

Wasteful and Unreasonable Use

Use of irrigation water for livestock feed production in California conflicts with **Article 10, Section 2 of CA Constitution** which declares that

“the waste or unreasonable use ... of water be prevented ... The right to water or to the use or flow of water ... does not and shall not extend to the waste or unreasonable use ... of water.”

Waste of Water

Pulses (legumes), e.g., pinto beans, kidney beans, navy beans, dry peas, and lentil

- use only one-sixth of the water that bovine meat requires to produce a comparable gram of protein (19 liters vs. 112 liters.)
- require substantially less water to produce a gram of protein than cow milk (19 liters vs. 31 liters).

(Mekonnen and Hoekstra 2010)

Unreasonable Use of Water

- LFCs produced from CA water are fed to livestock.
- Through enteric fermentation, livestock then generate and emit methane into the atmosphere. (Methane is also released from anaerobic manure lagoons.)
- Methane in the atmosphere is a highly potent greenhouse gas (GHG) that contributes to global warming and rapid Arctic heating.
- Global warming and rapid Arctic heating have been strongly linked to the severe drought in California that has adversely impacted the state's water supplies.

Methane Emissions from Dairy and Livestock Industries in California, 2013

1,911,000,000 pounds of cattle-associated methane emissions — the total resulting from

997,000,000 pounds by way of enteric emissions,

914,000,000 pounds by way of manure-related emissions.

**Annual CO₂ Emission Equivalent (CO₂e) of
this Annual Livestock-Related Methane
Emission Value (1.911 billion pounds) is
Comparable to the Annual Amount of CO₂
Emitted by**

19 coal-fired electricity generation (CFEG) plants
(20-year GWP)

6.3 CFEG plants (100-year GWP)

Source: cumulative cattle-associated methane emission values for California during 2013 released by the California Air Resources Control Board. Numbers are approximated values. Using an IPCC AR5th 20-year interval methane GWP, the carbon dioxide equivalent (CO₂e) value associated with this mass of methane is comparable to an amount of carbon dioxide that would be **annually** released by 19.1 coal-fired electricity generation (CFEG) plants that would then trap heat in the atmosphere for 20 years before being sequestered.)Using an IPCC AR5th 100-year interval methane GWP, the CO₂e value associated this mass of methane is comparable to an amount of carbon dioxide that would be **annually** released by 6.36 CFEG plants that would then trap heat in the atmosphere for 100 years before being sequestered.)

Using a methane GWP of 84 (2013 IPCC 100 year methane GWP, without climate-carbon feedbacks incorporated)

$1.911 * 10^9)(8.4 * 10^1) = 1.605 * 10^{11}$,
or just over **160 billion lbs** of CO₂e
(20-year interval)

Using a methane GWP of 28 (2013 IPCC 100-year methane GWP, without climate-carbon feedbacks), all values are reduced by two-thirds, resulting in roughly
54 billion lbs of CO₂e emissions.

"We have a very high statistical confidence that the **warming of California would not happen without human influence**, and the amount of years that are warm and dry would not have happened without humans."

"Continued human emissions are likely to lead to the continued warming of California, increased co-occurrence of dry years and warm conditions and the increased occurrence of extremely low precipitation seasons."

Stanford University scientist and professor **Noah Diffenbaugh**

[http://www.appeal-democrat.com/news/scientists-blame-human-activity-for-climate-change/article_c26d333e-4b8b-11e5-ab6d-ab7bd68872bc.html]

“Anthropogenic warming is estimated to have accounted for 8–27% of the observed drought anomaly [in California] in 2012–2014 and 5–18% in 2014.

“Anthropogenic warming has substantially increased the overall likelihood of extreme California droughts.”

A.P. Williams, R. Seager, J.T. Abatzoglou, B.I. Cook, J.E. Smerdon, and E.R. Cook (2015), Contribution of anthropogenic warming to California drought during 2012–2014, *Geophys. Res. Lett.*, 42, 6819–28, doi:10.1002/2015GL064924.

“High temperatures plus low precipitation are more likely to produce a drought, and this will increase with climate change.”

“Global warming has at least tripled the probability of the atmospheric condition that brought the resilient high-pressure ridge”
[the meteorological phenomenon that has been identified strongly with the California drought]

Stanford University scientist and professor **Noah Diffenbaugh**

[<http://www.dailybreeze.com/environment-and-nature/20150825/california-climate-researchers-sound-the-alarm-at-symposium-theres-no-way-out>]

Total year-2011 global anthropogenic livestock-related and cattle-related methane emissions likely increased the 2015 average global temperature by 0.0044 and 0.0033° C (respectively) beyond what it would otherwise have been.

Total year-2011 global anthropogenic livestock-related and cattle-related methane emissions can be expected to increase the 2021/2022 average global temperature by 0.0061 and 0.0045° C (respectively) beyond what it would otherwise likely be.

(See Figure 2d in "New use of global warming potentials to compare cumulative and short-lived climate pollutants" (Myles R. Allen, Jan S. Fuglestedt, Keith P. Shine, Andy Reisinger, Raymond T. Pierrehumbert and Piers M. Forster, Nature Climate Change, May 2, 2016).

Figure 2d is based upon a value of **330 Mt**, and livestock and cattle-related values for that year are **98 Mt** and **72 Mt**, using FAO values. California methane emissions due to dairy and livestock production are typically **just under one Mt per year – (0.867 Mt)** - which includes both enteric and manure-related methane emissions.)

- **Excessive groundwater pumping in Tulare County may be significantly reducing groundwater storage**

(See <http://ca.water.usgs.gov/projects/central-valley/central-valley-subsidence-data.html>)

- **Well water levels are at historic lows** due to planting of higher-dollar crops requiring more irrigation
- **1,244 wells failed in Tulare County** (30–50 per week) (2014–2015)

Total Crop Acreage and Applied Water that Resulted in Livestock Feed Crops (Tulare County, 2014)

Alfalfa: 80,046 acres and 410.6 TAF

“Other Hay”: 1,579 acres and 2.6 TAF

Corn: 60,638 acres and 191.6 TAF

Oat: 8,613 acres and 14.2 TAF

Sorghum: 11,281 acres and 31.69 TAF

Almond Hull: 33,894 acres and 131.85 TAF

Irrigated Pasture: 46,500 acres and 230 TAF

Total area: 242,554 acres

Total likely applied water: 1,012,910 acre feet.

Hay Exports and Wasteful, Unreasonable Use

(Example for 4/4–5/1, 2015)

- California hay growers sold over 16% of California-produced hay for export: **≈11,000 tons of hay sold to foreign countries.**
- Amount of water required to grow this amount of hay: **≈10,000 acre feet** (alfalfa production in SE CA requires just under one acre-foot of water to produce one ton of alfalfa)

Another type of animal agriculture that worsens global climate change ...

Ranching on federal public lands annually produces CO₂e equal to

- 3.9 coal-fired power plants for one year or
- energy use of 1,354,143 homes for one year or
- annual gas emissions from 3,124,507 passenger vehicles

Rural Economic Vitalization Act (HR 3410)

Would reduce these GHG emissions by facilitating the **permanent closure** of federal grazing allotments and the **permanent retirement** of the associated grazing permits.

To support this legislation, please **like** the bill's Facebook page and **ask** your member of Congress to co-sponsor the bill through a link found on that page.

Links to Locate and Download Comments

Todd Shuman, Wasteful UnReasonable Use, tshublu@yahoo.com

Ara Marderosian, Sequoia ForestKeeper, ara@sequoiaforestkeeper.org

http://www.sequoiaforestkeeper.org/comments_to_sqf_and_other_agencies.aspx

http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/comments_tucp2015/

State Water Board Drought Year Water Actions

2015 Public Comments / Objections / Protests / Petitions for Reconsideration

Comments / Objections / Protests Regarding January 23, 2015 Temporary Urgency
Change Petition and Petitions for Reconsideration of Order Approving Temporary Urgency
Change for the Central Valley and State Water Projects

Comments/Objections/Protest/Petitions for Reconsideration Submitted After April 6, 2015

Sequoia ForestKeeper and Wasteful UnReasonable Use [Ara Marderosian, Todd Shuman, Mike Hudak, & Jan Dietrick](#) 04/13/2016

Sequoia ForestKeeper and Wasteful UnReasonable Use [Ara Marderosian, Todd Shuman, Mike Hudak, & Megan Gallagher](#) 10/14/2015

Sequoia ForestKeeper and Wasteful UnReasonable Use [Ara Marderosian, Todd Shuman Mike Hudak, & Megan Gallagher](#) 08/16/2015

Sequoia ForestKeeper [Ara Marderosian et al.](#) 07/06/2015

Sequoia ForestKeeper [Ara Marderosian et al](#) 06/19/2015

WURU Press Release [Todd Shuman](#) 06/19/2015