

August 16, 2015

Thomas Howard, Executive Director
Members of the Board
State Water Resources Control Board
Clerk to the Board, (916) 341-5600
1001 I Street Sacramento, CA 95814
Sent via email to Rich.Satkowski@waterboards.ca.gov

RE: Unreasonable and Wasteful Water Use: Rice Cultivation, Livestock Feed Crop Production, the Sacramento River Settlement Contractors, and the July 3, 2015 TUCO

Thank you for the opportunity to comment on the important issue of rice-cultivation-related agricultural water use in California and livestock feed crop production in the Sacramento River Valley.

To start, we wish to formally incorporate into this comment by reference the 6 July 2015 comment to the SWRCB titled “June 8, 2015 Temporary Urgency Change Petition Concerning SWP/CVP and Water Deliveries, in relation to the April 6, 2015 TUCO,” submitted by Ara Marderosian (Sequoia ForestKeeper), Guy Saperstein, Alexandra Paul, Jon Marvel, Connie Hanson, Mike Hudak, Lorelei Plotczyk, Lorin Lindner, Marcia Hanscom, Robert Roy van de Hoek, and Todd M. Shuman (Wasteful UnReasonable Use), as well as the Objection/Protest respectfully submitted to the SWRCB by Sequoia ForestKeeper (SFK) and Wasteful UnReasonable Use (WURU) regarding the 8 June 2015 Notice of Request Filed by the California Department of Water Resources and the United States Bureau of Reclamation to modify and renew a Temporary Urgency Change Order regarding permits and license of the State Water Project and the Central Valley Project (filed initially on May 21, 2015). We request this comment to be considered by the SWRCB as a logical extension of, and appendix to, our 6 July 2015 SWRCB Objection/Protest concerning the 3 July 2015 TUCO.

The use of irrigated water for rice cultivation is unreasonable and wasteful during this time of drought in California; use of irrigated water for rice cultivation during this time of drought in California conflicts with the “waste or unreasonable use” section of the California Constitution. (See Article 10, Section 2, 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.”¹) Moreover, the continued allocation of Central Valley Project Water to the Sacramento River Settlement Contractors (SRSCs) for flood-irrigated rice cultivation—while endangered aquatic species native to the Delta, the Sacramento River, and associated Sacramento River tributaries drift rapidly toward extinction—constitutes a clear violation of California Public Trust Doctrine.

Rice Cultivation, Methane Emissions, and Flood Irrigation

A: For year 2014, we estimate that just over 800 TAF (thousand acre feet) was applied for rice cultivation in the approximated area of four of the largest SRSCs. (The four in the approximation

¹ See Appendix A for more on this and beneficial uses.

area are Glenn Colusa Irrigation District, Sutter Municipal Water District (Sutter MWD), Natomas MWD, and Reclamation District 108. The approximation area also includes other smaller adjacent water districts that were difficult to exclude in map creation. See CropScape approximation map, CropScape map-associated spreadsheet, and the Sacramento Valley Water Districts map in Appendix B.)

[Calculation: Water Applied to Cultivate Rice: apply the 4.2 Applied Water coefficient for Glenn County: 192,503.5 acres x 4.2 = 808,514.7 AF. (Source of 2010 AW coefficient: CA DWR)]

B: For year 2014, we estimate the atmospheric carbon emission of the methane (converted into CO₂ equivalency) associated with the rice cultivation in this approximated SRSC area at 3.16 billion pounds of CO₂e—3.16 billion pounds of CO₂e that will trap heat in the atmosphere for 20 years!

[Calculation: apply a Methane GWP of 86 (IPCC, 5th, 2013) to denote a CO₂e that traps heat in the atmosphere for a period of 20 years: 190.926 lbs CH₄ per rice-acre-cultivated X 192,503.5 acres X 86 equals 3,160,837,399 lbs (CO₂e) released in 2014, or 3.16 billion pounds of CO₂ equivalency, or 3/8 of the amount of CO₂ that a year 2010 coal plant would have emitted into the atmosphere in 2014. (EPA) The 190 lbs/acre figure concerning rice cultivation comes from the conversion of the 2013 CARB figure of 214,000 g/ha as the annual amount of methane released per land unit area due to rice cultivation in California. (See http://www.arb.ca.gov/cc/inventory/doc/docs3/3c7_ricecultivation_ricecroparea_ch4_2013.htm—CARB is the California Air Resources Board.) To see our rationale for using the Methane GWP of 86—20 year interval, see Appendix C]

We assert that it was unreasonable (and hence, unconstitutional) for these large SRSCs to use water for rice cultivation when such rice cultivation likely generated an additional, large, and significant emission level of CO₂ equivalency (20-year interval) on an already warming planet. This use was especially unreasonable when such water use occurred at the expense of imperiled native aquatic species in the Delta and along the Sacramento River during the 2014 drought year.

C: For year 2014, we estimate that nearly 356 TAF applied to rice cultivation in the approximated SRSC area was likely not used by the rice plants being cultivated.

*[Calculation: apply the Consumed Fraction coefficient/constant applicable for rice, Glenn County (0.56) to determine what amount of applied water was used by all rice plants in the approximation area. Therefore 0.44 x 808.5147 TAF represents the estimated amount of applied water **not** used by the rice plants in the approximation area, which equals 355.746 TAF. Source of CF constant is CA DWR]*

We also assert that the use of such water for rice cultivation was wasteful (and hence, unconstitutional), as smaller amounts of water could likely have been used to create alternate, lower-methane-emitting, compensatory habitat for migrating bird species. Alternate, non-methane-emitting methods for groundwater aquifer recharge could also have been deployed.

We note also that the likely method used for this wasteful rice cultivation was flood irrigation. In

our previous comments and protest submitted to the SWRCB (and in recent comments and protests submitted to the SWRCB by the California Sportsfishing Protection Alliance), we and CSPA have argued that flood irrigation during this drought period should be considered an unconstitutional violation of Article 10, Section 2 of the California Constitution. We again make this argument.

Livestock Feed Crops and the SRSCs

We note for the record that substantial cultivation of livestock feed crops also occurs in this SRSC-dominated approximation area. Acreage devoted to growing alfalfa, corn, “other hay”, oats, and sorghum amounted to approximately 28,000 acres in 2014 (see spreadsheet, Appendix B). If acreage attributed to almond hull production is included (see our 6 July 2015 comment referenced above for rationale and methodology used), irrigation of over 37,000 acres in this area produced livestock feed crops in 2014. This number increases by yet another 3,000–5,000 acres, if the irrigation of “other hay” and alfalfa in 2014 in the Anderson-Cottonwood Irrigation District (ACID, the other large SRSC near Redding, see Appendix D) is also included. Our conservative estimate of the water used in this SRSC-dominated approximation area in 2014 that resulted in the production of livestock feed crop commodities is approximately 94 TAF (and 97 TAF if ACID is included.)

(For full transparency, we note that this estimate used the following 2010 CA DWR Applied Water coefficients: 3.3 for alfalfa, 2.36 for almonds/almond hulls, 1.8 for corn, 1.0 for Shasta County “other hay”, and 0.5 for all other livestock feed crops. We also note for the record that this number does **not** include any water applied for rice cultivation that ultimately resulted in rice bran/rice hull-based livestock feed commodities. This exclusion imparts further conservative bias concerning our estimate of water used that ultimately resulted in the production of livestock feed commodities.)

As we argued in earlier comments to the SWRCB, livestock feed crops are partially converted into significant atmospheric methane emissions by dairy and beef cows. Such emissions then contribute to the further warming of our planet and the related, intensified duration of the drought conditions that have afflicted California for the last four years. We assert again that water used to produce livestock feed crops is wasteful, unreasonable, and unconstitutional.

Conclusion:

Since CVP water delivered to SRSCs under the authority of the 2015 TUCOs has likely been used by SRSCs for flood-irrigated rice cultivation and livestock feed crop production, it is likely that the 2015 numbers concerning applied water, methane emission, unconsumed applied water, and livestock feed crop acreage will not prove to be significantly dissimilar from the 2014 numbers presented above. For that reason, the arguments concerning the unreasonable and wasteful use of water devoted to flood-irrigated rice cultivation and livestock feed crop production in 2014 are equally applicable to 2015. The use of CVP-delivered water to SRSCs to cultivate rice through flood irrigation and produce livestock feed crops in 2015 is an unconstitutional violation of Article 10, Section 2 of the California Constitution. Moreover, the 2015 allocation of CVP Water to the SRSCs for flood-irrigated rice cultivation and livestock

feed crop production—while endangered aquatic species native to the Delta, the Sacramento River, and associated Sacramento River tributaries experience yet another year of rapid drift toward extinction—constitutes yet another clear violation of California Public Trust Doctrine.

Sincerely,

Mr. Ara Marderosian, Sequoia ForestKeeper®
P.O. Box 2134 Kernville, CA 93238
(760) 376-4434 ara@sequoiaforestkeeper.org

Todd M. Shuman, Wasteful UnReasonable Use
Camarillo, CA, 805.987.8203, 805.236.6456

Mike Hudak, BA (Math), PhD (Advanced Technology/Computer Science)
Author: *Western Turf Wars: The Politics of Public Lands Ranching*
Documentarian: <https://www.youtube.com/user/MJHudak1952>
Chair (2008–2013): Sierra Club National Grazing Team
Volunteer leader of effort to strengthen Sierra Club Grazing Policy (1998–2000)
38 Oliver Street
Binghamton, NY 13904
[\(607\) 240-5225](tel:6072405225)
mike.hudak@gmail.com
<http://mikehudak.com/>

Megan E. Gallagher, Esq.
Attorney at Law
Adjunct Professor
MeganGallagherLaw@gmail.com
916.420.5110

Appendix A

California Constitution

ARTICLE 10 WATER

“SEC. 2. It is hereby declared that because of the conditions prevailing in this State the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable, and that the waste or unreasonable use or unreasonable method of use of water be prevented, and that the conservation of such waters is to be exercised with a view to the beneficial use thereof in the interest of the people and for the public welfare. The right to water or to the use or flow of water in or from any natural stream or water course in this State is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does not and shall not extend to the waste or unreasonable use or unreasonable method of use or unreasonable method of diversion of water. Riparian rights in a stream or water course attach to, but to no more than so much of the flow thereof as may be required or used consistently with this section, for the purposes for which such lands are, or may be made adaptable, in view of such reasonable and beneficial uses; provided, however, that nothing herein contained shall be construed as depriving any riparian owner of the reasonable use of water of the stream to which the owner's land is riparian under reasonable methods of diversion and use, or as depriving any appropriator of water to which the appropriator is lawfully entitled. This section shall be self-executing, and the Legislature may also enact laws in the furtherance of the policy in this section contained.”

SWRCB Beneficial Uses

The Water Board must broadly consider how farmstead uses (Agricultural Supply [AGR]) are undermining the protection of municipal and domestic supply and human health. The Board must consider the relationship between water used to grow livestock feed crops, water freely drunk by livestock, and the climate-changing greenhouse gases generated by livestock production. Recent research implicates these gases in significantly increasing the probability of Pacific Ocean high pressure ridge formation that is deeply associated with California's four-year-long drought.

The SWRCB cannot effectively protect long-term human health by increasing water diversions to farmers who grow alfalfa, corn, and other feed for methane-emitting livestock. Water diversions for this particular use should no longer be considered a “beneficial use” as defined by the California Constitution.

“2.1.1 AGRICULTURAL SUPPLY (AGR)

Uses of water for farming, horticulture, or ranching, including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.

The criteria discussed under municipal and domestic water supply (MUN) also effectively protect farmstead uses. To establish water quality criteria for livestock water supply, the Water Board must consider the relationship of water to the total diet, including water freely drunk, moisture content of feed, and interactions between irrigation water quality and feed quality. The University of California Cooperative Extension has developed threshold and limiting

concentrations for livestock and irrigation water. Continued irrigation often leads to one or more of four types of hazards related to water quality and the nature of soils and crops. These hazards are (1) soluble salt accumulations, (2) chemical changes in the soil, (3) toxicity to crops, and (4) potential disease transmission to humans through reclaimed water use. Irrigation water classification systems, arable soil classification systems, and public health criteria related to reuse of wastewater have been developed with consideration given to these hazards.”

http://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/planningtmdls/basinplan/web/bp_ch2.shtml

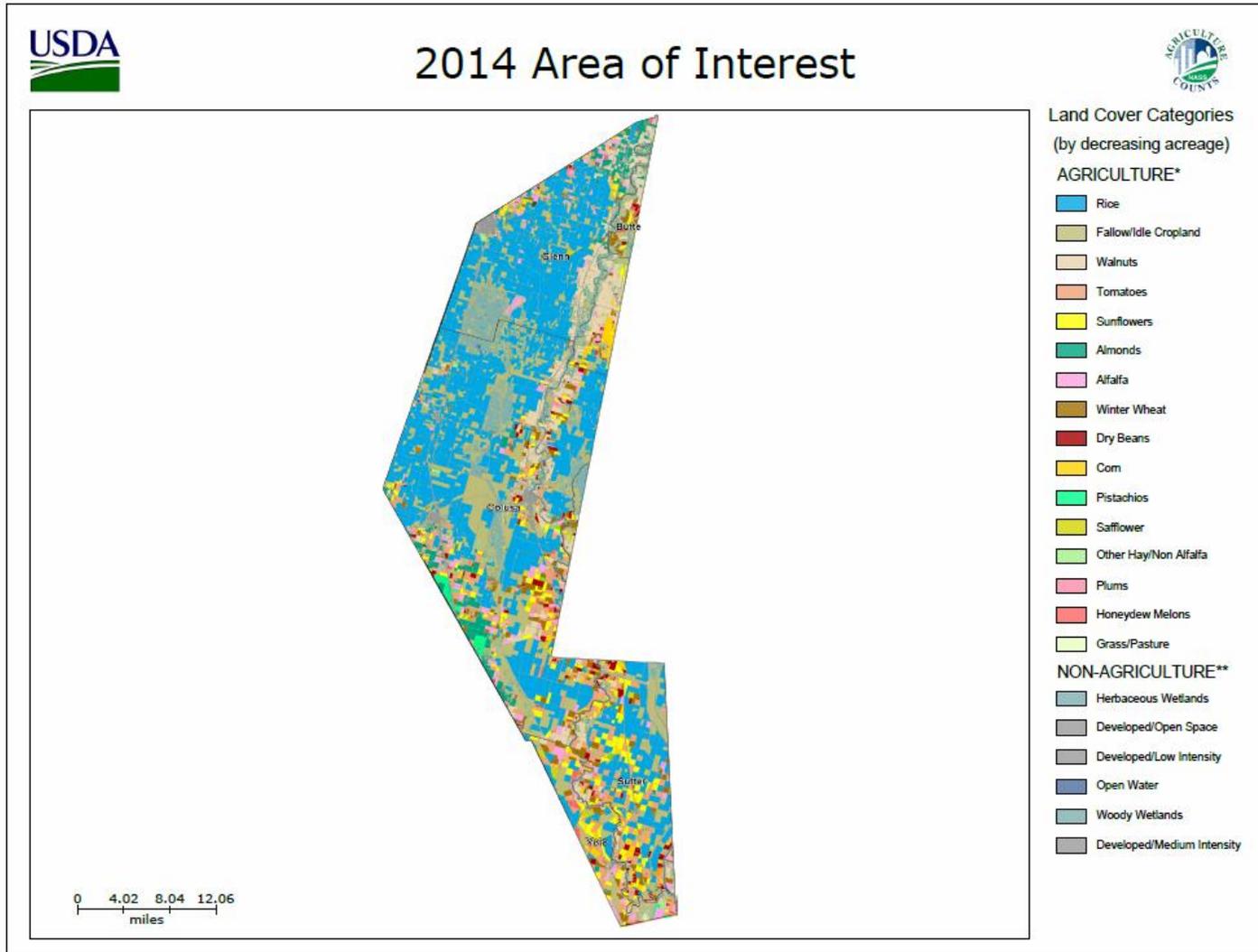
The Water Board addresses in CHAPTER 2: BENEFICIAL USES the need for “protection of public health” (discussed under “[municipal and domestic water supply \(MUN\)](#)”): “The health aspects broadly relate to: direct disease transmission, toxic effects, and increased susceptibility to disease, such as links between halogenated organic compounds and cancer.”

Condition 1e of the March 5, 2015 Modified Order states: “2. DWR and Reclamation shall consult on a regular basis with designated representatives from the State Water Board, Department of Fish and Wildlife, National Marine Fisheries Service and U.S Fish and Wildlife Service (fisheries agencies) concerning current conditions and potential changes to SWP and CVP operations **to meet health and safety requirements and to reasonably protect all beneficial uses of water.**”

http://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/tucp/tucp_order_030515.pdf

Appendix B: CropScape Map, Spreadsheet, and Sacramento Valley Water Districts Map

Mapped Approximation Area of Glenn Colusa Irrigation District, Sutter MWD, Natomas MWD, and Reclamation District 108 (CropScape)



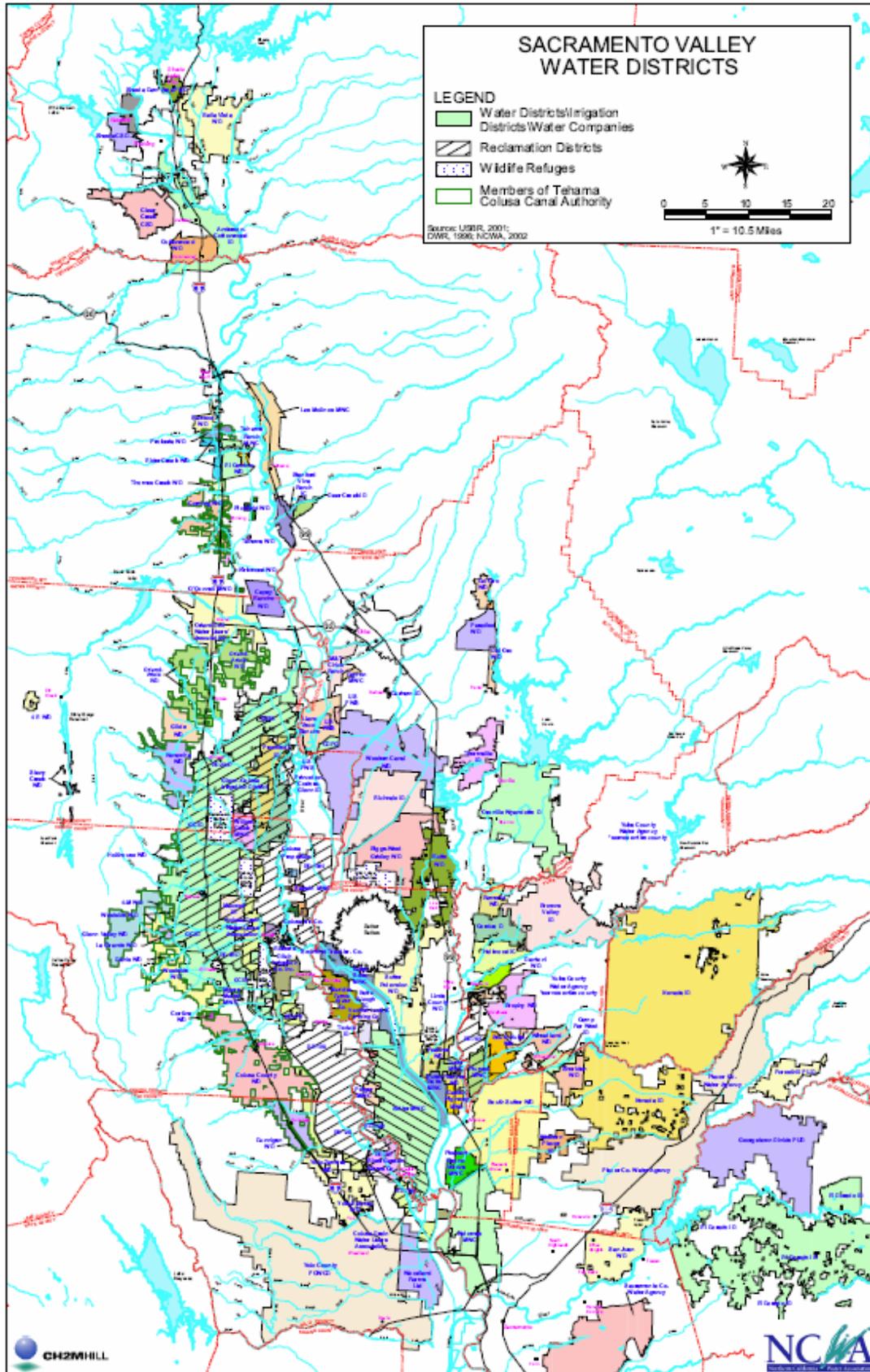
Produced by CropScape - <http://massgeodata.gmu.edu/CropScape>

* Only top 16 agriculture categories are listed. ** Only top 6 non-agriculture categories are listed.

Associated Spreadsheet Data for Approximation Map (CropScape)

Value	Category	Count	Acreage
1	Corn	34720	7721.5
2	Cotton	1297	288.4
3	Rice	865594	192503.5
4	Sorghum	2784	619.1
6	Sunflowers	96162	21385.9
13	Pop or Orn Corn	235	52.3
14	Mint	1	0.2
21	Barley	6	1.3
23	Spring Wheat	80	17.8
24	Winter Wheat	73319	16305.8
27	Rye	108	24
28	Oats	2476	550.6
31	Canola	5	1.1
33	Safflower	10670	2373
36	Alfalfa	77492	17233.8
37	Other Hay/Non Alfalfa	9201	2046.3
41	Sugarbeets	120	26.7
42	Dry Beans	35387	7869.9
43	Potatoes	1	0.2
44	Other Crops	104	23.1
48	Watermelons	3038	675.6
49	Onions	251	55.8
50	Cucumbers	808	179.7
53	Peas	1244	276.7
54	Tomatoes	121862	27101.5
57	Herbs	1053	234.2
58	Clover/Wildflowers	638	141.9
59	Sod/Grass Seed	59	13.1
61	Fallow/Idle Cropland	512337	113941
66	Cherries	11	2.4
67	Peaches	49	10.9
69	Grapes	1638	364.3
71	Other Tree Crops	64	14.2
75	Almonds	82252	18292.4
76	Walnuts	179897	40008.1
77	Pears	286	63.6
92	Aquaculture	91	20.2
111	Open Water	22254	4949.2

121	Developed/Open Space	56922	12659.1
122	Developed/Low Intensity	35711	7941.9
123	Developed/Medium Intensity	17702	3936.8
124	Developed/High Intensity	2888	642.3
131	Barren	3231	718.6
141	Deciduous Forest	28	6.2
142	Evergreen Forest	111	24.7
143	Mixed Forest	6	1.3
152	Shrubland	40	8.9
176	Grass/Pasture	4234	941.6
190	Woody Wetlands	18863	4195
195	Herbaceous Wetlands	111527	24803
204	Pistachios	12297	2734.8
205	Triticale	2076	461.7
206	Carrots	23	5.1
208	Garlic	340	75.6
209	Cantaloupes	1101	244.9
211	Olives	1729	384.5
212	Oranges	9	2
213	Honeydew Melons	5131	1141.1
216	Peppers	245	54.5
220	Plums	5535	1231
221	Strawberries	1	0.2
222	Squash	1182	262.9
223	Apricots	1	0.2
224	Vetch	37	8.2
225	Dbl Crop WinWht/Corn	627	139.4
226	Dbl Crop Oats/Corn	2286	508.4
229	Pumpkins	12	2.7
236	Dbl Crop WinWht/Sorghum	1324	294.5
242	Blueberries	9	2
244	Cauliflower	488	108.5
			538930.9



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Appendix C: Methane GWP and Time Intervals

Quoted text below is from:

Claims that Livestock Grazing Enhances Soil Sequestration of Atmospheric Carbon Are Outweighed by Methane Emissions From Enteric Fermentation: A Closer Look at Franzluebbbers and Stuedemann (2009)

Mike Hudak, mike.hudak@gmail.com, www.mikehudak.com 7 April 2015 Revised 29 July 2015

Page 2:

Current studies peg the GWP of CH₄ at “34” over a 100-year interval (GWP₁₀₀) and at “86” over a 20-year interval (GWP₂₀) [5]. Stated otherwise, over a 20-year interval, a given mass of CH₄ would have the same effect in the global climate system as a mass of CO₂ that is 86 times greater than that mass of CH₄.

But in 2013, the IPCC noted that “there is no scientific argument for selecting 100 years compared with other choices.”[6] Moreover, the IPCC found that at the 20-year timescale, total global emissions of CH₄ are equivalent to over 80% of global CO₂ emissions.[7] In that light, Howarth (2014) argued for focusing on the 20-year, rather than the 100-year, period based on “the urgent need to reduce methane emissions over the coming 15–35 years.”[8]

Page 6:

[5]. Intergovernmental Panel on Climate Change, *Climate Change 2013: The Physical Science Basis*, 714, Table 8.7, <https://www.ipcc.ch/report/ar5/wg1/> (accessed 13 July 2015).

[6]. *Ibid.*, 711.

[7]. *Ibid.*, 719, Figure 8.32.

[8]. Robert W. Howarth, “A Bridge to Nowhere: Methane Emissions and the Greenhouse Gas Footprint of Natural Gas,” *Energy Science & Engineering*, (2014) doi:10.1002/

We wish to note for the record that Howarth, on pages 8–9 of “A Bridge to Nowhere ... (2014),” also wrote:

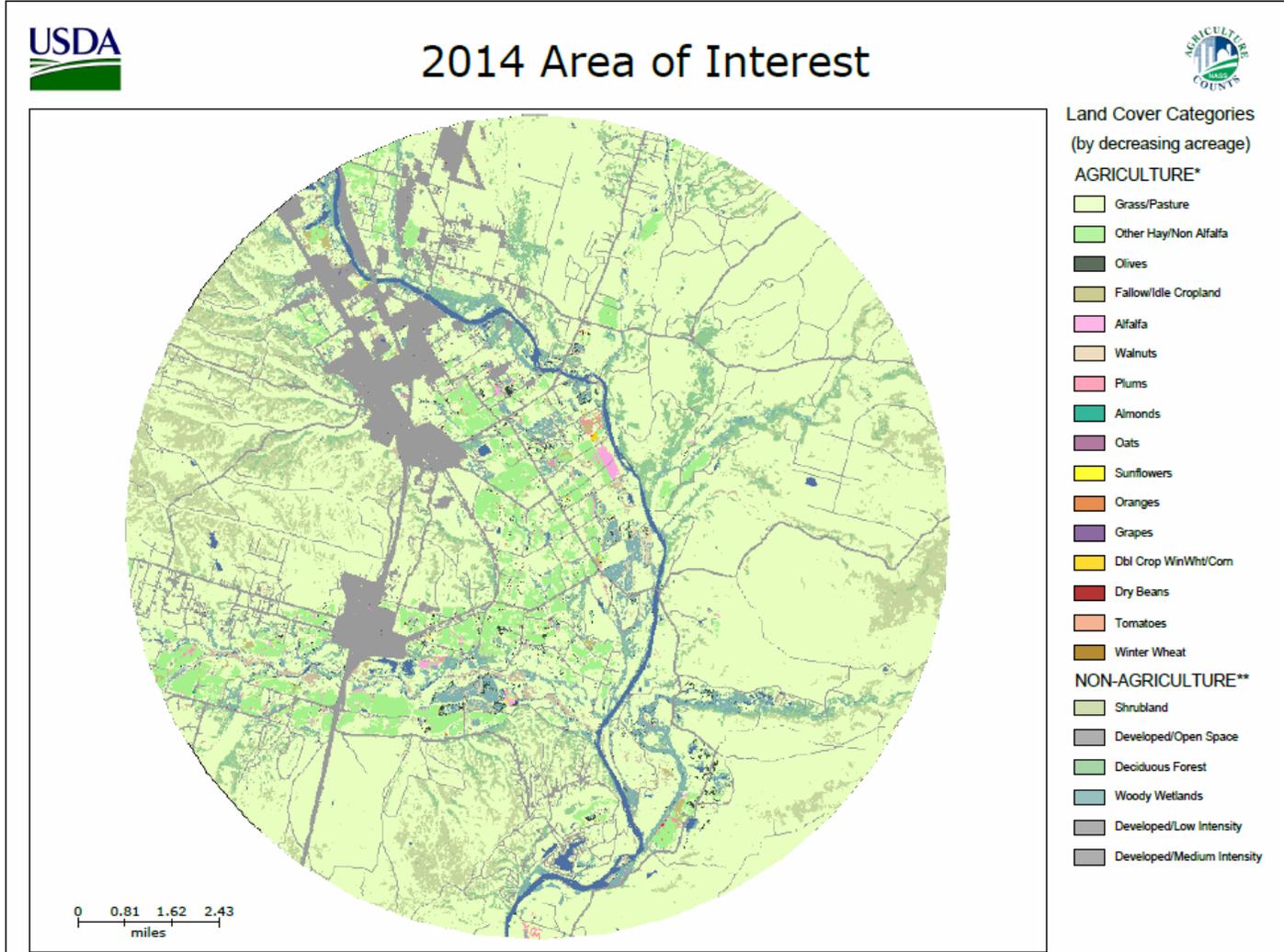
“The model published in 2012 by Shindell and colleagues [41] and adopted by the United Nations [42] predicts that unless emissions of methane and black carbon are reduced immediately, the Earth’s average surface temperature will warm by 1.5°C by about 2030 and by 2.0°C by 2045 to 2050 whether or not carbon dioxide emissions are reduced. Reducing methane and black carbon emissions, even if carbon dioxide is not controlled, would significantly slow the rate of global warming and postpone reaching the 1.5°C and 2.0°C marks by 15–20 years ...

Why should we care about this warming over the next few decades? At temperatures of 1.5–2.0°C above the 1890–1910 baseline, the risk of a fundamental change in the Earth’s climate system becomes much greater [41–43], possibly leading to runaway feedbacks and even more global warming. Such a result would dwarf any possible benefit from reductions in carbon dioxide emissions over the next few decades (e.g., switching from coal to natural gas, which

does reduce carbon dioxide but also increases methane emissions). One of many mechanisms for such catastrophic change is the melting of methane clathrates in the oceans or melting of permafrost in the Arctic. Hansen and his colleagues [43, 44] have suggested that warming of the Earth by 1.8°C may trigger a large and rapid increase in the release of such methane. While there is a wide range in both the magnitude and timing of projected carbon release from thawing permafrost and melting clathrates in the literature [45], warming consistently leads to greater release. This release can in turn cause a feedback of accelerated global warming [46] ...

An increasing body of science is developing rapidly that emphasizes the need to consider methane's influence over the decadal timescale, and the need to reduce methane emissions.”

Appendix D: 2014 CropScape Approximation Map for Anderson-Cottonwood Irrigation District and Adjacent Areas (ACID, Redding area)



Produced by CropScape - <http://massgeodata.gmu.edu/CropScape>

* Only top 16 agriculture categories are listed. ** Only top 6 non-agriculture categories are listed.

**Associated Spreadsheet for Approximated ACID Area and Adjacent Areas
(CropScope)**

Value	Category	Count	Acreage
1	Corn	4	0.9
3	Rice	2	0.4
6	Sunflowers	45	10
21	Barley	2	0.4
22	Durum Wheat	1	0.2
24	Winter Wheat	14	3.1
28	Oats	53	11.8
36	Alfalfa	1280	284.7
37	Other Hay/Non Alfalfa	21796	4847.3
42	Dry Beans	22	4.9
43	Potatoes	1	0.2
44	Other Crops	1	0.2
48	Watermelons	5	1.1
54	Tomatoes	16	3.6
61	Fallow/Idle Cropland	1482	329.6
66	Cherries	1	0.2
69	Grapes	30	6.7
71	Other Tree Crops	6	1.3
75	Almonds	83	18.5
76	Walnuts	1258	279.8
111	Open Water	6386	1420.2
121	Developed/Open Space	29206	6495.3
122	Developed/Low Intensity	9539	2121.4
123	Developed/Medium Intensity	7770	1728
124	Developed/High Intensity	2330	518.2
131	Barren	3652	812.2
141	Deciduous Forest	20306	4515.9
142	Evergreen Forest	1136	252.6
143	Mixed Forest	231	51.4
152	Shrubland	36113	8031.3
176	Grass/Pasture	290876	64689.3
190	Woody Wetlands	14853	3303.2
195	Herbaceous Wetlands	50	11.1
204	Pistachios	4	0.9
211	Olives	1808	402.1
212	Oranges	32	7.1
220	Plums	854	189.9
225	Dbf Crop WinWht/Corn	29	6.4
242	Blueberries	6	1.3