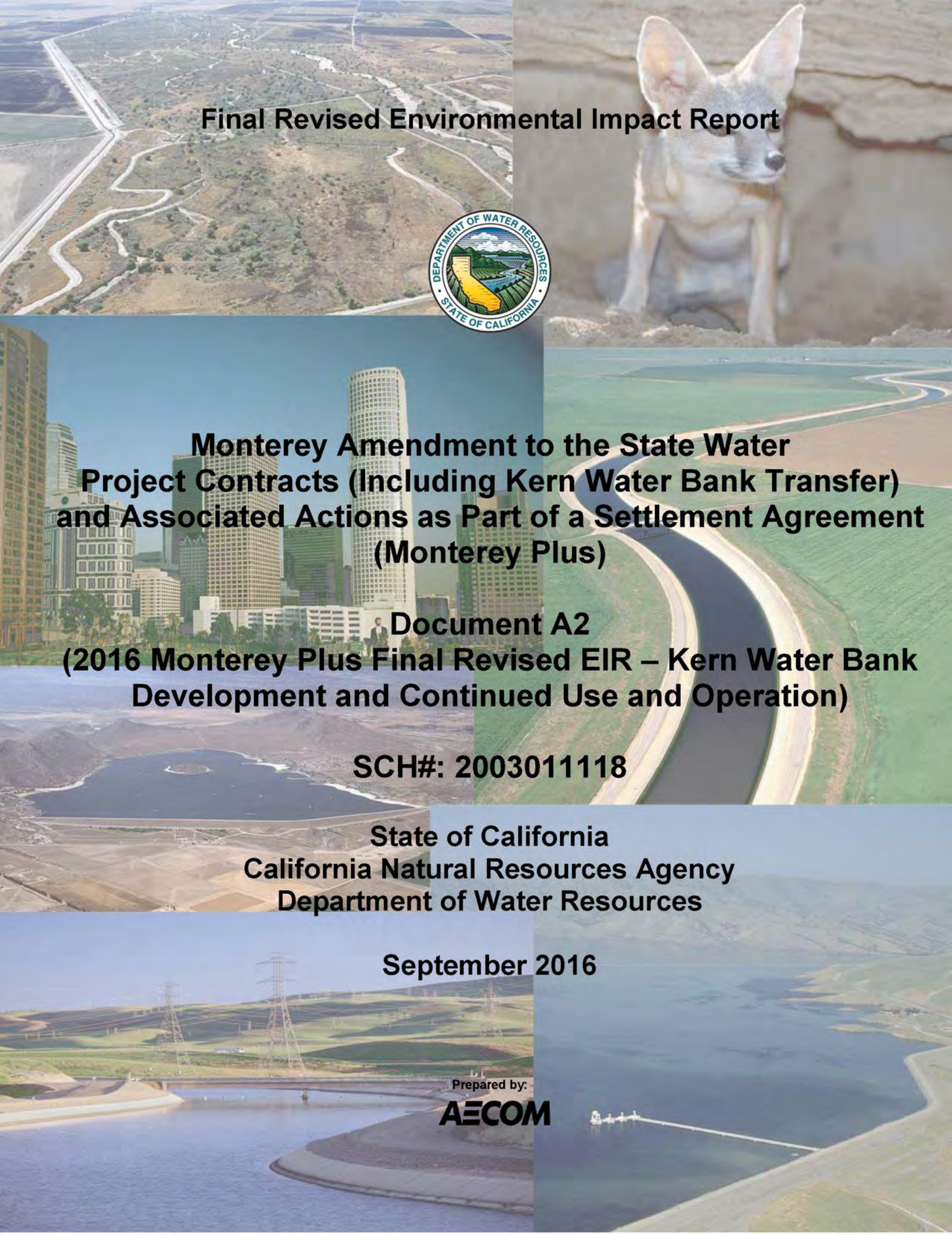

Final Revised Environmental Impact Report

Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus)

Document A2
(2016 Monterey Plus Final Revised EIR – Kern Water Bank Development and Continued Use and Operation)

SCH#: 2003011118

State of California
California Natural Resources Agency
Department of Water Resources

September 2016

Prepared by:
AECOM

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Governor

CALIFORNIA NATURAL RESOURCES AGENCY
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Prepared by:

AECOM
Sacramento, CA

September 2016

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APPENDICES

Appendix A. Letter dated June 13, 2016 with Attachments from Center for Food Safety, California Water Impact Network, California Sportfishing Protection Alliance, Center for Biological Diversity, Central Delta Water Agency, and South Delta Water Agency.

TABLES

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FIGURES

Figure Page

RAR002266

ABBREVIATIONS

ABBREVIATIONS

1995 KWB MOU	Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program
AF	acre-feet
bgs	below ground surface
CBD	Center for Biological Diversity
CDWA	Central Delta Water Agency
CEQA	California Environmental Quality Act
CEQA Guidelines	Guidelines for Implementation of California Environmental Quality Act
CFS	Center for Food Safety
CSPA	California Sportfishing Protection Alliance
CVP	Central Valley Project
CWIN	California Water Impact Network
DEIR	draft environmental impact report
Delta	Sacramento-San Joaquin Delta
Department	California Department of Water Resources
Draft REIR	Draft Revised Environmental Impact Report
DRWD	Dudley Ridge Water District
DSC	Delta Stewardship Council
DWR	California Department of Water Resources
DWR KWB Model	California Department of Water Resources Kern Water Bank Model
EIR	environmental impact report
FEIR	Final Environmental Impact Report
HCP	habitat conservation plan
InSAR	Satellite Interferometric Synthetic Aperture Radar”
IRWD	Irvine Ranch Water District
JPL	Jet Propulsion Laboratory
KCWA	Kern County Water Agency
KFE	Kern Fan Element
KWB	Kern Water Bank
KWBA	Kern Water Bank Authority
M&I	municipal and industrial
Monterey Plus EIR	Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus) Environmental Impact Report (EIR)
NCCP	natural community conservation plan
NOC	Notice of Completion
OPR	Governor’s Office of Planning and Research
PG&E	Pacific Gas & Electric Company
PSEEP	Pump System Energy Efficiency Plan
REIR	revised environmental impact report
SCE	Southern California Edison
SDWA	South Delta Water Agency
SWP	State Water Project
SWRCB	State Water Resources Control Board
USDA	U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WD	Water District

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1. INTRODUCTION

1. INTRODUCTION

1.1 INTRODUCTION

The Department of Water Resources (Department) circulated the Monterey Amendment to the State Water Project (SWP) Contract (including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus or proposed project) Draft Revised Environmental Impact Report (Draft REIR) for public and agency comment between April 28, 2016 and June 13, 2016. During the comment period, the Department held public hearings in Fresno and Bakersfield on June 1 and 2, 2016, respectively. At the end of the circulation period for the Draft REIR, a total of five written comment letters and e-mails were received commenting on the Draft REIR. In addition, three individuals provided oral comments on the Draft REIR at the June 1, 2016, public hearing in Bakersfield, two of which also submitted written comments at the Bakersfield public hearing. See Chapter 4, Comments and Responses, for comments received on the Draft REIR and responses to those comments.

This document is the Final REIR for the proposed project and it contains written responses to all written and oral comments received by the Department from agencies and the public on the Draft REIR, and corrections to the Draft REIR made in response to staff review. Because multiple comments were received with respect to most key issues, the Department prepared comprehensive responses addressing all comments relating to each substantive issue (master responses). Each of these master responses provides some background regarding the specific issue, how the issue was addressed in the Draft REIR, and additional clarification and explanation as appropriate in response to the concerns raised in the comments. Individual responses to each comment received are also provided in Chapter 4, Responses and Comments. The responses to comments clarify and amplify text in the Draft REIR, as appropriate and do not alter the text or conclusions of the Draft REIR.

This Final REIR (Document A2) has been prepared in accordance with the California Environmental Quality Act (CEQA) and together with the Draft REIR (Documents A1, B, and C, and Appendices) constitutes the REIR for the proposed project.

1.2 DOCUMENT ORGANIZATION

The Final REIR is organized as follows:

Chapter 1 – Introduction: This chapter describes the contents and organization of the Final REIR.

Chapter 2 – Text Changes to the Draft REIR Text, Figures, and Tables: This chapter presents the text changes to the Draft REIR. All text changes to the Draft REIR are minor text changes to address errata. Changes to the text of the DEIR are shown by either a line through the text (strike out) that has been deleted and/or a double underline where new text has been inserted. The revisions are corrections that have been identified since publication of the Draft REIR. The text revisions do not result in substantive changes in the analysis and conclusions presented in the Draft REIR.

Chapter 3 – Index to Comments and Responses: This chapter lists all of the agencies or persons who submitted comments on the Draft REIR during the public review period.

Chapter 4 Comments and Responses: This chapter contains the comments submitted during the public review period and the Department's responses to those comments.

Chapter 5 – References: This chapter contains the documents used to prepare the Final REIR.

Appendices: This section includes one appendix, which is the complete comment letter (including attachments) from the Center for Food Safety (CFS), California Water Impact Network (CWIN), California Sportfishing Protection Alliance (CSPA), Center for Biological Diversity (CBD), Central Delta Water Agency (CDWA), and South Delta Water Agency (SDWA).

1.3 PUBLIC PARTICIPATION AND REVIEW

The Department notified all responsible and trustee agencies and interested groups, organizations, and individuals (including all those that commented on the 2007 Monterey Plus DEIR and 2010 Monterey Plus FEIR) that the Draft REIR on the proposed project was available for review. The following list of actions took place during the preparation, distribution, and review of the Draft REIR:

- A Notice of Completion (NOC) and copies of the Draft REIR were filed with the State Clearinghouse on April 28, 2016 with an ending period of June 13, 2016.
- Notices of the two public hearings on the Draft REIR were included in the Draft REIR, on the Department website, and in 19 newspapers: Bakersfield Californian, Chester Progressive, Chico Enterprise-Record, Feather River Bulletin, Fresno Bee, Indian Valley Record, Portola Reporter, Ontario Inland Valley Daily Bulletin, Los Angeles Times, Oroville Mercury-Register, Riverside Press-Enterprise, Sacramento Bee, San Bernardino County Sun, San Diego Union-Tribute, San Francisco Chronicle, San Jose Mercury-News, Santa Barbara News Press, the Tribune (Newspaper of Central Coast), and the Ventura County Star.
- Public hearings to receive comments on the Draft REIR were held in Fresno and Bakersfield on June 1 and 2, 2016, respectively.
- Copies of the Draft REIR, including its technical appendices and all pages from documents referenced in the Draft REIR, were available for public review by request from the Department, on the Department's website, at the Department's South Central Region office in Fresno, and at the following libraries:

  Beale Memorial Library
  701 Truxtun Avenue
  Bakersfield, CA 93301

  Colusa County Library
  738 Market Street
  Colusa, CA 95932

  Mary L. Stephens Davis Branch Library
  315 E. 14th Street
  Davis, CA 95616

  El Centro Public Library
  Community Center Branch
  1140 N. Imperial Avenue
  El Centro, CA 92243

Fairfield Civic Center Library
1150 Kentucky Street
Fairfield, CA 94533

Fremont Library
2400 Stevenson Boulevard
Fremont, CA 94538

Hanford Branch Library
401 North Douty Street
Hanford, CA 93230

Los Angeles Public Library
Central Library
630 West 5th Street
Los Angeles, CA 90071

Merced County Library
Merced Branch
2100 O Street
Merced, CA 95340

Modesto Public Library
1500 I Street
Modesto, CA 95354

Napa Main Library
580 Coombs Street
Napa, CA 94559

Oroville Branch Library
1820 Mitchell Avenue
Oroville, CA 95966

Pleasant Hill Library
1750 Oak Park Boulevard
Pleasant Hill, CA 94523

Quincy Public Library
445 Jackson Street
Quincy, CA 95971

Red Bluff Library
645 Madison Street
Red Bluff, CA 96080

Redding Library
1100 Parkview Avenue
Redding, CA 96001

Riverside Public Library
Main Library

3581 Mission Inn Avenue
Riverside, CA 92501

Sacramento Public Library
Central Library
828 I Street
Sacramento, CA 95814

Norman F. Feldheym Central Library
555 West 6th Street
San Bernardino, CA 92410

San Diego Public Library
Central Library
330 Park Blvd.
San Diego, CA 92101

Dr. Martin Luther King, Jr. Library
150 East San Fernando Street
San Jose, CA 95112

Central Library
40 East Anapamu Street
Santa Barbara, CA 93101

Cesar Chavez Central Library
605 N. El Dorado Street
Stockton, CA 95202-1907

E. P. Foster Library
651 East Main Street
Ventura, CA 93001

Visalia Branch Library
200 West Oak Avenue
Visalia, CA 93291

Willows Public Library
201 North Lassen Street
Willows, CA 95988

Sutter County Library
Main Branch
750 Forbes Avenue
Yuba City, CA 95991

Betty Rodriguez Regional Library
3040 N. Cedar Avenue
Fresno, CA 93703

1.4 CEQA CERTIFICATION AND PROJECT APPROVAL

Section 15090(a) of the CEQA Guidelines states that “prior to approving a project, the lead agency shall certify (1) that the final EIR has been completed in compliance with CEQA; 2) that the final EIR was presented to the decision-making body of the lead agency and that the decision-making body reviewed and considered the information contained in the final EIR prior to approving the project; and (3) the final EIR reflects the lead agency’s independent judgment and analysis.”

Following completion of the public review process for the Monterey Plus Draft REIR and preparation and circulation of the Monterey Plus Final REIR, the Department (as lead agency) will consider taking the following actions:

- certify the Monterey Plus Final REIR (CEQA Guidelines Section 15090),
- adopt a revised mitigation monitoring and reporting program with respect to any mitigation measures (CEQA Guidelines Section 15091[d]),
- adopt revised findings with respect to any significant environmental effects (CEQA Guidelines Section 15091),
- adopt a revised statement of overriding considerations with respect to any significant and unavoidable impacts (CEQA Guidelines Section 15093),
- make a new determination with the Kern Water Bank Authority (KWBA) (as a responsible agency) with regard to whether or not to continue the use and operation of the Kern Water Bank (KWB) by KWBA, after compliance with CEQA, and
- file a notice of determination (CEQA Guidelines Section 15094).

Although federal and state agencies have regulatory authority that affects operation of components of the proposed project, no separate permits are required for project approval. Some of the components that require subsequent actions or decisions to implement may need separate permits. For example, the KWB is subject to a Habitat Conservation Plan (HCP), and certain actions addressed in the Settlement Agreement involve actions in Plumas County that may require added local decisions.

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2. CHANGES TO THE DRAFT REIR TEXT, FIGURES, AND TABLES

2. CHANGES TO THE DRAFT REIR TEXT, FIGURES, AND TABLES

2.1.1.1 Introduction

This chapter presents minor corrections made to the Draft REIR initiated by the staff and/or consultants based on their on-going review. All corrections are made to correct errata. New text is indicated in a double underline and text to be deleted is reflected by a ~~strike through~~. Text changes are presented in the page order in which they appear in the Draft REIR.

None of the changes identified below results in a significant impact that was not already identified in the Draft REIR. Furthermore, none of the impacts identified in the Draft REIR were found to be substantially more severe as the result of the following changes. For these reasons, recirculation of the Draft REIR is not warranted.

2.1.1.2 Preface

Page P-1, the title is revised to read:

PREFACE (NEW)

Page P-2, Figure P-1, the following figure text on “Document A1” is revised to read:

Volume 1

Preface (New)

~~Executive Summary (New)~~

Table of Contents (New)

Abbreviations (New)

Introduction/Executive Summary (New)

Chapter 1 – Introduction (No change)

Chapter 2 – ~~SWP~~State Water Project (No change)

Chapter 3 – History and Background (No change)

Chapter 4 – Proposed Project (Revised)

Chapter 5 – Methods (No change)

Chapter 6 – Effects of Proposed Project on SWP and SWP Contractor Operations (No change)

2.1.1.3 Table of Contents

Page after Page P-2, the divider title is revised to read:

TABLE OF CONTENTS (NEW)

Pages i-x, the header title is revised to read:

TABLE OF CONTENTS (NEW)

Page i, specific lines are revised to read:

Page ii, specific lines are revised to read:

Page iv, specific lines are revised to read:

Page vii, under “Figure” column, add hyphens after “7.1”

Page viii, the following lines are added:

RAR002282

Page ix, the following line is revised to read:

2.1.1.4 Abbreviations

Page after Page x, the divider title is revised to read:

ABBREVIATIONS (NEW)

Page 1, the section title is revised to read:

ABBREVIATIONS (NEW)

Pages 1-6, the header titles are revised to read:

Abbreviations (New)

Page 4, the following text is added to the abbreviations:

PCL Planning and Conservation League

Page 5, the following text is added to the abbreviations:

TCWD Tejon-Castac Water District

TMV Tejon Mountain Village

2.1.1.5 Introduction/Executive Summary (New)

Page ES-21, Table ES-1, mitigation measure text is revised to read:

TABLE ES-1

MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Prior to Mitigation		Mitigation Measure(s)	Level of Significance After Mitigation	
	1996-2014	2015-2030*		1996-2014	2015-2030*
7.2-2 KWB operations could mobilize contamination in soils or the unsaturated zones associated with hazardous waste sites or oil and gas production operations and potentially degrade groundwater quality.	LTS	PS	7.2-2 KWBA will implement the following measures: a) Comply with Mitigation Measure 7.11-4~~3~~. b) Hazardous waste sites would be subject to the county public health department and/or the CVRWQCB oversight with the responsible parties (see Section 7.0.4.1.7). KWBA will cooperate with the	NA	LTS

RAR002283

TABLE ES-1 MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES					
Impact	**Level of Significance Prior to Mitigation**		**Mitigation Measure(s)**	**Level of Significance After Mitigation**	
	1996-2014	**2015-2030***		**1996-2014**	**2015-2030***
			regulatory agency(s) during the process and provide pertinent groundwater elevations and water		

Page ES-38, Table ES-1, mitigation measure text is revised to read as follows since there is no Mitigation Measure 7.8-2:

TABLE ES-1 MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES					
Impact	**Level of Significance Prior to Mitigation**		**Mitigation Measure(s)**	**Level of Significance After Mitigation**	
	1996-2014	**2015-2030***		**1996-2014**	**2015-2030***
7.11-1 KWB construction activities could potentially expose workers or the public to previously unidentified hazards or hazardous materials.	LTS	PS	7.11-1 KWBA will implement the following measures: a) Require construction contracts to include specific language requiring contractors to comply with applicable hazardous materials management laws and regulations adopted at the State level in Titles 19 and 22 of the CCR, which address proper storage and disposal of substances such as fuels and Title 8 of the CCR which addresses the use of hazardous products in the work environment, which would apply to construction contractors. (See Section 7.0.4.1.2.) b) Ensure that the use of herbicides on the site shall be permitted in accordance with the KWB HCP/NCCP Vegetation Management Plan, which will incorporate by reference any other applicable laws, rules, and regulations regarding the use of pesticides as they take effect.	NA	LTS

RAR002284

TABLE ES-1

MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Prior to Mitigation		Mitigation Measure(s)	Level of Significance After Mitigation	
	1996-2014	2015-2030*		1996-2014	2015-2030*
			(Measure B-3(e), Ongoing Pesticide Use, in 1997 Monterey IS and Addendum)(see Appendix 7-6a and Section 7.0.4.1.5). c) Provide a comprehensive Worker Environmental Awareness Program (WEAP) that will include all training requirements identified in Best Management Practices, Worker Site Specific Health and Safety Plan, and mitigation measures, including training for all field personnel (e.g., KWBA employees, agents, and contractors). The WEAP shall include protocols and training for responding to and handling of hazardous materials and hazardous waste management, and emergency preparedness, release reporting, and response requirements. KWBA will ensure that all construction workers at risk of inhaling dust shall be provided masks with filters designed to trap spores of the size of Valley Fever fungus. (See Appendix 7.6b, 2016 KWBA Resolution). d) Comply with Mitigation Measure 7.8-1 ~~and 7.8-2~~.		

RAR002285

Page ES-64, Table ES-1, text from Chapter 12 inadvertently left out of Table ES-1 is added in to read:

TABLE ES-1

MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Prior to Mitigation		Mitigation Measure(s)	Level of Significance After Mitigation	
	1996-2014	2015-2030*		1996-2014	2015-2030*
12-1 KWB construction and operations/maintenance would generate GHG emissions that could potentially make a considerable contribution to a significant cumulative effect on climate change.	LTS	S	12-1 KWBA will implement the following measures (2016 KWBA Resolution, Appendix 7.6b): a) **Pump Efficiency Monitoring**: KWBA will conduct pump efficiency monitoring to ensure that all KWB pumps are monitored and evaluated at regular intervals during recovery periods. i. Daily Pump Efficiency Monitoring: Pumps shall be monitored daily for their total water volume pumped (acre-feet [AF]) and electricity consumption (kilowatt-hours [kWh]), which will be used to calculate a daily energy efficiency value (i.e., kWh/AF). ii. Pump Efficiency Software: Metro or an equivalent water system management program will be used to provide up-to-date and streamlined methods to analyze KWB's individual pump and total system efficiency. b) **Pump Rehabilitation, Retrofits, and Replacement**: KWBA shall use data from the Pump Efficiency Monitoring component to strategically and actively rehabilitate, retrofit, and/or replace pumps as needed during recovery periods. i. Pump Prioritization and Testing: Pump rehabilitation, retrofit, and replacement shall be prioritized by accounting for the relative efficiency of each pump with respect to the total pump system and water volume pumped through each pump. Data obtained from the Pump Efficiency Monitoring component shall be used to prioritize which pumps will be rehabilitated, retrofitted, and/or replaced. In addition efficiency testing by external entities if available (e.g., pump company,	NA	LTS

TABLE ES-1

MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Prior to Mitigation		Mitigation Measure(s)	Level of Significance After Mitigation	
	1996-2014	2015-2030*		1996-2014	2015-2030*
			Pacific Gas & Electric Company [PG&E]) or other similar analysis will also be used for the prioritization process. ii. Schedule: KWBA shall rehabilitate, retrofit, and/or replace pumps/wells at the earliest possible time without substantially disturbing ongoing O&M activities, but at a minimum will rehabilitate, retrofit, and/or replace at least an annual average of 5 pumps per year during a prolonged recovery period such as occurred between 2013 and 2016. c) **Reporting**: KWBA will maintain a quarterly and annual reporting program that will be publicly available online. Annual reports will cover calendar years and be posted online by March 30 to cover the previous year. Quarterly reports will be posted online within 30 days of the end of each calendar quarter. The annual and quarterly reports will include, but are not limited to, the following components: i. KWB O&M Totals: Total quarterly electricity consumption for recovery pumping activities along with total acre-feet recovered shall be provided online. A running total of the annual electricity consumption and acre-feet recovered by quarter shall also be provided. ii. Pump Efficiency: A summary of the pump efficiency (kWh/acre-feet) for each of KWB's pumps will be provided quarterly. Similar to the KWB O&M Totals, a running annual average efficiency for each pump shall be provided. These data shall be used to identify the 5 pumps per year that will be rehabilitated, retrofitted, or replaced. If a pump/well is adjusted for depth, notes shall be made within the reports to explain these changes in pump efficiency.		

TABLE ES-1

MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES

Impact	Level of Significance Prior to Mitigation 1996-2014	Level of Significance Prior to Mitigation 2015-2030*	Mitigation Measure(s)	Level of Significance After Mitigation 1996-2014	Level of Significance After Mitigation 2015-2030*
			iii. Electricity Efficiency Actions: Each report should include actions taken in the previous quarter to rehabilitate, retrofit, and/or replace pumps. Any other energy efficiency measures taken will be reported. When information is available from PG&E's Advanced Pumping Efficiency Program or other similar programs, annual electricity savings from these actions shall be included in the quarterly and annual reports to clearly show the electricity savings associated with rehabilitation, retrofit, and/or replacement actions. If annual energy savings cannot be determined through pre- and post-pump improvement testing, KWBA shall report the empirical annual energy savings (kWh/year) from these improvements in its annual reports. iv. Identifying Next Steps: Each annual report will include the list of 5 or more pumps planned to be evaluated for potential rehabilitation, retrofit, or replacement during that year. If all five of the least efficient pumps are not scheduled for rehabilitation, retrofit, and/or replacement in the coming year, the annual report shall explain what KWB operation requires the pump to remain in service that year. d) **Pump Compliance:** KWBA will only purchase new pumps that comply with United States Department of Energy pump efficiency regulations (10 CFR Part 429 and 431) when those regulations become effective in the marketplace in 2020. e) **Future Increases in Technology and Emissions Standards:** KWBA shall actively consider replacing older pumps with new pumps with increased efficiency technology. All future requirements for pumps at the		

TABLE ES-1 MONTEREY PLUS REIR: SUMMARY OF IMPACTS AND MITIGATION MEASURES					
Impact	Level of Significance Prior to Mitigation		Mitigation Measure(s)	Level of Significance After Mitigation	
	1996-2014	2015-2030*		1996-2014	2015-2030*
			federal, state, and/or local level shall be complied with.		
12-2 Construction and operations/maintenance of the existing and proposed KWB activities could conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing greenhouse gas emissions.	LTS	LTS	121-2 None required.	NA	NA

2.1.1.6 Chapter 7. Introduction to the Analysis (Revised and New)

Divider page, the divider title is revised to read:

7.~~0~~ ENVIRONMENTAL ANALYSIS (REVISED AND NEW)~~INTRODUCTION TO THE ANALYSIS (NEW)~~

Page 7.0-1, second list, text is revised to read:

- Appendix 7-1. Kern Water Bank ~~KWB~~ Study Area Physical Data Collection Technical Report
- Appendix 7-2. DWR Kern Water Bank ~~Groundwater~~ Model Results Technical Report
- Appendix 7-3. Kern Water Bank Study Area Surface and Groundwater Quality Technical Report
- Appendix 7-4. Kern Water Bank Air Quality Model Results
- Appendix 7-5a. Memorandum of Understanding Regarding Operation and Monitoring of the Kern Water Bank Groundwater Banking Program (1995~~ KWB MOU~~)
- Appendix 7-5b. Interim Project Recovery Operations Plan Regarding Kern Water Bank Authority (KWBA) and Rosedale-Rio Bravo Water Storage District (Rosedale) Projects (2014)

Page 7.2-49, first list, text is revised to read:

a) Comply with Mitigation Measure 7.11-4~~3~~.

Page 7.3-3, heading levels at bottom of page, text is revised to read:

7.3.2 ENVIRONMENTAL SETTING

7.3.2~~1~~.14 Life Histories of Fish Species of Concern through 2014

Page 7.3-4, heading levels, text is revised to read:

7.3.2~~1~~.2~~5~~ Physical Setting in 1995

7.3.2~~1~~.3~~6~~ Changes in Physical Setting between 1996 and 2014

Page 7.3-5, heading levels, text is revised to read:

7.3.2~~1~~.4~~7~~ Regulatory Setting in 1995

7.3.2~~1~~.5~~8~~ Changes in Regulatory Setting between 1996 and 2014

Page 7.3-6, heading levels, text is revised to read:

7.3.3~~2~~ IMPACTS AND MITIGATION MEASURES

Page 7.5-3, second subheading, text is revised to read:

7.5.2.2 Changes in Physical Setting between 1996 and 2014~~03~~

Page 7.7-1, first subheading, text is revised to read:

7.7.1.1 Cont~~n~~ent

Page 7.11-29, list item d), text is revised to read:

d) Comply with Mitigation Measure 7.8-1~~ and 7.8-2~~.

2.1.1.7 Chapter 8. Growth-Inducing Impacts (New)

Page 8-3, first subheading, text is revised to read:

8.1~~2~~.24.4~~1~~ Types of Environmental Impacts Related to Growth

Page 8-7, first subheading, text is revised to read:

8.1~~2~~.24.5~~2~~ Local Decision Making on Land Use Planning

Page 8-7, 8.2 heading, text is revised to read:

~~POTENTIAL~~ GROWTH-INDUCING IMPACTS OF THE KWB

Page 8-8, subheadings, text is revised to read:

8.2.24.1 Population Projections

8.2.24.2 Water Supply and Demand

RAR002290

Page 8-10, subheading, text is revised to read:

8.2.3~~4~~.1 Water Supply and Demand

2.1.1.8 Chapter 13. References

Divider page. The divider title is revised to read:

13. REFERENCES (NEW)

Pages 13-1 thorough 13-16, header titles are revised to read:

13. References (NEW)

2.1.1.9 Chapter 14. Report Preparation (New)

Page 14-1, headings, text is revised to read:

14~~8~~.1 LEAD AGENCY

14~~8~~.2 PRIME CONTRACTOR

Page 14-2, heading, text is revised to read:

14~~8~~.3 REVISED EIR TECHNICAL SUPPORT

Appendix 7-3. Kern Water Bank Study Area Surface and Groundwater Quality Technical Report

Page i, Specific lines are revised to read:

Section~~Chapter~~

~~7.3 Introduction……………………………………………………………………………………1~~

Page i, new text is added under “Tables” to read:

7.3-2 Wells with Constituents that Exceeded California or U.S. Maximum Contaminant Levels in Samples Collected during 2012 through 2015……………………………………………14

Page 19, duplicate Table 7.3-3B is deleted.

Appendix 7-4. G. K&B O&M Pump Efficiency Electricity and Emissions Reductions

Divider page. The divider title is revised to read:

APPENDIX 7-4. G. KW&B O&M PUMP EFFICIENCY ELECTRICITY AND EMISSIONS REDUCTIONS

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3. INDEX TO COMMENTS AND RESPONSES

3. INDEX TO COMMENTS AND RESPONSES

At the end of the circulation period, a total of five written comment letters and e-mails were received commenting on the Draft REIR. In addition, three individuals provided oral comments on the Draft REIR at the June 1, 2016 public hearing in Bakersfield, two of which also submitted written comments at the Bakersfield public hearing. The oral comments were transcribed. Written and transcribed comments have been assigned a unique code (see Table 3-1). Individual comments have been bracketed based on the issue presented and assigned a unique code.

Multiple comments were received with respect to several key issues. To provide more complete responses regarding the issues raised, the Department prepared "master responses" addressing all comments relating to each substantive issue raised repeatedly by commenters. Each master response provides some background regarding the specific issue, how the issue was addressed in the Draft REIR, and additional clarification and explanation as appropriate to the concerns raised in the comments. At the beginning of each master response, the comments the response addresses are identified.

3.1 LIST OF AGENCIES AND PERSONS COMMENTING

Federal Agencies

None.

State Agencies

1. Governor's Office of Planning and Research, State Clearinghouse and Planning Unit, Scott Morgan, Director State Clearinghouse, letter dated June 14, 2016.

Local Agencies

2. Kern Water Bank Authority, Jonathan Parker, General Manager, letter dated June 13, 2016.

Tribal

3. San Manuel Band of Mission Indians, Leslie Mouriquand and Daniel McCarthy, Director, Cultural Resources Management Department, email dated May 3, 2016.

Organizations/Local Agencies

4. Center for Food Safety, California Water Impact Network, California Sportfishing Protection Alliance, Center for Biological Diversity, Central Delta Water Agency, and South Delta Water Agency. Ryan Berghoff (CFS), Carolee Krieger (CWIN), Bill Jennings (CSPA), John Buse (CBD), Dante Nomellini (CDWA), and John Herrick (SDWA), letter dated June 13, 2016.

Individuals

5. Dennis Fox, letter undated but received May 31, 2016.

6. Dennis Fox, comment card at Fresno Hearing, June 1, 2016.

7. Phillip Merlo, comment card at Fresno Hearing, June 1, 2016.

Individual Speakers at Fresno Hearing, June 1, 2016

8. Adam Keats with Center for Food Safety, representing CFS, CWIN, CSPA, CBD, CDWA, and SDWA.

9. Dennis Fox

10. Phillip Merlo

Individual Speakers at Bakersfield Hearing, June 2, 2016

None.

TABLE 3-1

INDEX TO COMMENTS AND RESPONSES

Commenter Code	Name	Agency / Affiliation	Commenting Entity	Comment Type and Date
OPR	Scott Morgan	Governor's Office of Planning and Research, State Clearinghouse and Planning Unit	State Agency	Letter dated June 14, 2016
KWBA	Jonathan Parker	Kern Water Bank Authority	Local Agency	Letter dated June 13, 2016
SANMANUEL	Leslie Mouriquand and Daniel McCarthy	San Manuel Band of Mission Indians	Tribal	Email dated May 3, 2016
CFS1	Ryan Berghoff (CFS), Carolee Krieger (CWIN), Bill Jennings (CSPA), John Buse (CBD), Dante Nomellini (CDWA), and John Herrick (SDWA).	Center for Food Safety, California Water Impact Network, California Sportfishing Protection Alliance, Center for Biological Diversity, Central Delta Water Agency, and South Delta Water Agency.	Organization	Letter dated June 13, 2016
CFS2	Adam Keats (CFS)	Representing: Center for Food Safety, California Water Impact Network, California Sportfishing Protection Alliance, Center for Biological Diversity, Central Delta Water Agency, and South Delta Water Agency.	Organization	Verbal at Bakersfield Hearing, June 1, 2016
FOX1	Dennis Fox		Individual	Letter undated but received May 31, 2016
FOX2	Dennis Fox		Individual	Written at Bakersfield Hearing, June 1, 2016
FOX3	Dennis Fox		Individual	Verbal at Bakersfield Hearing, June 1, 2016
MERLO1	Phillip Merlo		Individual	Written at Bakersfield Hearing, June 1, 2016
MERLO2	Phillip Merlo		Individual	Verbal at Bakersfield Hearing, June 1, 2016

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4. COMMENTS AND RESPONSES

4. COMMENTS AND RESPONSES

4.1 INTRODUCTION

This chapter presents comments received on the Draft REIR and the Department's responses to those comments.

DWR received both written and oral comments on the Draft REIR. When there is significant public comment, CEQA allows lead agencies to summarize or consolidate responses to similar comments, as long as all substantive issues are represented.

There was an array of similar comments about particular topics which revealed different aspects of common issues. To present responses that address all aspects of these related comments, master responses were prepared. The master responses are a means of providing a broader context to the response than may be possible when making individual responses. In some cases, an individual comment may be answered by one or more of the master responses. Master responses are as follows:

- Master Response 1: Kern Water Bank and Crop Conversion
- Master Response 2: Delta Impacts
- Master Response 3: Article 21(g)(1)
- Master Response 4: Agricultural Resources Environmental Analyses
- Master Response 5: Groundwater Depletion and Mitigation
- Master Response 6: Land Subsidence
- Master Response 7: Project Alternatives

Individual responses to comments which are fully addressed by a master response include references to the appropriate subsection or subsections of the master response where the comment is addressed. Where commenters provided comments in both a letter and at the public hearings, those comments are treated individually. The responses to comments clarify and amplify text in the Draft REIR, as appropriate and do not alter the conclusions of the Draft REIR.

This chapter is organized as follows:

- Section 4.1, Introduction
- Section 4.2, Master Responses
- Section 4.3, Individual Comments and Responses

4.2 MASTER RESPONSES

4.2.1 MASTER RESPONSE 1: KERN WATER BANK AND CROP CONVERSION

Comments addressed in this master response are: CFS1-9, CFS1-14, CFS1-20, CFS1-22, CFS1-23, CFS1-24 to CFS1-27, CFS1-30, CFS1-31, CFS2-4, CFS2-5, CFS2-7, CFS2-9, and FOX3-4.

Comments on the Draft REIR contend that the KWB substantially contributes to the "hardening" of the water demand or "drought hardening" by farmers within the KWB participants' service area shifting their choice of what types of crops to plant from annual row crops to permanent (or perennial) crops (primarily orchard trees) that require a stable water supply each year, and that this impact on California's water supply was not evaluated in the Draft REIR.

In the discussion which follows, the development and continued use and operations of KWB was not found to have a significant impact on crop conversion, including water supply effects, based on the following:

- The trend from annual (row) crops to permanent (orchard) crops is not only a local shift in Kern County, but a regional shift throughout the San Joaquin Valley and a statewide shift throughout California.
- The amount of permanent almond crop acreage (which dominates the orchard acreage added) is directly related to its world commodity price; the higher the price, the greater the amount of planted acreage.
- A State policy is to increase agricultural irrigation efficiency. Increased efficiency generally requires more expensive irrigation systems, both in capital and energy expenditures. The cost of installing more expensive irrigation infrastructure requires production of more valuable crops to recover investments.
- Absent the KWB, alternative sources of water are available to support permanent crop irrigation. Where available, groundwater is used as the primary alternative to surface water. This is evidenced by increased agricultural pumping during years of surface water deficit including drought. Agricultural power utilization graphs from both Pacific Gas and Electric Company (PG&E) and Southern California Edison (SCE) show that in years of surface water deficit or drought, agricultural pumping increases.

Comments CFS1-30 and CFS1-31 state:

> "Once the Revised EIR recognizes that irrigated annual crops were converted to permanent crops, it must identify and analyze the impacts of that conversion to determine whether it is significant. It is impossible to mitigate the effects of converting to permanent crops that require a dedicated source of water without first identifying the significant environmental impacts of that conversion. (See *Sierra Club v. Board of Forestry* (1994) 7 Cal.4th 1215, 1233 [CEQA compels government first to identify the significant environmental effects of projects, and then to mitigate those effects through imposition of feasible mitigation measures or through selection of feasible alternatives].) The Revised EIR must determine whether there is any effect on the availability of water resources in the region and the flexibility of the water supply. We believe that the significance of this impact is obvious: by making the region's water supply *seemingly* more reliable, at least in the short term (since water bank withdrawals can be used to compensate for large drops in SWP deliveries during short-term droughts), the unfettered operation of the KWB hardens the demand for Delta water pumping. The Revised EIR must explore this impact. It must ask whether permanent crops require greater amounts of water over time, and whether permanent crops have different impacts on water supplies than annual crops."

The effect on drought protection in the context of "drought or demand hardening" with regard to agricultural contractors was addressed in the 2010 Monterey Plus FEIR as follows:

> "The terms "drought hardening" or "demand hardening" apparently refer to the situation where water agencies implement more stringent conservation measures on an ongoing basis thereby leaving less flexibility for significant cutbacks during drought periods…It is not clear whether the transfers from agricultural contractors to M&I contractors would reduce the flexibility of agricultural contractors in a drought period. Since the agricultural contractors were requesting full Table A

> supplies prior to the Monterey Amendment, it is doubtful that these supplies were used for drought relief. As discussed in the DEIR regarding Agricultural Resources Impact 7.6-1 (on pages 7.6-5 through 7.6-9), there is no strong evidence to support a conclusion that land was taken out of irrigated production as a result of the proposed project. As discussed in DEIR regarding Terrestrial Biological Resources Impact 7.4-1 (on pages 7.4-20 through 7.4-22), the trend of replacing irrigated annual crops with permanent crops is expected to continue in the future with or without the proposed project. While it is possible that additional land could be converted to permanent crops as a result of the proposed project, no clear trend can be attributed to the proposed project that can be discerned from the historical analysis period. Although the proposed project resulted in a reduction of agricultural contractors' share of SWP Table A amount on an annual average basis, the reliability of their Table A supplies increased during drought periods.
>
> If enough water that is surplus to contractors' annual needs (either Table A or Article 21) can be stored to weather drought periods and more than offset the losses of Table A supply in those years, then the storing contractors could better maintain supplies during droughts. Such stored supplies can reduce the effects of "drought or demand hardening" by reducing the added degree of conservation that a water agency may need to impose during a drought. See the discussion in Chapter 8 of this FEIR relating to drought supplies from banked water for M&I contractors…" (2010 Monterey Plus FEIR, Subsection 13.2.4.1, pages 13-17 to 13-18; also see 2010 Monterey Plus FEIR Subsection 15.2.3.5 on whether the Monterey Amendment increased demand.)

This master comment discusses several key causal factors involved in the shift from annual to permanent crops that go well beyond KWB. It should be reviewed in conjunction with Master Response 2: Delta Impacts; Master Response 3: Article 21(g)(1), and Master Response 4: Agricultural Resources Environmental Analyses, as all are linked with respect to potential significant effects of the KWB on State water supplies and agriculture.

4.2.1.1 Kern Water Bank Effects on Crop Shift

In the 2007 Monterey Plus DEIR Chapter 7.6, the Department addressed agricultural trends in Kern County prior to 1997 and noted:

> "For several decades, the proportion of permanent crops (fruits and nuts) in the San Joaquin Valley has increased and the proportion of field crops has decreased. In 1980, field crops were cultivated on 72 percent of the cropland in the San Joaquin Valley. In 1997, field crops were grown on 55 percent of the cropland.[7] In the late 1970s and 1980s interest rates made financing very expensive and many smaller farming operations were bought out by larger operations. After the prolonged six-year drought of 1986 to 1992 and the reduction in Delta pumping necessitated by more stringent Delta water quality standards and the Central Valley Project Improvement Act, many agricultural operations re-evaluated their farming strategies. The aforementioned events resulted in a shift in the views of Westside farmers and had a large impact on how future farming was to occur. Some agricultural land was abandoned during this period as profitability was drastically reduced. The trend toward planting high value permanent crops and vegetables in place of field crops continued into the 2000s.
>
> The value of agricultural production in the San Joaquin Valley has increased between 1996 and the present. The value of agricultural production in Kern County in 2005 was $3.5 billion. Current trends show increasing acreages of tree crops and decreasing acreages of field crops and to lesser extent vegetable crops.[8]The value of agricultural production in Kings County in 2005 was $1.4 billion. Kings County is also experiencing a trend toward increased acreage of tree crops.[9]" (2007 Monterey Plus DEIR, Section 7.6.2.2.)

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7. Congressional Research Service, *California's San Joaquin Valley: A Region in Transition.* 2005.

8 Kern County Department of Agriculture and Measurement Standards. 2005. *Agricultural Crop Report, 2005.*

9 Kern County Department of Agriculture and Measurement Standards. 2005. *Agricultural Crop Report, 2005.*

As in the Monterey Plus EIR, the Draft REIR readily recognizes that there has been a shift from annual crops to permanent crops in Kern County (Draft REIR, page 7.6-6).

The Draft REIR further states that this trend is not only a local shift in Kern County, but a regional shift throughout the San Joaquin Valley as well as a State-wide shift throughout California. The Draft REIR found that there had been an increase in permanent crops in Kern County and the rest of California and that "[c]onsequently, KWB activities could make a cumulatively considerable incremental contribution to this shift to permanent crops, at least during current economic conditions (always a critical factor driving agricultural cropping patterns)" (Draft REIR, page 10.1-32.) The Draft REIR also noted that the shift has been caused by several factors beyond anything that might be attributed to the KWB, and can be seen statewide, not just within Kern County:

> "However, local, regional, and even global economics also contribute substantially to this recent shift to permanent crops. The trend of shifting to permanent crops may continue in the future with or without KWB activities and cumulative water banking projects because such shifts are typically driven by crop production, supply, and demand; profit margins; and regional and global economics; as has been the case with California's almond industry, a leading crop type within Kern County and the KWB participants' service area." (Draft REIR, page 10.1-32.)

As evidenced in the Draft REIR, Table 7.6-6, the project does not directly or indirectly cause conversion to permanent crops. Changes in farming practices in the KWB participants' service area are consistent with the county-wide trend and with a state-wide trend even in areas that do not depend upon water banks for water storage (see **Figures 4-1a, 4-1b, 4-2a, and 4-2b** based on USDA [2016b] and California Department of Food and Agriculture [2016]). The Department nonetheless analyzed the potential environmental effects caused by crop conversion from annual crops to permanent crops. Cumulative and indirect impacts of conversion from annual to permanent crops are analyzed in Draft REIR Chapter 10.1, Cumulative Environmental Impacts. The following discussion provides more detail regarding these factors that have strongly influenced the local, regional, and state-wide shift from annual to permanent crops.

4.2.1.2 World Commodity Price Increases

A major factor causing the increase in permanent crops is the rise in world commodity prices for permanent crops, such as almonds, compared to other crops. California has a comparative advantage in the range of crops that it can grow which allows it to quickly enter markets with price increases. **Figure 4-3** compares the world almond price (USDA 2016a) to the acreage planted statewide and in Kern County, from 1982 to 2014 (USDA 2016b, California Department of Food and Agriculture 2016). It is evident that the price spikes peaking in 1995 and again in 2005 are related to the increases in almond acreage. Given how planted almond acreage responded previously to spikes in world prices, it appears that the current drought may have dampened acreage planting since 2012, which would be a trend contrary to the assertions by some commenters that the KWB has created an incentive to plant permanent crops.

The question raised by the comments is whether Kern County with its access to the KWB has seen a disproportionate share of the growth in almond acreage. If so, that would be consistent with the assertions by the commenter about the incentive created by the KWB to plant orchard crops. When looking across the eight counties which hold the greatest share of almond acreage (Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare), Kern had the second highest average annual growth rate in almond acreage from 1982 to 2015 (USDA 2016b, California Department of Food and Agriculture 2016).

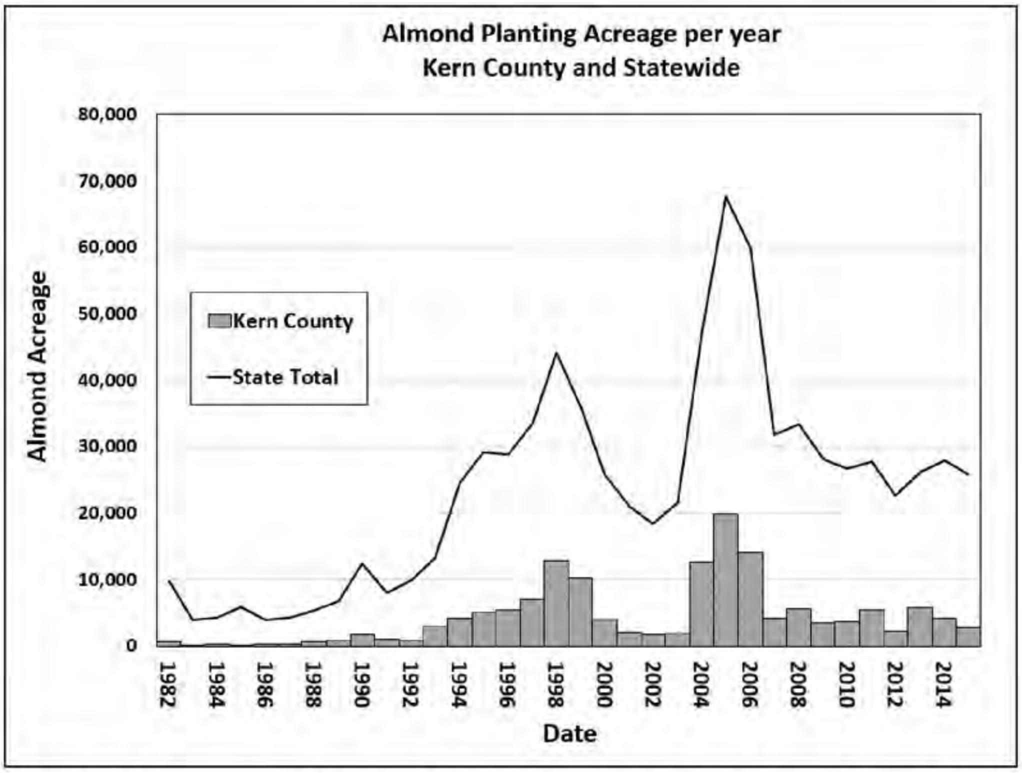

Figure 4.1a. Almond Planting Acreage Per Year, Kern County and Statewide

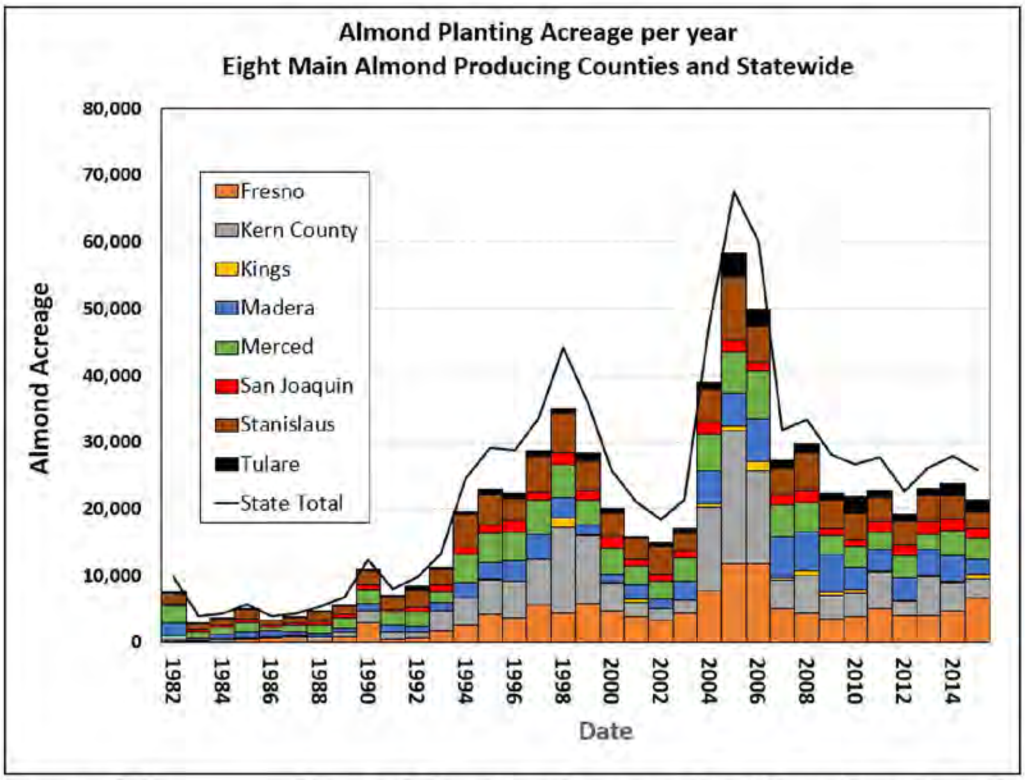

Figure 4.1b. Almond Planting Acreage Per Year, Key Counties and Statewide

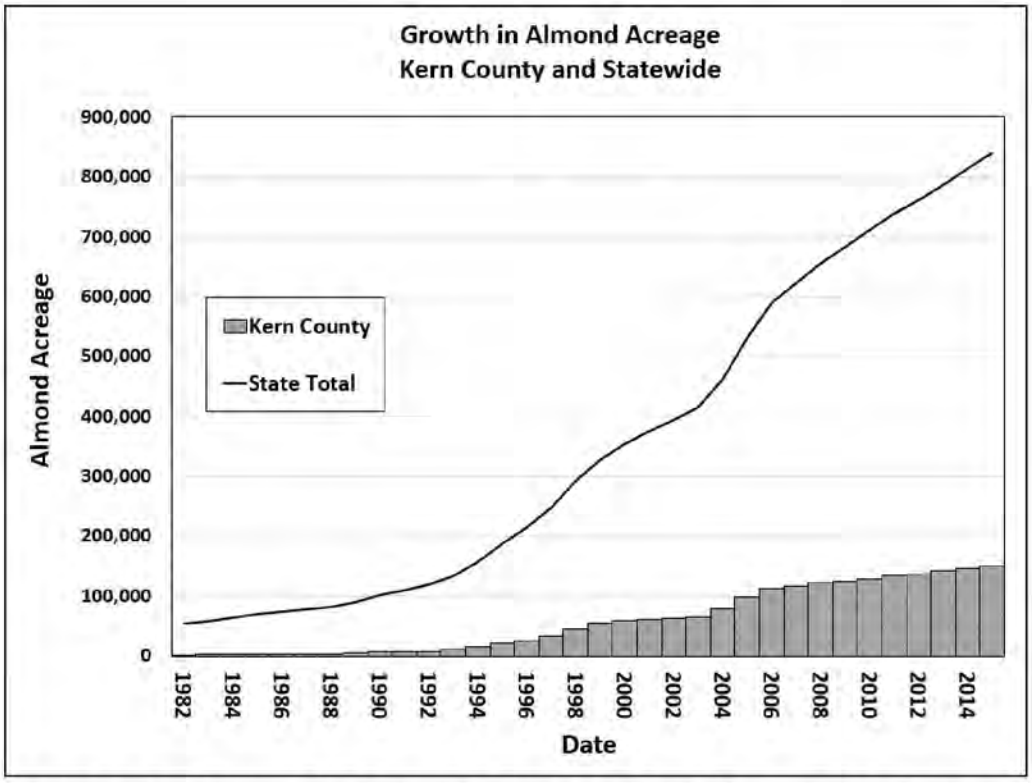

Figure 4.2a. Growth in Almond Acreage, Kern County and Statewide

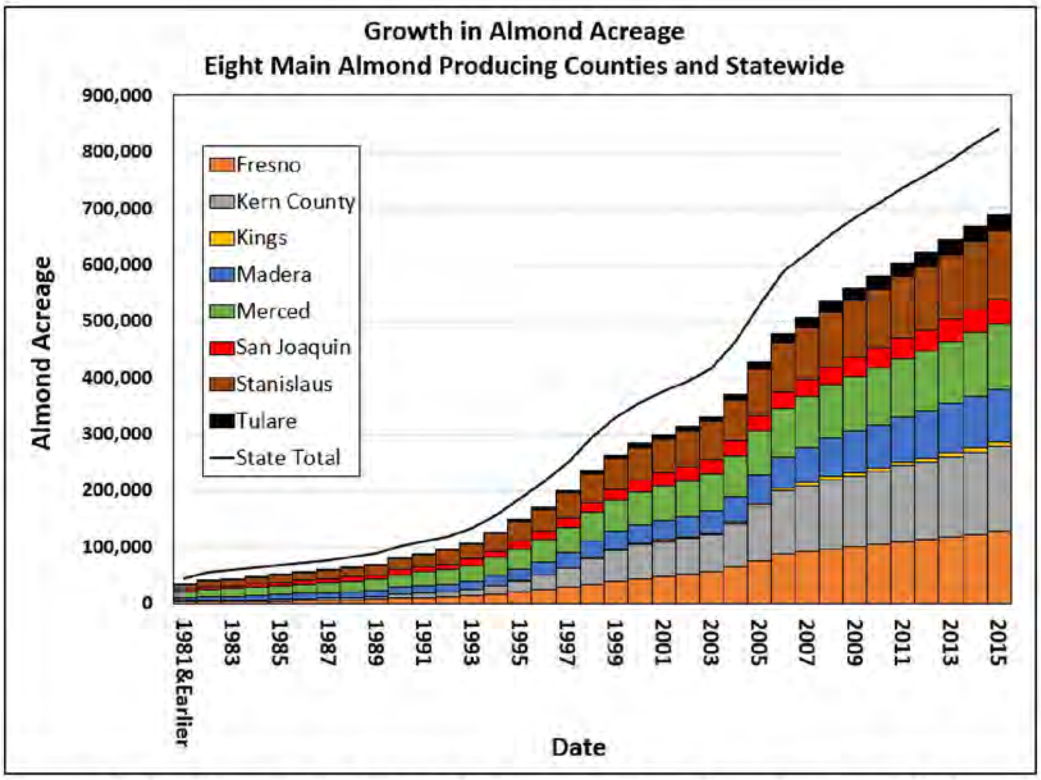

Figure 4.2b. Growth in Almond Acreage, Key Counties and Statewide

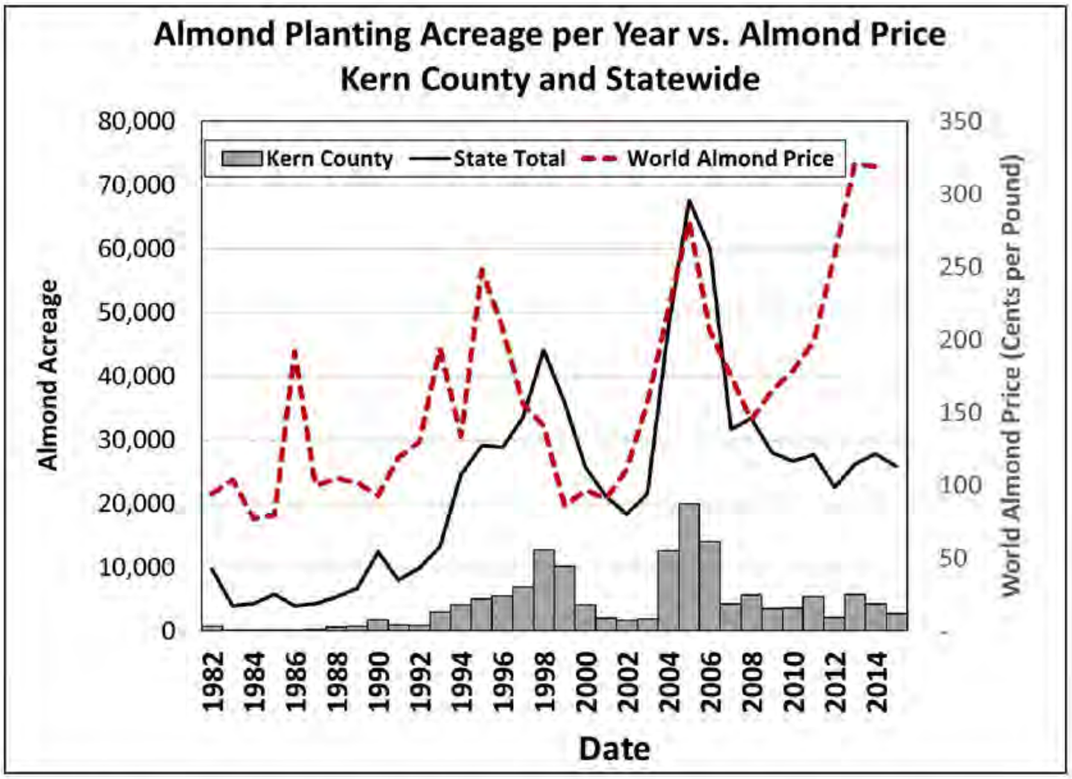

Figure 4-3. Almond Planting Acreage per Year vs. Almond Price

However, from 1996 to 2015—the 20-year period after the transfer of the KWB—Kern County fell back to third, near the statewide average. Thus, the start of KWB operations coincided with a relative decrease in new almond acreages in Kern County rather than an increase (which is what would be required to support the commenters' hypothesis). The available data do not support the commenters' assertion.

4.2.1.3 State Policy to Increase Agricultural Irrigation Efficiency

The observed increase in permanent crops is also caused by State policy to increase agricultural irrigation efficiency. That initiative has three profound effects. The first effect is the increase in the comparative cost of irrigation systems. Flood and furrow irrigation is an inexpensive irrigation method but is comparatively less efficient than microdrip irrigation; on the other hand, installing microdrip can be a major investment that can cost up to $2,000 per acre. As a result, farmers using the more efficient microdrip irrigation method tend to plant crops with the highest return per acre to justify the investment. Relying on crops that give a steady year to year output is key to recovering this investment.

The second effect is that these new irrigation systems brought the ability to increase yield per acre, so revenues increased. Microdrip gives growers the ability to target nutrients and precisely schedule water and other input applications. This effect can be seen in row crops such as tomatoes and melons where yields have increased 50% from 2006 to 2014 in certain counties (for example, Fresno County Agricultural Commissioner 2007, Fresno County Agricultural Commissioner 2014).

The third effect is that microdrip systems work best with the grit-free water supplied from groundwater wells. Thus, growers have shifted from SWP supplies to groundwater in many cases to enhance the reliability of their irrigation systems.

4.2.1.4 Permanent Crops

A "permanent" crop is one produced from plants which last for many seasons, rather than being replanted after each harvest. Permanent crops (also known as perennials), which is the term used throughout the Draft REIR, includes orchards (fruit and nut-producing crops such as oranges and almonds) and vineyards. It is important to note, however, that no crop is truly permanent. For example, in February 2016, Wonderful Orchards, formerly known as Paramount Farms, took 10,000 almond acres out of production in the western part of Kern County because of "limited water resources and market factors" (Cox 2016). This type of crop shifting is frequent in the agricultural industry, and dependent on numerous factors as discussed herein.

4.2.1.5 Reliance on Groundwater Pumping

The use of groundwater pumping in Kern County, the San Joaquin Valley, and statewide has smoothed the overall agricultural water supply. **Figures 4-4** and **4-5** below show the variance in electricity used for groundwater pumping by PG&E for 2001-2013 and SCE agricultural customers for 2004-2013 (McCann 2015a,b). This is shown in the graphs below where in years where surface water is most available, it is used, such as in 2006 and 2011; in years when it is not available, groundwater is pumped, such as in 2007 to 2009 and in 2012 to 2016. This would be true with or without KWB operations.

4.2.1.6 Conclusion

The Draft REIR on page 10.1-33 concluded that numerous factors are causing the increase in permanent crops in Kern County, and the shift is not due to KWB activities:

> "As evidenced by the KWB participants' service area analysis, changes in farming practices in the KWB participants' service area are consistent with the county-wide trend discussed above (Table 7.6-6) and with a state-wide trend even in areas that do not depend upon water banks for water storage." (Draft REIR, page 7.6-13.)

The discussion above provides additional information that KWB development and continued use and operation did not have a significant impact on crop conversion. This was based on the following: the trend from row crops to permanent crops is not only a local shift in Kern County but a regional shift throughout the San Joaquin Valley and a statewide shift throughout California; the amount of permanent crop acreage is directly related to its commodity price; and, the State policy to increase agricultural irrigation efficiency requires a more expensive irrigation system requiring the production of more valuable crops.

4.2.2 MASTER RESPONSE 2: DELTA IMPACTS

Comments addressed in this master response are: CFS1-9, CFS1-12, CFS1-20, CFS1-31, CFS1-32, CFS1-33, CFS1-36, CFS1-37, FOX1-9, FOX3-5, FOX3-6, and MERLO 2-1.

4.2.2.1 Delta Reform Act, Covered Actions, and Applicability to the Kern Water Bank

Several comments state that the Draft REIR must consider the Delta Plan (Delta Stewardship Council 2012) and all likely mandated decreases in Delta Plan exports, and analyze what impacts that process will have on KWB operations. The comments allege that since the KWB obtains most of its water from the SWP, the KWB is subject to Delta Plan requirements to specify decreases in exports from the Delta (including all areas served by export water).

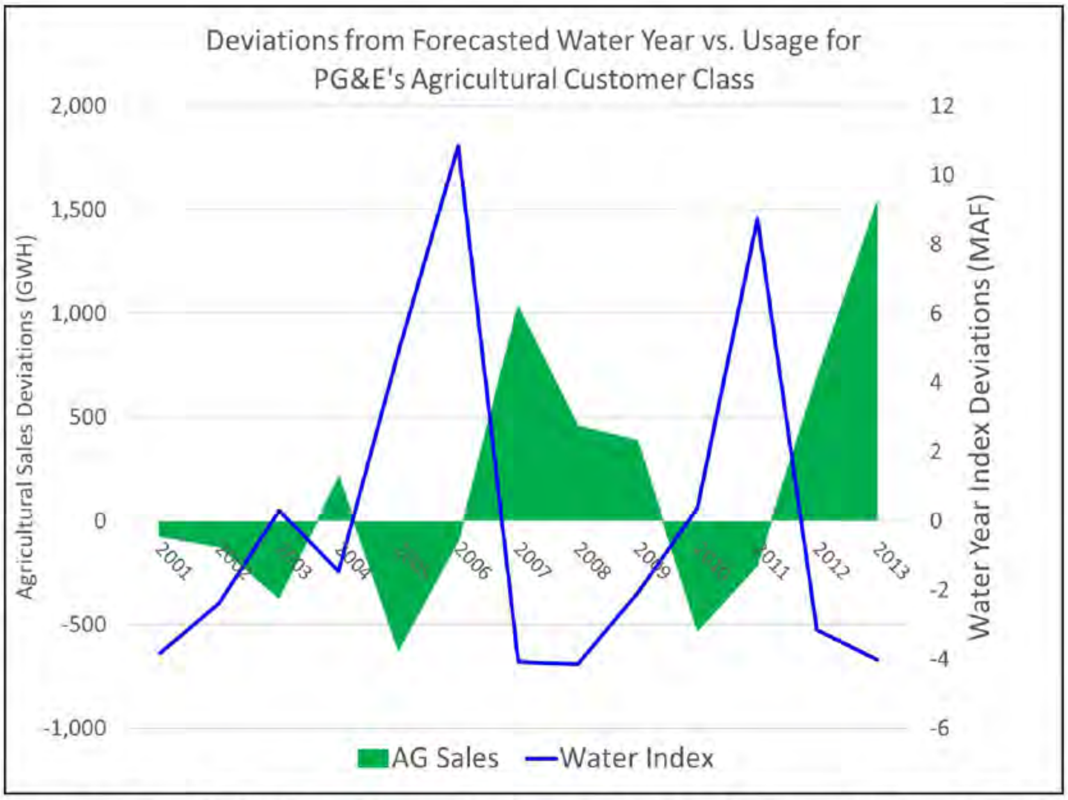

Figure 4-4. Deviations from Forecasted Water Year vs. Usage for PG&E's Agricultural Customer Class

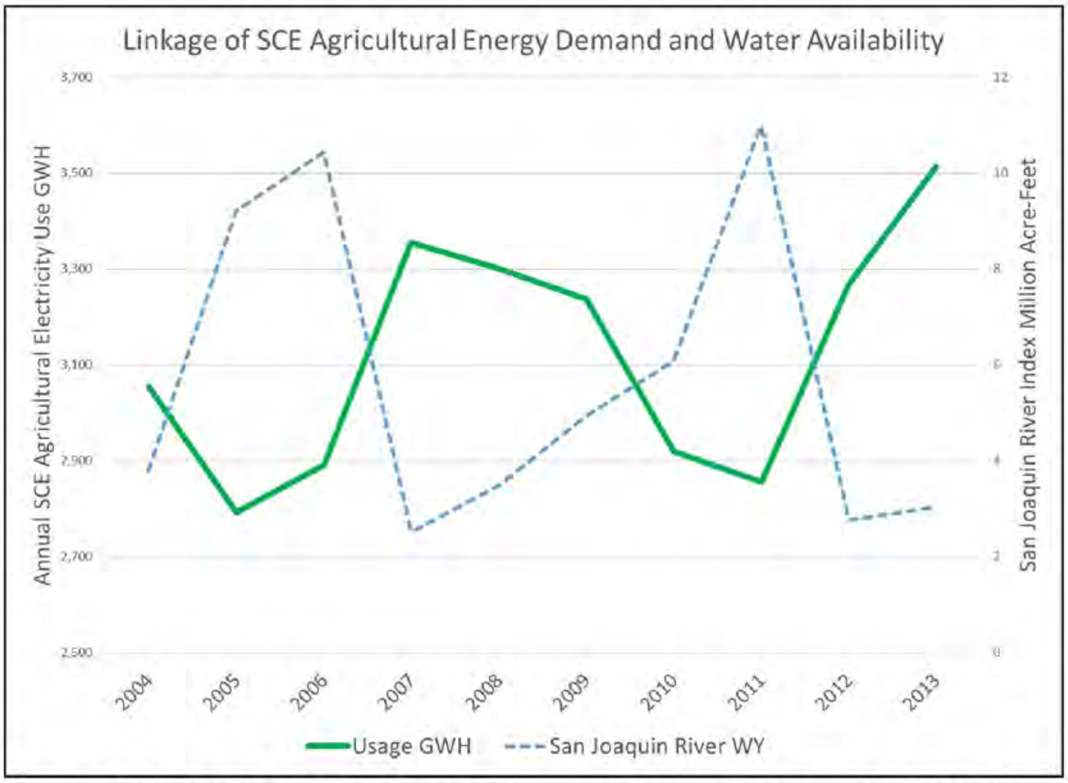

Figure 4-5. Linkage of SCE Agricultural Energy Demand and Water Availability

The Sacramento-San Joaquin Delta Reform Act of 2009 (Wat. Code, § 85000, *et seq.*) (Delta Reform Act), established an independent State agency, the Delta Stewardship Council (DSC), to further the co-equal goals of Delta ecosystem restoration and a reliable water supply. The DSC is charged with developing and implementing the comprehensive Delta Plan.

The Delta Reform Act gave the DSC direction and authority to serve two primary governance roles: 1) set a comprehensive, legally enforceable direction for how the State manages important water and environmental resources in the Delta through the adoption of a Delta Plan, and 2) ensure coherent and integrated implementation of that direction through coordination and oversight of State and local agencies proposing to fund, carry out, and approve Delta-related activities.

The Delta Reform Act defines a "covered action" as:

> "…a plan, program, or project as defined pursuant to Section 21065 of the Public Resources Code that meets all of the following conditions:
>
> 1. Will occur, in whole or in part, within the boundaries of the Delta or Suisun Marsh;
> 2. Will be carried out, approved, or funded by the state or a local public agency;
> 3. Is covered by one or more provisions of the Delta Plan;
> 4. Will have a significant impact on the achievement of one or both of the coequal goals or the implementation of government-sponsored flood control programs to reduce risks to people, property, and state interests in the Delta.
>
> (Wat. Code, § 85057.5, subd. (a).)

But, a covered action does not include:

> "…A plan, program, project, or activity that occurs, in whole or in part, in the Delta, if both of the following conditions are met:
>
> > The plan, program, project, or activity is undertaken by a local public agency that is located, in whole or in part, in the Delta.
> >
> > Either a notice of determination is filed, pursuant to Section 21152 of the Public Resources Code, for the plan program, project, or activity, by, or the plan, program, project, or activity is fully permitted by, September 30, 2009."
>
> (Wat. Code, § 85057.5, subd. (b)(6)(A) & (B).)

Timeliness to Argue Applicability of the Delta Reform Act

The Delta Reform Act was added by statutes 2009-2010 and became effective on February 3, 2010. The appropriate time to argue that the Monterey Amendment, including KWB operations, was a covered action could have been raised in the *Central Delta Water Agency, et al.* legal challenge, but was not. Moreover, the court's Findings and Preemptory Writ of Mandate states:

> "5. DWR shall be allowed to correct the deficiencies identified in the Court's Rulings on Submitted matter (March 2014) and Joint Ruling on Submitted Matter (October 2, 2014) and recertify a revised Monterey Plus EIR without reopening the non-defective portions of the Monterey Plus EIR. Upon recertification, only those portions of the revised Monterey Plus EIR that are new or changed shall be subject to challenge under CEQA by petitioners or other interested parties." (*Central Delta Water*

> *Agency, et al. v. California Department of Water Resources, et al.* (Sacramento Case No. 34-2010-80000561) and *Rosedale-Rio Bravo Storage District, et al. v. California Department of Water Resources, et al.* (Sacramento Co. Superior Court Case No. 34-2010-80000703; Findings and Peremptory Writ of Mandate, November 24, 2014, p.2, lines 26-28 – p. 3, lines 1-3.)

In addition, the Sacramento County Superior Court has set aside the Delta Plan until such time the DSC amends the Plan to conform to the Court's ruling. DSC filed a Notice of Appeal of the Superior Court's decision. Therefore, at this time, the Delta Plan is in flux.

Delta Reform Act Applicability to the Draft REIR

Based on the statute and the Delta Plan that the court set aside, KWB activities do not appear to be a covered action for a number of reasons and therefore are not required to show consistency with the Delta Plan: KWB activities are not within the boundaries of the Delta or Suisun Marsh, are not covered by one or more provisions of the Delta Plan, and were fully permitted prior to September 30, 2009. Additionally, the KWBA is not located, in whole or in part, in the Delta.

Although the KWB does receive water from the Delta, KWB activities in the past, present, and future, as analyzed in the Draft REIR, do not propose any new action to export water from, transfer water through, or use water in the Delta (see discussion below at 4.2.2.2). The KWB activities would be undertaken by KWBA, not the Department. Should KWBA undertake a plan, program, or project in the future not covered in the Draft REIR, it can make its own determination based on its own discretion and authority as to whether its activity must be consistent with the Delta Plan.

KWB Consistency with the Delta Plan

Even if the Proposed Project was a covered action, it is consistent with the Delta Plan. The Delta Plan sets out "policies and recommendations for providing more reliable water supply for California based on four core strategies:

- Increase water conservation and expand local and regional supplies
- Improve groundwater management
- Improve conveyance and expand storage
- Improve water management information."

(Delta Plan, page 102.)

For instance, one policy of the Delta Plan is to improve conveyance and expand storage. As noted within the Delta Plan,

> "The greatest conflicts between the water needs of the people and fish within the Delta occur during dry years. That is when the least amount of water is flowing into the Delta and, historically, when exports have been a much larger percentage of Delta inflows compared with wet years. The timing and pattern of Delta diversions must be shifted so that more water can be exported during wet years, when there is significantly more water available for diversion, and less is taken in dry years, when the water is needed for in-Delta water quality and ecosystem protections. . . ." (Delta Plan, p. 105.)

The KWB implements the above policy of the Delta Plan. It stores water in wet years for use in dry years and reduces demand on the Delta during dry years. It also stores water from sources other than through the Delta. Additionally, supply of SWP water to KWB is limited by a complex set of regulations. (Monterey Plus 2010 FEIR, Section 7.1.2.3, pages 7.1-19 through 7.1-34.)

4.2.2.2 Impacts to the Delta

Several comments contend that the Department must expand its analysis contained in the Draft REIR to consider impacts to the Delta that have resulted from and will result from KWB activities. Additionally, one comment suggested that the KWB demands and the drought are impacting Delta water rights holders, presumably because the commenter thinks that KWB demands would result in increased exports from the Delta, thereby reducing water otherwise available to upstream users.

The Department analyzed and clarified the potential environmental effects on the Delta in general and with regard to impacts resulting from a locally-owned KWB in the Monterey Plus EIR. SWP water delivered from the Delta and stored in the KWB is allowed under the Department's permits, that is, the requirements of D-1641 and other regulatory constraints.

Deliveries to SWP Agricultural Water Contractors

Commenters appear to argue that if the KWB did not exist, SWP contractors that store water in the KWB would not have a demand for the water that would have gone into the KWB and therefore Delta exports would be less. The following discussion clarifies that it is more likely that contractors storing water in the KWB would have still requested the same amount of water with or without the KWB, and pumping from the Delta would be unchanged.

For general context, it is helpful to understand that for agricultural contractors, the Monterey Amendment provides a more reliable Table A water supply during droughts due to the change in how the Department will allocate water during shortages. For example, historical allocations with and without the Monterey Amendment for agricultural Table A allocations provide for a significant increase in water during dry years 2001 and 2002 under the Monterey Amendment (2007 Monterey Plus DEIR Table 6-9). These changes have nothing to do with the KWB. Therefore and regardless of the KWB activities, agricultural contractors' water supply will increase during drier years.

Additionally, as noted on pages 13-17 of the 2010 Monterey Plus FEIR, the agricultural contractors were requesting full Table A supplies prior to the Monterey Amendment. There is no reason to expect that KWCA and Dudley Ridge Water District (WD) contractors would have requested less than full Table A supplies after the Monterey Amendment, even if there was no KWB.

The SWP is generally supply limited. For more information on SWP demands and Delta pumping, see the 2007 Monterey Plus DEIR Chapter 6, and 2010 Monterey Plus FEIR Sections 17.2.5.9: Demand, and 17.2.5.10: Increase in Deliveries not due to Monterey Amendment. See also FEIR Sections 15.2.3.1 Contractor Requests for Water, 15.2.3.2 SWP Delta Deliveries are Primarily Supply Limited, 15.2.3.3 Most Increased Pumping Not Monterey Related, and 15.2.3.5 Did Monterey Amendment Increase Demand for Water. These sections point out that:

(1) except for the small increase in Delta pumping due to the proposed Monterey Amendment was caused by the Water Supply Management Practices, increased pumping from the Delta is caused by factors not related to the Monterey Amendment. Since 2003, all contractors have been requesting Maximum Table A amounts; and

(2) As a consequence of the increase in requests for Table A water, and relatively dry hydrologic conditions since 2000, there are more times when Delta pumping at Banks Pumping Plant is supply limited than there were prior to 2000 (i.e., the SWP is supply limited, not demand limited).

Increased regulatory export restrictions will also increase the times that pumping from the Delta is supply-limited.

Therefore Kern County Water Agency (KCWA) and Dudley Ridge WD contractors are likely to request their Maximum Table A amounts annually, but the amount of water they receive will be limited by the amount of water that can be pumped out of the Delta pursuant to current and future regulatory requirements.

Kern County Water Agency Water Contractors

With regard to water used in Kern County, the 2010 Monterey Plus FEIR Section 16.2.7 states:

> "As noted in DEIR Section 5.5, the KWB Lands were developed as a locally-owned facility on land transferred from the Department as part of the Monterey Amendment. As noted in DEIR Section 6.4.1, the KWB Lands could represent new south of delta storage for KCWA that would not be available under the baseline scenario and thus could potentially increase deliveries and Delta diversions.
>
> In trying to determine what deliveries KCWA could have taken absent the KWB Lands, the Department asked KCWA to review the deliveries of SWP water to the KWB Lands and determine how much of that water it could have stored in other storage programs to which KCWA had access that were existing at the time of delivery. The other existing storage programs KCWA considered were limited to projects in the Kern Fan area, including: the Berrenda Mesa Project; City of Bakersfield 2800 acres; and the Pioneer Project, including the Kern River Channel. KCWA conducted a detailed monthly analysis of these storage programs, looking at the historical deliveries that were made to those programs, estimating the remaining recharge capacity that would have been available for additional deliveries, and comparing the SWP deliveries to the KWB Lands to this remaining available recharge capacity.
>
> KCWA's analysis show that from 1995 through 2004 all SWP water deliveries to the KWB Lands by KWBA participants located within Kern County could have been recharged in available capacity in these other Kern Fan projects (see Section VII of DEIR Appendix E). This conclusion, while based on information received from the KCWA, was independently reviewed at the time the DEIR was prepared and the DEIR concluded that all SWP water delivered to the KWB Lands by KWB participants located within Kern County could have been delivered to KCWA if the Monterey Amendment's transfer of the KFE property had not happened (DEIR Appendix K, page 13). This conclusion was again independently reviewed and confirmed by the Department during the development of the FEIR.
>
> The results of KCWA's analysis show that from 1995 through 2004 all SWP water deliveries to the KWB Lands by KWBA participants located within Kern County could have been recharged in available capacity in these other Kern Fan projects (see Section VII of DEIR Appendix E). This conclusion, while based on information received from the KCWA, was independently reviewed at the time the DEIR was prepared and the DEIR concluded that all SWP water delivered to the KWB Lands by KWB participants located within Kern County could have been delivered to KCWA if the Monterey Amendment's transfer of the KFE property had not happened (DEIR Appendix K, page 13). This conclusion was again independently reviewed and confirmed by the Department during the development of the FEIR."

The project's potential impacts on the Delta were discussed in the Monterey Plus EIR. The Monterey Plus EIR concluded that the water that was projected to be stored in the KWB by KWB participants would have been stored somewhere else in Kern County. Therefore, with or without the KWB, the same amount of water would have been used or stored in Kern County. Thus, the Department's pumping of water from the Delta would be the same with or without the KWB. The Draft REIR did not identify any new information that would change this conclusion.

Dudley Ridge Water District

With regard to water used by Dudley Ridge WD, the 2010 Monterey Plus FEIR Section 16.2.7 states:

> Dudley Ridge WD is the only other KWB participant not located in Kern County. Dudley Ridge WD deliveries therefore to the KWB Lands were included in deliveries to storage outside of contractors' service areas (DEIR Appendix K, Tables 1 and 3, column 6) which were analyzed as part of the water supply management practices. The DEIR concluded that past implementation of the water supply management practices did not result in a significant impact; but there was a small, but potentially significant, impact from the proposed project on Delta fisheries due to future application of the water supply management practices as a result of increased Delta export pumping. See further discussion of this impact in FEIR Subsection 15.2.2."

This is not a case where the Department relied on compliance with the law to avoid compliance with CEQA. To mitigate the impact potentially caused by the water supply management practices (including KWB water delivered to Dudley Ridge WD), the Department committed to Mitigation Measure 7.3-5, which committed SWP operations to comply with existing and future regulatory permits and processes. The Monterey Plus EIR identified regulatory measures that could and would be implemented to protect the Delta, and committed to operate the SWP in compliance with these requirements. The regulatory requirements include applicable State Water Resources Control Board (SWRCB) orders; U.S. Army Corps of Engineers permits; Biological Opinions and incidental take permits; habitat protection plans; and other regulatory constraints designed to minimize, reduce, and/or avoid potential adverse effects on the Delta aquatic environment by, among other things, limiting Delta exports. The Department's Delta exports are subordinate to these laws. The Department is legally obligated to operate SWP facilities in compliance with the regulatory requirements. No new significant impacts were identified within the Draft REIR and the court's ruling found the mitigation of Delta impacts to be adequate. (See "Court Ruling Regarding Proposed Project Delta Impacts" below.)

Court Ruling Regarding Proposed Project Delta Impacts

The Department's conclusions regarding the project's potential impacts on the Delta was the subject of litigation in *Central Delta Water Agency, et al. v. DWR, et al.,* Sacramento County Superior Court Case No. 34-2010-80000561. The court's Ruling on Submitted Matter, March 5, 2014, already upheld the Department's conclusions regarding the project's Impacts on the Delta. The Ruling on Submitted Matter states at page 23:

> "The EIR concludes that the Project could have a potentially significant impact on Delta aquatic life, but that such impacts will be reduced to a less-than-significant level by complying with Mitigation Measure 7.3-5, which committed SWP operations to comply with existing and future regulatory permits and processes. Petitioners argue that this mitigation measure violates CEQA's prohibition against deferred mitigation and is not adequate mitigation for potentially significant impacts to the Delta.
>
> The court disagrees that Mitigation Measure 7.3-5 improperly defers mitigation for the potentially significant impacts to the Delta. Deferring the formulation of the details of mitigation is authorized where another regulatory agency will impose mitigation requirements independent of the CEQA process, so long as the agency commits itself to mitigation that will satisfy articulated performance standards. (*North Coast Rivers Alliance v. Marin Municipal Water Dist. Bd. Of Directors* (2013) 216 Cal.App.4th 614, 647-48.) Courts have consistently held that "[a] condition requiring compliance with environmental regulations is a common and reasonable mitigating measure." (*Id.* at p. 647; *Clover Valley Foundation v. City of Rocklin* (2011) 197 Cal.App.4th 200, 236; *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 906.)

The Monterey Plus EIR thus concludes that the small incremental potential for increased pumping from the Delta, including KWB water used by KWB participant Dudley Ridge WD, was mitigated. The draft REIR did not identify any new information that would change this conclusion.

4.2.2.3 Conclusion

As explained in the Draft REIR, Introduction/Executive Summary, page ES-4, "The focus of public review and comment should be on Document A1 since public comments will only be considered on the revised and new text, contained entirely within Document A1."

With respect to the Delta Plan, this issue could have and should have been raised during the comment period for the 2007 Monterey Plus DEIR. To the extent the Delta Plan does apply, the Draft REIR did not identify any increases in exports from KWB activities beyond those discussed in the Monterey Plus EIR and REIR that would constitute a covered action under the Delta Plan.

Discussion of impacts on the Delta from the Monterey Amendment, including the KWB, was discussed in the Monterey Plus EIR. The Monterey Plus EIR concluded that before the Monterey Amendment, including the KWB, all SWP contractors were requesting their maximum Table A amounts and that most of the time, exports from the Delta were limited by the amount of water that could legally be pumped and not by "demands" from downstream contractors. The Monterey Plus EIR also concluded that the KWB did not increase the amount of water that would have gone to KCWA and therefore did not increase Delta exports for Kern County water users. It also concluded the only increase in Delta pumping due to the Monterey Amendment that might increase exports was caused by the Water Supply Management Practices (which applies to KWB participant Dudley Ridge WD) and found that Mitigation Measure 7.5-3, which requires compliance with current and future Delta regulatory requirements that the Department is legally obligated to operate SWP facilities under, reduces these impacts to less than significant.

The Court's March 5, 2014 Ruling on Submitted Matter found the mitigation of Delta impacts to be adequate.

The Draft REIR did not identify any new impacts of KWB activities that would change these conclusions. Nor have commenters identified any additional impacts of KWB activities that would change these conclusions. Therefore, the discussion on impacts on the Delta is outside the scope of this REIR.

4.2.3 MASTER RESPONSE 3: ARTICLE 21(G)(1)

Comments addressed in this master response are: CFS1-9, CFS1-12, CFS1-23, CFS1-31, CFS1-35, CFS1-36, and CFS1:37.

Several comments argue that new data in the Draft REIR Agricultural Resources chapter suggest that removal of Article 21(g)(1) from the baseline calculation "was a significant impact that needs to be updated." (See comment CFS1-35.)

Article 21 is a component of the SWP long-term water supply contracts between the Department and SWP contractors, which addresses non-Table A water that becomes available on an intermittent, interruptible basis. Article 21(g)(1) in the pre-Monterey Amendment contracts states:

> "In providing for the delivery of surplus water pursuant to this article, the State shall refuse to deliver such surplus water to any contractor or noncontractor to the extent that the State determines that such delivery would tend to encourage the development of an economy within the area served by such contractor or noncontractor which would be dependent upon the sustained delivery of surplus water." (2010 Monterey Plus FEIR Section 17.2.5.4, page 17-14.)

Article 21(g) is discussed in the 2010 Monterey Plus FEIR Section 6.1.2.3.4: Article 21(g)(1) in the Baseline; FEIR Section 9.2.5.2.1: Understanding Article 21(g)(1); and FEIR Section 17.2.5.4: Article 21 Changes "Surplus Water for Permanent Development."

The Department does not agree that Article 21(g)(1) needs to be revisited. The Draft REIR does not provide any new information that would show that development of an economy in the KWB participants' service area is dependent upon the sustained delivery of surplus water.

Key points regarding Article 21 are noted below from the 2010 Monterey Plus FEIR:

(1) The restrictions in Article 21(g)(1) were meant to apply to "scheduled surplus water." Prior to 1987, when SWP demands were generally below 2 million acre-feet, a "surplus water" supply was offered first to SWP contractors who could use such a supply for agricultural use or groundwater replenishment, then to SWP contractors for municipal and industrial (M&I) uses. The contractors could schedule this water (often called "scheduled surplus water") for delivery throughout a year when the total SWP water supply could fulfill the total of that year's annual Table A and when reservoir storage targets had been met. (See 2007 Monterey Plus DEIR, Section 2.5.4.)

    By the early 1990s, contractual Table A amounts had increased to the maximum amounts and many contractors were beginning to request delivery of full Table A in some years. Therefore, the Department could no longer deliver such extra water supply. As contractor demand grew and the 1987 to 1992 drought impacted deliveries, it became apparent that scheduled surplus water would not be available in the future. No scheduled surplus water was delivered after 1994 (after the Monterey Amendment). (See 2010 Monterey Plus FEIR, Section 9.2.5.2.)

(2) Extra surplus water (later renamed to "unscheduled" and then to "interruptible water") is intermittent and not an annual dependable supply. The Department has delivered "extra surplus water" (further renamed "unscheduled water") when all of the following conditions have existed: the SWP's share of San Luis Reservoir is full, or projected to be full in the near term; other SWP reservoirs are full or at their storage targets, or the conveyance capacity to fill these reservoirs is maximized; the Delta is in "excess" conditions; Table A deliveries are being fully met; and the Banks Pumping Plant has spare capacity. "Unscheduled water" has been relatively unpredictable and has been as brief as a day or as long as several months, and had priorities similar to "surplus" water. (See 2007 Monterey Plus DEIR, Section 2.5.4.)

(3) The 2007 Monterey Plus DEIR, Chapter 6, shows how much Table A and Article 21 water each contractor receives under different hydrologic scenarios. These considered delivery of water to KCWA (which include KWB participants) as a result of the transfer of the KFE. There is nothing in the further analysis of KWB activities that would indicate that more water would be delivered from the Delta as a result of KWB activities.

(4) It is good water management to store both Table A and Article 21 water for conjunctive use. The Department would consider storing SWP delivered water in the ground during wet years and using it during dry years as sound water management policy and would not call forth the Article 21(g)(1) restriction. (2010 Monterey Plus FEIR, page 9-17.)

4.2.3.1 Conclusion

As explained in the Draft REIR, Introduction/Executive Summary, page ES-4, "The focus of public review and comment should be on Document A1 since public comments will only be considered on the revised and new text, contained entirely within Document A1."

The elimination of Article 21(g)(1) was addressed in the 2007 Monterey Plus DEIR. No changes or revisions were made to Article 21 in the Draft REIR. The trial court decision found the discussion of Article 21(g)(1) to be adequate.

Moreover, the court's November 24, 2014 Findings and Preemptory Writ of Mandate states in Finding #5:

> "5. DWR shall be allowed to correct the deficiencies identified in the Court's Rulings on Submitted matter (March 2014) and Joint Ruling on Submitted Matter (October 2, 2014) and recertify a revised Monterey Plus EIR without reopening the non-defective portions of the Monterey Plus EIR. Upon recertification, only those portions of the revised Monterey Plus EIR that are new or changed shall be subject to challenge under CEQA by petitioners or other interested parties." (Central Delta Water Agency, et al. v. California Department of Water Resources, et al. (Sacramento Case No. 34-2010-80000561) and Rosedale-Rio Bravo Storage District, et al. v. California Department of Water Resources, et al. (Sacramento Co. Superior Court Case No. 34-2010-80000703; Findings and Peremptory Writ of Mandate, November 24, 2014, p.2, lines 26-28 – p. 3, lines 1-3.)

The Draft REIR did not identify any additional impacts of KWB activities that would change these conclusions. Nor have commenters identified any additional impacts of KWB activities that would change these conclusions. Therefore, the discussion on Article 21(g)(1) is outside the scope of this Draft REIR.

4.2.4 MASTER RESPONSE 4: AGRICULTURAL RESOURCES ENVIRONMENTAL ANALYSES

Comments addressed in this master response are: CFS1-9, CFS1-14, CFS1-21 through CFS1-24, CFS1-28, CFS1-29, CFS1-30, CFS1-31, CFS1-34, CFS1-38, CFS1-61, CFS2-3, CFS2-4, CFS2-5, CFS2-6, and CFS2-9.

This master response addresses several comments received regarding the following specific agricultural-related issues:

- use of CEQA Guidelines Appendix G sample questions for agriculture-related impacts as standards of significance for agriculture and forestry resources in the Draft REIR, and
- adequacy of the Draft REIR's analyses regarding crop conversion,

These topics are addressed below. The related specific issue of the conversion of annual crops to permanent crops and whether the conversion "hardens" water demands is covered under Master Response 1: Kern Water Bank and Crop Conversion.

4.2.4.1 Use of CEQA Guidelines Appendix G for Standards of Significance for Agriculture and Forestry Resources

The Department used the five sample questions within CEQA Guidelines Appendix G relating to Agriculture and Forestry Resources. The Department's standards of significance for agricultural resources are presented in the Draft REIR's Section 7.6.1.3, Standards of Significance, and draw upon all five questions in the Appendix G checklist (Draft REIR pages 7.6-2 and 7.6-3). Draft REIR Section 7.6.1.3 discusses potential impacts related to three of the Appendix G checklist items and concluded that they were not applicable because no or minimal impact would occur with regard to these potential impacts:

- Result in a substantial inconsistency with objectives of local, regional and state plans, including zoning for agricultural use or Williamson Act Contracts;
- Result in a substantial conflict with existing zoning for, or cause rezoning of, forestland (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code

Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)); and

- Result in a substantial loss of forestland or conversion of forestland to nonforest use.

In regard to changes in crop patterns, the Department did not merely conclude that the impacts are less than significant because the thresholds developed from Appendix G make it so. On the contrary, the Department answered the question as to whether changes in crop patterns constituted a significant environmental effect, i.e. "a substantial, or potentially substantial, adverse change in the environment." (Pub. Resources Code, Section 21068.)

As discussed below in Subsection 4.2.4.2, the Department in the Draft REIR explained why it reached the conclusion that crop conversion is not a significant adverse impact.

4.2.4.2 Kern Water Bank Impacts from Crop Conversion

Direct Environmental Impacts on Agriculture

The Department analyzed two potential impacts of KWB activities on agricultural resources in Impact 7.6-1 discussed in the Draft REIR on pages 7.6-12 through 7.6-14; the first impact was the potential conversion of agricultural uses to nonagricultural uses, and the second impact was the potential conversion of annual crops to permanent crops

When considering potential conversion of agricultural uses to non-agricultural uses, the Department analyzed crop acreage for Kern County, and specifically for the service area of the KWB participants. As noted in the Draft REIR at the bottom of page 7.6-6, "active agricultural acreage in the KWB participants' service area shows a relatively small increase in agricultural acreage (approximately 3.7 percent) between 1995 and 2015." Therefore, the total amount of land in agriculture was nearly the same and no agricultural land was converted to non-agricultural land as a result of KWB activities. The Department concluded in Impact 7.6-1 that:

> "KWB activities did not convert agricultural uses to nonagricultural uses on KWB Lands as agriculture ceased prior to the property transfer. Overall, KWB activities did not result in significant changes in the physical environment that could directly result in the conversion of agricultural land, including Important Farmland, to nonagricultural uses.
>
> Therefore the impact of KWB activities between 1996 and 2014 on conversion of agricultural lands, including Important Farmland, to nonagricultural uses was ***less than significant***. (Draft REIR, page 7.6-13.)"

With respect to the second potential impact, the Draft REIR recognizes the substantial change from annual to permanent crops. The Draft REIR on page 7.6-6 states,

> "Although there was a relatively small increase in agricultural acreage in Kern County (approximately 1.2 percent) between 1996 and 2014, the cropping patterns within the county changed substantially. As shown on Table 7.6-5, the acreage of nut crops increased by approximately 206 percent and almonds accounted for more than 65% of the total nut crops. Specifically, almond producing increased by approximately 610 percent between 1996 and 2014 within Kern County alone. Other counties including Fresno, Kern, Madera, and Stanislaus, experienced a similar shift to orchard crops."

The Department identifies that these changes in farming practices in the KWB participants' service area are consistent with the county-wide, San Joaquin Valley, and state-wide trend, even in areas that do not depend upon water banks for water storage. (Draft REIR, page 7.6-13.) The Department concludes on

Draft REIR page 10.1-34, "A shift in crop patterns, in and of itself, is not a significant adverse environmental impact." The land remains in agriculture, and the direct impact on agriculture is less than significant.

Cumulative and Indirect Environmental Impacts on Agriculture

The Draft REIR analyzes cumulative (and indirect) impacts in Section 10.1, Cumulative Environmental Impacts, including the cumulative (and indirect) impacts of crop conversions. The Draft REIR concludes that the crop shift trend could contribute to cumulative (or indirect) impacts on environmental resources other than agriculture. The Department discussed these possible cumulative (or indirect) environmental impacts within the cumulative impact sections for each resource area potentially affected, as described below.

The Department discussed and analyzed impacts specifically related to changes in cropping patterns and concluded that the KWB activities did not make a cumulatively considerable incremental contribution to any significant cumulative impacts. Impact 10.1-44 discusses cumulative crop conversion impacts in the context of agricultural resources. The trend of shifting to permanent crops may continue in the future with or without KWB activities and cumulative water banking projects because such shifts are typically driven by crop production, supply, and demand; profit margins; and regional and global economics; as has been the case with California's almond industry, a leading crop type within Kern County and the KWB participants' service area (see Draft REIR, Section 7.6, Agricultural Resources, Subsection 7.6.2.2). It concludes that based on the Appendix G checklist, there is a less-than-significant overall cumulative impact to agriculture. (See Draft REIR, page 10.1-34.)

However, it also found that there could be an impact to other resources and specifically states:

> "Other indirect cumulative effects from conversion of irrigated crops to permanent crops, such as those associated with biological resources, visual resources, air quality, soils, noise, traffic and transportation, and cultural and paleontological resources, could occur. The cumulative effects on these resources areas of changes from irrigated crops and annual field crops to permanent crops such as orchards are discussed separately in this cumulative impacts analysis for each potentially affected resource area." (Draft REIR, page 10.1-34.)

Specifically, the Draft REIR discussed potential cumulative (and indirect) impacts related to crop conversion on the following resources and found that KWB activities would not make a cumulatively considerable incremental contribution to a significant cumulative impact related to crop conversion:

- Impact 10.1-40 on special-status terrestrial species (pages 10.1-29 and 10.1-30),
- Impact 10.1-42 on visual resources (pages 10.1-31 and 10.132),
- Impact 10.1-44 on agricultural resources (pages 10.1-33 and 10.1-34),
- Impact 10.1-48 on air pollutant emissions (pages 10.1-36 and 10.1-37),
- Impact 10.1-53 on soil erosion (page 10.1-39),
- Impact 10.1-56 on land use patterns (page 10.1-41),
- Impact 10.1-60 on noise levels (page 10.1-43),
- Impact 10.1-62 to cultural and paleontological resources (page 10.1-45), and
- Impact 10.1-65 on traffic (pages 10.1-46 and 10.1-47).

The Draft REIR also analyzed the proposed project's environmental justice impacts. The Department used the following standard of significance: "Environmental justice impacts would be considered potentially significant if implementation of the proposed project would result in direct or cumulative impacts on the natural or physical environment that would result in proportionately high or adverse impact on a minority or low-income population, considering the population levels or income levels of all affected groups." (Draft REIR, page 10.4-3.)

The Department concluded "…the KWB activities would not result in disproportionately high or adverse impacts to minority or low-income communities and, therefore, would not contribute to cumulative impacts." ((Draft REIR, page 10.4-4.)

Some commenters have raised questions as to whether the crop conversion could result in a hardening of demand that would affect availability of water. These issues are primarily discussed in Master Comment 1: Kern Water Bank and Crop Conversion, with related discussions in Master Comment 2: Delta Impacts, Master Comment 3: Article 21(g)(1), and Master Comment 5: Groundwater Depletion and Mitigation.

4.2.4.3 Conclusion

As evidenced in Draft REIR Sections 7.6 and 10.1, the Department's Draft REIR considers all possible potentially significant environmental changes resulting from crop conversion. Not only does the Draft REIR identify direct effects from crop conversion, but also the indirect and cumulative effects from crop conversion. All impacts were determined to be less than significant.

4.2.5 MASTER RESPONSE 5: GROUNDWATER DEPLETION AND MITIGATION

Comments addressed in this master response are: CFS1-9, CFS1-10, CFS1-12, CFS1-15, CFS1-20, CFS1-29, CFS1-30, CFS1-38, CFS1-39, CFS1-41, CFS1-43, CFS1-46 through CFS1-49, CFS1-53 through CFS-59, CFS1-60, and CFS1-62.

Several comments stated that the Draft REIR fails to analyze the significant impact that groundwater depletion from the KWB has on nearby water users, as well as "failing to analyze the impacts of the other current regional water banking activities or activities of other nearby water users."

A clarification of the term "groundwater depletion" is warranted before responding to individual comments. The commenter uses the term "groundwater depletion" in two ways: reduced groundwater storage volume, and reduced groundwater levels. Each are discussed below.

4.2.5.1 Reduced Groundwater Storage Volume

The amount of groundwater in storage in the aquifer resulting from KWB operations has always been positive. After more than 20 years of KWB operations, there is more than 600,000 acre-feet (AF) more water in the aquifer than there would be without KWB operations during 1995-2014. KWB operations require limits to recovery: no more than 90% of the water imported into the basin for KWB storage may be recovered. The remaining 10% consists of 6% operational losses, including pond evaporation losses, and 4% preserved for overdraft protection for the benefit of the basin (see Draft REIR Section 7, Figure 7.1-15, and reproduced below). This positive balance would continue through projected KWB operations during 2015-2035 when there would be more groundwater in the aquifer than without the presence of the KWB (see Draft REIR Section 7, Figure 7.1-16). Since there is no short- or long-term negative water balance due to KWB operations, groundwater storage depletion has not occurred and would not occur in the future. Consequently, no mitigation is required or proposed for groundwater storage depletion. The only impact of KWB operations on groundwater storage levels is to increase the levels.

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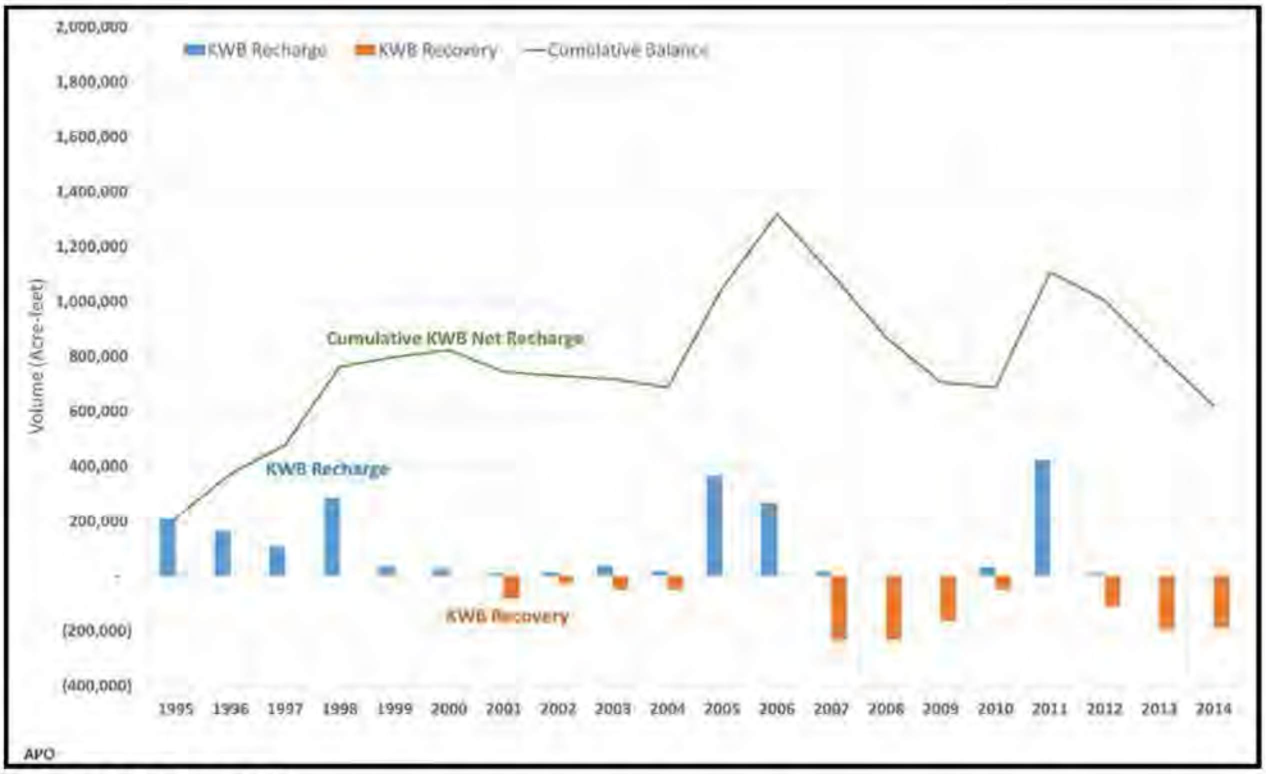
4.2.5.2 Reduced Groundwater Levels

There is a distinction between short- and long-term groundwater level declines. The U.S. Geological Survey (USGS) defines groundwater depletion "as long-term water level declines caused by sustained groundwater pumping" (Bartolino and Cunningham, 2003). Both historical groundwater levels and results of the DWR KWB Model show that there is no long-term decline in groundwater levels in the KWB or its vicinity due to KWB operations.

Recharge and recovery periods in the KWB during the 1995-2014 historic operations has been cyclical: 3 to 4 years of recharge followed by 2 to 4 years of recovery. For most of the historical period, groundwater levels are above where they would be absent recharge operations of the KWB. Toward the end of a multi-year recovery period, groundwater levels show a temporary decline, along the border of the KWB, below where levels would be absent KWB operations. These declines are short-term and a result of any groundwater bank operations. Groundwater levels recover promptly when project recovery pumping stops and another recharge cycle begins. Since there is no long-term decline of groundwater level due to KWB operations, there is no long-term groundwater depletion resulting from KWB operations. The DWR KWB Model results show that KWB operations result in higher groundwater elevation in the majority of years over a wide area outside of the KWB as shown in **Figure 4-6** below (also see Draft REIR Appendix 7-2, Figures 3.2-13, 3.3-11, and 3.4-11). Using the Appendix G sample question parlance, KWB activities do not cause a "net deficit in aquifer volume," (CEQA Guidelines, Appendix G, Section IX(b).)

Historical operations also show that the number of years of recharge and recovery are more or less evenly distributed without any prolonged recovery period. Results of the DWR KWB Model for future scenarios (AFO-EC and AFO-BC) show no long-term groundwater level declines and, therefore, there is no aquifer depletion from KWB operations. (Draft REIR pages 7.1-30 through 7.1-33.)

The Draft REIR recognizes that there have been short-term water level declines in an area bordering KWB during extended recovery periods. The DWR KWB Model shows, both in the past and continuing into the future, that at the end of a recovery cycle there will be localized and short-term declines in groundwater levels below what would occur absent KWB. These short-term declines are the expected effect of operations of most, if not all, direct recharge groundwater banks like KWB. Recharge operations create a groundwater mound which extends beyond the border of the bank. Recovery operations reverse this pattern to create flow back toward the recovery wells. The result is two-fold: an area extending well beyond the borders of the bank where groundwater is elevated, and an area bordering the bank where groundwater levels are lowered to allow gravity flow of groundwater back toward the recovery wells. Although this is a potentially significant short-term impact, it is mitigated through the use of a variety of mitigation measures, including well improvements, alternative water sources, and changes in KWB operations, as discussed below in Subsection 4.2.4.3.



Source: Draft REIR, Figure 7.1-15

Figure 4-6. Historical (1995–2014) Kern Water Bank Modeled Recharge, Recovery, and Cumulative Net Recharge

4.2.5.3 Mitigation for Short-Term Direct and Cumulatively Considerable Incremental Groundwater Level Declines

One commenter contends that the mitigation for groundwater impacts is inadequate as follows, "The proposed mitigation measures only monitor groundwater depletion and pay for the damage after the fact, rather than mitigate the actual impact of a depleting groundwater supply." (Comment CFS1-39.) This section discusses why the proposed mitigation for groundwater impacts is adequate.

The Draft REIR has identified, discussed, and disclosed the potential for significant short-term impacts resulting from KWB operations under future conditions (Draft REIR, Impact 7.1-2, pages 7.1-39 to 7.1-48). See also Section 4.2.5.2. The Draft REIR also presents Mitigation Measure 7.1-2, which includes implementation of a Long-Term Project Recovery Operations Plan regarding the Kern Water Bank Project (2016 KWB Long-Term Operations Plan, Draft REIR Appendix 7-5c), which KWBA is obligated to carry out (see Draft REIR Section 7.0.4.3.2, 2016 KWBA Resolution). Therefore, impacts from KWB activities with regard to groundwater elevations are less than significant, with mitigation. (See Draft REIR, pages 7.1-48 to page 7.1-54.)

The Long-Term Project Recovery Operations Plan includes monitoring and reporting, operations management, and mitigation for potential impacts for both agricultural and domestic wells. Key components of the Plan and Mitigation Measure 7.1-2 in the Draft REIR on pages 7.1-52 and 7.1-53 for *agricultural wells* are as follows:

- "Identify water of an equivalent water quantity and quality suitable for agricultural uses for the affected landowner from an alternate source at no greater cost to the affected landowner or, with the consent of the affected landowner, identify acceptable mitigation (for example, drill and equip a new well) to provide the least-cost short- and long-term solution, including an estimate to compete the necessary work."

- "At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the NPI [negative potential impact] using the Model to identify the well or wells that may require reduction or adjustment in pumping."

- "If groundwater declines are due to KWB operations, unless E.3 occurs, once an agreement is reached between KWBA and the landowner to provide mitigation pursuant to E.2.b. and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work."

Key components of the Plan and Mitigation Measure 7.1-2 in the Draft REIR on pages 7.1-53 and 7.1-54 for *domestic wells* are as follows:

- "Identify availability and cost of a permanent connection to the nearest water service provider."
- "Identify acceptable mitigation (for example, lower the domestic submersible pump bowl setting sufficient to restore and maintain service or drill and equip a new well that complies with applicable county well standards) to provide the least-cost short- and long-term solution, including an estimate to complete the necessary work."
- "If necessary for emergency health and safety concerns, provide interim in-home water supplies within 14 days after receipt of the claim until a permanent mitigation action is implemented or the claim has been denied because groundwater declines are not due to KWB operations."
- "At KWBA's option, it may reduce or adjust pumping of its wells as necessary to prevent, avoid, or eliminate the NPI using the Model to identify the well or wells that may require reduction or adjustment in pumping."
- "If groundwater declines are due to KWB operations, unless F.3 occurs, once an agreement is reached for KWBA to provide mitigation pursuant to F.2.c above and all cost estimates have been completed, pay costs associated with the landowner claim (considering C.3 above), including the cost to complete the necessary work."

CEQA Guidelines recognize that there are a variety of types of mitigation that are adequate, including measures to rectify and compensate for impacts. (CEQA Guidelines, § 15370, subds. (c) and (e).) Thus, even if payment was the only method of mitigation proposed, which it is not, providing payment for a substitute resource is appropriate mitigation under CEQA.

KWBA and other neighboring groundwater bank sponsors have implemented permanent mitigation measures to address impacts to shallow groundwater wells in the vicinity, by deepening such wells, hooking up residences to public water supplies, or changing operations. It is reasonably expected that future impacts will be less because wells particularly vulnerable to declining groundwater wells are among the first wells to be permanently mitigated. (Draft REIR, page 7.1-39.) Clearly, physically lowering affected wells meeting the criteria stated in Mitigation Measure 7.1-2 is a physical action, not just payment or mitigation after-the-fact, that reduces the potential for significant impacts in future years.

Mitigation Measure 7.1-2 in the Draft REIR mitigates the potentially short-term significant impacts and cumulative impacts on groundwater levels and nearby water users during prolonged recovery periods. The modeling analysis showed that the decline in the groundwater elevations is localized not only spatially (areas close to KWB boundaries) but also temporally (limited to periods of project recovery pumping). The localized groundwater decline recovers shortly after the project recovery cycle (see Draft REIR Section 7.1, Figures 7.1-20, 7.1-21, 7.1-24, 7.1-25, 7.1-28, and 7.1-29; See also Draft REIR, Section 10.1, pages 10.1-19 and 10.1-20). Therefore, the mitigation measures in the Draft REIR are designed to address the short-term localized impacts of any wells significantly impacted (whether directly or cumulatively) by KWB activities, although it is expected that such impacts will occur only at wells near the KWB boundaries. The goal is to mitigate any potential disruption of water supply due to short-term groundwater decline during and immediately after the project recovery cycle because the groundwater elevation recovers quickly after the project recovery pumping stops and is followed by a recharge cycle.

4.2.5.4 Conclusion

The Draft REIR found that there were no long-term adverse impacts on groundwater storage or ground water levels. Mitigation Measure 7.1-2 mitigates the direct and cumulatively considerable short-term well drawdown impacts on nearby water users. The modeling analysis showed that the decline in the groundwater elevations is localized not only spatially (areas close to KWB boundaries) but also temporally (limited to periods of project recovery pumping). The localized groundwater decline recovers shortly after the project recovery cycle (see Draft REIR Section 7 Figures 7.1-20, 7.1-21, 7.1-24, 7.1-25, 7.1-28, and 7.1-29). As a result, Mitigation Measure 7.1-2 was designed to address the short-term localized impacts at wells near the KWB boundaries. The goal is to mitigate potential disruption of water supply due to short-term groundwater decline. Consistent with Mitigation Measure 7.1-2, KWBA and other neighboring groundwater banks have implemented permanent mitigation measures to address impacts to shallow groundwater wells in the vicinity, by deepening such wells, hooking up residences to public water supplies, or changing operations.

4.2.6 MASTER RESPONSE 6: LAND SUBSIDENCE

Comments addressed in this master response are: CFS1-10, CFS1-12, CFS1-15, CFS1-49, FOX1-2, FOX1-3, and FOX3-11.

A number of comments alleged that the KWB is contributing to land subsidence and the related potential for adverse impacts from such subsidence. The Draft REIR (Section 7.8-3) provides support for the conclusion that the potential for impacts from KWB development and continued use and operations on land subsidence was less than significant based on: 1) the presence of an abundant amount of coarse-grained sediments, and 2) the lack of any evidence of subsidence from KWB's on-site extensometer as well as from recent and past subsidence studies.

Additional information on the potential for subsidence is presented below, which further supports the Draft REIR. This included an evaluation of:

1) Geologic and aquifer sedimentary conditions,

2) KWB extensometer data,

3) USGS subsidence studies and land survey data, and

4) Satellite Interferometric Synthetic Aperture Radar (InSAR) data from the Jet Propulsion Laboratory (JPL) at the California Institute of Technology.

4.2.6.1 Geologic and Aquifer Sedimentary Conditions

There are generally a minimum of three conditions that must be met before land subsidence can occur.

- The presence of confining aquifer conditions (typically formed by an areally extensive and impermeable clay layer). The Corcoran Clay layer provides the necessary confining conditions in most of the San Joaquin Valley.

- The presence of relatively soft interbeds of clay beneath the confining layer that, as water levels decline, the support of the pressure system in the aquifer also declines and the interbedded soft clays release water contained within the clay structure.
- Declining water levels (pressure surface) beneath the confining layer. The result is inelastic subsidence. This is a one-time event and even when groundwater levels recover, the clays do not re-absorb their lost water and there is a loss of aquifer volume. The Corcoran Clay, the dominant confining layer in the region, was formed in a very large lake present in the west-central portion of the San Joaquin Valley extending from Kern County north to San Joaquin County.

The KWB lies at the western end of the Kern River alluvial fan. The Kern River emanates from the base of the Sierra Nevada where it undergoes a dramatic change from a steep river channel flowing between relatively constrictive canyon walls out onto the valley floor (sjvgeology.org “Hydrogeology of the Kern River Alluvial Fan). This change in slope and confinement results in coarse-grained sediments being deposited on the fan surface. Sediment accumulation over time has resulted in a thick and broad sequence of permeable aquifer material. This has created the conditions necessary for groundwater storage and is the reason for the number and size of groundwater banks in the San Joaquin Valley compared to in other parts of California or the world. The coarse nature of the sediments is due to the very rapid uplift of the southern Sierra Nevada (Bartow and McDougall, 1984), which has sharply incised the Kern River, which eroded and transported sand, gravel, and boulders to the San Joaquin Valley that formed the aquifer in the KWB and adjacent groundwater banks. The river’s presence has precluded the long-lasting and quiet water conditions necessary for thick clay accumulations and the formation of a confining clay unit in the Kern River fan, including KWB Lands. The geologic conditions necessary for subsidence are therefore absent on and near KWB Lands.

4.2.6.2 KWB Extensometer Data

The Draft REIR Section 7.8-3 notes that an on-site extensometer located near the middle of the KWB showed only small ground surface elevation changes from 1994 to 2016. Monitoring of the 780-foot-deep extensometer began on June 1, 1994, approximately 1 year prior to the beginning of KWB banking operations. The extensometer is measured monthly for aquifer compaction, and an adjacent monitoring well cluster is monitored for groundwater levels. The extensometer measurements are precise, showing changes as small as one-hundredth of a foot.

Figure 4-7 includes three insets: 1) one showing the location of the KWB, the Kern River, and the location of surrounding water agencies (Kern County Water Agency, 2016a); 2) water level hydrographs for a monitoring well cluster (30S/25E-16L 01 to 04) located in the middle of the KWB (Kern County Water Agency, 2016b); and 3) a graph showing monthly monitoring of an extensometer located adjacent to the monitoring well cluster (30S/25E-16L05) (DWR, 2016). The hydrographs show the operational effects of filling KWB in 1995 with a more than 100-foot rise in water levels at the extensometer. In years following 1995, the hydrographs show rising and declining groundwater levels corresponding to periods of groundwater banking and groundwater recovery. The maximum groundwater level difference occurred in 2007 when water levels were relatively high as compared to 2010 when water levels were relatively low; the difference in water levels were about 250 feet. Extensometer data through the entire monitoring period 1994 to 2016 showed only minor changes (maximum difference of about 0.03 feet) and no discernible correlation between groundwater level changes and extensometer readings. The past extensometer data, therefore, show no subsidence during 22 years of KWB continued use and operations and no future subsidence would be expected.

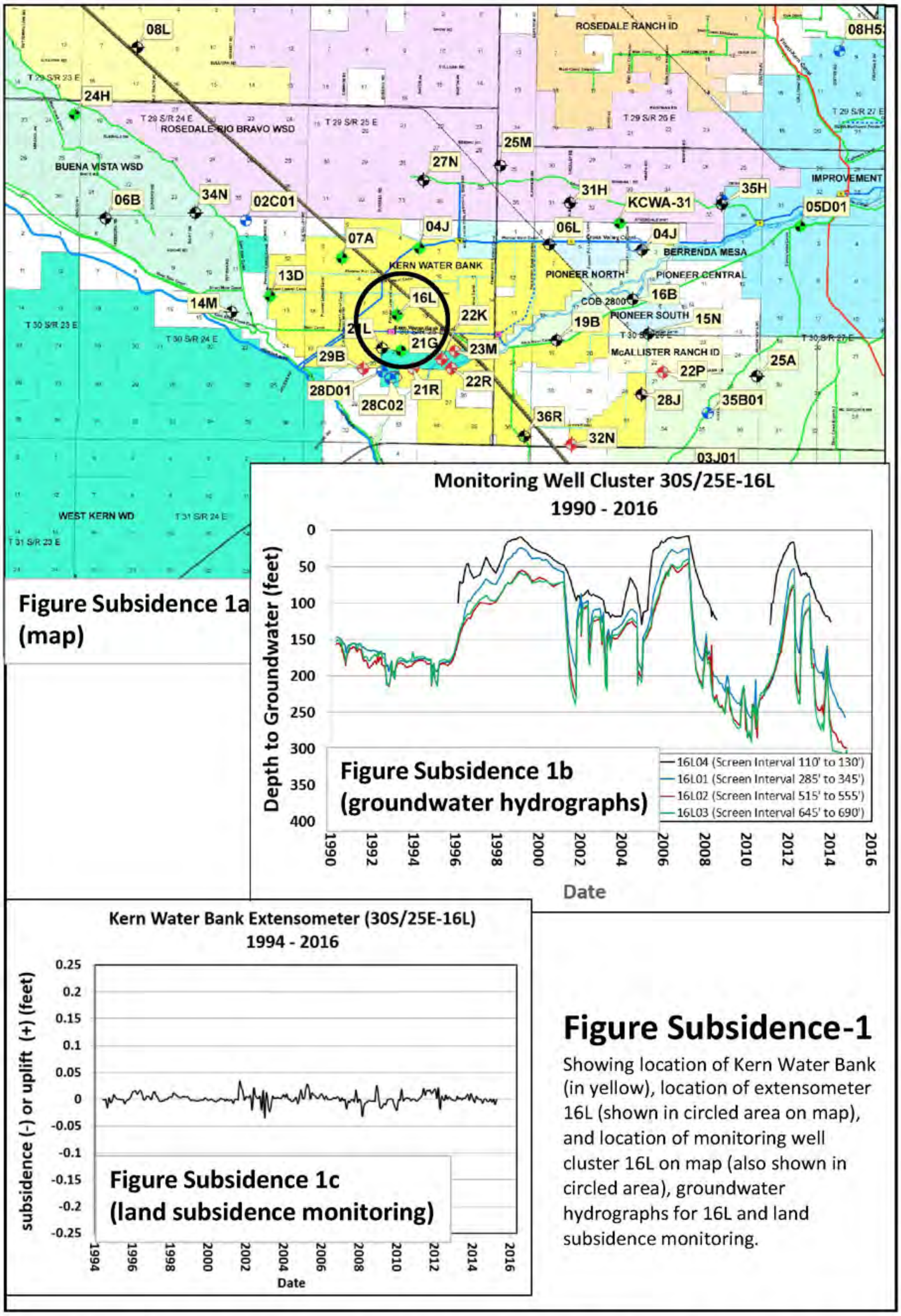


Figure 4-7. Land Subsidence Monitoring from Kern Water Bank Extensometer

4.2.6.3 U.S. Geological Survey Subsidence Studies and Land Survey Data

USGS has extensively investigated subsidence in the San Joaquin Valley and Kern County and published its findings in a series of publications. The studies occurred over two time periods: an initial group of studies including land elevation surveys and extensometer installations, followed by a second group of on-going investigations focusing on satellite surveys. The initial studies covered 1926 through about 1970. However, the recent and longer duration drought conditions have caused a large increase in water well drilling activity and groundwater pumping to replace the reduced availability of surface water supplies. The drought conditions have renewed subsidence in the San Joaquin Valley where the necessary geologic and sedimentary conditions are present, as well investigations of subsidence.

The initial USGS investigations were updated and summarized in a 1984 report, "Land Subsidence in the San Joaquin Valley, California as of 1980" (Ireland et al., 1984). **Figure 4-8** shows two subsidence areas in the San Joaquin Valley occurring during 1926 to 1970: areas with subsidence >1 foot and areas with little or no subsidence. The KWB and surrounding areas are in an area identified as "areas of little or no subsidence."

4.2.6.4 Satellite Radar Data (InSAR) from the JPL

USGS, JPL, and the Department have recently used satellite radar methods to map elevations. "Satellite Interferometric Synthetic Aperture Radar" (InSAR) is a revolutionary technique that allows scientists to measure and map changes on the Earth's surface as small as a few millimeters (Bawden et al., 2014).

A recent JPL presentation in May 2016, "Monitoring Subsidence in California with Orbital Radar," used InSAR satellite data to measure subsidence in 2007-2011 (Farr 2016). **Figure 4-9** shows San Joaquin Valley areas impacted by subsidence during that period; the KWB area does not show active subsidence.

The same presentation also provides InSAR satellite imaging for the period May 2015 to March 2016 (Farr 2016). **Figure 4-10** from the slide presentation shows KWB outside of actively subsiding areas.

The Draft REIR (Section 7.8-3) concluded that the potential for impacts from KWB development and continued use and operations on land subsidence was less than significant based on: 1) the presence of an abundant amount of coarse-grained sediments, and 2) the lack of any evidence of subsidence from KWB's on-site extensometer as well as from recent and past subsidence studies.

4.2.6.5 Conclusion

The Draft REIR (Section 7.8-3) supports the conclusion that the potential for impacts from KWB development and continued use and operations on land subsidence was less than significant based on: 1) the presence of an abundant amount of coarse-grained sediments, and 2) the lack of any evidence of subsidence from KWB's on-site extensometer as well as from recent and past subsidence studies. The additional and recent data and studies presented herein corroborate the Draft REIR conclusions; subsidence monitoring by extensometer, land surveys, and orbiting satellite remote sensing methods combine to demonstrate that subsidence has not historically occurred and there is little or no potential of subsidence at KWB or caused by KWB development and continued use and operations.

Furthermore, under the No-Project Alternative, the Department would still retain a groundwater bank, and operations would be expected to be similar to those by KWBA because groundwater banks essentially operate in the same manner by storing water in wet years and withdrawing the banked water for use in dry years.

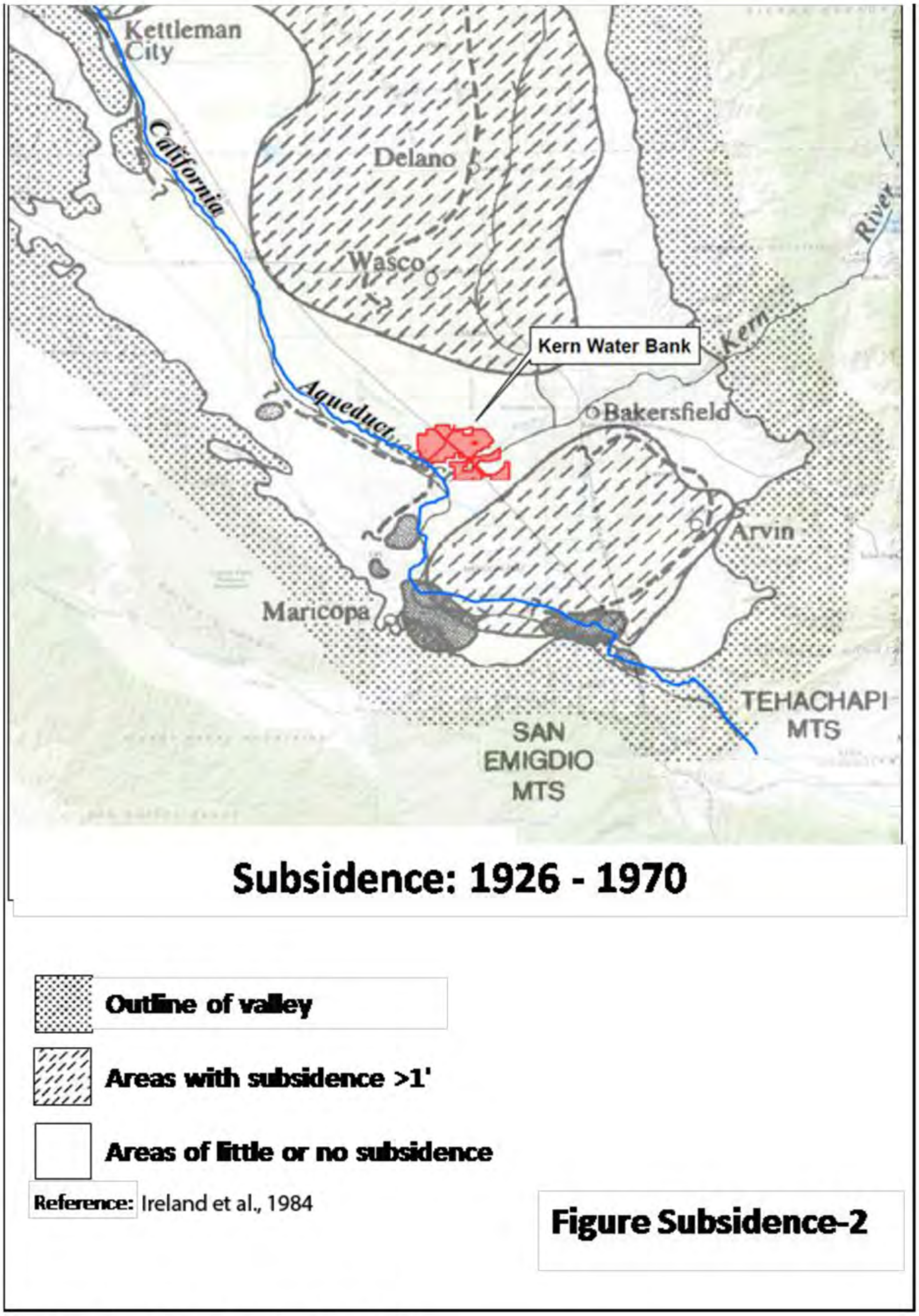
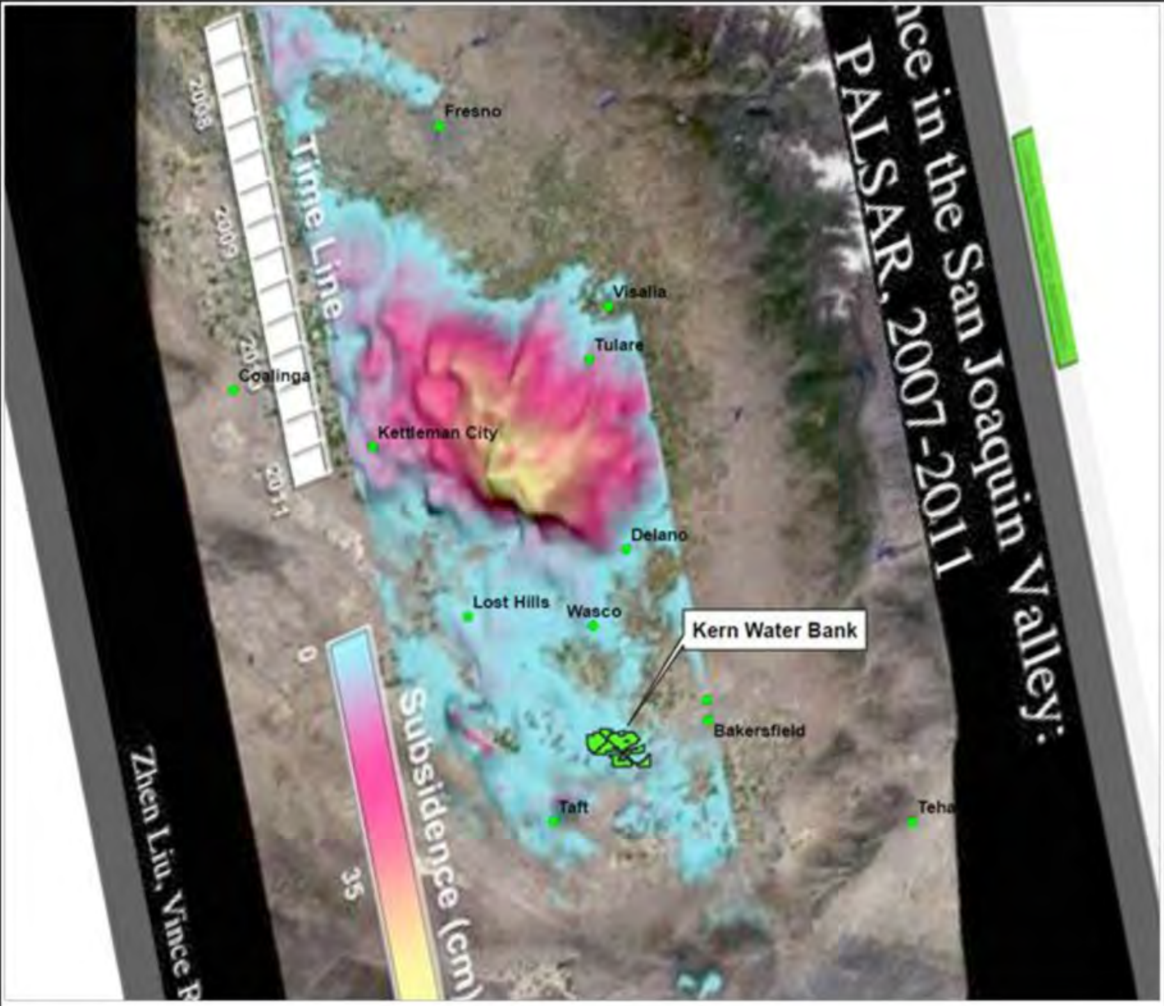


Figure 4-8. Subsidence: 1926-1970

RAR002328



Subsidence: 2007 - 2011

Subsidence (cm)

0	35

Reference: Farr, 2016

Figure Subsidence-3

Figure 4-9. Subsidence: 2007-2011

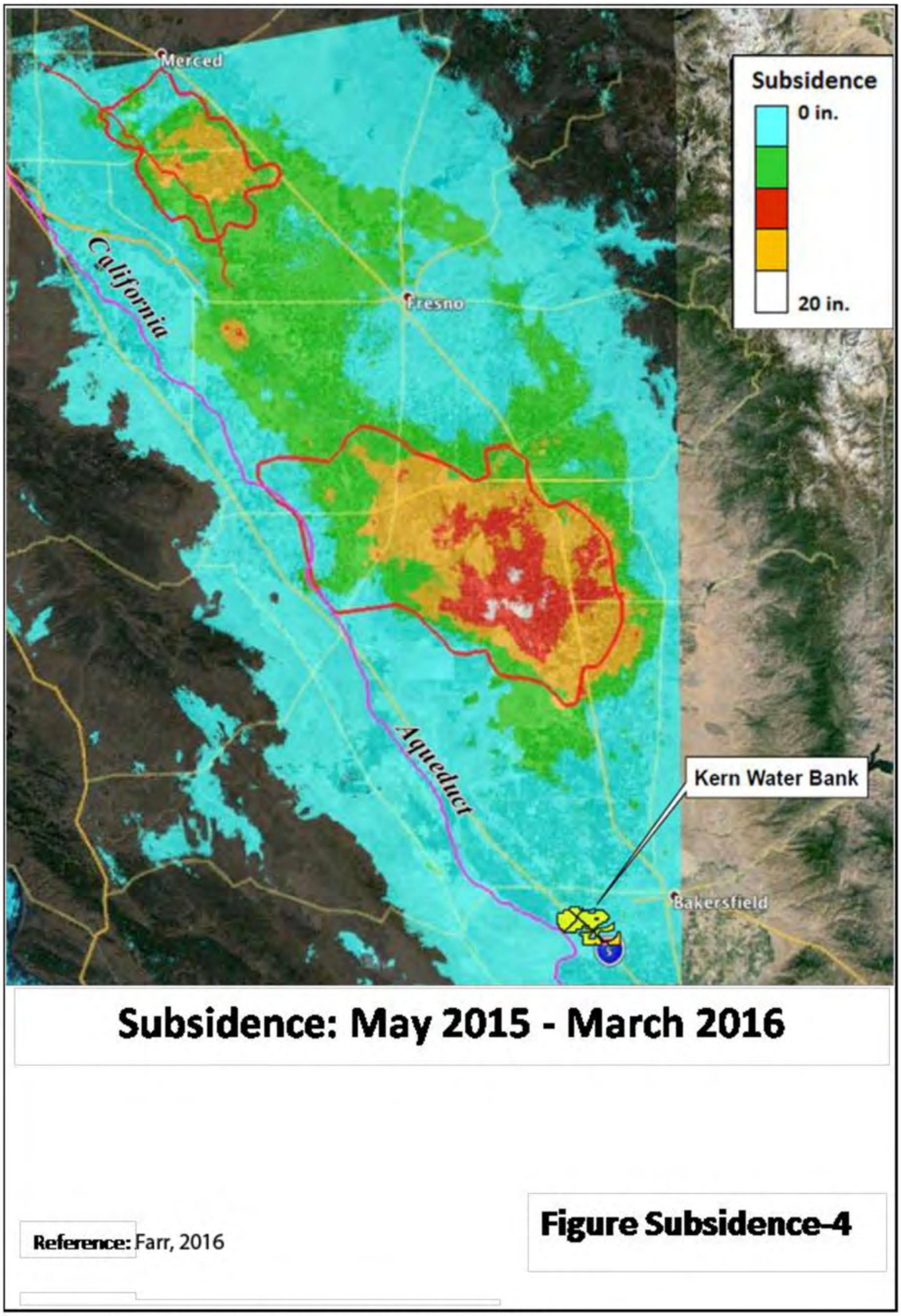


Figure 4-10. Subsidence: May 2015-March 2016

4.2.7 MASTER RESPONSE 7: PROJECT ALTERNATIVES

Comments addressed in this master response are: CFS1-7, CFS1-11, CFS1-30, CFS1-40, CFS1-47, CFS1-48, CFS1-60, CFS1-62 through CFS1-66, and Fox1-7.

Several comments contend that the Draft REIR fails to identify feasible alternatives to avoid or lessen significant impacts.

4.2.7.1 Superior Court Ruling on Monterey Plus EIR Alternatives

The Department's 2010 Monterey Plus EIR identified a reasonable range of alternatives to the proposed project. (See *Central Delta Water Agency, et al. v. DWR, et al.*, Sacramento County Superior Court Case No. 34-2010-80000561, Ruling on Submitted Matter, March 5, 2014, p. 17.)

As the Court stated in its Ruling on Submitted Matter:

> "In this case, the nature of the Project – representing a negotiated compromise between DWR and urban and agricultural contractors – necessarily limits the objectives of the Project. The overall objective of the Project is to resolve the underlying issues that led to the Monterey Amendment and implement the Settlement Agreement. (AR 23:11158.)"

The Court further stated:

> "The specific objectives of the Monterey Amendment are to resolve conflicts and disputes among SWP contractors regarding water allocations and financial responsibilities for SWP operations; restructure and clarify procedures for SWP water allocation and delivery during times of shortage and surplus; reduce financial pressures on agricultural contractors in times of drought and supply reductions; adjust the financial rate structure of the SWP to more closely match revenue needs; facilitate water management practices and water transfers that improve reliability and flexibility of SWP water supplies in conjunction with local supplies; and resolve legal and institutional issues related to storage of SWP water in Kern County groundwater basins and other areas. [Citation to administrative record.] These objectives correspond to five elements of the Monterey Amendment, which are: changes in the procedures for allocation of Table A water and surplus water among the SWP contractors; approval of the permanent transfer of 130,000 AF and retirement of 45,000 AF of Table A amounts; transfer of the Kern Water Bank property; water supply management practices; and restructured rates. (*Ibid.*)
>
> Because the Project represents a negotiated compromise, the Project's objectives are interdependent. Failing to achieve any of the objectives is likely to upset the negotiated balance of interests reflected in the compromise. In such cases, the California Supreme Court has recognized that the interdependent nature of a project's objectives may constrain the range of alternatives that can feasibly meet those objectives. [citations] Such is the case here. DWR appropriately screened out the various alternatives that would not meet most, if any, of the Project's objectives, including those proposed by the PCL plaintiffs during the EIR Committee process. [Citations to administrative record.]"

No further project alternatives are required under CEQA or under the Superior Court's rulings on the Monterey Plus EIR.

4.2.7.2 Project Alternatives to Avoid Significant Impacts

Several comments state that alternatives should be considered to avoid significant impacts, particularly with respect to groundwater depletion and water supply impacts.

Commenters appear to claim that CEQA requires EIRs to consider alternatives to each part of a project or each unmitigated impact. As discussed in the section above (4.2.7.1), the Department correctly examined alternatives to the Monterey Amendment and Settlement Agreement, not to each portion of the project or to each unmitigated impact.

However, with regard to KWB activities, the Department did not conclude that converting annual crops to permanent crops or water supply impacts were significant impacts. Rather, the Department determined in the Draft REIR that these impacts were less than significant as a direct impact (pages 7.6-12 through 7.6-14), and as an indirect and cumulative impact (pages 10.1-29 through 10.1-47). Furthermore, all potentially significant and significant impacts were mitigated to less-than-significant impacts in the Draft REIR with one exception described below. Therefore, there was no reason to consider other alternatives.

The KWB's storage and provision of a portion of the water supplies used for the Tejon Industrial Complex area and the Tejon Mountain Village may have contributed to the resulting growth-inducing and significant cumulative impacts to aesthetics, air quality and climate change, agricultural resources, biological resources, noise, population and housing, public services, and transportation and traffic. This is a potentially significant and unavoidable impact. The Draft REIR concluded, consistent with the conclusion in the 2010 Monterey Plus FEIR, that the Department and KWBA lack the authority to approve or deny development projects or to impose mitigation to address significant environmental impacts associated with development projects; that authority resides with local cities and counties (Draft REIR, pages 8-14).

4.2.7.3 Conclusion

The Department's Monterey Plus EIR identified a reasonable range of alternatives to the proposed project. (See *Central Delta Water Agency, et al. v. DWR, et al.*, Sacramento County Superior Court Case No. 34-2010-80000561, Ruling on Submitted Matter, March 5, 2014, p. 17.) No further project alternatives are required under CEQA or under the Superior Court's rulings on the Monterey Plus EIR.

Furthermore, all potentially significant and significant impacts were mitigated to less-than-significant impacts in the Draft REIR with the exception of KWB's storage and provision of a portion of the water supplies used for the Tejon Industrial Complex area and the Tejon Mountain Village, and resulting cumulative impacts. Since these development projects are subject to local government approvals, neither DWR nor KWBA have the authority to impose mitigation measures or alternatives available to reduce KWB's potential contribution to these significant and unavoidable impacts.

4.3 INDIVIDUAL COMMENT LETTERS AND RESPONSES

4.3.1 OPR LETTER AND RESPONSE

OPR

STATE OF CALIFORNIA

GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

STATE CLEARINGHOUSE AND PLANNING UNIT

EDMUND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

June 14, 2016

Karen Dulik
Department of Water Resources
3374 E. Shields Ave
Fresno, CA 93726

Subject: 2016 Monterey Plus Revised EIR - Kern Water Bank Development and Continued Use and Operation
SCH#: 2003011118

Dear Karen Dulik:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. The review period closed on June 13, 2016, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. 1

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Scott Morgan
Director, State Clearinghouse

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH#	**2003011118**
Project Title	2016 Monterey Plus Revised EIR - Kern Water Bank Development and Continued Use and Operation
Lead Agency	Water Resources, Department of

Type	**EIR** Draft EIR
Description	Transfer of property known as the "Kern Fan Element property" in Kern County and its development and continued use and operation as a locally owned and operated groundwater banking and recovery project.

Lead Agency Contact

Name	Karen Dulik		
Agency	Department of Water Resources		
Phone	559-230-3300	***Fax***	
email			
Address	3374 E. Shields Ave		
City	Fresno	***State*** CA	***Zip*** 93726

Project Location

County				
City	Bakersfield			
Region				
Lat / Long	35° 18' 53.5" N / 119° 16' 45.3" W			
Cross Streets	hwy 43, 58			
Parcel No.				
Township		***Range***	***Section***	***Base***

Proximity to:

Highways	43, 58
Airports	
Railways	
Waterways	Kern River
Schools	
Land Use	Kern County GP: Intensive Ag, Mineral and Petroleum and Resources MGMT. Metro Bakersfield GP: HC, R-IA, R-MP, OS

Project Issues	Air Quality; Archaeologic-Historic; Biological Resources; Drainage/Absorption; Geologic/Seismic; Minerals; Noise; Recreation/Parks; Soil Erosion/Compaction/Grading; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects; Other Issues; Aesthetic/Visual; Agricultural Land; Public Services; Septic System; Sewer Capacity; Solid Waste

Reviewing Agencies	Resources Agency; Department of Fish and Wildlife, Region 4; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 6; State Water Resources Control Board, Divison of Financial Assistance; Regional Water Quality Control Bd., Region 5 (Fresno); Native American Heritage Commission

Date Received 04/27/2016 ***Start of Review*** 04/28/2016 ***End of Review*** 06/13/2016

Response to Comment OPR-1

The comment indicates that the review period for the Draft REIR closed on June 13, 2016, that no state agencies submitted comments by that date to the Governor's Office of Planning and Research (OPR), and that the Department has complied with the State Clearinghouse review requirements for draft environmental documents pursuant to CEQA.

The comment is noted. No further response is required.

4.3.2 KWBA Letter and Response

KWBA

KERNWATERBANKAUTHORITY

June 13, 2016

Ms. Karen Dulik
Department of Water Resources
3374 E. Shields Avenue
Fresno, CA 93726

Subject: Draft Revised Environmental Impact Report, Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus)

Dear Ms. Dulik:

The Kern Water Bank Authority (KWBA) and its member entities sincerely appreciate the significant effort the California Department of Water Resources made in preparing the Draft Revised Environmental Impact Report, Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Associated Actions as Part of a Settlement Agreement (Monterey Plus) (DREIR). The KWBA is the responsible public agency implementing the Kern Water Bank Project, which stores surplus water supplies that are available in wet years for later use during dry years. The project serves the water needs of prime agricultural lands in the southern San Joaquin Valley and residents of the greater Bakersfield area. The benefits of the Kern Water Bank Project are many fold, including those provided to the state's economy and job market, increased water security for municipal users, and the conservation of nearly 20,000 acres of wildlife habitat, which includes several endangered species, in the Southern San Joaquin Valley. 1

The KWBA is committed to operating the Project in a responsible manner, as demonstrated by the comprehensive mitigation measures provided in the DREIR and incorporated into the KWBA's Board Resolution 16-02. We believe these measures will ensure that any potential impacts from the Kern Water Bank Project are mitigated consistent with the requirements of CEQA and that the Project's benefits are fully realized.

Once again, we express our sincere appreciation to the Department of Water Resources for their significant and comprehensive efforts in preparing the DREIR. Please let me know if you have any questions.

1620 Mill Rock Way | Suite 500 | Bakersfield, California 93311 | Phone 661-398-4900 | Fax 661-398-4959

Ms. Karen Dulik | Page 2 of 2 | June 13, 2016

Sincerely,
Kern Water Bank Authority,

Jonathan Parker
General Manager

cc: KWBA Board of Directors

RECEIVED
JUN 13 2016
South Central Region

Dulik, Karen@DWR

From:	Jonathan Parker <jparker@kwb.org>
Sent:	Monday, June 13, 2016 2:54 PM
To:	Dulik, Karen@DWR
Subject:	Monterey Plus Draft Revised EIR
Attachments:	KWBA DREIR Comments.pdf

Dear Ms. Dulik,

Please find attached a letter regarding the subject document.

Jon Parker
Kern Water Bank Authority
661-398-4900 work
661-398-4959 fax
661-303-7069 cell
jparker@kwb.org

1

Response to Comment KWBA-1

The comment appreciates the Department's significant efforts preparing the Draft REIR, provides a brief introduction to KWBA, commits to operating the Project in a responsible manner as demonstrated by the comprehensive mitigation measures provided in the Draft REIR and incorporated into KWBA's Board Resolution 16-02, and believes these measures will ensure that any potentially significant impacts from the KWB Project are mitigated consistent with CEQA requirements and that the Project's benefits are fully realized.

The comment is noted. KWBA Board Resolution 16-02 (included as Draft REIR Appendix 7-6b) fully incorporates and adopts all of the Draft REIR mitigation measures.

4.3.3 SANMANUEL EMAIL AND RESPONSE

SANMANUEL

From: Daniel McCarthy
To: Dulik, Karen@DWR
Subject: Monterey Amendment to Kern Water Bank response
Date: Tuesday, May 03, 2016 5:10:27 PM

Karen,

We received the notice and CD of the DREIR for the proposed Monterey Amendment to the State Water Project Contracts, etc.. Thank you for the opportunity to review and respond. The project is outside of the Tribe's ancestral territory, therefore we have no comments, other than to recommend that you contact other tribes in Kern County about this amendment. 1

Thank you,
Leslie Mouriquand MA, RPA

Daniel McCarthy, MS, RPA
Director
Cultural Resources Management Department
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, CA 92346
Office: 909 864-8933 x 3248
Cell: 909 838-4175
dmccarthy@sanmanuel-nsn.gov

Response to Comment SANMANUEL-1

The comment states that the project is outside of the Tribe's ancestral territory, and therefore the Tribe has no comments other than to recommend that the Department contact other tribes in Kern County about the project.

The comment is noted. The Department sent notification of the Draft REIR's availability for public review to: the Bakersfield American Indian Health Center (Daniel Tatum), Demna Wo-Wah Tribal Government (Robert Ledger, Sr., Tribal Chair), Foothill Yokuts Mono Wuksache (Kenneth Woodrow, Tribal Chair), Kern Valley Indian Center (Hilda Vazquez, Program Director), Kitanemuk/Yowlumne Tejon Indians (Delia Dominguez, Chair), Traditional Choinummni Tribe (David Alvarez, Tribal Chair), Native American Heritage Preservation Council of Kern County (Ben Alvitre and Gene Alvitre), Salinan-Chumash (Arianne Garcia, Tribal Chair; and Juanita Lomas), Southern Paiute Kawwaiisu Koso Yokuts Tubatulabal (Robert Robinson, Co-Chairperson; and Julie Turner, Secretary), Southern Valley Yokuts Tachi Tache (Rueben Barrios, Sr., Tribal Chair; and Lalo Franco, Cultural Coordinator), The Choinumni Tribe of Yokuts (Rosemary Smith, Tribal Chair), Tubatulabal (Robert Gomez, Jr., Tribal Chair; and Donna Begay), Serrano (Daniel McCarthy, Director-CRM Department), Yokuts (Neil Peyron, Tribal Chair; Kerri Vera, Environmental Department; and Joey Garfield, Tribal Archaeologist), and Yowlumne Kitanemuk Kawaiisu (Kathryn Montes-Morgan, Tribal Chair).

4.3.4 CFS1 LETTER AND RESPONSE

CFS1

From: Ryan Berghoff
To: Dulik, Karen@DWR
Cc: Adam Keats
Subject: Monterey Plus - Comments on Draft Revised EIR
Date: Monday, June 13, 2016 4:43:18 PM
Attachments: 2016-6-13 Comments to Revised KWB EIR FINAL.pdf

Dear Ms. Dulik,

Please find attached a copy of Comments on the Department of Water Resources 2016 Monterey Plus Draft Revised Environmental Impact Report, submitted by Center for Food Safety (CFS), California Water Impact Network (CWIN), California Sportfishing Protection Alliance (CSPA), Center for Biological Diversity (CBD), Central Delta Water Agency (CDWA), and South Delta Water Agency (SDWA). Please confirm that you received this email.

If you have any questions regarding this matter, do not hesitate to call or email me. You can reach me by phone at (415) 826-2770 or by email at rberghoff@centerforfoodsafety.org.

Best,
Ryan Berghoff
Legal Fellow
Center for Food Safety

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California Department of Water Resources
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Comments on the Department of Water Resources 2016 Monterey Plus Draft Revised Environmental Impact Report – Kern Water Bank Development and Continued Use and Operation

To Department of Water Resources ("DWR"):

The undersigned organizations submit these comments on DWR's 2016 Monterey Plus Draft Revised Environmental Impact Report ("Revised EIR") regarding the Kern Water Bank ("KWB") Development and Continued Use and Operation. These comments are submitted on behalf of the organizations themselves, as well as their members, volunteers, and employees.

The Center for Food Safety ("CFS") is a nonprofit, public interest advocacy organization dedicated to protecting human health and the environment by curbing the proliferation of harmful food production technologies and promoting sustainable agriculture, including impacts to water resources. In furtherance of this mission, CFS uses legal actions, groundbreaking scientific and policy reports, books and other educational materials, and grassroots campaigns on behalf of its 750,000 farmer and consumer members across the country.

The California Water Impact Network ("CWIN") is a nonprofit, public benefit corporation formed under the laws of the State of California for the purpose of protecting and restoring fish and wildlife resources, scenery, water quality, recreational opportunities, agricultural uses, and other natural environmental resources and uses of the rivers and streams of California, including the San Francisco Bay-Delta estuary, also known as the Sacramento-San Joaquin Bay-Delta ("Bay-Delta"), its watershed and its underlying groundwater resources.

The California Sportfishing Protection Alliance ("CSPA") is a nonprofit organization with more than 2,500 members throughout California dedicated to protecting, preserving, and enhancing the fisheries and associated aquatic and riparian ecosystems of California waterways, including the Central Valley rivers leading to the Bay-Delta. CSPA and its members actively

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participate in water rights and water quality processes, engage in education and organization of the fishing community, conduct restoration efforts, and vigorously enforce environmental laws enacted to protect fisheries, habitat, and water quality.

Center for Biological Diversity ("CBD") is a nonprofit, public interest corporation with over one million members and online activists dedicated to protecting diverse native species and habitats through science, policy, education, and environmental law. CBD and its members have a particular interest in protecting lands affected by the State Water Project, including Bay-Delta, for recreational, wildlife viewing, scientific, and educational purposes.

Central Delta Water Agency ("CDWA") is a political subdivision of the State of
California created under the Central Delta Water Agency Act, Chapter 1133 of the Statutes of 1
1973 as amended. The CDWA encompasses approximately 120,000 acres within San Joaquin
County, all of which is within the Bay-Delta. The water rights pertaining to the lands within
CDWA jurisdiction are principally riparian and in-part covered by pre-1914,"prior vested" water
rights, which enjoy seniority over post-1914 water rights and those of DWR. CDWA is
empowered to assist landowners within its jurisdiction to protect and assure a dependable supply
of water of suitable quality sufficient to meet present and future needs.

South Delta Water Agency ("SDWA") is a political subdivision of the State of California created by the California Legislature under the South Delta Water Agency Act, Chapter 1089 of the Statutes of 1973 as amended. The SDWA encompasses approximately 148,000 acres within San Joaquin County, of which is within the Bay-Delta. The water rights pertaining to the lands are principally riparian and are in-part covered by pre-1914, "prior-vested" water rights, which enjoy seniority over post-1914 water rights and those rights of DWR. SDWA is empowered to assist landowners within its jurisdiction to protect and assure a dependable supply of water of suitable quality to meet present and future needs.

I. INTRODUCTION

In the late 1980s and early 1990s, the State Water Project ("SWP") started to not be able
to fulfill the maximum annual amount of SWP water that each water contractor applied for (then
called entitlements, now "Table A amounts"). California experienced a drought from 1986
through 1991, forcing DWR in 1991 to reduce entitlement deliveries to agricultural contractors
to zero, pursuant to Article 18(a) of the State Water Project Long-Term Contracts. Article 18(a) 2
provided that in times of short-term deficits, agricultural contractors would have their deliveries
cut first, sparing the urban contractors (and their more permanent reliance on the deliveries) from
diminished deliveries. This event gave rise to a dispute between agricultural and urban
contractors, with the agricultural contractors threatening to invoke Article 18(b) of the long-term
contracts. Article 18(b) provided that in the event of a permanent deficit in the SWP system, all
contractors' entitlements would be reduced.

The invocation of Article 18(b) was anathema to the urban contractors, who had grown
dependent on the promise—if not the actual delivery—of their full entitlements of SWP water,
using this "paper water" (the difference between what was promised as "entitlements" based on a 3
proposed build-out of the SWP system that never occurred and what the SWP could actually

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deliver in any given year within the confines of the actually-built-out system) as proof of water supplies in order to approve development projects that would become dependent on SWP water deliveries. With both sides finding fault with different contract provisions, a select group of urban and agricultural contractors secretly met with DWR representatives in Monterey, California, to hash out a compromise. cont. 3

The real cause of the dispute was neither the drought nor a general growing demand for limited water resources, but rather DWR's continued support for the paper water entitlements contained in the long-term contracts and DWR's failure to consistently and properly invoke both Articles 18(a) and 18(b). Rather than correcting the inflated entitlements (as Article 18(b) required) and consistently applying Article 18(a)'s provisions during drought periods, which not only would have addressed both the agricultural and urban concerns but also brought the SWP system closer to a sustainable operation, the Monterey parties decided to toss out these essential checks-and-balances and to restructure the rest of the contracts. This agreement became known as the Monterey Agreement, and resulted in the Monterey Amendment to the State Water Project Long-Term Contracts. 4

In addition to deleting Articles 18(a) and 18(b), the Monterey Amendment included a provision (relevant here) that provided for the transfer of the KWB from state control (DWR) to "local" control, in the form of an initial transfer to Kern County Water Agency ("KCWA") followed by a second transfer to the Kern Water Bank Authority ("KWBA"), officially a joint project between private and public entities but in fact an entity majority-controlled by a single corporate agribusiness interest. As citizen watchdogs and activists have since repeatedly argued and demonstrated, the transfer was made in exchange for illusory consideration: primarily the bogus "retirement" of 45,000 acre-feet ("AF") of Table A water amounts held by some of the KWBA member entities. 5

California has been suffering ever since.

The KWB is an approximately 20,000 acre alluvial groundwater reservoir in southern Kern County. DWR purchased the KWB lands in 1988 as part of a plan to develop a state-owned groundwater storage bank for the SWP, which DWR called the Kern Water Bank. Due primarily to intransigence on the part of the KCWA (which had a legislatively-granted veto over any statewide water facility within its service area), full operation of the KWB stalled. With KCWA holding the KWB hostage, DWR capitulated, agreeing to hand over the valuable resource to the "local" water interests as part of the Monterey Amendment. 6

The initial KWB Transfer was subject to the California Environmental Quality Act ("CEQA") review, which was performed as part of the review of the entire Monterey Amendment project in 1995. That EIR was challenged in court, and as a result of a successful lawsuit brought by the Planning and Conservation League and others, was decertified in 2003. As part of a settlement agreement in that case, DWR agreed to produce a new EIR, which it completed in 2010. Challenged again in court, this time by a coalition of nonprofit organizations, two Delta water agencies, and two individuals, this second EIR—the Monterey Plus FEIR—was also decertified. (*Central Delta Water Agency v. California Department of Water*, (Jan. 31, 2014) Sacramento Sup. Ct. No. 34-2010-80000561.) The superior court 7 concluded that DWR violated CEQA by failing to adequately describe, analyze, and (as appropriate) mitigate the potential impacts of the Project associated with the anticipated use and operation of the KWB. The court stated that the failure to include relevant information regarding KWB operations precluded informed decision-making and informed public participation, thereby thwarting the statutory goals of the EIR process. cont. 7

The superior court ordered DWR back to the drawing board, at least regarding its review to the KWB Transfer, and it is this EIR—the 2016 Monterey Plus Draft Revised EIR—that is the subject of these comments.

The Revised EIR reveals that KWB operations resulted in significant environmental 8
impacts that were not adequately described, analyzed, or properly mitigated. The Revised EIR
fails to analyze the significance that converting annual crops to permanent crops has on the water 9
supply and fails to analyze the significant impact that groundwater depletion has on nearby water 10
users and subsidence. The Revised EIR does not analyze any alternatives to avoid or lessen any 11
of the newly-identified significant impacts of the project, and the mitigation measures it analyzes
will not make the impacts less than significant. 12

II. DISCUSSION

An EIR is a "detailed statement prepared under CEQA describing and analyzing the significant effects of a project and discussing ways to mitigate or avoid the effects." (CEQA Guidelines, § 15362.) It must be organized and written in a manner that will be meaningful and useful to decision-makers and to the public. (Pub. Resources Code, § 21003, subd. (b).) To serve this purpose, the EIR must identify and focus on the possible significant environmental impacts of the proposed project. (CEQA Guidelines, §§ 15126, subd. (a), 15126.2, subd. (a); Pub. Resources Code, § 21100, subd. (b)(1).) A significant effect is any "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic and aesthetic significance." (CEQA Guidelines, § 15382.) At its most basic level, CEQA compels government first to identify the significant environmental effects of projects, and then to mitigate those adverse effects through imposition of feasible mitigation measures or through selection of feasible alternatives. (*Sierra Club v. Board of Forestry* (1994) 7 Cal.4th 1215, 1233.) 13

The Revised EIR fails to analyze numerous significant effects including the conversion 14
from annual crops to permanent crops facilitated by the KWB transfer; the impacts of
groundwater depletion on nearby water users, state water resources, and subsidence; and the 15
cumulative impacts of KWB operations with other current water banking activities and other 16
water users. The Revised EIR also fails to identify feasible alternatives to avoid or lessen the 17
significant impacts, or properly analyze appropriate mitigation measures. For these reasons, the
Revised EIR is deficient. 18

a. Project Decision

The Revised EIR repeats a fundamental error made in the Monterey Plus FEIR, describing DWR's decision on the Project as being "whether or not to continue the use and 19

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operation of the KWB by KWBA, after compliance with CEQA." (Revised EIR at ES-3.) The euphemistic "decision" to "continue the use and operation" represents a fundamental departure from the interactive process of review and decision required under CEQA, which requires the lead agency to complete its environmental review before making its final decision on the project as a whole. (See *County of Inyo v. City of Los Angeles* (1984) 160 Cal.App.3d 1178, 1185 [CEQA requires an "interactive process of assessment and responsive modification that must be genuine"].) As the Revised EIR admits, DWR must make its decision "after compliance with CEQA," which necessarily requires that a project approval follow environmental review, not precede it. (Revised EIR at ES-3.) Without a clear commitment to that process (and all indications in the Revised EIR are that DWR has no intention of following that correct procedure), the entire environmental review process represented by the Revised EIR will be nothing more than a sham. cont. 19

b. Agricultural Resources

The Revised EIR recognizes that KWB activities can facilitate and may already have facilitated the conversion of annual crops, which can be fallowed in dry years, to permanent crops, which require a dedicated water supply. But the Revised EIR erroneously concludes that this impact is not significant. A shift in crop patterns caused by the Project, even if the Project's contribution is only cumulatively significant, almost certainly impacts the state's water supply, particularly as it relates to groundwater depletion and Delta withdrawals, and the EIR must disclose and analyze this clearly significant impact. 20

i. Lack of Analysis Regarding Conversion to Permanent Crops

1. Appendix G of the CEQA Guidelines is Not Exhaustive

The Revised EIR must analyze all potentially significant impacts of the Project, even if not listed on Appendix G to the CEQA Guidelines. Appendix G provides an Environmental Checklist Form for assisting in the determination of the potential significance of a project impact. The form explicitly states that "[s]ubstantial evidence of potential impacts that are not listed on this form must also be considered." (CEQA Guidelines, Appendix G, at 1.) Thus, Appendix G serves as a starting point for determining the significance of a project; it is not exhaustive or exclusive. DWR must still identify and analyze all other potentially significant effects.

The Revised EIR identifies a "substantial" change in crop patterns since the transfer of the KWB, resulting in farmers shifting from annual crops to permanent crops. (Revised EIR at 7.6-13.) However, the Revised EIR concludes that the Project's "cumulatively considerable incremental contribution to this shift to permanent crops" is less-than-significant because it "does not exceed any of the Appendix G standards of significance in the CEQA Guidelines related to agriculture and forestry resources." (Revised EIR at 10.1-34.) The Revised EIR opines that this shift does not need to be evaluated because a "shift in crop patterns, in and of itself, is not a significant adverse environmental effect." (*Id.*) But merely because a shift in crop patterns is not listed in Appendix G of the CEQA Guidelines does not relieve DWR of its duty to analyze other potentially significant effects. Here, the Revised EIR identified a "substantial" change in crop 21

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patterns, resulting in a shift from irrigated annual crops that can be "fallowed in dry/critically dry years" to permanent crops that require a "dedicated water supply." (Revised EIR at 7.6-13.) The impacts of this conversion must be analyzed. cont. 21

2. The Revised EIR Fails to Analyze Any of the Impacts From Conversion of Irrigated Annual Crops to Permanent Crops.

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The Revised EIR concludes that "KWB activities could … potentially convert irrigated farmland to orchards, which could cause other indirect effects." (Revised EIR at 7.6-12.) Despite that recognition, the Revised EIR fails to analyze any impacts related to the conversion of crops.

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Making unreliable seasonal water "reliable" by storing it in a water bank and knowingly permitting that water to be used for permanent crops is a significant effect that obviously and logically requires analysis. The Revised EIR identifies that there was only a relatively small increase in agricultural acreage in Kern County between 1996 and 2014, but the cropping patterns within the county changed "substantially." (Revised EIR at 7.6-13.) The acreage of total nut crops between 1996 and 2014 increased by approximately 206% and almonds accounted for more than 65% of the total nut crops in 2014. (*Id*; see Exhibits A-E.)[1] Combined acreages of seed crops, field crops, and vegetable crops all decreased during the same time period. (*Id.*; see Exhibit F.)[2] The Revised EIR further recognizes that KWB activities may have increased water supply reliability (at least in the short term, and only for the KWBA member entities), which has potentially resulted in changes from "irrigated crops or annual field crops on land that could be fallowed in dry/critically dry years to permanent crops like orchards and vines that require a dedicated water supply." (*Id.*)

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Nonetheless, the Revised EIR does not analyze the effects of this crop conversion, stating that the change in farming practices is "consistent with the county-wide trend [] and with a state-wide trend even in areas that do not depend upon water banks for water storage." (*Id.*) That

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[1] *See* Dale Kasler, *California Almond Growers to Expand Orchards, Despite Drought*, The Sacramento Bee (Apr. 16, 2015) ("[T]he amount of California farmland devoted to almonds has nearly doubled over the past 20 years, to more than 900,000 acres"), http://www.sacbee.com/news/state/california/water-and-drought/article18716937.html (Attached as Exhibit A); *see also* Geissler & Horwath, *Almond Production in California*, UC Davis University of California (Jun. 2016) ("[W]hile the [almond] acreage remained relatively stable between 1985 and 1995, it increased again reaching a new high in 2011 with 760,000 acres of bearing orchards producing 2.02 billion pounds of almonds, which accounted for 84% of the global production."), https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Almond_Production_CA.pdf (Attached as Exhibit B); Robert Rodrigues, *California Almond Acreage Continues to Grow*, The Fresno Bee (Apr. 29, 2016) ("California almonds, ones of the state's largest crops, increased in acreage by 6 percent last year."), http://www.fresnobee.com/news/business/agriculture/article74770332.html (Attached as Exhibit C); Ari Phillips, *Thank Almonds, Pistachios, Wine, and Groundwater for California's Record Harvest*, Fusion (Aug. 27, 2015) ("The total increase in fruit and nut acreage since 2000 was 570,00 acres, or 24%, according to the [Pacific Institute] study." [citing Cooley et al., *Impacts of California's Ongoing Drought: Agriculture*, Pacific Institute (Aug. 2019), http://pacinst.org/app/uploads/2015/08/ImpactsOnCaliforniaDrought-Ag.pdf (Attached as Exhibit E)]), http://fusion.net/story/189826/california-record-harvest-due-to-excessive-groundwater-use/ (Attached as Exhibit D).

[2] *See* Philpott & Lurie, *Here's the Real Problem With Almonds*, New Republic (Dec. 31, 2015) ("California acreage devoted to alfalfa is expected to shrink 11 percent, and cotton acres look set to dwindle to their lowest level since the 1920s. Meanwhile, the market is pushing almonds and other nuts in the opposite direction."), https://newrepublic.com/article/125450/heres-real-problem-almonds (Attached as Exhibit F).

this conversion from annual crops to permanent crops may have been a county-wide trend does not prove that the KWB Transfer did not facilitate this conversion. The KWBA participants are part of Kern County, and their crop production between 1995 and 2014 accounts for more than a quarter of the increased nuts (65,900 acres/203,938 acres), half of the increased fruit (22,096 acres/50,269 acres) and nearly all of the increased citrus (17,442 acres/22,489 acres), all of which are permanent crops. (See Revised EIR at 7.6-7, Tables 7.6-5 and 7.6-6.) Thus, the Revised EIR's statement that conversion to permanent crops is less than significant because the "trend of replacing irrigated annual crops with permanent crops is expected to continue in the future with or without the KWB" is unfounded. (Revised EIR at 7.6-14.) There is a clear connection between the conversion of annual crops to permanent crops within Kern County and the KWB Transfer, and the Revised EIR must analyze the effects of this conversion. 24

The graphs in Appendix E of the Revised EIR illustrate the clear connection between the KWB Transfer and the region's conversion from annual crops to permanent crops. (See Revised EIR at E-43 to E-46.) This correlation is readily apparent in Tables 1 and 2, below. Table 1 depicts the cumulative growth in the total acreage of almonds in Kern County, based on the U.S. Department of Agriculture ("USDA") Census data from 1982 to 2012,[3] compared to the percentage of allocation (percentage of Table A requests delivered). (Revised EIR at E-44, Table 7.)[4] Table 2 depicts the amount of new almond acreage planted each year in Kern County[5] compared to the percent of SWP allocation. The tables show that the growth in cumulative acreage and increase in newly planted acreage of almonds in Kern County is an almost direct result of the KWB Transfer. (See Table 1 and 2.) 25

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[3] USDA, *Census Publications – Census by State* (1982-2012), https://www.agcensus.usda.gov/Publications/2012/Full_Report/Census_by_State/.

[4] The percent of Table A requests from 1982 to 1994 were calculated from DWR, *CalSim II Simulation of Historical SWP/CVP Operations, Technical Memorandum Report*, at 29 (Table 4) (Nov. 2003), http://baydeltaoffice.water.ca.gov/swpreliability/HistoricalSimulationReport_111203.pdf.

[5] California Department of Food and Agriculture Cooperating with USDA, National Agricultural Statistics Service, Pacific Regional Office, *2015 California Almond Acreage Report* (April 27, 2016), https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/201605almac.pdf.

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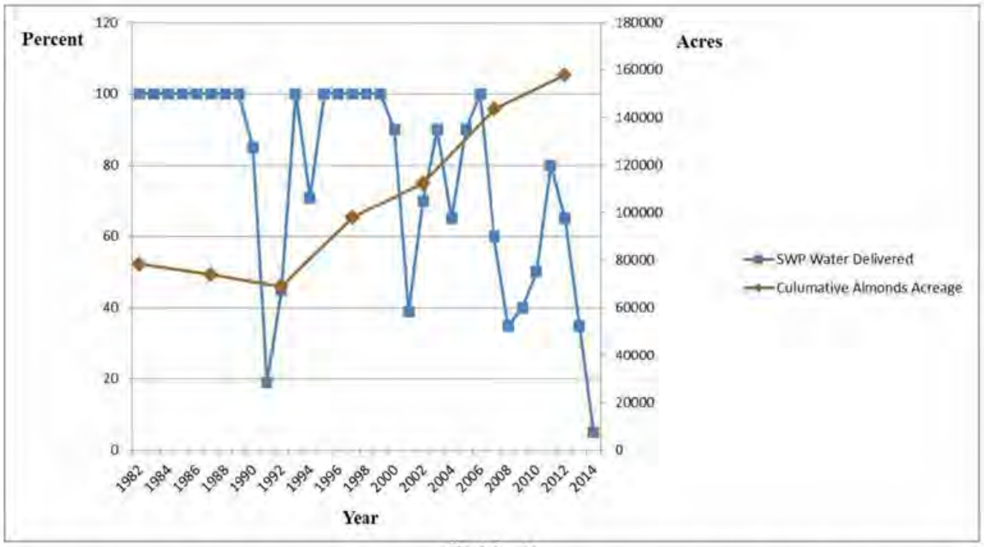
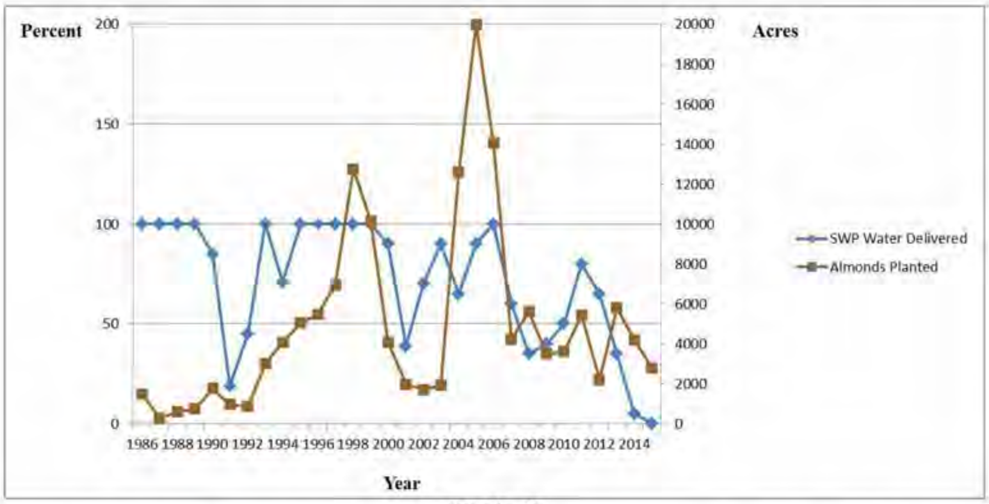


(Table 1)

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cumulative Almonds	78,395					73,869					69,024					97,845					112,492					143,473					157,819		
SWP Water Delivered	100	100	100	100	100	100	100	100	85	19	45	100	71	100	100	100	100	100	90	39	70	90	65	90	100	60	35	40	50	80	65	35	5



(Table 2)

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Almonds Planted	1,454	277	586	746	1,768	963	856	3,009	4,089	5,050	5,473	6,940	12,758	10,156	4,073	1,974	1,705	1,904	12,580	19,963	14,062	4,233	5,616	3,493	3,613	5,441	2,186	5,795	4,186
SWP Water Delivered	100	100	100	100	85	19	45	100	71	100	100	100	100	100	90	39	70	90	65	90	100	60	35	40	50	80	65	35	5

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For example, the years 2001 through 2005 witnessed a drought in which the total amount of Table A deliveries that was requested in Kern County was reduced due to a lack of available supply in the SWP system. (Tables 1 and 2.) Nonetheless, during that drought, there was a marked increase in Kern County in both the cumulative acreage as well as the amount of newly planted acreage of almonds. (*Id.*) Table 1 shows that cumulative acreage of almonds in Kern County decreased between 1982 and 1992, but between 1992 and 2012 the acreage of almonds nearly doubled, despite multiple droughts. (Table 1.) Table 2 shows that in 2004 only 65% of Table A requested water was delivered, but 12,580 new acres of almonds were planted. (Table 2.) In 2005, when only 90% of Table A water was delivered, 19,963 new acres of almonds were planted. (*Id.*) 26

In other words, while much of the state experienced water shortages, presumably leading to the fallowing of annual cropland to match agricultural needs with a diminished water supply, KWBA participants were enabled—by the KWB—to not only maintain their acreages of permanent crops but to plant more new permanent crops. (Table 1 and 2.) These trends continued during the most recent drought between 2007 and 2015, in which the state, for the first time in California history, ordered all urban water districts to reduce their water usage,[6] but KWBA participants maintained their water use and continued planting more permanent crops. (*Id.*; see Exhibit G.) What this means for California's water supply, and the other users throughout the state dependent on it, is not addressed at all in the Revised EIR, despite widespread acknowledgment that a conversion to permanent crops—and in particular almonds—may significantly impact California's water supply. (See Exhibit A, F, H-K.)[7] 27

Even if the KWB Transfer did not facilitate this conversion of crops—and the data presented indicates that it did—it would not relieve DWR of its duty to analyze the effects of the conversion of crops in the KWBA participants' service area. According to Table 7.6-6, permanent crops such as nuts, citrus, and fruit all increased by over 100%, while all annual crops 28

[6] Executive Order B-29-15, https://www.gov.ca.gov/docs/4.1.15_Executive_Order.pdf (Attached as Exhibit G).
[7] *See* Kasler, *supra* note 1 ("[A]lmonds are permanent crops. They can't be fallowed in dry years, unlike rice, tomatoes, and other annual crops. Much of the increased planting in recent years has occurred on the west side of the San Joaquin Valley, where water supplies have become among the most fragile in California."); *see also* Philpott & Lurie, *supra* note 2 ("Unlike other crops, almonds always require a lot of water—even during drought. Annual crops like cotton, alfalfa, and veggies are flexible—farmers can fallow them in dry years. That's not so for nuts, which need to be watered every year, drought or no, or the trees die, wiping out farmers' investments."); *see also* United States Geological Survey (USGS), *Changing California Land Uses Will Shape Water Demand in 2062* (May 18, 2016) ("If past patterns of California land-use change continue, projected water needs by the year 2062 will increase beyond current supply."), https://www.usgs.gov/news/changing-california-land-uses-will-shape-water-demands-2062 (Attached as Exhibit H); *see also* Lei Wang, *California's Insane Nut Boom, in 3 Simple Charts*, Mother Jones (Nov. 3, 2014) ("A single almond requires a gallon of water to grow."), http://www.motherjones.com/environment/2014/11/almonds-water-walnuts-pistachios-california-drought-charts (Attached as Exhibit I); *see also* Eric Holthaus, *Stop Vilifying Almonds*, Slate (Apr. 17, 2015) ("Almonds use about as much water each year as the entire city of Los Angeles does in three, and about two-thirds of those nuts are exported … [a]lmonds use 10 percent of California's agricultural water supply."), http://www.slate.com/articles/business/moneybox/2015/04/almonds_in_california_they_use_up_a_lot_of_water_but_they_deserve_a_place.html (Attached as Exhibit J); *see also* Peter Fimrite, *California Drought: how Water Crisis is Worse for Almonds*, SF Gate (Mar. 4, 2014) ("A huge shift away from annual crops to nut trees has transformed the California farm belt over the past two decades and left farmers perilously vulnerable to the severe drought that is currently gripping the state."), http://www.sfgate.com/science/article/California-drought-How-water-crisis-is-worse-for-5341382.php (Attached as Exhibit K).

decreased by over 50%. (See Revised EIR at 7.6-7, Table 7.6-6.) The Revised EIR recognizes that annual field crops can be fallowed in dry/critically dry years, but permanent crops require a dedicated water supply. (Revised EIR at 7.6-13.) The Revised EIR further acknowledges that the "KWB increases the reliability of water supplies to its participants … [and] it is possible that KWB activities could result in additional land being converted to permanent crops." (Revised EIR at 7.6-14.) Nonetheless, the Revised EIR improperly states that this conversion is less than significant, without actually analyzing the impacts. cont. 28

Data indicates that at a county scale, annual cropland losses to permanent cropland and development drive net increases in water demand. (Exhibit L.)[8] Net declines in water demand are only projected where losses of annual cropland exceed gains of permanent cropland and new developed land.[9] The Revised EIR shows that the gains in permanent cropland far exceeded the losses of annual cropland subsequent to the KWB Transfer. (Revised EIR at 7.6-7, Table 7.6-6.) In addition, there has been a significant increase in almonds, and almonds are the fourth most water intensive crop in California.[10] The Revised EIR identifies that groundwater resources may be depleted, but fails to analyze how a shifting to permanent crops may contribute to that depletion. (See Revised EIR at 7.1-33; see Exhibit M.)[11] The Revised EIR clearly fails to analyze the significant effects that conversion of annual cropland to permanent cropland has on California's water supply. 29

Once the Revised EIR recognizes that irrigated annual crops were converted to permanent crops, it must identify and analyze the impacts of that conversion to determine whether it is significant. It is impossible to mitigate the effects of converting to permanent crops that require a dedicated source of water without first identifying the significant environmental impacts of that conversion. (See *Sierra Club v. Board of Forestry* (1994) 7 Cal.4th 1215, 1233 [CEQA compels government first to identify the significant environmental effects of projects, and then to mitigate those effects through imposition of feasible mitigation measures or through selection of feasible alternatives].) 30 The Revised EIR must determine whether there is any effect on the availability of water resources in the region and the flexibility of the water supply. We believe that the significance of this impact is obvious: by making the region's water supply *seemingly* more reliable, at least in the short term (since water bank withdrawals can be used to compensate for large drops in SWP deliveries during short-term droughts), the unfettered operation of the KWB hardens the demand for Delta water pumping. The Revised EIR must 31

[8] Wilson et al., *Future Land-Use Related Water Demand in California*, Environ. Res. Lett. 11: 054018, at 8 (May 18, 2016), http://iopscience.iop.org/article/10.1088/1748-9326/11/5/054018 (Attached as Exhibit L); USGS, *supra* note 6 ("Assuming a 'business-as-usual' scenario of future land-use change, we show that the current pattern of increasing development and additional perennial cropland (orchards and vineyards) will lead to loss of grassland habitat and increased water use.").

[9] Wilson, *supra* note 8, at 8.

[10] *Id.* at 9.

[11] *See also* Gillis and Richtel, *Beneath California Crops, Groundwater Crisis Grows*, New York Times (Apr. 5, 2015) ("Even as the worst drought in decades ravages California, and its cities face mandatory cuts in water use, millions of pounds of thirsty crops like oranges, tomatoes and almonds continue to stream out of the state and onto the nation's grocery shelves. But the way that California farmers have pulled off that feat is a case study in unwise use of natural resources, many experts say. Farmers are drilling wells at a feverish pace and pumping billions of gallons of water from the ground, depleting a resource that was critically endangered before the drought."), http://www.nytimes.com/2015/04/06/science/beneath-california-crops-groundwater-crisis-grows.html?_r=0 (Attached as Exhibit M).

explore this impact. It must ask whether permanent crops require greater amounts of water over time, and whether permanent crops have different impacts on water supplies than annual crops. 31

The Revised EIR must also expand its analysis to consider impacts to the Delta caused by increased Delta pumping that has resulted from and will result from the KWB Transfer. The Revised EIR improperly confines its analysis to the geographic area of KWB lands and groundwater impacts. But the hardening of demand caused by the shift to permanent crops has had devastating impacts on the Delta ecosystem, impacts not previously disclosed or analyzed. Increased demand due to the planting of permanent crops places pressure on SWP deliveries, which in turn increases demand pressures on the Delta, which in turn affects fisheries and in-Delta water right users. Over the past few years of drought, the SWRCB has relaxed minimum in-Delta fishery and other water quality standards, primarily because exports were not decreased in prior years to plan for multiple drought years. The drought also resulted in SWRCB curtailment of senior right holders while exports continued. One cannot separate increased permanent demand created by the KWB from the ongoing stresses in the Delta and Delta water right holders. 32

Moreover, the recent decision in the Delta Stewardship Council Cases (Coordinated Case No. JCCP 4758, Sacramento Superior Court) concluded that the Delta Plan is required to specify decreases in exports from the Delta and that all areas served by export water were subject to Delta Plan mandates. As the KWB obtains the vast majority of its water from the SWP, it is subject to these mandates. The Revised EIR must therefore consider the Delta Plan and all likely mandated decreases in exports that it mandates, and analyze what impacts that process will have on KWB operations. 33

As these impacts are directly connected to the new significant impacts identified in the Revised EIR, they must be analyzed. As it stands now, the Revised EIR's analysis on agricultural resources, and in particular its analyses regarding the conversion of irrigated annual crops to permanent crops, is insufficient under CEQA. 34

ii. The Revised EIR Should Analyze the Significance of Article 21 and the KWB Transfer

The Revised EIR makes no revisions to Section 2, State Water Project; however, new data provided in the Agricultural Resources Section indicates that removal of Article 21(g)(1) from the baseline calculation was a significant impact that needs to be updated. Article 21(g)(1) provided for the delivery of surplus water to SWP contractors, but explicitly limited this water to non-permanent uses: DWR was required to refuse the delivery of such water to the extent that it determined such delivery would tend to encourage the development of an economy within the area served which would be dependent upon the sustained delivery of surplus water. (Monterey Plus FEIR at 6.1-9.) The Monterey Plus FEIR concluded that deletion of Article 21(g)(1) would not have a significant impact on the baseline because there was no difference in the baseline demand before or after the Monterey Amendment. (*Id.*) The FEIR stated that Article 21(g)(1) was designed to prevent the establishment of permanent agricultural crops based on the delivery of *scheduled* surplus water. (*Id.*) Since scheduled surplus water had not been available for about nine years prior to the Monterey Amendment and unscheduled (interruptible) water was 35

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infrequently available in the same period (1987-1995), DWR reasoned that it was unlikely that
anyone thought that intermittent Article 21 water would be used to support development of an 35
economy in agriculture or municipal and industrial areas. (*Id.* at 6.1-9 to 6.1-10.)

These earlier conclusions and assumptions must now be revisited. The Revised EIR's
data regarding the conversion of annual crops to permanent crops in Kern County, including
within the KWBA member agencies' service areas, proves that surplus water—both scheduled
and unscheduled/interruptible water—has been and likely will be used for growing permanent
agricultural crops. At its core, the development and operation of the KWB facilitates the use of 36
surplus water as irrigation for permanent crops, which is exactly what the Monterey Plus FEIR
admits Article 21(g)(1) was intended to prevent. The Monterey Plus FEIR's assumption that it
was unlikely that anybody thought that such water would be used for such a purpose has been
proven false and the Revised EIR must now address this issue.

Specifically, the data regarding conversion from annual to permanent crops indicates that
crop patterns changed substantially within the county between 1996 and 2014. (Revised EIR at
7.6-13.) Nuts, citrus, and fruit—all of which are permanent crops—increased by 189%, 238%,
and 141% respectively in that time period in the KWBA participants' service area. (*Id.* at 7.6-7,
Table 7.6-6.) What the Revised EIR does not analyze is how much surplus water—water that
was formerly subject to Article 21(g)(1)'s restrictions—has been used to recharge the KWB, and 37
thus how much surplus water has been used to irrigate permanent crops. There can be no
question that, if Article 21(g)(1)'s restrictions applied to any amount of recharged water stored in
the KWB, growers using KWB water may have made different crop selection decisions. The
Revised EIR needs to include this data and then disclose and analyze the significant impacts that
resulted and will result from the removal of Article 21(g)(1)'s restrictions.

c. Surface Water and Groundwater Hydrology

The Revised EIR admits to possible groundwater depletion as a result of the operation of
the KWB, but concludes that this is only a potentially significant impact and that mitigation
makes it less than significant. However, the Revised EIR explicitly states that relevant 38
information needed to determine the significance of groundwater depletion on nearby water users
was not gathered, despite acknowledgement that some wells have and will become inoperable.
(Revised EIR at 7.1-33 and 10.1-19.) Moreover, the proposed mitigation measures only monitor
groundwater depletion and pay for the damage after the fact, rather than mitigate the actual 39
impact of a depleting groundwater supply. By rubber-stamping the mitigation measures already
agreed to from the settlement agreement with the Rosedale parties, the Revised EIR ignores any
possible alternatives that could avoid the significant impacts in the first place. The Revised EIR
must identify and analyze alternatives in addition to mitigation measures; that the trial court in 40
the Monterey Plus case found no fault with the Monterey Plus FEIR's alternatives does not
absolve DWR from satisfying CEQA with regards to newly-identified significant impacts.

i. Groundwater Depletion

1. Lack of Analysis Regarding Groundwater Depletion

The Revised EIR does not contain the information necessary to determine the significance of groundwater depletion by KWB activities. In the Surface Water and Groundwater Hydrology Section, the Revised EIR recognizes that KWB operations could potentially deplete groundwater supplies so that a lowering of the local groundwater table level would occur (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted). (Revised EIR at 7.1-33.) However, the Revised EIR does not analyze the significance that lowering the groundwater table will have on nearby water users. Instead, the Revised EIR asserts that whether KWBA's operations cause an impact that actually is significant at a specific agricultural or domestic well would depend on several factors, such as location of the well, depth of the well, operational depth of the pump, pump efficiency, and pumping rate. (*Id.* at 7.1-38.) The Revised EIR states that since this information for each well is not known, the specific potential impacts of KWB activities with respect to lowering of the local groundwater table at specific wells cannot be determined through modeling alone; the Revised EIR then makes no attempt to gather the necessary information to analyze the significant effects. (*Id.*) 41

In its analysis of past operations (1995-2014), the Revised EIR recognizes that KWB operations could lower the groundwater table up to fifty-five feet outside of KWB lands. (*Id.* at 7.1-34.) The Revised EIR notes that most private wells are perforated up to approximately 400 feet below ground surface ("bgs") and produce water at rates that meet domestic water use requirements.[12] (*Id.* at 7.1-38.) The Revised EIR estimates that KWB activities lowered groundwater levels to approximately 260 feet bgs at the end of 2007-2009 recovery period and to approximately 300 feet bgs at the end of the 2012-2014 recovery, which left approximately 100 feet of screened well below the water level. According to the Revised EIR, this would provide adequate flow to support operations at sufficient production rates for private wells. (*Id.*) The Revised EIR therefore concludes that KWBA operations are not expected to have a significant effect on operation of neighboring private landowner wells under historical low groundwater conditions except on those wells that are perforated to a depth less than 300 feet. (*Id.*) 42

The Revised EIR also recognizes that future activities will further deplete groundwater sources. In its analysis of future operations (2015-2035) under existing conditions, the Revised EIR reveals that KWB activities could lower groundwater levels to approximately 340 feet bgs at the end of the 2015 recovery period and to approximately 310 bgs at the end of the 2033-2035 recovery period. (*Id.* at 7.1-39.) This would leave only approximately sixty feet of screened well below the water level, and the Revised EIR again concludes that this provides adequate flow to support operations at sufficient production rates for private wells. (*Id.*) For its future analysis under build out conditions—in which 862 acres of recharge ponds will be developed including additional wells for pumping groundwater—the Revised EIR estimates that KWB activities lower groundwater levels to approximately 360 feet bgs at the end of the 2015 recovery period and to approximately 340 feet bgs at the end of the 2033-2035 recovery period. (*Id.* at 7.1-40.) 43

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[12] No data is provided for the assumption that most private wells are perforated up to approximately 400 feet bgs.

DWR states that this would leave approximately forty feet of screened well below the water level, and again concludes that this would provide adequate flow to support operations at sufficient production rates for private wells. (*Id.*) cont. 43

Thus, the Revised EIR acknowledges that KWB activities will deplete groundwater sources, but concludes that no matter how much depletion occurs there will be adequate flow to support operations at sufficient production rates for private wells; however, this conclusion is impossible without gathering information for each well that will be impacted, which the Revised EIR explicitly states has not been done. (See *Id.* at 7.1-38.) To the contrary, the Revised EIR presents evidence that indicates the groundwater depletion on private wells is significant and the flow is not adequate to support operations at sufficient production rates for private wells. Even more illuminating is the cumulative impacts analysis, which states that KWB activities "may cause groundwater levels to decrease such that some existing wells in an area immediately outside KWB Lands could become *inoperable*." (*Id.* at 10.1-19)(emphasis added.) The Revised EIR therefore recognizes that its activities may dry up nearby wells, but inexplicably states in its analysis that there will always be an adequate flow. 44

Evidence in the Revised EIR illustrates that groundwater depletion can be substantial enough to require landowners to make claims regarding significant groundwater impacts. (See *Id.* at 7.1-38) In 2014, KWBA and Rosedale developed and implemented an Interim Operations Plan ("Interim Plan") which designates measures to be employed to prevent, eliminate, or mitigate significant adverse impacts resulting from KWB and Rosedale project operations. (*Id.*) The plan requires the formation of a Joint Operations Committee ("JOC") that oversees implementation of the plan, including the establishment of a process to respond to and evaluate landowner claims associated with project operations including claims made prior to the Interim Plan. (*Id.*) The JOC sent letters in 2010 to those who made claims of groundwater impacts. (*Id.*) The letters alerted them to the potential for groundwater level declines to affect their wells and that the groundwater bank participants may be able to provide funds to help alleviate those impacts. (*Id.*) As of December 31, 2015, the JOC has evaluated claims made prior to the Interim Plan and has received twenty-one new claims from 2015. (*Id.*) Of the pre-Interim Plan claims, the JOC processed eight for payment and eight were rejected. (*Id.*) Of the 2015 claims, thirteen have been processed for payment and six have been rejected. (*Id.*) At this point, the JOC has authorized payments totaling approximately $447,800 as mitigation for the processed claims. (*Id.*) 45

This information directly contradicts the Revised EIR's claim that current groundwater depletion provides adequate flow to support operations at sufficient production rates for private wells; in fact, it reveals the opposite to be true: groundwater depletion is having a significant effect on nearby landowners, resulting in nearly half a million dollars expended to alleviate the harm caused by that depletion. The Revised EIR states that the money paid out was used to provide a permanent connection to a municipal water supply, lowering pumps in existing wells, and drilling deeper wells, and that any future impacts are less likely to occur because wells vulnerable to declining groundwater levels have already been permanently mitigated. (*Id.* at 7.1-39.) Claiming that the money was used to help fix certain vulnerable wells by no means proves that the problem has been permanently mitigated for those wells, especially considering that the Revised EIR predicts that future KWB activities will continue to lower the groundwater 46 table. Moreover, since information regarding specific wells in nearby communities is not provided, it is impossible to conclude that all vulnerable wells have been permanently mitigated and future impacts are less likely to occur. This is particularly apparent considering that more than half of the groundwater claims occurred *after* 2015. cont. 46

Lastly, payment is not adequate mitigation to make the problem less than significant: private landowners may prefer maintaining their water supply instead of losing water in return for payment. Even if one could argue that the mitigation is sufficient, without a proper analysis of alternatives, the public and decision-makers have no way of knowing whether the impacts could be avoided in the first place, without having to resort to costly and possibly insufficient mitigation measures. 47

The Revised EIR must fully analyze alternatives to and mitigation measures for KWB's impact on groundwater depletion, with the goal of doing more than merely paying people for the Project's harms after the fact. To accurately determine the significance of groundwater depletion on private wells, the Revised EIR must include information regarding those wells. The Revised EIR's conclusions that there is adequate flow for private wells and vulnerable wells are permanently mitigated are erroneous without more information on nearby wells. The information on nearby wells is not difficult to ascertain, and the Revised EIR's analysis of groundwater depletion is insufficient. 48

2. Lack of Analysis Regarding Subsidence Due to Groundwater Depletion

In addition, groundwater depletion could lead to the significant effect of subsidence, in which the land above groundwater begins to sink, causing permanent damage. (Exhibit N.)[13] Subsidence is a particular concern when annual crops change to permanent crops because there is less flexibility for farmers during droughts, causing them to increase groundwater pumping.[14] The Revised EIR mentions that KWB activities can potentially cause or contribute to subsidence as a result of groundwater extraction, but concludes that this impact is less than significant because no subsidence has occurred in the KWB area. (Revised EIR at 7.8-10 to 7.8-11.) Just because subsidence has not yet occurred in the KWB area does not mean that it will not occur in the future. The Revised EIR models show that groundwater depletion is occurring and will continue to occur, but the Revised EIR does not use those models to evaluate potential subsidence in the area resulting from continued and increased groundwater depletion. The Revised EIR must analyze the potential for continued groundwater depletion to cause subsidence in the KWB and surrounding areas, rather than relying purely on the observation that no subsidence has yet occurred. 49

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[13] Amy Quinton, *USGS Study: 1200 Square Miles of Central Valley Land is Sinking*, Capital Public Radio News (Nov. 22, 2013) ("[E]xcessive groundwater pumping causes [] subsidence."), http://www.capradio.org/articles/2013/11/22/usgs-study-1200-square-miles-of-central-valley-land-is-sinking/ (Attached as Exhibit N).

[14] *Id.* ("[T]he subsidence area has seen more row crops change to permanent crops. 'That has the effect of providing less flexibility for farmers when there are droughts because these permanent crops will need water during droughts … if you have row crops then perhaps fallowing the land during drought would be an option.")

3. Lack of Cumulative Impact Analysis Regarding the Aquifer Deficit and Groundwater Depletion

The cumulative impact analysis regarding the aquifer deficit and depletion of groundwater supplies is also woefully inadequate. Under the CEQA Guidelines, an impact is cumulatively considerable when the "incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines, § 15064, subd. (h)(1).) The Revised EIR identifies current water banking activities within the area and recognizes that KWB activities may have cumulative impacts on the net aquifer deficit as well as groundwater depletion; yet the Revised EIR only analyzes KWB activities, failing to analyze the impacts of the other current regional water banking activities or activities of other nearby water users. Without analyzing the impacts of the other water banking activities or water users, it is impossible to determine the significant cumulative impacts of KWB activities. 50

a. Aquifer

The Revised EIR fails to analyze the cumulative impacts KWB operations has on the aquifer used by the KWBA participants. In its cumulative impact analysis regarding whether KWB activities, in combination with regional and local water banking projects, could potentially deplete groundwater supplies so that a net deficit in aquifer volume of stored groundwater would occur, the Revised EIR simply reiterates what it said in its non-cumulative impact analysis. (Revised EIR at 10.1-19.) The Revised EIR claims that there will not be a net deficit in aquifer volume of stored water because at the end of 1995-2014 historical KWB modeled operations, there was an accumulated balance of about 617,000 AF of stored water. (*Id.*) This number is based on a model of past operations between 1995 and 2014, in which DWR estimated a recharge of 2,006,372 AF at the KWB facilities, and estimated a recovery of only 1,389,113 AF, resulting in a net balance of 617,000 AF. (*Id.* at 7.1-30.) However, this number is based only on a model of KWB facilities. No information is provided regarding the other identified operations that use the same aquifer, and thus it is impossible to determine cumulative impacts, even if KWB modeled a net accumulation in its own water use. 51

More importantly, the Revised EIR does not contain an analysis of the actual needs of the KWBA participants to extract water from the KWB lands for recovery under different hydrologic cycles. As explained above, there is a growing trend in converting annual crops into permanent crops, but no information is presented regarding how that change impacts the water demands of KWBA participants. There is no way to determine how changing trends in crop patterns resulted in the net balance of 617,000 AF in a twenty year period, and whether it can be assumed that the next twenty years will be similar to the 1995-2014 analysis. In relation to the cumulative impacts analysis, the Revised EIR does not identify the other water users who use the aquifer or their changing water demands. Without information about KWBA participants' and other aquifer users' water demands, the Revised EIR cannot determine whether KWB activities are having a significant cumulative impact. 52

b. Groundwater

The Revised EIR also fails to properly analyze the cumulative impacts that KWB activities have on the depletion of groundwater resources. In its cumulative impact analysis regarding whether KWB activities, in combination with regional and local water banking projects, could potentially deplete groundwater supplies so that a lowering of the local groundwater table level would occur, the Revised EIR again only reiterates what it said in its non-cumulative impact analysis. (Revised EIR at 10.1-19.) The cumulative impact analysis recognizes that KWB activities may decrease water levels such that some existing wells in an area immediately outside KWB Lands could become "inoperable."[15] (*Id.*) But the Revised EIR then gives similar reasoning for why it cannot determine whether the impact is actually significant: "whether the impact actually would be significant (i.e., substantial) would depend on several factors, including the specific field conditions and physical characteristics of the agricultural and domestic wells in the affected area." (*Id.*) The Revised EIR does not present any information regarding other agricultural and domestic wells in the affected area. The Revised EIR then makes the assumption that "all groundwater banks generally have similar operations: recharge when water supplies are available and recovery when water supplies are scarce." According to the Revised EIR, "numerous water banks adjacent to the KWB and in the same region would operate similarly and potentially result in an overall significant cumulative impact. Therefore, this would be a potentially significant cumulative impact." This is the extent of the analysis. 53

In the preceding groundwater analysis section, the Revised EIR recognizes that KWB activities *alone* will decrease the groundwater table; in fact, it will decrease so much that wells will become inoperable. This determination is made without analyzing other wells in the area or other water banking activities. If other water banking activities have similar impacts to KWB's activities, than it would presumably follow that many wells would become inoperable due to a severe depletion in groundwater. The Revised EIR identifies multiple other nearby banking projects, including the Pioneer Groundwater Recharge and Recovery Project; the Rosedale-Rio Bravo Water Storage District Groundwater Storage, Baking, Exchange, Extraction and Conjunctive Use Program; Rosedale-Rio Bravo Water Storage District/ID4 Joint-Use Groundwater Recovery Program; Rosedale-Rio Bravo Water Storage District/Irvine Ranch Water District Integrated Banking Project; and the West Kern Water District/Buena Vista Water Storage District Joint-Use Recharge Facility; however, the Revised EIR does not provide information regarding the amount of groundwater depletion caused by any of those other water banks. (*Id.* at 10.1-9 to 10.1-10.) The Revised EIR nonetheless assumes that the cumulative impact of KWB activities to groundwater depletion is only a potentially significant impact. 54

In order to determine the significance of the cumulative impact of KWB activities, the Revised EIR must analyze the rate at which other banking activities and other water users deplete the groundwater. Without providing this information, which should be feasible, the Revised EIR cannot determine the significance of the cumulative impact of KWB activities, and in turn cannot adequately identify necessary mitigation measures. 55

[15] It's worth noting that the Revised EIR recognizes wells will become inoperable, without evaluating the impacts of other regional or local water banks, but does not use the term "inoperable" in its preceding analysis of groundwater depletion.

4. Improper Mitigation Measures to Prevent Groundwater Depletion

The Revised EIR fails to adopt proper mitigation measures to prevent depletion of groundwater resources or make the impact less than significant. Agencies are required to adopt feasible mitigation measures in order to substantially lessen or avoid the otherwise significant adverse environmental impacts of proposed projects. (Pub. Resources Code, §§ 21002, 21081, subd. (a); CEQA Guidelines. §§ 15002, subd. (a)(3), 15021, subd. (a)(2), 15091, subd. (a)(1).) 56
Mitigation measures should be capable of: (a) "[a]voiding the impact altogether by not taking a certain action or parts of an action;" (b) "[m]inimizing impacts by limiting the degree or magnitude of the action and its implementation;" (c) "[r]ectifying the impact by repairing, rehabilitating, or restoring the impacted environment;" or (d) "[r]educing or eliminating the impact over time by preservation and maintenance of operations during the life of the action." (CEQA Guidelines, § 15370.) The Revised EIR must set forth mitigation measures that decision-makers can adopt at the findings stage of the planning process. (Pub. Resources Code, § 21100, subd. (b)(3); CEQA Guidelines, §§ 15126, subd. (e), 15126.4.)

Here, the Revised EIR's improper analysis of groundwater depletion and lack of cumulative impact analysis illustrate the deficiency of the proposed mitigation measures. The Revised EIR's mitigation measures include monitoring and reporting groundwater conditions; implementing proactive measures such as identifying at risk wells; providing mitigation and/or compensation for adverse impacts cause by KWB activities; reducing or adjusting pumping at 57
KWBA's option if necessary; and finding other suitable sources of water for a user who is adversely impacted. (Revised EIR at 7.1-49 to 7.1-54.) These mitigation measures do not avoid the impact, minimize the impact, rectify the impact by restoring the impacted environment, or reduce the impact overtime.

The Revised EIR merely commits to monitoring groundwater and essentially paying landowners when groundwater is depleted. The Revised EIR states that it will use a model to calculate a negative potential impact ("NPI") in which KWB operations deplete groundwater by at least thirty feet, but no commitment is made to mitigation measures other than KWBA 58
participants reducing pumping at its option and/or KWBA participants compensating well owners based on submission of a claim. These mitigation measures do not prevent or mitigate the depletion of groundwater identified in the Revised EIR, nor do they make the impacts of KWB operations less than significant. Rather, these mitigation measures are designed to pay-off nearby water users after depletion of groundwater has already occurred. Lastly, the Revised EIR states that "it is possible that a joint long-term agreement will be developed in the near future between KWBA, Rosedale, and the Pioneer Project for the coordinated implementation of a long-term banking operations plan that includes standards that address potential cumulative impacts of the participating water banks." (Revised EIR at 7.1-49.) Twenty years has passed in 59
which these agencies could have identified mitigation measures, and assuming that KWBA may enter into a future long-term agreement to prevent cumulative impacts falls far short of measures necessary to mitigate cumulative groundwater depletion.

5. Failure to Evaluate Alternatives

The Revised EIR fails to analyze any alternatives that could avoid or lessen the significant impacts of the project. An EIR must describe a reasonable range of alternatives to the project, or to the location of the project, that could feasibly attain most of the basic objectives of the project while avoiding or substantially lessening any of the significant effects of the project. (CEQA Guidelines, § 15126.6, subds. (a), (f).) Alternatives analyzed in the EIR need not be actually feasible, but rather need only be "potentially feasible." (CEQA Guidelines, § 15126.6, subd. (f)(1).) The Revised EIR identifies significant and potentially significant impacts from transferring the KWB, but does not include an analysis of any alternatives, relying completely on the alternatives analysis in the Monterey Plus FEIR, which provided four different variations of the "no project" alternative. That analysis fails to consider the significant impacts identified for the first time in the Revised EIR. 60

The Revised EIR recognizes that the KWB Transfer could result in a conversion of annual crops to permanent crops as well as a depletion of the groundwater table, but does not analyze alternatives that would avoid or lessen the harms caused by those impacts. For issues related to conversion of permanent crops that require a dependable water supply, the Revised EIR must evaluate an alternative that has safeguards for the use of surplus water to prohibit the creation of permanent economies, or limits the use of surplus water that could be used to create permanent economies. An evaluation of alternatives that limits surplus water for use in permanent economies would allow for adequate analysis of the project's impacts on the state water supply. Here, the Revised EIR evaluates no alternatives, ignoring the widespread conversion to permanent crops that has occurred because of the KWB Transfer. 61

The Revised EIR must also analyze alternatives that avoid or lessen the significant impacts on groundwater resources. The Revised EIR should analyze alternatives that require a certain amount of water to be recharged before recovery, or set limits on the amount of water recovered, to ensure reliability of groundwater and aquifer resources; as it stands, there are no actual limits to the amount of water that KWBA participants may withdraw, which the Revised EIR identifies has potentially significant impacts on the depletion of groundwater and net aquifer deficit. 62

6. Inadequate "No Project" Alternative

The Revised EIR must also update the "no project" alternatives based on the new data. The purpose of the "no project" alternatives is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. (CEQA Guidelines § 15126.6, subd. (e).) Due to the unique nature of this EIR, in which the project took place prior to approval, there is data in the Revised EIR that will allow decision-makers to make a more informed decision. 63

Here, the Revised EIR indicates that since 1995 there has been a substantial change in crop patterns, in which annual crops that are capable of being fallowed in dry years have been converted to permanent crops that require a dedicated water supply. That impact must be included in the "no project" alternatives to help decision-makers understand the impacts of approving the project. 64 The Revised EIR additionally recognizes that the KWB transfer resulted 65

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in a depletion of groundwater resources, and that data must be included in the "no project" alternatives. cont. 65

The lack of alternatives and the insufficient "no project" alternatives are clear deficiencies in the Revised EIR. 66

III. CONCLUSION

The Revised EIR is inadequate and based on incomplete analyses, lacks critical data, and ignores significant impacts. The Revised EIR's conclusions are erroneous and indicate DWR's failure to properly evaluate the impacts of transferring the KWB under CEQA. DWR must prepare an adequate EIR that evaluates the significant impacts identified, alternatives to avoid significant impacts, and proper mitigation. 67

Sincerely,

Ryan Berghoff
Center for Food Safety

Carolee Krieger
California Water Impact Network

Bill Jennings
California Sportfishing Protection Alliance

John Buse
Center for Biological Diversity

Dante Nomellini
Central Delta Water Agency

John Herrick
South Delta Water Agency

(Note: Only the main body of the CFS1 letter is shown above. The entire CFS1 letter, which includes more than 100 pages of exhibits, is presented in Appendix A.)

Response to Comment CFS1-1

The comment summarizes each organization participating in the comment letter including its nature and mission.

The comment is noted. No further response is required.

Response to Comment CFS1-2

The comment states that in 1991, in response to a drought, the Department reduced water deliveries to agricultural contractors to zero under Article 18(a) of the State Water Project Long-Term Contracts. Article 18(a) provided that in terms of short-term drought, water supplies to agricultural contractors would be cut before water supplies to urban contractors. The comment further states that a dispute then arose wherein the agricultural contractors considered invoking Article 18(b) of the long-term contracts, which provided that in the event of a permanent deficit in the SWP system, all contractors' entitlements would be reduced.

The Draft REIR makes no changes or revisions to the history or the administration of the long-term SWP water supply contracts or background. Therefore, no response to comment is necessary as the comment is outside the scope and content of the Draft REIR.

Furthermore, the comment does not raise an environmental issue related to the Draft REIR.

Response to Comment CFS1-3

The comment alleges that urban water contractors became dependent on "'paper water' (the difference between what was promised as 'entitlements' based on a proposed build-out of the SWP system that never occurred and what the SWP could actually deliver in any given year within the confines of the actually-built-out system) as proof of water supplies in order to approve development projects that would become dependent on SWP water deliveries." The comment further alleges that "a select group of urban and agricultural contractors secretly met with DWR representatives in Monterey, California, to hash out a compromise."

The Department disagrees with the commenter's interpretation and argument contained within this comment. See Response to Comment CFS1-2.

Response to Comment CFS1-4

The comment states that the underlying cause of the dispute between agricultural and municipal contractors over water deliveries was the Department's continued support for the alleged "paper water" entitlements contained in the long-term contracts and the Department's alleged "failure to consistently and properly invoke both Articles 18(a) and 18(b)." The comment further alleges that rather than "consistently applying Article 18(a)'s provisions during drought periods, which not only would have addressed both the agricultural and urban concerns but also brought the SWP system closer to a sustainable operation, the Monterey parties decided to toss out these essential checks-and-balances and to restructure the rest of the contracts. This agreement became known as the Monterey Agreement, and resulted in the Monterey Amendment to the State Water Project Long-Term Contracts."

The Department disagrees with the commenter's interpretation and argument contained within this comment. See Response to Comment CFS1-2.

Response to Comment CFS1-5

The comment states that in addition to deleting Articles 18(a) and 18(b), the Monterey Amendment also included a provision to transfer the KWB from the Department's control to control by KCWA, and then a second transfer to the KWBA. The comment alleges that the KWBA was "officially a joint project between private and public entities but in fact an entity majority-controlled by a single corporate agribusiness interest. As citizen watchdogs and activists have since repeatedly argued and demonstrated, the transfer was made in exchange for illusory consideration: primarily the bogus 'retirement' of 45,000 acre-feet of Table A water amounts held by some of the KWBA member entities."

The Department disagrees with the commenter's interpretation and argument contained within this comment. A response to a similar comment was provided in the 2010 Monterey Plus FEIR, Section 16.2.5, on pages 16-8 through 16-10. The Department concluded that the existence of a bank would have no effect on total deliveries to contractors averaged over the 73-year period of hydrologic record whether the bank was owned and operated by the Department or under local control. Furthermore, the same land would be involved for similar purposes – to store surplus water during years of abundant supply for extraction and use in dry years by developing a water and recharge facility.

The Draft REIR makes no changes or revisions to the history or the administration of the long-term SWP water supply contracts or background. Therefore, no response to comment is necessary as the comment is outside the scope and content of the Draft REIR. Furthermore, the comment does not raise an environmental issue related to the Draft REIR.

Response to Comment CFS1-6

The comment states that the Department purchased the KWB Lands in 1988 as part of a plan to develop a state-owned groundwater storage bank for the SWP, which was called the KWB. The comment further alleges that "[d]ue primarily to intransigence on the part of the KWBA (which had a legislatively-granted veto over any statewide water facility within its service area), full operation of the KWB stalled. With KCWA holding the KWB hostage, DWR capitulated, agreeing to hand over the valuable resource to the 'local' water interests as part of the Monterey Amendment."

The Department disagrees with the commenter's interpretation and argument contained within this comment. See Response to Comment CFS1-2.

Response to Comment CFS1-7

The comment provides a brief summary of the environmental documents and associated legal challenges related to the transfer, use, and operation of the KWB. The comment further alleges that "[t]he superior court ordered DWR back to the drawing board, at least regarding its review to the KWB Transfer,…"

The comment does not raise an environmental issue related to the Draft REIR. No further response is required. Nevertheless, please see Draft REIR, Introduction/Executive Summary, pages ES-1 and ES-2 regarding the history of the legal actions.

Additionally, the Department disagrees with commenter's assertion that "[t]he superior court ordered DWR back to the drawing board, at least regarding its review to the KWB Transfer,…" Please see specifically the Draft REIR, page ES-2, Section (3) which cites to the November 24, 2014 writ stating:

> "DWR shall revise the Monterey Plus EIR's project description to include the development, use and operation of the Kern Water Bank as a water banking and recovery project, and revise the Monterey Plus EIR as necessary to correct the CEQA error with respect to the analysis of the potential impacts associated with the transfer, development, use and operation of the Kern Water Bank as

a water banking and recovery project, as identified in the Court's Rulings on Submitted Matter (March 5, 2014)…"

Response to Comment CFS1-8

The comment states that "[t]he Revised EIR reveals that KWB operations resulted in significant environmental impacts that were not adequately described, analyzed, or properly mitigated."

The Department disagrees. All significant impacts described in the Draft REIR were adequately described, analyzed, and properly mitigated when feasible and within the Department's control. Thus, the Monterey Plus EIR fully disclosed all impacts caused by KWB operations. Further, the comment makes only a generalized conclusion and does not raise an environmental issue related to the Draft REIR. No further response is required.

Response to Comment CFS1-9

The comment states that "[t]he Revised EIR fails to analyze the significance that converting annual crops to permanent crops has on the water supply."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 2: Delta Impacts, Master Response 3: Article 21(g)(1), Master Response 4: Agricultural Resources Environmental Analyses, and Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-10

The comment states that the Draft REIR "fails to analyze the significant impact that groundwater depletion has on nearby water users and subsidence."

The Department disagrees. With respect to the KWB, the public was informed of the public comment period for the Draft REIR; no nearby water users submitted comments. The commenter also does not provide any evidence in support of the comment. See Master Response 5: Groundwater Depletion and Mitigation, for impacts and mitigation related to groundwater depletion. See Master Response 6: Land Subsidence, regarding impacts related to subsidence. Responses to Comments CFS1-38 and CFS1-50 present additional information.

Response to Comment CFS1-11

The comments states that "[t]he Revised EIR does not analyze any alternatives to avoid or lessen any of the newly-identified significant impacts of the project."

The Department disagrees. See Master Response 7: Project Alternatives.

Response to Comment CFS1-12

The comment states that the mitigation measures analyzed in the Draft REIR will not mitigate for newly disclosed (by the commenter) significant impacts with respect to crop conversion and its effect on water supply, groundwater depletion effects on nearby water users, and subsidence.

The Department disagrees. The Department analyzed and found all of these impacts to be less than significant, with the exception of temporary, short-term impacts from KWB activities with regard to groundwater elevations near the KWB during major recovery periods which is mitigated to less than significant (see Master Response 5: Groundwater Depletion and Mitigation. Therefore, there is no need to provide mitigation for these impacts. The appropriateness of mitigation proposed in the Draft REIR is addressed in Response to Comment CFS1-38.

See Master Response 1: Kern Water Bank and Crop Conversion, regarding impacts from crop conversion; Master Response 2: Delta Impacts, and Master Response 3: Article 21(g)(1), regarding water supply; Master Response 5: Groundwater Depletion and Mitigation, regarding groundwater depletion effects on nearby water users and mitigation; and Master Response 6: Land Subsidence, regarding impacts to subsidence.

Response to Comment CFS1-13

The comment summarizes several of the Guidelines for Implementation of CEQA ("CEQA Guidelines"), the CEQA statutes, and a conclusion from Sierra Club v. Board of Forestry (1994) 7 Cal.4th 1215, 1233 related to identification of and mitigation for significant environmental impacts.

The comment does not raise an environmental issue related to the Draft REIR. No further response is required.

Response to Comment CFS1-14

The comment states that "[t]he Revised EIR fails to analyze numerous significant effects including the conversion from annual crops to permanent crops facilitated by the KWB transfer."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-15

The comment states that the Draft REIR fails to analyze "the impacts of groundwater depletion on nearby water users, state water resources, and subsidence."

The Department disagrees. See Master Response 5: Groundwater Depletion and Mitigation, Master Response 6: Land Subsidence, and Response to Comment CFS1-50.

Response to Comment CFS1-16

The comment states that the Draft REIR fails to analyze the "cumulative impacts of KWB operations with other current water banking activities and other water users."

The Department disagrees. See Responses to Comments CFS1-38 and CFS1-50.

Response to Comment CFS1-17

The comment states that "[t]he Revised EIR also fails to identify feasible alternatives to avoid or lessen the significant impacts or properly analyze appropriate mitigation measures."

The commenter generally contends that the Department failed to properly analyze appropriate mitigation measures but does not specifically identify which mitigation measures are inappropriate.

The Department disagrees with the commenter's general contention and believes that appropriate mitigation measures have been proposed that have specific performance measures and meet CEQA requirements for adequacy.

Mitigation measures are proposed in the Draft REIR that reduce all impacts to less than significant, with the exception of KWB's storage and provision of a portion of the water supplies used for the Tejon Industrial Complex area and the Tejon Mountain Village, and resulting cumulative impacts. Since these development projects are subject to local government approvals, neither DWR nor KWBA have the authority to impose mitigation measures or alternatives available to reduce KWB's potential contribution to these significant and unavoidable impacts

See Master Response 7: Project Alternatives, for additional information regarding the lack of need to evaluate alternatives to the proposed project in this Draft REIR.

Response to Comment CFS1-18

The comment alleges that the Draft REIR is deficient for the reasons stated in comments CFS1-14 through CFS1-17.

The Department disagrees. See responses above to comments CFS1-14 through CFS1-17, respectively.

Response to Comment CFS1-19

The comment cites County of Inyo v. City of Los Angeles (1984) 160 Cal.App.3d 1178, 1185 ["CEQA requires an 'interactive process of assessment and responsive modification that must be genuine'"], and then alleges that "the entire environmental review process represented by the Revised EIR will be nothing more than a sham" on the premise that the Department has already made a decision to continue with the use and operation of the KWB before the appropriate environmental review has been prepared.

The Department disagrees. The Sacramento County Superior Court has severed the use and operation of the KWB from the remainder of the Monterey Plus project. (See Draft REIR, Executive Summary, page ES-1.)

Additionally, the Sacramento County Superior Court's October 2, 2014 Joint Ruling on Submitted Matters in the CDWA v. DWR, et al. cases (case numbers 34-2010-80000561 and 34-2010-80000703) states:

> "Invalidating the Project approvals is unnecessary and would throw the entire SWP into complete disarray, smack in the middle of one of the most severe droughts on record. The circumstances of this case do not warrant that degree of judicial intervention, especially where, as here, the SWP has been operating under such approvals for years while DWR prepared the EIR.
>
> However, while the court shall allow the Project approvals to remain in place on an interim basis pending preparation of an adequate EIR, the court's writ shall require DWR (as lead agency) and KWBA (as a responsible agency) to make a new determination regarding whether to continue the use and operation of the Kern Water Bank by KWBA, after compliance with CEQA." (Joint Ruling on Submitted Matters, p. 9.)

Consistent with the Court's direction, the Department will make a new determination regarding whether to continue the use and operation of the KWB following certification of the Final REIR.

Response to Comment CFS1-20

The comment states that the Draft REIR recognizes that KWB activities facilitate the conversion of annual crops to permanent crops but that the REIR erroneously concludes that this impact is not significant. The comment further states, "[a] shift in crop patterns caused by the Project, even if the Project's contribution is only cumulatively significant, almost certainly impacts the state's water supply, particularly as it relates *to groundwater depletion and Delta withdrawals, and the EIR must disclose and analyze this clearly significant impact."*

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 2: Delta Impacts, and Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-21

The comment disagrees with the significance thresholds used in the Draft REIR related to agricultural impacts, stating that "merely because a shift in crop patterns is not listed in Appendix G of the CEQA Guidelines does not relieve DWR of its duty to analyze other potentially significant effects." The comment alleges that the "Revised EIR identified a 'substantial' change in crop patterns, resulting in a shift from irrigated annual crops that can be 'fallowed in dry/critically dry years' to permanent crops that require a 'dedicated water supply'," citing to the Draft REIR at 7.6-13, and stating that the impacts of this conversion must be analyzed.

The Department disagrees. See Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-22

The comment cites to text contained in the Draft REIR at 7.16-12 ("KWB activities could…potentially convert irrigated farmland to orchards, which could cause other indirect effects"), and alleges that the Draft REIR failed to analyze any impacts related to the conversion of crops.

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, and 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-23

The comment states that, "Making unreliable seasonal water 'reliable' by storing it in a water bank and knowingly permitting that water to be used for permanent crops is a significant effect that obviously and logically requires analysis." The comment also cites statements from the Draft REIR regarding cropping pattern changes.

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 3: Article 21(g)(1), and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-24

The comment cites crop data contained in the Draft REIR in Section 7.6-7, Tables 7.6-5 and 7.6-6, and alleges that these data show "[t]here is a clear connection between the conversion of annual crops to permanent crops within Kern County and the KWB Transfer, and the Revised EIR must analyze the effects of this conversion."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-25

The comment provides crop acreage data that "illustrate the clear connection between the KWB Transfer and the region's conversion from annual crops to permanent crops."

The Department disagrees. The commenter cites their Tables 1 and 2 to show growth in almond acreage in Kern County. The tables are based on U.S. Department of Agriculture (USDA) data from 1982 to 2012 (USDA 2016b). These two tables are then compared to SWP water deliveries water and the commenter concludes that there is a correlation between the SWP deliveries and an increase in almond acreage. (see **Figures 4-1a, 4-1b, 4-2a, and 4-2b** based on USDA [2016b] and California Department of Food and Agriculture [2016]).

However, crop conversion from low value field crops to higher value permanent crops like almonds is occurring state-wide. **Figures 4-11a** and **4-11b** show annual plantings of almonds and total almond acreage for both Kern County and Statewide (USDA, 2016b; California Department of Food and Agriculture, 2016). There is a clear and identical pattern for both Kern County and the State**. Figures 4-12a** and **4-12b** show annual plantings and total almond acreage for the eight main almond-producing counties and Statewide (USDA, 2016b; California Department of Food and Agriculture, 2016). There is a clear and identical pattern for each of the counties and for the State as a whole. This is regardless of source of crop water: each county varies in type of water available for crop production and may include: groundwater pumping, surface water diversions from streams, and CVP and SWP water.

Also see Master Response 1: Kern Water Bank and Crop Conversion.

Response to Comment CFS1-26

The comment interprets crop acreage data to show the relationship between water delivered and planted acreages of almonds.

See Response to Comment CFS1-25, and Master Response 1: Kern Water Bank and Crop Conversion.

Response to Comment CFS1-27

The comment states that during a drought, KWB participants were able to maintain and plant new permanent crops, while others had to fallow their crops, and the Revised EIR failed to analyze that "a conversion to permanent crops—and in particular almonds—may significantly impact California's water supply."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion.

Response to Comment CFS1-28

The comment quotes from the Draft REIR at 7.6-14 ("KWB increases the reliability of water supplies to its participants … [and] it is possible that KWB activities could result in additional land being converted to permanent crops"), and states that the Department has a duty to analyze the effects of the conversion of crops in the KWBA participants' service area, even if such crop conversion was not facilitated by the KWB transfer.

As evidenced in the Draft REIR, Table 7.6-6, the project does not directly or indirectly cause conversion to permanent crops. Changes in farming practices in the KWB participants' service area are consistent with the county-wide trend and with a state-wide trend even in areas that do not depend upon water

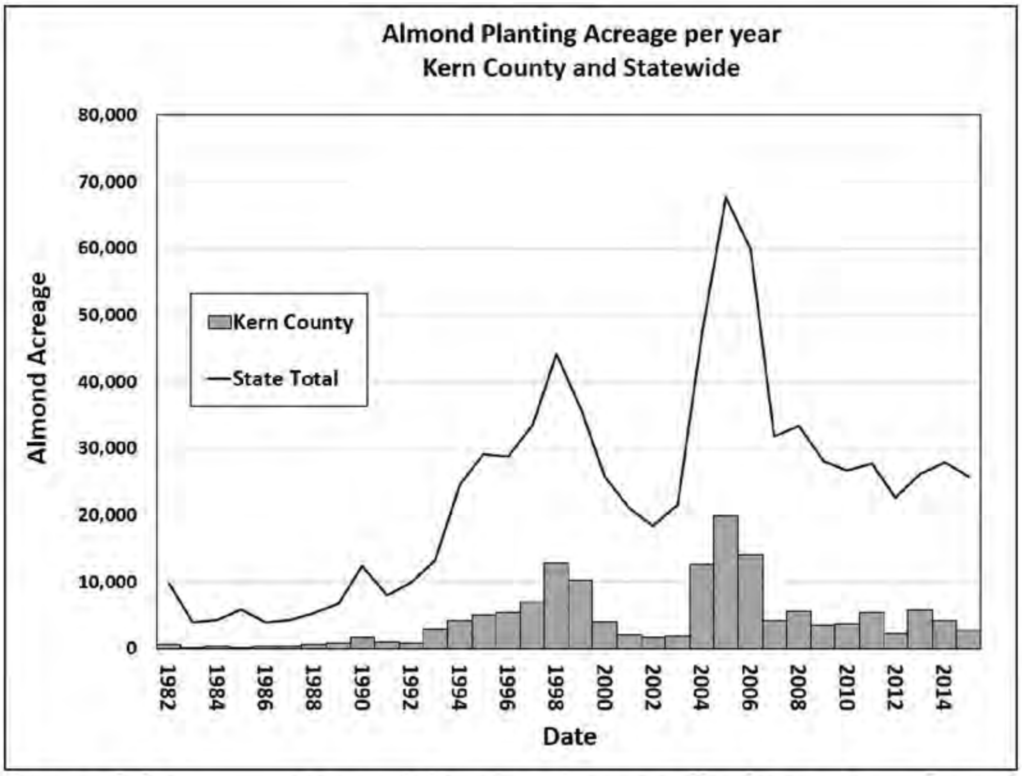

Figure 4.11a. Almond Planting Acreage Per Year, Kern County and Statewide

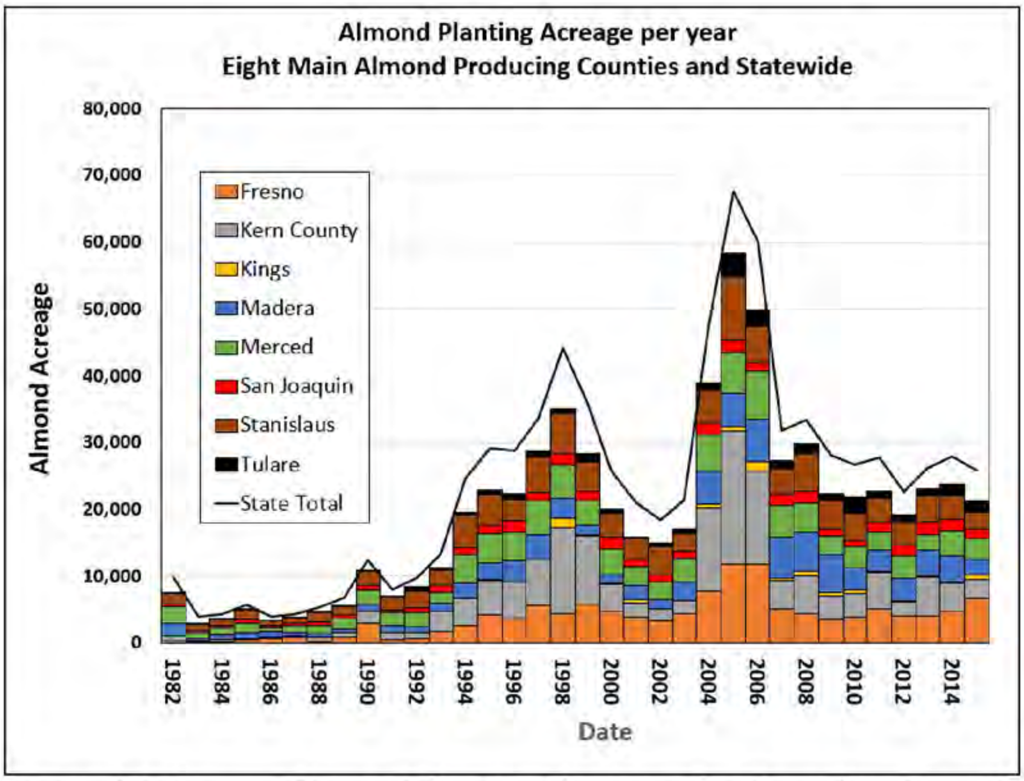

Figure 4.11b. Almond Planting Acreage Per Year, Key Counties and Statewide

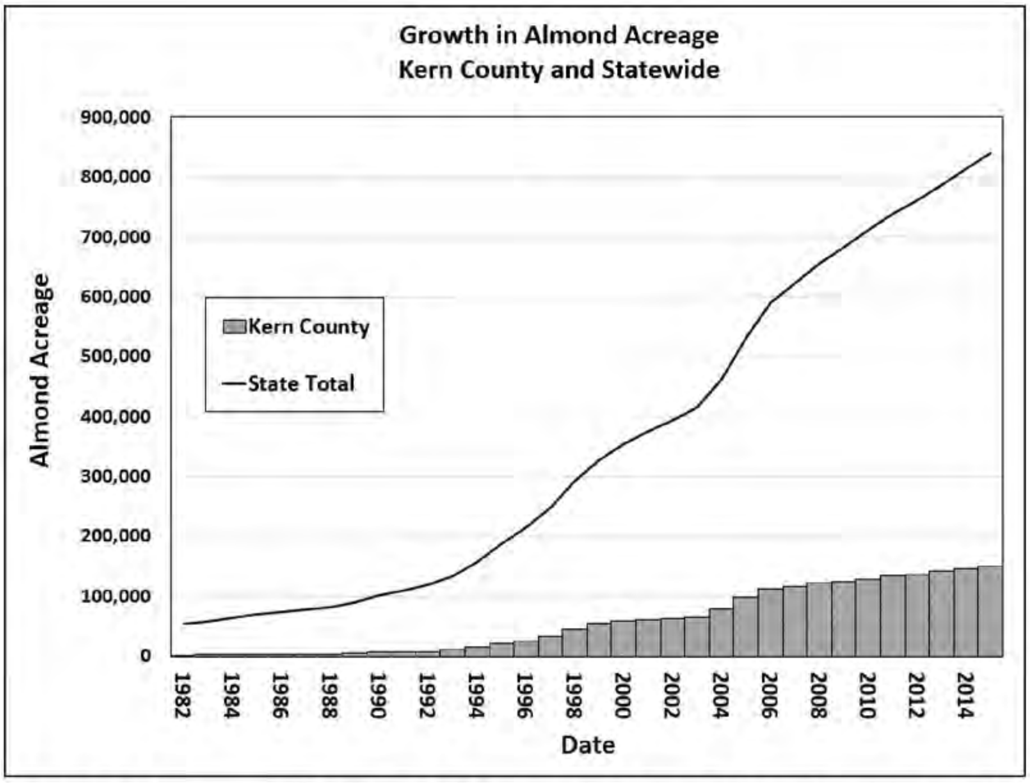

Figure 4.12a. Growth in Almond Acreage, Kern County and Statewide

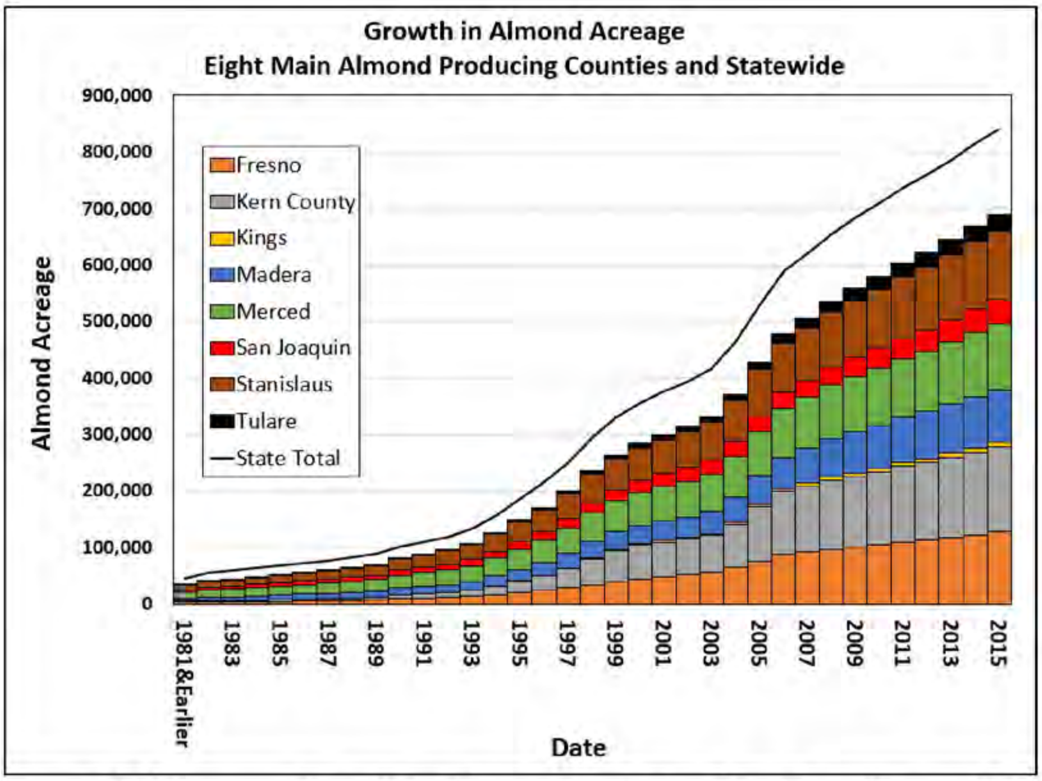

Figure 4.12b. Growth in Almond Acreage, Key Counties and Statewide

banks for water storage. The Department nonetheless analyzed the potential environmental effects caused by crop conversion from annual crops to permanent crops. Cumulative and indirect impacts of conversion from annual to permanent crops are analyzed in Draft REIR Chapter 10.1, Cumulative Environmental Impacts. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-29

The comment cites data contained in the Draft REIR at 7.6-7, Table 7.6-6, and contends that this data "shows that the gains in permanent cropland far exceeded the losses of annual cropland subsequent to the KWB Transfer." The comment also states "there has been a significant increase in almonds, and almonds are the fourth most water intensive crop in California." The comment further contends that "the Draft REIR identifies that groundwater resources may be depleted, but fails to analyze how a shifting to permanent crops may contribute to that depletion. (See Revised EIR at 7.1-33; see Exhibit M.)" Based on this information, the comment concludes that "[t]he Revised EIR clearly fails to analyze the significant effects that conversion of annual cropland to permanent cropland has on California's water supply."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 4: Agricultural Resources Environmental Analyses, and Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-30

The comment states that since "the Revised EIR recognizes that irrigated annual crops were converted to permanent crops, it must identify and analyze the impacts of that conversion to determine whether it is significant," citing an alleged summary of the court's position in Sierra Club v. Board of Forestry (1994) 7 Cal.4th 1215, 1233 that "CEQA compels government first to identify the significant environmental effects of projects, and then mitigate those effects through imposition of feasible mitigation measures or through selection of feasible alternatives."

See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses. Also see Master Response 5: Groundwater Depletion and Mitigation, regarding mitigation and Master Response 7: Project Alternatives, regarding alternatives.

Response to Comment CFS1-31

The comment states, "[t]he Revised EIR must determine whether there is any effect on the availability of water resources in the region and the flexibility of the water supply. We believe that the significance of this impact is obvious: by making the region's water supply seemingly more reliable, at least in the short term (since water bank withdrawals can be used to compensate for large drops in SWP deliveries during short-term droughts), the unfettered operation of the KWB hardens the demand for Delta water pumping. … It must ask whether permanent crops require greater amounts of water over time, and whether permanent crops have different impacts on water supplies than annual crops."

See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 2: Delta Impacts, Master Response 3: Article 21(g)(1), and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-32

The commenter first indicates that the Draft REIR must expand its analysis to consider impacts to the Delta caused by increased Delta pumping that has resulted from and will result from the KWB Transfer.

The Department disagrees. See Response to Comment CFS1-33 and Master Response 2: Delta Impacts.

Response to Comment CFS1-33

The comment states that the REIR must consider the Delta Plan and all likely mandated decreases in Delta Plan exports, and analyze what impacts that process will have on KWB operations, w alleging that since the KWB obtains most of its water from the SWP, the KWB is subject to Delta Plan requirements to specify decreases in exports from the Delta (including all areas served by export water).

It was proper for the Department to rely on its commitment to comply with applicable environmental laws to mitigate the Project's potentially significant environmental impacts. It was not necessary (or feasible) for the Department to propose additional mitigation measures on its own, separate from the existing regulatory scheme in the Delta. See Master Response 2: Delta Impacts, for further discussion of Delta impacts.

Response to Comment CFS1-34

The comment states that "the Revised EIR's analysis on agricultural resources, and in particular its analyses regarding the conversion of irrigated annual crops to permanent crops, is insufficient under CEQA."

The Department disagrees. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-35

The comment states that "new data" provided in the Agriculture section of the Draft REIR indicates that removal of Article 21(g)(1) from the baseline calculation was a significant impact that needs to be updated because Article 21(g)(1) "provided for the delivery of surplus water to SWP contractors, but explicitly limited this water to non-permanent uses: DWR was required to refuse the delivery of such water to the extent that it determined such delivery would tend to encourage the development of an economy within the area served which would be dependent upon the sustained delivery of surplus water. (Monterey Plus FEIR at 6.1-9.)"

The Department disagrees. See Master Response 3: Article 21(g)(1).

Response to Comment CFS1-36

The comment states that "[t]he Revised EIR's data regarding the conversion of annual crops to permanent crops in Kern County, including within the KWBA member agencies' service areas, proves that surplus water—both scheduled and unscheduled/interruptible water—has been and likely will be used for growing permanent agricultural crops. At its core, the development and operation of the KWB facilitates the use of surplus water as irrigation for permanent crops, which is exactly what the Monterey Plus FEIR admits Article 21(g)(1) was intended to prevent."

See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 2: Delta Impacts, and Master Response 3: Article 21(g)(1).

Response to Comment CFS1-37

The comment states that "[n]uts, citrus, and fruit—all of which are permanent crops—increased by 189%, 238%, and 141% respectively in that time period in the KWBA participants' service area," citing to the Draft REIR at 7.6-7, Table 7.6-6.)

The Department disagrees with the commenter's assertion that Draft REIR Table 7.6-6 shows that nuts, citrus, and fruit increased by 189%, 238%, and 141% in the KWBA participants' service area. Data in Draft REIR Tables 7.6-5 and 7.6-6 show that the acreage of nuts increased by 36% and the acreage of citrus and fruit each increased by 65% in Kern County. Furthermore, although the total acreage of nut crops in Kern County did increase, the KWB participants' total contribution to nut production countywide decreased from 35% in 1995 to 33% in 2015. See Response to Comment CFS2-6.

The comment further states that the Draft REIR should have analyzed how much surplus water—water that was formerly subject to Article 21(g)(1)'s restrictions—has been used to recharge the KWB, and thus how much surplus water has been used to irrigate permanent crops. See Master Response 1: Kern Water Bank and Crop Conversion, Master Response 2: Delta Impacts, Master Response 3: Article 21(g)(1), and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS1-38

The comment cites the Draft REIR at 7.1-33 and 10.1-19, and states that although the Draft REIR "admits to possible groundwater depletion as a result of the operation of the KWB, but concludes that this is only a potentially significant impact and that mitigation makes it less than significant. However, the Revised EIR explicitly states that relevant information needed to determine the significance of groundwater depletion on nearby water users was not gathered, despite acknowledgement that some wells have and will become inoperable."

The Department disagrees. The Department proposes, and KWBA has agreed, to establish a program that meets the following requirements in accordance with the Long-Term Project Recovery Operations Plan regarding the KWB (the Plan is Appendix 7-5c in the Draft REIR). The Long-Term Project Recovery Operations Plan includes but is not limited to, monitoring and reporting, operations management, and mitigation for negative potential impacts for both agricultural and domestic wells. See also Response to Comment CFS1-39 and Master Response 5: Groundwater Depletion and Mitigation.

The comment that the Draft REIR "explicitly states that relevant information needed to determine the significance of groundwater depletion on nearby water users was not gathered…" is untrue and not in context. The Department collected and analyzed relevant and available data to evaluate the impacts of the short-term groundwater declines on nearby water users. The Department collected well data during the model development and calibration process. There are 753 pumping wells specified in the DWR KWB Model that are distributed throughout the model domain as well as the area of potential impacts from short-term water level changes. Although every well is not included in the model, each area of wells is represented within the model by identifying an area of potential impact from water level changes where such wells may be present (see Draft REIR Section 7.1, Figures 7.1-19, 7.1-23, and 7.1-27; and Tables 7.1-5 to 7.1-7). Any well that is not included in the model database would be impacted in a manner similar to a neighboring well depending on its well screen depth.

Well construction data were evaluated from well driller reports near KWB's northern boundary where groundwater elevation decline exceeds 30 feet with KWB operations at any time step of the Draft REIR's model simulation period. These areas include the following: T29S/R25E sections 31 to 36, T30S/R25E sections 1 through 6, T29S/R26E section 31, and T30S/R26E section 6. The compiled well construction data are provided in **Table 4-1**. Table 4-1 shows that 28 of 32 wells (87.5%) are perforated to a depth of

400 feet below ground surface (bgs) or more, which clearly supports the Draft REIR assumption that wells are typically 400 feet or more deep in the project impact area. Table 4-1 also provides sufficient information to support the conclusion made in the Draft REIR that a large majority of wells in the affected area will have more than 40 feet of screened well below water to provide adequate flow to private wells because model simulation results indicate that groundwater elevations stay above 360 feet bgs for all scenarios.

TABLE 4-1

DEPTH OF WELLS IN AREAS NORTH OF KERN WATER BANK WHERE GROUNDWATER ELEVATION DECLINE EXCEEDS 30 FEET WITH KWB OPERATIONS

Well Identification	Year Drilled	Depth of Completed Well (feet below ground surface)	Depth to Top of Perforation (feet below ground surface)	Depth to Bottom of Perforation (feet below ground surface)
29S/25E-31F	1973	495	200	495
29S/25E-32	1991	610	460	610
29S/25E-32	1991	670	460	670
29S/25E-32	1974	500	250	500
29S/25E-32A	2003	605	271	605
29S/25E-32N	1974	505	250	505
29S/25E-33D	1974	450	225	450
29S/25E-33N	1974	402	204	402
29S/25E-35A	1972	400	200	400
29S/25E-35L	1977	600	300	600
29S/25E-36	1973	500	200	300
29S/25E-36	1975	484	200	483
29S/25E-36	1976	600	250	600
29S/25E-36	1977	400	220	400
29S/25E-36	1992	400	260	400
29S/25E-36H	1989	600	496	600
29S/25E-36J	1999	400	247	400
29S/25E-36N01	2001	602	452	602
29S/25E-36P	1973	300	200	300
29S/25E-36Q	1981	524	292	524
29S/26E-31B1	1977	300	150	300
29S/26E-3J1	1988	805	330	805
30S/25E-1A	1990	600	500	600
30S/25E-1A2	2002	400	300	400
30S/25E-2	1976	502	248	502
30S/25E-2H	1966	504	180	504
30S/25E-2K	1965	504	180	504
30S/25E-4	1973	600	300	600
30S/25E-4L1	N/A	700	250	700
30S/25E-5	1977	702	300	700
30S/25E-6	1977	701	0	400
30S/26E-6Q	1993	185	165	185

Consequently, it was not necessary to sample every well given the Department's data collection design methodology. Relevant information on a subsample of wells *was* gathered, which was an entirely appropriate method to assist in modeling and the determination of potentially significant effects.

The comment also refers to a statement in the Draft REIR, page 7.1-38, "Because all of this information for each well is not known, the specific potential impacts of KWB activities with respect to lowering of the local groundwater table at specific wells could not be determined through modeling alone." This statement is in reference to the scope of the method of analysis, which is complemented by field monitoring (as the information on a non-model well becomes available), reporting, and review process included in the mitigation measures. Again, even without data from every well, and using evidence based on available data sets, historic operations, and modeled future operations, the Department could and did make a finding with respect to a short-term and potentially significant impact on groundwater levels during prolonged recovery periods. The mitigation measures adopted to address any site-specific impacts from KWB activities apply to any well owner or user impacted by KWB activities.

See Response to Comment CFS1-50 for additional related information.

Response to Comment CFS1-39

The comment states that "the proposed mitigation measures only monitor groundwater depletion and pay for the damage after the fact, rather than mitigate the actual impact of a depleting groundwater supply."

The Department disagrees. There is no groundwater depletion. Short-term water level declines which have the potential to impact neighboring wells are mitigated by the Long-term Operations Plan. The Plan includes monitoring, reporting, providing alternative water supplies, improving wells, and changing KWB operations. See Master Response 5: Groundwater Depletion and Mitigation.

Further, the available evidence indicates that KWB's operations have had smaller contributions to impacts of shallow residential wells (i.e., wells screened at less than 300 feet bgs) than other nearby groundwater banks; KWB's contribution to those impacts was approximately 15 percent for claims filed through 2015; other groundwater banking operations caused approximately 85 percent of the impact to such wells. (Draft REIR, page 7.1-38.)

Response to Comment CFS1-40

The comment states that "[t]he Revised EIR must identify and analyze alternatives in addition to mitigation measures; that the trial court in the Monterey Plus case found no fault with the Monterey Plus FEIR's alternatives does not absolve DWR from satisfying CEQA with regards to newly-identified significant impacts."

The Department disagrees. See Master Response 7: Project Alternatives.

Response to Comment CFS1-41

The comment states that the Draft REIR Surface Water and Groundwater Hydrology section fails to properly evaluate the potential for depletion of groundwater supplies so that a lowering of the local groundwater table level would occur because it states that the level of impact would depend on several factors, such as location of the well, depth of the well, operational depth of the pump, pump efficiency, and pumping rate, and that the appropriate data was not obtained in order to model the impacts that might occur at each water user's specific well.

The Department disagrees. See Master Response 5: Groundwater Depletion and Mitigation, Response to Comment CFS1-38 regarding data, and Response to Comment CFS1-50 regarding overall groundwater impact analyses.

Response to Comment CFS1-42

The comment cites to data contained in the Draft REIR at pages 7.1-34 and 7.1-38 and notes that the Draft REIR concludes that KWBA operations are not expected to have a significant effect on operation of neighboring private landowner wells under historical low groundwater conditions except on those wells that are perforated to a depth less than 300 feet.

The comment is noted. No further response is required.

Response to Comment CFS1-43

The comment restates additional data in the Draft REIR regarding groundwater depletion and conclusions.

The draft REIR does not state that "future activities will further deplete groundwater." See Master Response 5, Groundwater Depletion and Mitigation.

Response to Comment CFS1-44

The comment states that conclusions in the Draft REIR regarding groundwater depletion are not possible since necessary data to support conclusions was not obtained.

The Department disagrees. The Department collected and analyzed relevant and available data to evaluate the impacts of the short-term groundwater declines on nearby water users. DWR's analysis indicated that there is no long-term decline in groundwater levels due to KWB operations and hence there is no long-term groundwater depletion; the impact on water wells is of short duration and mitigated by improving wells, providing an alternate source of water, or KWB operational changes. Furthermore, necessary data are available to support conclusions.

Furthermore, because KWB activities have been ongoing for more than 20 years, the Department had the unique ability to assess whether KWB activities actually caused significant impacts to groundwater wells, as opposed to merely forecasting and modeling whether KWB activities may have impacts. The real world data suggest that KWB activities have had relatively minor impacts to other groundwater wells, and that KWB's contribution to those impacts are relatively minor compared to the contribution of other neighboring groundwater banks (KWB's share of impacts was determined to be approximately 15% based on claims filed through 2015, while the other groundwater banks assumed approximately_85% responsibility.) (Draft REIR, page 7.1-38.)

In addition, KWBA and other neighboring groundwater banks have implemented permanent mitigation measures to address impacts to shallow groundwater wells in the vicinity, by deepening such wells, or hooking up residences to public water supply. To the extent that KWB activities contribute to lowering groundwater elevations in wells in the vicinity, it is reasonably expected that future impacts will be less because wells particularly vulnerable to declining groundwater wells have already been permanently mitigated. (Draft REIR, page 7.1-39.)

See Response to Comment CFS1-38, which discusses available data used in the KWB impact analysis, and Response to Comment CFS1-50, which discusses overall groundwater impact analyses.

Response to Comment CFS1-45

The comment restates information provided in the Draft REIR regarding the KWBA and Rosedale-Rio Bravo Water Storage District (Rosedale) Interim Operations Plan.

The comment is noted. No further response is required.

Response to Comment CFS1-46

The comment claims that evidence presented in the Draft REIR Surface Water and Groundwater Hydrology section shows that "groundwater depletion is having a significant effect on nearby landowners, resulting in nearly half a million dollars expended to alleviate the harm caused by that depletion." The comment further states "[c]laiming that the money was used to help fix certain vulnerable wells by no means proves that the problem has been permanently mitigated for those wells, especially considering that the Revised EIR predicts that future KWB activities will continue to lower the groundwater table."

The Draft REIR does not predict that "future KWB activities will continue to lower the groundwater table." See Master Response 5: Groundwater Depletion and Mitigation for further information.

Response to Comment CFS1-47

The comment states that "payment is not adequate mitigation to make the problem less than significant: private landowners may prefer maintaining their water supply instead of losing water in return for payment. Even if one could argue that the mitigation is sufficient, without a proper analysis of alternatives, the public and decision-makers have no way of knowing whether the impacts could be avoided in the first place, without having to resort to costly and possibly insufficient mitigation measures."

The Department disagrees. See Master Response 5: Groundwater Depletion and Mitigation, regarding mitigation; and Master Response 7: Project Alternatives.

Response to Comment CFS1-48

The comment states that the Draft REIR's analysis of groundwater depletion is insufficient because it must fully analyze alternatives to and mitigation measures for KWB's impact on groundwater depletion, and it must include information regarding private wells.

The Department disagrees. See Master Response 5: Groundwater Depletion and Mitigation, regarding mitigation; Master Response 7: Project Alternatives, regarding alternatives; and Response to Comment CFS1-38 and CFS1-50 regarding overall groundwater impact analyses.

Response to Comment CFS1-49

The comment states that groundwater depletion could cause subsidence. In part it states, "The Revised EIR must analyze the potential for continued groundwater depletion to cause subsidence in the KWB and surrounding areas, rather than relying purely on the observation that no subsidence has yet occurred.

The Department disagrees. First, the KWB will not deplete groundwater over the long term; see Master Response 5: Groundwater Depletion and Mitigation, and Response to Comment CFS1-50. Second, the KWB has not and will not cause subsidence; see Master Response 6: Land Subsidence.

Response to Comment CFS1-50

The comment states that the Draft REIR "identifies current water banking activities within the area and recognizes that KWB activities may have cumulative impacts on the net aquifer deficit as well as groundwater depletion; yet the Revised EIR only analyzes KWB activities, failing to analyze the impacts of the other current regional water banking activities or activities of other nearby water users."

The Department disagrees. The Department analyzed the cumulative impacts of KWB operations with other current water banking activities and other water users in many different ways in the Draft REIR as summarized in this response. In general, the Monterey Plus EIR impacts analysis was updated in the Draft REIR as follows:

> "by including past, present, and probable future water and other development projects that potentially could impact resources affected by KWB activities. The update includes: 1) using new information to update project status for projects relevant to KWB activities in the Monterey Plus EIR cumulative impact analysis, and 2) including additional projects related specifically to KWB activities such as water banking programs and projects in the Kern Fan area; regional and local development plans and programs; and related development projects in the city of Bakersfield and Kern County (Table 10.1-1)." (See Draft REIR, pages 10.1-1 and 10.2-2.)

More specifically, the Department made the Draft REIR's cumulative impact analysis, including the impacts of the other current regional water banking activities or activities of other nearby water users, a core focus of its groundwater and cumulative analyses as summarized below. This approach ensured that the impacts presented in the Draft REIR include and are based on the cumulative effects of existing regional water banking projects, activities of other nearby water users, and probable future water banking projects and development projects near the KWB. Moreover, Draft REIR Section 7.1, Surface Water and Groundwater Hydrology, contains more than 80 pages of technical analyses supported by two major technical appendices (Draft REIR Appendices 7.1 and 7.2).

1. DWR KWB Modeling Input Data. Cumulative impacts are included in the Draft REIR groundwater analyses through the baseline assumptions (see Draft REIR Section 7.1, Table 7.1-3) that were incorporated into the DWR KWB Model input files, including the historical recharge and recovery amounts of current regional water banking facilities, as well as the activities of nearby water users in terms of crop acreage, urban acreage, agricultural and urban pumping, surface water supplies, and imported water. In addition, probable future recharge/recovery projects that are in existing plans and other EIRs are also included in future scenarios.

Furthermore, the past, existing, and future water demands of KWB participants and other nearby water banks and development projects were also evaluated and included as necessary in the DWR KWB Model (see Draft REIR, Tables 7.1-1, 7.1-2, and 7.1-3, and Figures 7.1-1, 7.1-2, and 7.1-3 on Draft REIR pages 7.1-2 through 7.1-11; and Appendix 7-1, Kern Water Bank Study Area Physical Data Collection Technical Report and Appendix 7-2, DWR Kern Water Bank Model Results Technical Report). Several nearby water banks with appropriate input files and the water supply demands from 13 development projects (including the city of Bakersfield and Kern County General Plans) were used in the DWR KWB Model. Therefore, available quantitative data were used extensively in model development.

2. DWR KWB Model Scenarios. As described on Draft REIR pages 7.1-5 through 7.1-11, three modeling scenarios were developed to evaluate impacts of KWB activities under different levels of development (i.e., historic, existing conditions, and future build-out [2030] conditions). Extensive documentation of these scenarios is included in Appendix 7-2, DWR Kern Water Bank Model Results Technical Report. Consequently, a range of modeling scenarios including future buildout conditions in 2030 were evaluated.

3. DWR KWB Model Simulation Period. A 20-year hydrologic period (1995-2014), including wet and extended drought years, was used in the model runs. This period of record facilitates the evaluation of direct, indirect, and cumulative impacts over a range of hydrologic conditions representing both KWB recharge and recovery periods.

4. Kern Water Bank Historical Operations. Long-term groundwater level declines occur when the volume of groundwater pumped from an aquifer is greater than the volume of water recharging the aquifer over an extended period of time. KWB operations do not cause any long-term decline in groundwater levels because it only recovers up to 90% of the water that is delivered for recharged. The remaining 10% consists of 6% operational losses, including pond evaporation losses, and 4% preserved for overdraft protection for the benefit of the basin. Also, by using data spanning KWB operations, as well as nearby groundwater banks, the modeling and empirical analyses both incorporate local as well as regional projects and their hydrologic effects.

The KWB has historically been operated so that a significant volume of water has remained in the bank. In 2015, the bank had more than 600,000 AF of water stored in the aquifer (see Draft REIR Section 7, Figure 7.1-15). Historical operations also show that the number of years of recharge and recovery are more or less evenly distributed without any prolonged recovery period. Hence, there is no volumetric depletion of groundwater due to KWB operations even on a short-term basis. Similarly, results of the DWR KWB Model for future scenarios show no long-term groundwater declines and therefore, there is no aquifer depletion.

5. Evaluation of Empirical Well Data. Empirical data from KWB wells and nearby wells were evaluated and used to develop the impact analysis, impact conclusions, and mitigation. Draft REIR Appendix 7-1, Kern Water Bank Study Area Physical Data Collection Technical Report, is representative of the efforts made by the Department to collect, evaluate, and incorporate relevant water resources data into its modeling and impact analyses. See also response to CFS1-38.

6. Draft REIR Section 10.1, Cumulative Environmental Impacts. A total of 69 individual cumulative impacts were identified and evaluated in 52 pages of text in the Draft REIR, Section 10.1, Cumulative Environmental Impacts. More than 90 projects (some of which were included in the quantitative analysis for Chapter 7.1) were considered in a qualitative way in the Draft REIR cumulative impact analysis, including many probable future projects (see Table 10.1-1 on pages 10.1-3 through 10.1-6).

7. Growth-Inducing Impacts. Growth-inducing impacts (see Draft REIR, Chapter 8, Potential Growth-Inducing Impacts) were evaluated in concert with cumulative impacts. This 14-page analysis considered the effects of growth potentially resulting from KWB water to urban developments as input to Section 10.1, Cumulative Environmental Impacts.

Response to Comment CFS1-51

The comment states that the Draft REIR fails to analyze the cumulative impacts that KWB operations would have on the aquifer used by KWBA participants because "[n]o information is provided regarding the other identified operations that use the same aquifer, and thus it is impossible to determine cumulative impacts, even if KWB modeled a net accumulation in its own water use."

See Responses to Comments CFS1-38 and CFS1-50.

Response to Comment CFS1-52

The comment states that the Draft REIR "does not contain an analysis of the actual needs of the KWBA participants to extract water from the KWB lands for recovery under different hydrologic cycles. … Without information about KWBA participants' and other aquifer users' water demands, the Revised EIR cannot determine whether KWB activities are having a significant cumulative impact."

The Department disagrees. Regarding the first part of the comment, CEQA does not require an analysis of the needs of a project proponent or participants.

Regarding the demands of KWBA participants during hydrologic cycles, the DWR KWB Model included recharge and recovery under a wide variety of hydrologic conditions; the modeled hydrologic conditions, as well as data collected as input to the DWR KWB Model, included historic periods of drought and flooding over a 20-year timespan. Therefore, water use under different hydrologic conditions has been considered.

The past, existing, and future water demands of KWB participants and other nearby water banks and development projects were also evaluated and included as necessary in the DWR KWB Model (see Draft REIR, Tables 7.1-1, 7.1-2, and 7.1-3, and Figures 7.1-1, 7.1-2, and 7.1-3 on pages 7.1-2 through 7.1-11; and Appendix 7-1, Kern Water Bank Study Area Physical Data Collection Technical Report and Appendix 7-2, DWR Kern Water Bank Model Results Technical Report).

Significant impacts could readily be determined based on the substantial data collected and reviewed, model development and consideration of several scenarios, and use of water demands not only of KWB participants but nearby water users and development projects as well. See Responses to Comments CFS1-38 and CFS1-50 for further details.

Response to Comment CFS1-53

The comment states that the Draft REIR fails to properly analyze the cumulative impacts that KWB activities may have on the depletion of groundwater resources because the Draft REIR does not present any information regarding other agricultural and domestic wells in the affected area.

The Department disagrees. First off, there is no long-term groundwater depletion due to KWB operations as explained in Master Response 5: Groundwater Depletion and Mitigation. See Response to Comment CFS1-38 and CFS1-50 regarding the use of well data in the affected area.

Response to Comment CFS1-54

The comment states that the Draft REIR improperly assumes that the cumulative impact of KWB activities to groundwater depletion is "only a potentially significant impact" because the Draft REIR does not provide information regarding the amount of groundwater depletion caused by other water banks.

The Department disagrees. First off, there is no long-term groundwater depletion due to KWB operations as explained in Master Response 5: Groundwater Depletion and Mitigation.

See Draft REIR, Chapter 7.1, Surface Water and Groundwater Hydrology. See also Response to Comment CFS1-38, regarding the use of data in groundwater analyses. Also see Response to Comment CFS1-50, which addresses how other groundwater banking projects were included in the cumulative analysis. Also see Draft REIR Table 7.1-3.

Response to Comment CFS1-55

The comment states that "[i]n order to determine the significance of the cumulative impact of KWB activities, the Revised EIR must analyze the rate at which other banking activities and other water users deplete the groundwater. Without providing this information, which should be feasible, the Revised EIR cannot determine the significance of the cumulative impact of KWB activities, and in turn cannot adequately identify necessary mitigation measures."

The Department disagrees. The Department made the conclusion that the impact is potentially significant based its analyses presented in the Draft REIR. The Draft REIR DWR KWB Model included and analyzed other banking activities water demands; see Response to Comment CFS1-50.

Furthermore, the Department proposes and KWBA has agreed to establish a program that meets the following requirements in accordance with the Long-Term Project Recovery Operations Plan regarding the KWB (the Plan is Appendix 7-5c in the Draft REIR). The Long-Term Project Recovery Operations Plan includes but is not limited to, monitoring and reporting, proactive management, mitigation for negative potential impacts for both agricultural and domestic wells. See Master Response 5: Groundwater Depletion and Mitigation.

Furthermore, there is no long-term groundwater depletion due to KWB operations; see Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-56

The comment alleges that the Draft REIR fails to adopt proper mitigation measures to prevent depletion of groundwater resources or make the impact less than significant, citing to various portion of the CEQA statutes and the CEQA Guidelines.

The Department disagrees. The Department proposes proper, appropriate, and feasible mitigation measures to minimize the potentially significant impact of groundwater depletion to a less-than-significant level. See Master Response 5: Groundwater Depletion and Mitigation.

Also, there is no long-term groundwater depletion due to KWB operations; see Master Response 5: Groundwater Depletion and Mitigation. Therefore, there is no need for mitigation measures for long-term impacts. Modeling results also showed that KWB operations actually result in higher groundwater elevations in the majority of years over a wide area outside of the KWB (see Draft REIR Appendix 7-2, Figures 3.2-13, 3.3-11, and 3.4-11).

The last part of the comment merely restates the law. Thus, no response is required to that part of the comment.

Response to Comment CFS1-57

The comment alleges that the mitigation measures proposed in the Draft REIR on pages 7.1-49 to 7.1-54 related to depletion of groundwater "do not avoid the impact, minimize the impact, rectify the impact by restoring the impacted environment, or reduce the impact over time."

The Department disagrees. The Department has provided adequate information to support its conclusion regarding groundwater depletion impacts as well as adequate mitigation. See Master Response 5: Groundwater Depletion and Mitigation.

Furthermore, there is no long-term groundwater depletion due to KWB operations; see Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-58

The comment states that the Draft REIR's commitment to monitoring groundwater and "essentially paying landowners when groundwater is depleted" does not constitute mitigation measures that would prevent or mitigate the depletion of groundwater, nor do they make the impacts of KWB operations less than significant. The comment further alleges that these mitigation measures "are designed to pay-off nearby water users after depletion of groundwater has already occurred."

The Department disagrees with the comments. See Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-59

The comment states that the Draft REIR's assumption that "KWBA may enter into a future long-term agreement to prevent cumulative impacts falls far short of measures necessary to mitigate cumulative groundwater depletion."

The Department states in the Draft REIR at page 7.1-49, that "[i]t is possible that a joint long-term agreement will be developed in the near future between KWBA, Rosedale, and the Pioneer Project for the coordinated implementation of a long-term banking operations plan that includes standards that address potential cumulative impacts of the participating banks." However, because the Department has no authority over any joint long-term agreement, the Department did not make this joint long-term agreement a condition precedent to the mitigation proposed in Mitigation Measure 7.1-2.

Further, the Department states in the Draft REIR at page 10.1-19 as follows:

> "The impact of lowering groundwater elevations because of future KWB operations under the build-out (2030) level of development would be potentially significant. Consecutive years of recovery may cause groundwater levels to decrease such that some existing wells in an area immediately outside KWB Lands could become inoperable, thereby reducing short-term water supplies and adversely affecting land uses dependent on these supplies. However, whether the impact actually would be significant (i.e., substantial) would depend on several factors, including the specific field conditions and physical characteristics of the agricultural and domestic wells in the affected area (e.g., well location, operational depth of the well pump, pump efficiency, and overlying land use). All groundwater banks generally have similar operations: recharge when water supplies are available and recovery when water supplies are scarce. Consequently, numerous water banks adjacent to the KWB and in the same region would operate similarly and potentially result in an overall significant cumulative impact. Therefore, this would be a **potentially significant cumulative impact**." Mitigation Measure 7.1-2, the mitigation measure to which KWBA has committed, is adequate to mitigate the impact from KWB activities to less-than-significant levels, even if no further long-term agreement with other neighboring water banks is reached. Further, the Department has determined that Mitigation Measure 7.1-2 "would reduce the KWB's cumulatively considerable incremental contribution to the significant cumulative impact of a substantial depletion of groundwater supplies, or of substantial interference with groundwater recharge, to a less-than-considerable level." (Draft REIR Section 10.1, page 10.1-20.)

Also see Master Response 5: Groundwater Depletion and Mitigation.

Response to Comment CFS1-60

The commenter cites to Section 15126.6 of the CEQA Guidelines and states that "[t]he Revised EIR identifies significant and potentially significant impacts from transferring the KWB, but does not include an analysis of any alternatives, relying completely on the alternatives analysis in the Monterey Plus FEIR, which provided four different variations of the 'no project' alternative. That analysis fails to consider the significant impacts identified for the first time in the Revised EIR."

The Department disagrees. See Master Response 7: Project Alternatives.

Response to Comment CFS1-61

The comment states that "[t]he Revised EIR recognizes that the KWB Transfer could result in a conversion of annual crops to permanent crops as well as a depletion of the groundwater table, but does not analyze alternatives that would avoid or lessen the harms caused by those impacts."

The Department disagrees. The Department did not make a finding that conversion of annual crops to permanent crops was a significant adverse impact. Rather, the Department made several findings in the Draft REIR based on evidence that this impact was less than significant as a direct impact (pages 7.6-12 through 7.6-14), and as an indirect and cumulative impact on nine different resources (pages 10.1-29 through 10.1-47). Also see Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Regarding impacts to the groundwater table, the Department proposes, and KWBA has agreed, to establish a program that meets the following requirements in accordance with the Long-Term Project Recovery Operations Plan regarding the KWB (the Plan is Appendix 7-5c in the Draft REIR). The Long-Term Project Recovery Operations Plan includes but is not limited to, monitoring and reporting, proactive management, mitigation for negative potential impacts for both agricultural and domestic wells.

Also see Master Response 5: Groundwater Depletion and Mitigation, and Master Response 7: Project Alternatives.

Response to Comment CFS1-62

The comment states that "[t]he Revised EIR must also analyze alternatives that avoid or lessen the significant impacts on groundwater resources. The Revised EIR should analyze alternatives that require a certain amount of water to be recharged before recovery, or set limits on the amount of water recovered, to ensure reliability of groundwater and aquifer resources; as it stands, there are no actual limits to the amount of water that KWBA participants may withdraw, which the Revised EIR identifies has potentially significant impacts on the depletion of groundwater and net aquifer deficit."

The Department disagrees. The Draft REIR did not identify any significant impacts relating to groundwater declines (the commenter uses the term groundwater depletion) that were not mitigated to less-than-significant levels. See Master Response 5: Groundwater Depletion and Mitigation, and Master Response 7: Project Alternatives.

Response to Comment CFS1-63

The comment states that "[d]ue to the unique nature of this EIR, in which the project took place prior to approval, there is data in the Revised EIR that will allow decision-makers to make a more informed decision" and therefore alleges that Draft REIR must also update the "no project" alternatives based on the new data.

The Department disagrees. As noted within the *Central Delta Water Agency, et al. v. DWR, et al.*, Sacramento County Superior Court Case No. 34-2010-80000561, Ruling on Submitted Matter, March 5, 2014, at page 20, the Department included four "no project" alternatives in the 2010 Monterey Plus EIR.

The Department has already analyzed alternatives to the proposed project, which is the Monterey Amendment, including the transfer of the Kern Fan Element (KFE) Lands, and the Settlement Agreement, in the Monterey Plus EIR and does not need to re-analyze alternatives for purposes of the Draft REIR. See Master Response 7: Project Alternatives.

The transfer of the KWB Lands was a focus of the Monterey Plus EIR. The Superior Court in *Central Delta Water Agency v. Department of Water Resources* (Sacramento County Superior Court Case No. 34-2010-80000561) found that the Department's analysis of alternatives was adequate. The Draft REIR did not identify any new impacts or changes to impacts caused by the transfer of the KFE property; therefore, the Monterey Plus EIR fully disclosed all impacts caused by the transfer of the KFE property. Consequently, the Draft REIR focused on the development and continued use and operation of the KWB as a locally owned and operated groundwater banking and recovery project. (Draft REIR, pages ES-4 and ES-5).

Further, as explained in the Draft REIR, Introduction/Executive Summary, at page ES-4, there are no revisions to the other elements of the Monterey Amendment or of the Settlement Agreement, and no changes have been made relating to them in the Draft REIR.

Response to Comment CFS1-64

The comment states that since the Draft REIR indicates that there has been a substantial change in crop patterns since 1995, in which annual crops that are capable of being fallowed in dry years have been converted to permanent crops that require a dedicated water supply, that impact must be included in the "no project" alternatives to help decision-makers understand the impacts of approving the project.

The Department disagrees. See Response to Comment CFS1-63, and Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 7: Project Alternatives.

Response to Comment CFS1-65

The comment states that the Draft REIR "recognizes that the KWB transfer resulted in a depletion of groundwater resources, and that data must be included in the 'no project' alternatives."

The Department disagrees. To the contrary, the Department did not identify any new impacts or changes to impacts caused by the transfer of the KFE property. Thus, the Monterey Plus EIR fully disclosed all impacts caused by the transfer of the KFE property, and the Draft REIR fully discloses all impacts caused by the development and continued use and operation of the KWB. (See Draft REIR, Executive Summary, page ES-5.) Also see Response to Comment CFS1-63, Master Response 5: Groundwater Depletion and Mitigation, and Master Response 7: Project Alternatives.

Response to Comment CFS1-66

The comment states that "[t]he lack of alternatives and the insufficient 'no project' alternatives are clear deficiencies in the Revised EIR."

The Department disagrees. The Department's Draft REIR (which includes the 2007 Monterey Plus DEIR and 2010 Monterey Plus FEIR) fully complies with CEQA. See also Response to Comment CFS1-63 and Master Response 7: Project Alternatives.

Response to Comment CFS1-67

The comment states that "[t]he Revised EIR is inadequate and based on incomplete analyses, lacks critical data, and ignores significant impacts. The Revised DEIR's conclusions are erroneous and indicate DWR's failure to properly evaluate the impacts of transferring the KWB under CEQA. DWR must prepare an adequate EIR that evaluates the significant impacts identified, alternatives to avoid significant impacts, and proper mitigation."

The Department disagrees. The degree of specificity in the Draft REIR corresponds to the degree of specificity involved in the underlying activity described in the REIR (CEQA Guidelines Section 15146). Accordingly, a substantial level of analysis was conducted with respect to Surface Water and

Groundwater Hydrology (Section 7.1) and Surface Water and Groundwater Quality (Section 7.2), as specified by the Superior Court. Terrestrial Biological Resources (Section 7.4), Hazards and Hazardous Materials (Section 7.11), Growth-Inducing Impacts (Chapter 8), and Cumulative Environmental Impacts (Chapter 10) also involved a higher degree of specificity and technical detail.

The information contained in the Draft REIR included summarized technical data, maps, diagrams, modeling output, and similar relevant information sufficient to permit full assessment of significant impacts by reviewing agencies and the public (CEQA Guidelines Section 15147). Highly technical and specialized analyses and data were included in appendices (CEQA Guidelines Section 15147):

- Appendix E, Study of Transfer, Development, and Continued Use and Operation of the Kern Water Bank (Revised) (Appendix E-1),
- Kern Water Bank Study Area Physical Data Collection Technical Report (Appendix 7-1),
- DWR Kern Water Bank Model Results Technical Report (Appendix 7-2),
- Kern Water Bank Study Area Surface and Groundwater Quality Technical Report (Appendix 7-3), and
- Kern Water Bank Air Quality Model Results (Appendix 7-4).

Critical data are presented throughout the REIR, and particularly in the sections referenced above. Potentially significant and significant direct, indirect, and cumulative impacts are addressed for each environmental issue area. Feasible mitigation measures, with performance standards, are provided for all potentially significant and significant impacts, when such feasible mitigation measures are available. Project alternatives were evaluated sufficiently in the Monterey Plus EIR, and no feasible alternatives (or mitigation measures) are available to minimize significant and unavoidable impacts related to growth-inducing cumulative impacts.

4.3.5 CFS2 VERBAL COMMENTS AT FRESNO PUBLIC HEARING

FRESNO PUBLIC HEARING ON DRAFT REVISED EIR:
Verbal comments from: Center for Food Safety (CFS2), Dennis Fox (FOX3), Phillip Merlo (MERLO2)

CALIFORNIA DEPARTMENT OF WATER RESOURCES
PUBLIC COMMENT MEETING

MONTEREY AMENDMENT TO THE STATE WATER PROJECT CONTRACTS
INCLUDING KERN WATER BANK TRANSFER AND ASSOCIATED
ACTIONS AS PART OF A SETTLEMENT AGREEMENT,
MONTEREY PLUS

Wednesday, June 1, 2016
6:00 p.m. - 8:00 p.m.
Fresno, California
Woodward Park Library

Department of Water Resources:

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Wednesday, June 1, 2016; 6:00 p.m.

Woodward Park Library

MR. FAULKENBERRY: Good evening everyone. Thank you for coming. Thank you for taking time out of your busy day to attend this evening.

I would like to welcome you to the public comment meeting for the Monterey Agreement to the State Water Contracts and associated actions as part of the settlement agreement, Monterey Plus, Draft Revised Environmental Impact Statement Report.

My name is Kevin Faulkenberry. I'm with the California Department of Water Resources. I'm the chief of the South Central region office and the project manager for the Monterey Plus revised document that we're here to take comments on today. We are holding a series of meetings of which this is the first. The second one will be in Bakersfield, tomorrow night at five o'clock.

We'll be accepting both your written and oral comments here in a minute. As you can see, we have cameras in the room today. We're being filmed for potential use in an upcoming movie about water in California.

Be sure that when you come in, that everybody is signed in, or in respect to oral comments, please fill out a card. Karen has cards at the desk. Please fill out one of the cards and submit it to her. We'll take the cards and assemble them later on and then call your name out and ask you to give your oral comment one by one. You'll be given five minutes. We'll ask you to speak loudly, clearly, and slowly so that our reporter can record your comments.

We'll also be taking written comments. You can pick up sheets, also at the table where you came in. You can write -- you can write on those sheets and submit them to us today, or you can -- there's an address on them, and you can mail them in from home.

Everything that's happening today is being recorded and will be part of the admin record for the EIR. Just as an additional reminder, the public comment period ends June 13th, 2016. Comments on the EIR must be received by 5:00 p.m. on that day, at the address that's included on the written comment sheet that's over there on the table.

The EIR will be completed, and the administrative record collected on September 28th, 2016, and then we will be done with the document.

Now we can start with -- I don't know how many comment cards have been submitted at this point, for people who want to give oral comments.

We can stand up, you can do that. Why don't we do that? That way I know better. Thank you, John. We can go one by one. If you can stand up and introduce yourselves in the room so I have a better idea of who's here. That would be good. We'll start with you, sir.

MR. KEATS: Good morning evening. My name is Adam Keats, a senior attorney with the Center For Food Safety. I was the lead counsel on the lawsuit that precipitated this EIR, the Monterey Plus lawsuit. I'm here on behalf of my organization and the clients in that lawsuit, which I'm sure are familiar to the department. Thank you.

MR. FAULKENBERRY: Go ahead.

MR. VERKERK: My name is Robert Verkerk, I'm a consultant from here in Fresno. Just here because of my interest in water issues in California.

MR. FAULKENBERRY: Thank you.

MR. MERLO: Phillip Merlo. I'm a recent UC Berkeley graduate interested in the water law. I'm coming to check things out.

MR. FAULKENBERRY: Perfect, thank you.

Go ahead.

MR. PARKER: John Parker with Kern Water Bank.

PUBLIC COMMENT MEETING
CALIFORNIA DEPARTMENT OF WATER RESOURCES , Wednesday, June 01, 2016

MR. FAULKENBERRY: Thank you.

MS. HAYES: I'm Gene Hayes, representing Women's International League For Peace and Freedoms Earth Democracy Group.

MR. FAULKENBERRY: Sir, you in the back. Dennis --

MR. FOX: Dennis Fox. I'm involved in water. I'm with CALFED Watershed Work Group, and on the State Water Plan.

MR. FAULKENBERRY: Okay. Has everybody had a chance to fill out comment cards that are interested in commenting? We'll give you a little time to do that. Not everything has to be done immediately. We have until eight o'clock. So in case you guys missed in the beginning, I will not be -- there's not a presentation to be given here. We are accepting, again, oral and written comments only. So, again, this is a good time to get your cards in. We'll go through the stack and give you each five minutes to give your oral comments.

Is that all the cards? Is anybody else submitting an oral comment card? Raise your hand and let me know. We got two. That should be easy. All right.

We're going to start with Adam. You'll be the first one to speak. You get five minutes. Go ahead.

WOOD & RANDALL
(800) 322-4595

Say -- give your comments, and she'll record them for you.

MR. KEATS: Would you like me to do them from here? Sitting down?

MR. FAULKENBERRY: That's perfect. So everybody else can hear in the room. Make sure she can hear. She'll flag you if she can't. Speak as loud as you can, clearly, and slowly.

CFS2

MR. KEATS: Well, thank you. Thank you for having the hearing today. My name is Adam Keats, with the Center For Food Safety. I formally was at the Center For Biological Diversity, and I represent a number of organizations that sued back in 2010 on the earlier version of the Monterey Amendments, the second version of Monterey Amendments, EIR, the Monterey Plus EIR. As a result of that lawsuit, we won on one significant issue. The environmental review of the Kern Water Bank, and that is the review that we're here commenting on tonight. The EIR -- the revised EIR focused on the environmental impacts of the transfer, use, and operation of the Kern Water Bank as a water bank facility. 1

So I appreciate the opportunity to be able to comment. I appreciate the folks here that are here to witness -- the couple of folks here to witness democracy

in action. I understand -- you know, I'm hopeful that more folks will be submitting comments in written form. My organization will be also, and so tonight, I would 1
like to say a couple of things that we'll be following up in more detail in written comments at a later date before the deadline.

I think that the -- I would like to first say a word of commendation of DWR for -- and the CIR for acknowledging -- I think, perhaps, the most significant aspect and the most significant impact of the transfer of the Kern Water Bank, which is the conversion, the relationship, and the causal relationship that has to do with the conversion of huge swaths of agricultural land in Kern County and Southern San Joaquin Valley to permanent crops. 2

Back in 1995, 1996, and 1997 when this idea was hatched, and since then, we have implementing a extraordinarily significant policy change in California, regarding a massive change in land use that has shifted huge portions of the state and the agricultural capacity to an incredibly unsustainable form of ag related to almonds, pistachios, some citrus, some grapes. That's all been a result of this transfer of the Kern Water Bank from the State to the Kern Water Bank Authority and the other entities.

The EIR acknowledges that there is a potentially significant cumulative impact related to the transfer of the Kern Water Bank and that shift in crop patterns, but then, unfortunately, the EIR determines that impact is less than significant for a variety of reasons. And we take issue with those -- with that rational, and we hope that the department reviews that conclusion and goes back and does a more substantial and legally sufficient analysis of those impacts.

Number one, the EIR excuses its lack of analysis based on the absence of significant criteria in Appendage G of the guidelines. Appendix G is clear it's not an exhaustive list of significant criteria. We believe the shift in crop patterns from annual to permanent crops is an objectively permanent -- objectively significant impact that needs to be analyzed regardless of whether it's a significance criteria labeled in Appendix G or not. 3

Moreover, I think that the EIR -- the EIR runs, it tries hard to avoid any responsibility for that shift in crops. It says -- it basis -- it tries to place in context the shift in crop patterns on the Kern Water Bank service area within this broader context of what's happening in Kern County in general or what's happening in the county in general or the neighboring farms. 4

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And for context, in Kern County, we have the EIR discloses some very significant numbers. 1996, there was approximately 100,000 acres devoted to nut crops. In 2014, that number has risen to 302,000. Citrus rose from 41,000 to 64,000. Fruit, 93,000 to 143,000. These are percentage increases of 200 percent, 53 percent and 53 percent. These are extraordinary increases in this type of crop. They came with an extraordinary impact on water usage.

They were all -- the evidence, I think is there, they're all causal to the making of the Kern Water Bank go online, the decision to use it as a supplemental water supply for growers, specific growers that control the Kern Water Bank that were interested in profiting -- shifting their crop production to a high profit crop that required water year in and year out.

That impact and that -- that impact is significant and foreseeable. It was foreseeable then and obviously foreseeable now because it happened. We have the numbers.

The EIR should go -- the department should go back and change its analysis in the EIR and acknowledge that impact is significant and acknowledge the transfer of the Kern Water Bank's relationship to that conversion.

cont. 4

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Now, the EIR attempts to avoid that causal relationship by saying, "Well, this happened within, you know, all of Kern County." What the EIR does not reveal is who owns the Kern Water Bank, and what other properties in Kern County do they own? How many other -- how many other -- on fields and, you know, tree groves and crop land and all the rest of it, did the same member -- did the member entities of the Kern Water Bank Authority control outside of the Kern Water Bank service area, and what was the relationship of the rest of the county conversion permanent nut crops to permanent crops? 5

Those are just presented in the EIR as an abstract idea, and saying since it's happening everywhere else, we don't need to analyze it. Obviously, we had nothing to do with it. Moreover, to what extent was the Kern Water Bank Authority's -- one minute.

MR. FAULKENBERRY: I've given you a little more time.

MR. KEATS: I'm almost done. 6

To what extent was the Kern Water Bank Authority member service area, what percentage and what proportion of that was contributed to the overall county numbers? We did some numbers. We tried to do some work on numbers. The Kern Water Bank Authority participants alone, within Kern County, represented more than a quarter of the increase of nuts countywide between 1995 and 2014. Half of the increase in fruit and nearly all the increase in citrus. That's just within the Kern Water Bank Authority service area.

cont. 6

Now, again, what about the rest of the lands? Where are they getting their water, and why did they switch over to permanent crops, also?

7

We believe that the Kern Water Bank was the facilitator of a water use regime in Kern County that enabled both the member agencies within the Kern Water Bank Authority zone and member owners, the private owners, including Paramount Farms and their subsidiary and corollary and related companies that control a lot of land crop in Kern County and their affiliated and contractural related companies in Kern County. This is a dynamic process controlled by a few players in Kern County. They all had a concerted focused effort to convert the crop land in Kern County to an extraordinarily unsustainable permanent crop. That is has devastating impacts in our water supply in California.

8

All the impacts and all the analysis are completely absent from the EIR. We challenge you to go

9

4.3.6 FOX3 VERBAL COMMENTS AT FRESNO PUBLIC HEARING

back and look at those -- look at those numbers and look at those impacts, and do a proper environmental analysis of that incredibly significant matter. cont. 9

MR. FAULKENBERRY: Thank you. Thank you for your comment.

MR. KEATS: Thank you.

MR. FAULKENBERRY: All right. So the next person is Dennis.

Fox3

MR. FOX: The reason you have a hard time hearing me is I have driven up past the water bank, and all the dust has gotten to me.

Actually, it was very good. I don't know who wrote that. It was very extensive. 1

MR. FAULKENBERRY: Thank you.

MR. FOX: I have a lot of arguments what can be mitigated and what can't. I'm the great mitigator, they call me. It is -- I do take exception to a lot of it. There are impacts to the air, because without the water bank, it wouldn't be. 2 When they plow, the tumble weeds under, which also clog the canals, that it is causing -- they're just planting. Tumble weeds roll. They plant. So you're getting -- it's worse shape than what they are. I rather see goats and cows. They get rid of all that nasty stuff. 3

Some of the things that are primary and 4

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secondary, when the water bank went in, the State Water Project had enough water for the state at that time. Since then, the only thing that's been added has been the water bank. I haven't seen any Dos Rios sites or anywhere. So you have -- the supply is the same, but the demand is increased, and the water bank has increased demand. It's basic 101 Econ. cont. 4

So as it increases, so there is possibility to increase the state water supply, but because of that water bank and their -- the -- wanting an uncle to take care of everybody and the nanny thing, they whine enough. As you probably will see tomorrow, we have some world champion whining. It's called the Bakersfield Sound. We will not have guitars there, but you will like it.

The -- it has caused more on the west side, and I go along with Victor Davis Hansen of Fresno, who says they should abandon the west side because it's taking the water from the east side. You're using -- it has increased the demand. 5

What is going to happen, as I was wondering, is it is a Delta. You're taking water from one Delta to put in another, especially if San Luis meadows, which has been meadows for the last couple of years and not a reservoir, unfortunately, but if you can't store it 6

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there, you probably have to store it in the water bank, which will increase things. cont. 6

The water bank -- I would suggest you might start looking at wet stocking in the area, the oil companies invented that down there and great at it. The water people ought to do it, too. 7

The City of Bakersfield, which is buying -- which has hidden tax paying for most of this stuff, has a great urban water management plan, but they didn't do it. It was done for them, as usual, by the agency ID4, and I -- I do notice that partially treated sewage has been sent to these areas. Currently, they're doing it through soccer fields. It's going to percolate out. That is something to look at. I don't mind it as the water bank is being pumped out and City water is going over, and that's getting pumped out going to LA. I don't mind the sewage plant -- sewage water going down there, but they might not like it. We call it brain food. So that's something. 8

Also, the water bank has been operated as a private duck club for benefit of Phillimore, etc. It should be checked to make sure they're using the proper non-lead stuff. You're creating a situation down there, at the water bank and at the wildlife refuge with less water and getting partially treated sewage, setting up 9

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for one of those epidemics, avian cholera and botulism. That's something you should check with Fish and Game, keep on top of that. That -- it's possible, hopefully, to mitigate it. Those are -- I think one other -- oh, mainly it has to do with the -- I would say sociological and the health and safety issues when they ignored the West Nile virus situation. Just general health because it's a colonial situation. People who are operating it aren't there.

cont. 9

George and Alex and Tom and the other guys, Ben, we all thought that back in 1776, this was not the best situation. It definitely isn't. It's going to -- it is not good for -- it causes the whining. People who get the subsidies are not able to foresee things; therefore, that's when, I think, a major reason we're not going -- people are not looking at getting more water to various ways of getting water to the state. They're looking at getting other people's water. It sounds like something in Wall Street. The problem is OP water, other people water. I think that's about it.

10

Oh, subsidence. That is definitely a problem. Unless you guys can really pump that rock back up, you know? The storage capacity is going. The slabs I mentioned to cracking of slabs on houses, and if that is an issue or not, which I know -- I want to check in Taft

11

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cont.
11

and that area, as well as close to it.

12

The subsidence is going to be -- I think it's going to have an impact, also, on this river over here, about, what, a mile? Whether that's going to impact the flows and the geomorphism of the San Joaquin as it's already having problems with the Kern. It's not as -- it's a channel, not a river. Thank you.

MR. FAULKENBERRY: Okay. All right. Thank you.

MR. FOX: I have a lot of babble. I left it in the car, my notes.

MR. FAULKENBERRY: Thank you for your comments. So far, we have had two. I don't think we have anyone else. Have we received any other oral comment cards? So we'll go ahead and stay here and wait. We'll be here until eight o'clock, waiting for other comments; is that right? We still have a ways to go. That's a lot of time.

Thank you. Let me know if you want to comment. Like I said, please provide any written comments over here. Give them to Karen.

(Recess taken)

MR. FAULKENBERRY: Looks like we have another speaker. I'm just going to jot the name down.

Our next speaker is going to be Phillip Merlo;

4.3.7 MERLO2 VERBAL COMMENTS AT FRESNO PUBLIC HEARING

is that correct?

MR. MERLO: Yes.

THE COURT: Go ahead and start. You get five minutes plus.

Merlo2

MR. MERLO: My name is Phillip Merlo. I'm a recent UC Berkeley graduate. Interested in going into water law. Born and raised in Stockton. I go to a lot of different meetings for DWR and different water authorities and water districts in California, just to get interested, and the one thing I have realized over the course of the past six months while going to the different meetings, is the California water system is very interconnected.

So when you have something involving the Kern Water Bank, something as important as the Kern Water Bank, I feel it's important to actually have, for this particular meeting, there should have been outreach to different parties across the state. The Kern Water Bank drives exports in the Delta, which in turn drives the water system throughout the state.

So I guess I was just kind of interested -- I only heard of this from a friend. My boss knows Dennis. I thought that was kind of interesting that there was no public outreach. So I guess that's my comment. It's a little frustrating. 1

cont. 1

Cool. That's all I have to say.

MR. FAULKENBERRY: Thank you. Appreciate your comment.

STATE OF CALIFORNIA)
) ss.
COUNTY OF FRESNO   )

I, Bree Mervin, a Certified Shorthand Reporter for the State of California, hereby certify that I was present and reported in stenotypy all the proceedings in the foregoing-entitled matter; and I further certify that the foregoing is a full, true, and correct statement of such proceedings and a full, true, and correct transcript of my stenotype notes thereof.

Dated at Visalia, California, on Monday, June 13, 2016.

Bree Mervin, CSR No. 13057

4.3.8 CFS2 RESPONSES TO VERBAL COMMENTS

Center for Food Safety et al. Verbal Comments at Fresno Draft REIR Public Hearing (see pages 4-92 through 4-98)

Response to Comment CFS2-1

The comment summarizes the purpose of this EIR and notes that the Center for Food Safety will be providing further comments. (Note: Further comments are contained in letter CFS1 above.)

The comment is noted. No further response is required.

Response to Comment CFS2-2

The comment states that the Department has acknowledged that "the most significant aspect and the most significant impact of the transfer of the KWB, which is the conversion, the relationship, the causal relationship that has to do with the conversion of huge swaths of agricultural land in Kern County and the southern San Joaquin Valley to permanent crops."

See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS2-3

The comment states that the Revised EIR used Appendix G for its list of significance criteria and that it's not an exhaustive list of significance criteria, and "We believe the shift in crop patterns from annual to permanent crops is an objectively permanent – objectively significant impact that needs to be analyzed regardless of whether it's a significance criteria labeled in Appendix G or not. Conversion from temporary to permanent crops should be a significant impact; this should be a new threshold added to the EIR rather than using Appendix G checklist."

A shift from annual crops to permanent orchard and vineyard crops is not an environmental consequence in and of itself. Both are the results of direct human intervention in the landscape and outside the definition of the "natural" landscape typically evaluated in an environmental study. An environmental consequence may arise from how those changes then affect another environmental factor.

The Department analyzed the potential effect on the environment caused by a higher percentage of acreage served by the KWB participants being planted with permanent orchard crops than annual field crops. Those potential impacts were analyzed, as appropriate, in the relevant resource section. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS2-4

The comment summarizes acreages showing the increase in permanent crops and states that this "came with an extraordinary impact on water usage." The comment further states that the KWB participants shifted their crop production to a high profit crop that required water each year and that impact is significant and foreseeable, and recommends that the Department "...should go back and change its analysis in the EIR and acknowledge that impact is significant and acknowledge the transfer of the Kern Water Bank's relationship to that conversion."

See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS2-5

The comment states the Revised EIR does not reveal who owns the KWB and that conversion to permanent nut crops occurred within the KWB service area and beyond, and was responsible for the conversion to permanent nut crops beyond the KWB service area in Kern County.

The participants in the KWBA joint powers agreement are identified in Draft REIR, Appendix E (Revised), page E-18, Table 3. See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses regarding conversion of permanent nut crops.

Response to Comment CFS2-6

The comment states, "To what extent was the Kern Water Bank Authority member service area, what percentage and what proportion of that was contributed to the overall county numbers."

Tables 7.6-5 and 7.6-6 in Draft REIR Section 7.6, Agricultural Resources, show the acreages of nuts, citrus, fruit, seed, field, and vegetable crops in Kern County and the acreages of the same crops in the KWB participants' service area from 1995-2015. **Table 4-2** below provides a comparison of the total acreage of each crop in Kern County with the total acreage of each crop in the KWB participants' service area, and shows KWB participants' percent of Kern County land in crop types, 1995 to 2015.

TABLE 4-2

AGRICULTURAL ACREAGE IN KERN COUNTY COMPARED TO KERN WATER BANK PARTICIPANTS' SERVICE AREA*, 1996-2015

Crop Type	Total Crop Acres in Kern County (1996)	KWB Participants' Acreage in Kern County (1995)	KWB Participants Percent of Total Crop Acres (1995)	Total Crop Acres in Kern County (2014)	KWB Participants' Acreage in Kern County (2015)	KWB Participants Percent of Total Crop Acres (2015)
Nuts[1]	98,756	34,867	35	302,694	100,767	33
Citrus[2]	41,745	7,321	17	64,234	24,763	38
Fruit[3]	93,111	15,631	17	143,380	37,727	26
Seed[4]	2,257	0	0	1,550	0	0
Field[5]	538,648	98,961	18	298,843	11,070	4
Vegetable[6]	92,486	15,717	17	66,450	4,500	7
Total	**867,003**	**172,497**	**20**	877,151	**178,827**	**20**

Notes:

* The Kern Water Bank participants' service area consists of lands served with KWB water: Dudley Ridge Water District in Kings County, and Semitropic Water Storage District, Westside Mutual Water Company, and Wheeler Ridge-Maricopa Water Storage District in Kern and Kings Counties.

1. Nut crops consist of almonds and pistachios.
2. Citrus crops consist of grapefruit, oranges, lemons, and tangerines.
3. Fruit crops include apples, apricots, grapes, bush berries, and tomatoes.
4. Seed crops include cotton seed; alfalfa and wheat seed; and vegetable seed, including cabbage, carrots, lettuce, onion, and potatoes.
5. Field crops include alfalfa, beans, corn, cotton, and safflower.
6. Vegetable crops include asparagus, broccoli, cabbage, carrots, garlic, lettuce, melons, peppers, and onions.

Sources: Kern County Dept. of Agriculture and Measurement Standards, 1996, 2014; Insight Environmental Consultants 2015; data compiled by GEI Consultants, Inc. 2016.

The comment further states that KWB participants within Kern County "represented more than a quarter of the increase of nuts countywide between 1995 and 2014, half of the increase in fruit, and nearly all the increase in citrus countywide."

The commenter does not provide a source for this comment. As shown in Table 4-1, between 1995 and 2015, KWB participants within Kern County did represent more than a quarter of the increase of nuts; however, it should also be noted that while the total acreage of nut crops increased, the KWB participants' total contribution to nut production countywide **decreased** from 35% in 1995 to 33% in 2015. Furthermore, the countywide contribution of the KWB participants in 2015 represented less than half of the increase in fruit, and only one-quarter of the increase in citrus.

See also Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses.

Response to Comment CFS2-7

The comment states, "Now, again, what about the rest of the lands? Where are they getting their water, and why did they switch over to permanent crops, also?"

See Master Response 1: Kern Water Bank and Crop Conversion.

Response to Comment CFS2-8

The comment states that the KWBA participants and private owners, "…including Paramount Farms and their subsidiary and corollary and related companies that control a lot of land crop in Kern County and their affiliated and contractual related companies in Kern County" facilitated a "…concerted focused effort to convert the crop land in Kern County to an extraordinarily unstainable permanent crop" that is having devastating impacts to California's water supply.

The Department recognizes that Paramount Farms owns significant crop land in Kern County. However, the statement is unsupported and there is no evidence that the permanent crop is "extraordinarily unsustainable." See Master Response 1: Kern Water Bank and Crop Conversion for further context.

Response to Comment CFS2-9

The comment states, "All the impacts and all the analysis are completely absent from the EIR. We challenge you to go back and look at those – look at those numbers and look at those impacts, and do a proper environmental analysis of that incredibly significant matter."

The commenter's statement that impacts and analyses regarding crop conversions are completely absent from the Draft REIR are incorrect. The Draft REIR Section 7.6, Agricultural Resources, discusses the crop conversion issue extensively in Section 7.6.2, Environmental Setting, and in Section 7.6.3, Impacts and Mitigation Measures. Additionally, potential indirect and cumulative impacts related to conversion of annual crops to permanent crops are discussed as follows:

- Impact 10.1-40 on special-status terrestrial species (pages 10.1-29 and 10.1-30),
- Impact 10.1-42 on visual resources (pages 10.1-31 and 10.132),
- Impact 10.1-44 on agricultural resources (pages 10.1-33 and 10.1-34),
- Impact 10.1-48 on air pollutant emissions (pages 10.1-36 and 10.1-37),
- Impact 10.1-53 on soil erosion (page 10.1-39),

- Impact 10.1-56 on land use patterns (page 10.1-41),
- Impact 10.1-60 on noise levels (page 10.1-43),
- Impact 10.1-62 to cultural and paleontological resources (page 10.1-45), and
- Impact 10.1-65 on traffic (pages 10.1-46 and 10.1-47).

Also see Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 4: Agricultural Resources Environmental Analyses, for further information.

4.3.9 FOX1 LETTER AND RESPONSE

FOX1

Karen Dulik, DWR
23374 E Shields Ave.
Fresno, Ca 93726

Subject: DREIR Commentary

There are both primary and secondary impacts to the current operation of the Kern Water Bank:

- The area is a de facto private duck club: the same owner has been depleting the water at Kern National Wildlife preserve by the abutting land conversion and pumping. Is this also a factor at the water bank and a precursor to avian cholera or other diseases? 1
- Is this also a operational impact at other public or private duck clubs in the area?
- There has been cracking of the slabs at homes near Taft, is the subsidence caused from the water bank and other of the owners properties a contributing factor. 2
- Does the subsidence geomorphically impact the attempts to restore flows to the San Joaquin and salmon restoration? 3
- The refusal to Spray resulted in deaths which the current owner is responsible, though sneaking this into a County cost, does not this still evince a tendency to disregard the Health and Safety of the local population? 4
- The Migrating water into the Water Bank from areas such as the City and Rosedale are causing shortages. Does not the fact of Rosedale's going dry not constitute a Health and Safety issue? 5
- Does not the corruption that the current situation as to State and Local governments constitute a resulting health issue in the creation of what the LA TIMES has termed third world environments? Does the euphemism of underserved communities alleviate the problem? 6
- The focus on acquiring supplies from other areas to what may best be termed an aquatic parking lot and thus does it divert focus from acquiring "new" water such as retrofitting reservoirs to increase their capacity or addressing the ET loss? Does the Department even have personnel in decision positions aware of such possibilities or are they made to focus on deferring to the Banks operator? It is one or the other. 7
- Would not the State Pay in lieu fees to the County which is providing services , including the spraying, while being stiffed on taxes being paid by the Owner? 8
- Of course there are impacts up stream to the areas from which the water is taken. How can the Department justify the economic impacts, let alone the environmental ones, to these areas? 9
- The Water Bank is a weed reservoir spreading them to other areas and even clogging the aqueduct and canals. Discing tumbleweeds does a good job of planting and finally using cattle for grazing may be cheaper than goats ,but is it more efficient ? 10
- The problem of legacy oil sumps and spills etc might just be interesting to look at. Does the Department consider this worthwhile? 11
- Would not it be cost effective and environmentally to not pump the water over the transverse range but halt the water at the Water Bank if a public entity and use desalinization in the LA area?. 12
- What is the amount of hydropower used for pumping and how much water is then used for power production that is not conjunctive and thus a negative to Statewide water availability? 13

Dennis G. Fox
918 Blossom St.
Bakersfield, CA 93306

Board of Supervisors,
County of Kern
1115 Truxtun Ave
Bakersfield, CA 93301

Water Board
City of Bakersfield
1000 Buena Vista
Bakersfield, CA 93312

Subject:; Groundwater Authorities

Mister Chairmen, Board Members and other Locals:

When asked about relationships with other agencies, the Paramount manager , who was also the Water Bank manager and chair of a Kern water marketing committee stated: "...we certainly aren't going to let the locals tell us what to do"- a policy that has continued:

- Paramount's properties pay no taxes to the cash strapped local's governments including the 23,000 acre water bank, the mile long plant at Lost hills and its industrial and logistic parks.
- Though" the locals" owning property are taxed for Paramount's benefit, its satraps recently were irate that it would have to pay transfer fees for its acquisition of local water at nominal cost.
- Water supplies and availability for "the locals" have been curtailed when local water has migrated to the Water Bank- replacing water mined and exported. 14
- When the Water Bank received water releases from Isabella Reservoir, spraying was deemed too expensive and fought in court the year that "the locals" led the State in West Nile Virus cases and deaths.

Representatives of the locals ought now consider whether to continue this colonial system in light of the following:

- Locals who acquire knowledge of the above, from media more independent that that locally, may be less co-operative in conservation measures they see saving water for an external entities benefit.
- The negative impacts to local M&I groundwater resources 15
- The limitation of water imports to the local area from such areas who rely on it for their different type of agriculture, which is not obsessed with farming taxpayers, and loathe seeing their water taken for resale. 16

Sincerely,

Dennis Fox
918 Blossom St.
Bakersfield, CA 93306

(661) 366 4093

Response to Comment FOX1-1

The comment states that the area is a de facto private duck club, and the same owner has been depleting the water at Kern National Wildlife preserve by the abutting land conversion and pumping. The comment asks whether this is also a factor at the water bank and a precursor to avian cholera or other diseases, and whether this is an operational impact at other private duck clubs in the area.

As discussed in Draft REIR Section 7.9, Recreation, on page 7.9-3, KWBA has offered limited private hunting of dove, quail, and waterfowl since 1998 for generally 20 or fewer hunters who obtain permits from KWBA. The limited nature of duck hunting on KWB lands does not constitute a “de facto private duck club.”

The Kern National Wildlife Refuge is located approximately 30 miles northwest of the KWB. KWB operations are entirely unrelated to the refuge. KWB “With KWB Operations” modeling runs indicate that there would be less than 5 feet of negative differences (“With” minus “Without” KWB Operations) within approximately 15 miles of the KWB in all modeled scenarios (see Draft REIR Figures 7.1-18; 7.1-22, 7.1-26). The refuge is too far away from the KWB to experience water level effects from the KWB. Therefore, KWB operations do not deplete or affect water levels at the Kern National Wildlife preserve.

Created wetlands may produce infectious disease outbreaks. Appendix 7-7d presents the KWB HCP/Natural Community Conservation Plan (NCCP) Kern Water Bank Waterbird Management Plan. Page D-5 of the appendix states, “Water deliveries to the KWB are not suspected to promote avian diseases because of high infiltration rates which result in rapid water turnover and because of the cool temperatures of the recharge water.” Page D-6 of the appendix presents recommended measures as needed to monitor the presence of, and minimize any impacts from, waterfowl diseases. Outbreaks of waterfowl diseases such as avian cholera or avian botulism have not been an issue on KWB Lands. Mitigation Measure 7.4-3 includes Appendix 7-7d. The Draft REIR concludes that with this mitigation measure, impacts to terrestrial species, including impacts from waterfowl diseases, are determined to be less than significant at the KWB. Since KWB operations are not known to cause waterfowl diseases, there would be no effect at any other duck clubs in proximity to the KWB.

Response to Comment FOX1-2

The comment states, “[t]here has been cracking of the slabs at homes near Taft, is the subsidence caused from the water bank and other of the owners properties a contributing factor.”

The Department disagrees. Any potential subsidence in the Taft area is unrelated to KWB operations. See Master Response 6: Land Subsidence.

Response to Comment FOX1-3

The comment states, “[d]oes the subsidence geomorphically impact the attempts to restore flows to the San Joaquin and salmon restoration?”

The simple answer is no. See Master Response 6: Land Subsidence.

Response to Comment FOX1-4

The comment states, “The refusal to spray resulted in deaths which the current owner is responsible…”, which the comment further alleges serves as evidence that there is “a tendency to disregard the Health and Safety of the local population.”

The meaning of the comment cannot be ascertained with certainty. Without further details, the Department cannot respond with specificity other than to state that the Department is aware of no evidence to suggest that KWB activities resulted in the death of any person. This includes the asserted "failure to spray." The Department is aware that aerial spraying near recharge ponds by truck and helicopter was performed periodically in collaboration with the Westside Mosquito and Vector Control District to reduce mosquito populations and breeding habitat.

The likelihood that KWB activities could increase airborne vector populations or the likelihood of waterborne disease or illness (which includes West Nile virus) was evaluated in Draft REIR Impact 7.11-6, pages 7.11-36 and 7.11-37. Impacts during 1995 to 2014 were determined to be less than significant. From 2015 through 2030, this impact could be potentially significant, but implementation of Mitigation Measure 7.11-6 reduces this impact to a less-than-significant level. This mitigation measure requires KWBA to continue implementation of its Mosquito Abatement Plan, and to work with representatives of the Kern and Westside Mosquito Abatement Districts to develop improved mosquito control techniques. The Department is unaware of any evidence to suggest that the current owner of the KWB (i.e., KWBA) evinces "a tendency to disregard the Health and Safety of the local population."

Response to Comment FOX1-5

The comment states, "[t]he Migrating water into the Water Bank from areas such as the City and Rosedale are causing shortages. Does not the fact of Rosedale's going dry not constitute a Health and Safety issue?"

The Department disagrees. Commenter provides no evidence to support the claim that water is migrating into the KWB and causing shortages. The Department is aware of no evidence that the KWB is causing Rosedale to go dry. The KWB's contribution to localized impacts to relatively shallow groundwater wells is discussed in the Draft REIR on pages 7.1-33 to 7.1-53. The majority of impacts to shallow groundwater wells was attributed to the groundwater banking activities of non-KWB groundwater banks (see Response to Comment CFS1-50).

Response to Comment FOX1-6

The comment states, "[d]oes not the corruption that the current situation as to State and Local governments constitute a resulting health issue in the creation of what the LA TIMES has termed third world environments? Does the euphemism of underserved communities alleviate the problem?"

The comment does not raise any environmental issue related to the Draft REIR. No further response is required.

Response to Comment FOX1-7

The commenter asks whether focusing on acquiring water supplies from other areas diverts focus from acquiring new water such as retrofitting reservoirs to increase their capacity or addressing the evapotranspiration loss, and whether the Department has "personnel in decision positions aware of such possibilities or are they made to focus on deferring to the Banks operator?"

Department staff, including executive staff in decision-making positions, consider and explore all feasible opportunities to increase the State's water supply, as summarized in the California Water Plan Update 2013. The issue of other efforts related to environmental protection and growth, reliability, and water conservation was discussed in the 2010 Monterey Plus FEIR in Section 5.2.3.2. The 2007 Monterey Plus DEIR considers the relationship of the proposed project to other State water policy activities. As explained on page ES-4 of the Draft REIR, "The focus of public review and comment should be on Document A1 since public comments will only be considered on the revised and new text, contained entirely within Document A1." Therefore, no response to this comment is necessary as the comment is outside the scope and content of the Monterey Plus Draft REIR, which is to evaluate "environmental impacts associated with KWB transfer, development, and continued use and operation" (Draft REIR, bottom of Page ES-3).

To the extent that this comment is directed at alternatives to the proposed project, see Master Response 7: Project Alternatives.

Response to Comment FOX1-8

The comment states, "[w]ould not the State Pay in lieu fees to the County which is providing services, including the spraying, while being stiffed on taxes being paid by the Owner?"

Whether the State or KWBA pays in-lieu fees is not related to an environmental issue and therefore not within the scope of the Draft REIR.

Impact 7.11-6 regarding environmental impacts from increased airborne vector populations or the likelihood of waterborne disease or illness is covered on pages 7.11-36 and 7.11-37 in the Draft REIR. Mitigation Measure 7.11-6 addresses potentially significant impacts in the future. The county has not taken over vector control of the KWB. KWBA works closely with the Kern and Westside Mosquito Abatement Districts to ensure that vector control is done in accordance with the district's requirements (see Draft REIR, Mitigation Measure 7.11-6(b)(1).

Response to Comment FOX1-9

The commenter suggests there are impacts to upstream areas from which the water was taken, and asks how the Department can justify the economic and environmental impacts to those areas.

In regards to upstream impacts due to the acquisition of CVP or Kern River water by KWB participants, the analysis of these impacts is out of the scope of the Draft REIR and would be covered, if applicable, when KWB participants acquire such water. See Draft REIR Executive Summary Section ES.3, Scope and Content of the Revised EIR.

The Department analyzed and clarified the potential impacts from the Delta resulting from use of a locally-owned KWB in the 2007 Monterey Plus DEIR. See DEIR Section 16.2.7, Clarification of Potential Environmental Effects Resulting from a Locally-owned KFE. Also see Master Response 2: Delta Impacts.

Furthermore, the Department analyzed the potential impacts to disadvantaged communities specifically from KWB activities in Draft REIR Section 10.4.4.

Response to Comment FOX1-10

The comment states that "The Water Bank is a weed reservoir spreading them to other areas and even clogging the aqueduct and canals. Discing tumbleweeds does a good job of planting and finally using cattle for grazing may be cheaper than goats, but is it more efficient?"

KWBA does not disc tumbleweeds. As discussed in Draft REIR Section 7.4, Terrestrial Biological Resources, on pages 7.4-16 and 7.4-17, vegetation removal from roadways, turnouts, interbasin structures, road crossings, and control structures is accomplished by burning, motor grading (used minimally), mowing, herbicide, or hand. Vegetation removed from canals and basins is accomplished by hand control, lightweight equipment (weed-eaters), grazing, mowing, and burning. The KWB HCP/NCCP Vegetation Management Plan (see Draft REIR Appendix 7-7c) was developed to implement cost effective vegetation management and restoration practices for the long-term adaptive management and enhancement of the KWB. Protection of existing and newly established sensitive habitats; vegetation management of compatible habitat using effective, low-cost adaptive methods; and exotic pest plant control are primary goals under the KWB HCP/NCCP Vegetation Management Plan. The Plan considers the need for weed control with other important environmental factors, such as potential harm to humans, wildlife, and surface water and groundwater quality from herbicide application. There is no evidence that KWB activities are spreading weeds to other areas, including aqueducts and canals.

As browsers, goats tend to nibble from several different plant species. This behavior allows them to obtain needed nutrients while avoiding poisoning from toxic plants. Goats cannot be expected to eradicate any particular unwanted plant species. The preferred food source of goats—forbs and woody plants—are dormant during winter and may die out during hot, dry summers; thus, goats may require nutritional supplements during these periods. Furthermore, while it might be possible to augment the existing weed control program by grazing goats in addition to cattle, grazing by goats alone would not eradicate weeds. There are a number of factors that are considered in determining whether to use goats or cattle to help in reducing weeds. There is no evidence that either contributes to adverse environmental impacts.

Response to Comment FOX1-11

The comment states that, "The problem of legacy oil sumps and spills etc might just be interesting to look at. Does the Department consider this worthwhile?"

Legacy oil sumps and spills were discussed and evaluated throughout Draft REIR Section 7.11, Hazards and Hazardous Materials, as they relate to potential impacts from the KWB.

Response to Comment FOX1-12

The comment states, "[w]ould not it be cost effective and environmentally to not pump the water over the transverse range but halt the water at the Water Bank if a public entity and use desalinization in the LA area?"

The comment is outside the scope and content of the Draft REIR. No further response is required.

Response to Comment FOX1-13

The comment states, "What is the amount of hydropower used for pumping and how much water is then used for power production that is not conjunctive and thus a negative to Statewide water availability?"

Draft REIR Section 7.16-3 covers impacts and mitigation measures related to energy, including KWB pumping activities (pages 7.16-3 through 7.16-7). PG&E provides electricity for KWB pumping. PG&E must meet the 33 percent-by-2020 goal and the 50 percent-by-2030-goal required by electricity retailers in California. Because PG&E electrical generation technologies in Kern County could include cogeneration, wind energy, geothermal energy, biomass/transformation, solar energy, and hydroelectric (Draft REIR page 7.16-2), it cannot be determined specifically how much hydropower would be specifically used for KWB pumping. However, Mitigation Measure 7.16-2 requires that KWBA implement a formal Pump System Energy Efficiency Plan (PSEEP) to ensure that operations and maintenance activities are energy efficient. Overall SWP hydropower operations are presented in the 2010 Monterey Plus FEIR on pages 2-52 and 2-53. Impacts of pumping water from the Delta to different SWP water users is discussed in the 2007 Monterey Plus DEIR, Subsection 7.16, and is outside the scope of the Draft REIR.

Response to Comment FOX1-14

The comment raises various issues based on a conversation with "the Paramount manager, who was also the Water Bank manager and chair of a Kern water marketing committee" such as lack of payment of taxes by Paramount properties, payment of transfer fees for Paramount's acquisition of local water, local water supplies that the commenter claims have gone to the Paramount water bank, etc.

The comment does not raise any environmental issue related to the Draft REIR. No further response is required.

Response to Comment FOX1-15

The comment states that the KWB has "negative impacts to local M&I groundwater resources."

The commenter does not provide any details as to the specific impacts that he believes are occurring, and therefore the Department cannot respond with specificity. Impacts related to groundwater hydrology and groundwater quality were evaluated extensively in Draft REIR Section 7.1, Surface Water and Groundwater Hydrology, and Section 7.2, Surface Water and Groundwater Quality. Impacts 7.1-1 (KWB Operation could potentially deplete groundwater supplies so that a net deficit in aquifer volume of stored groundwater would occur) and 7.1-2 (KWB operations could potentially deplete groundwater supplies so that a lowering of the local groundwater table level would occur) present detailed information on pages 7.1-30 through 7.1-53. Mitigation measure 7.1-2 presents a comprehensive program, incorporated into KWBA's Board Resolution 16-02, that reduces potentially significant impacts related to lowering the local groundwater table to less-than-significant levels.

Impacts 7.2-1 (KWB construction and maintenance activities could potentially change groundwater quality), 7.2-2 (KWB operations could mobilize contamination in soils or the unsaturated zones associated with hazardous waste sites or oil and gas production operations and potentially degrade groundwater quality), 7.2-3 (The operation of oil and gas production wells within and surrounding KWB Lands could potentially degrade the quality of KWB water supplies), and 7.2-4 (KWB recharge and recovery operations could potentially change water quality in the underlying aquifer as a result of lateral and vertical migration of low quality water within and outside the limits of the KWB) are addressed on Draft REIR pages 7.2-39 through 7.2-61. Mitigation Measures 7.2-1, 7.2-2, and 7.2-3 are presented to reduce all potentially significant impacts related to groundwater quality to less-than-significant levels. The Draft REIR therefore fully discusses and discloses all potentially negative impacts to local M&I groundwater resources.

4.3.10 FOX2 WRITTEN COMMENTS AT FRESNO PUBLIC HEARING AND RESPONSES

PUBLIC COMMENT **FOX2**
for the Monterey Plus
Draft Revised Environmental Impact Report

Please check your affiliation:

- ☐ Federal
- ☐ State
- ☐ Elected Official
- ☐ Tribe
- ☐ Local Agency
- ☐ Organization
- ☒ Individual

Written comments can be submitted at the public meeting, mailed to the California Department of Water Resources (mailing address is on the back of this card), faxed 559-230-3301, or emailed toKaren.Dulik@water.ca.gov by 5 p.m. (PDT) on Monday, June 13, 2016. Thank you.

(Please print clearly)

Name Dennis Fox

Organization and Address

Phone (   ) FAX (   ) E-mail

Comment here: June 2 2016 (Date) DREIR (Main Topic of Comments)

- Raison D'etre for Water Bank was an aid to Kern users. LA & Fresno are recipients now, does that jeopardize its current use by externals. Obviously this is not Vegas, What is in Kern does not stay in Kern. 1
- Facilitating infrastructure transporting to the delta is being lined - thus reducing local recharge. 2
- The facility head pressure is exposing water to evaporation, this is versus evapo-transpiration of the facility if vegetated. If left unvegetated their is the set up for particulate matter polution and the vegetation facilitating percolation. A good cover grass or sedge would cost and cost is a no no to current management. 3
- Is there now a net increase to local water supply considering the foregoing and the focus put to total potential water aquisition whether desal, reservoir retrofit and watershead restoration. 4

All comments become part of the public record.

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California Department of Water Resources
3374 E. Shields Ave.
Fresno, CA 93726

Attn: Ms. Karen Dulik

Please fold, staple, stamp, and mail

PUBLIC COMMENTS
for the Monterey Plus Draft Revised Environmental Impact Report

Please check your affiliation:

- ☐ Federal
- ☐ State
- ☐ Elected Official
- ☐ Tribe
- ☐ Local Agency
- ☐ Organization
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Written comments can be submitted at the public meeting, mailed to the California Department of Water Resources (mailing address is on the back of this card), faxed 559-230-3301, or emailed toKaren.Dulik@water.ca.gov by 5 p.m. (PDT) on Monday, June 13, 2016. Thank you.

(Please print clearly)

Name____________________

Organization and Address ____________________

Phone (   )________ FAX (   )________ E-mail________

Comment here: __________ Date __________ *Main Topic of Comments*

to aquisition of SP water, also the shift from East Valley to Solano flushing.
Liability with the turnover having questionable and possible
litigation, does the State possibly have some residual
litigation possibilities, also in liability hazards. cont. 4

- The State pays in lieu fees the water Bank shirks
- The county had to take over Vector control for the company. 5

All comments become part of the public record.

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California Department of Water Resources
3374 E. Shields Ave.
Fresno, CA 93726

Attn: Ms. Karen Dulik

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Response to Comment FOX2-1

The comment states, "[r]aison D'etre for Water Bank was an aid to Kern users. LA & Fresno are recipients now, does that jeopardize its current use by externals. Obviously this is not Vegas. What is in Kern does not stay in Kern."

As reflected within the Draft REIR, the purpose of the KWB has not changed. The Draft REIR and the 2010 EIR disclose and identify uses and limitation of exports of KWB water (Draft REIR, Appendix E, Section V.B.5) as well as sales of KWB water (Draft REIR Appendix E, Section VI.A.3).

Draft REIR Appendix E states how water exchanges and transfers can be used by KWB Participants in Section VI.A.2. (The Department notes here that KWB water cannot physically be moved to Fresno.)

KWB water used outside the KWB participants' service area is addressed in Draft REIR Section 8.2.4. Draft REIR Section 8.2.4.1 on page 8-12 states:

> "During 2009 through 2014, there were no out-of-county sales of KWB water by KWB participants. Given the past history and current usage patterns, it is expected that sales to non-KWBA participants are likely to occur infrequently, if at all, outside of Kern County and would represent a small percentage of the total recovered KWB water by the KWBA participants."

The Department discloses use of the KWB by Irvine Ranch Water District, located in Southern California as follows:

> "The KWB is designed to store water for later use by participants in Kern and Kings Counties. It is therefore expected that most KWB recovered water will remain within Kern and Kings Counties as it has in the past. However, some of the water may be used outside Kern and Kings Counties. Irvine Ranch Water District (IRWD) is a member unit of SWP Contractor Metropolitan Water District of Southern California; however, it now owns land within Dudley Ridge Water District (DRWD) as noted below. IRWD intends to bank some of its water supplies in the KWB for future use in its service area in Orange County." (Draft REIR, page 8-13.)
>
> "IRWD acquired approximately 883 acres (the "Jackson Ranch") located within the DRWD and its associated rights to use approximately 1,738 afy of Table A SWP allocated water. Additionally, acquisition of the Jackson Ranch land included certain participation rights in the KWB…" (Draft REIR, page 8-13.)

Response to Comment FOX2-2

The comment states that "facilitating infrastructure transporting to the Delta is being lined – thus reducing local recharge."

The comment is unclear. The KWB does not facilitate infrastructure transporting water to the Delta. As explained on page ES-4 of the Draft REIR, "The focus of public review and comment should be on Document A1 since public comments will only be considered on the revised and new text, contained entirely within Document A1." Therefore, no response to this comment is necessary as the comment is outside the scope and content of the Monterey Plus Draft REIR, which is to evaluate "environmental impacts associated with KWB transfer, development, and continued use and operation" (bottom of page ES-3). The Department notes, however, that facilities transporting water from the Delta, such as the SWP and CVP conveyance canals, are lined to eliminate water loss from percolating into unlined facilities.

Response to Comment FOX2-3

The comment states, "The facility head pressure is exposing water to evaporation, this is versus evapotranspiration of the facility if vegetated. If left unvegitated [sic] their [sic] is the set up for particulate matter pollution and the vegetation facilitating percolation. A good cover grass or sedge would cost and cost is a no no to current management."

The comment is difficult to understand. There is always some evapotranspiration associated with shallow evaporation ponds or any surface water supply. The commenter is suggesting that a vegetative cover is needed. As discussed in Draft REIR Section 7.4, Terrestrial Biological Resources, on page 7.4-17, the KWB HCP/NCCP Vegetation Management Plan (see Draft REIR Appendix 7-7c) was developed to implement cost effective vegetation management and restoration practices for the long-term adaptive management and enhancement of the KWB. Protection of existing and newly established sensitive habitats; vegetation management of compatible habitat using effective, low-cost adaptive methods; and exotic pest plant control are primary goals under the KWB Vegetation Management Plan. The Plan balances the need for weed control with other important environmental factors, such as potential harm to humans, wildlife, and surface water and groundwater quality from herbicide application.

Response to Comment FOX2-4

The comment states, "Is there now a net increase to local water supply considering the forgoing and the focus not to total potential water acquisition whether desal, reservoir retrofit, and watershed restoration to acquisition of OP water. Also the shift from East Valley to Saline flushing. Liability with the turnover having questionable and possible litigation, does the State possibly have some residual litigation possibilities, also in liability hazards."

The KWB provides a net increase in local water supply by recharging water from the SWP, CVP, and Kern River flood flows into the KWB; and then pumping this water at a later time for delivery to KWB participants in Kern and Kings Counties. KWB recharge and recovery is summarized in the Draft REIR on pages 7.1-30 to 7.1-33.

The liability portion of this comment cannot be readily understood. The background and purpose of the REIR, including the ongoing litigation, is summarized on pages ES-1 and ES-2 in the Draft REIR. It is presently unknown whether there will be any further litigation regarding the KWB. No further response can be made due to the lack of clarity of the comment.

Response to Comment FOX2-5

The comment states, "The State of California pays in-lieu fees that the KWB should be paying, and that the county has had to take over vector control of the KWB."

See Response to Comment FOX1-8.

Dennis Fox Verbal Comments at Fresno Draft REIR Public Hearing (see pages 4-98 through 4-102)

4.3.11 FOX3 RESPONSES TO VERBAL COMMENTS AT FRESNO PUBLIC HEARING

Response to Comment FOX3-1

The comment states that the Draft REIR was very good and very extensive.

The comment is noted. No further response is necessary.

Response to Comment FOX3-2

The comment alleges that the KWB has impacts to air quality.

The comment does not provide any details as to the specific impacts that are occurring, and therefore the Department cannot respond with specificity. Air quality impacts were discussed and evaluated in detail throughout Draft REIR Section 7.7, Air Quality, from pages 7.7-8 through 7.7-16 and it was determined that with implementation of the mitigation measures, any impacts would be less than significant.

Response to Comment FOX3-3

The comment suggests that goats should be grazed on KWB Lands, rather than plowing and cattle grazing, to reduce weeds.

See Response to Comment FOX1-10.

Response to Comment FOX3-4

The comment states that the KWB has increased demand but the water supply is the same because the SWP has not added other facilities to increase water supply.

The commenter has not defined "demand" in a manner that can be quantified and assessed. With respect to adding SWP facilities, numerous capital additions have been made along with operational changes to accommodate a range of water needs and policy objectives, as discussed and summarized in the California Water Plan Update 2013 Highlights (DWR 2013).

Response to Comment FOX3-5

The comment is difficult to understand, but seems to address water demand.

See Master Response 1: Kern Water Bank and Crop Conversion, and Master Response 2: Delta Impacts.

Response to Comments FOX3-6

The comment is largely incomprehensible but states, "[y]ou're taking water from one Delta to put in another, especially if San Luis meadows, which has been meadows for the last couple of years and not a reservoir, unfortunately, but if you can't store it there, you probably have to store it in the water bank, which will increase things."

The comment appears to be addressing Delta and San Luis Reservoir water supplies. The comment does not raise any environmental issue related to the Draft REIR and is outside the focus of the Draft REIR, which is on the KWB. Related information is presented in Master Response 2: Delta Impacts.

Response to Comment FOX3-7

The comment states, "[t]he water bank -- I would suggest you might start looking at wet stocking in the area, the oil companies invented that down there and great at it. The water people ought to do it, too."

The comment is largely incomprehensible and does not address the KWB. No response is necessary.

Response to Comment FOX3-8

The comment expresses concern that sewage from the City of Bakersfield might contaminate the groundwater as a result of KWB pumping.

The Department disagrees. There is no evidence that sewage from the City of Bakersfield has been or will contaminate the groundwater as a result of KWB pumping. The Draft REIR discusses groundwater quality in the Draft REIR, Section 7.2, Surface Water and Groundwater Quality, as well as in Section 7.11, Hazards and Hazardous Materials.

Response to Comment FOX3-9

The comment states that the KWB is being operated as a private duck club, that it should be checked to make sure that the "proper non-lead stuff" is being used, there is the possibility of an epidemic such as avian cholera and botulism, the "West Nile virus situation," and there could be health and safety issues.

See Response to Comment FOX1-1 regarding the private duck club, epidemics, West Nile virus, health and safety issues, and impacts on the wildlife refuge. With respect to lead-based bullets or pellets used in firearms for hunting purposes, the owners of all firearms are required to ensure that such operation occurs in accordance with State and Federal law, including the type and content of ammunition that is used. Furthermore, there has been no documented bird mortality from lead-based bullets on KWB Lands. Appendix 7-7d presents the KWB HCP/NCCP Kern Water Bank Waterbird Management Plan, and Page D-6 addresses hunting as a permitted activity under the HCP, subject to further approvals by the Resource Agencies and in collaboration with the California Department of Fish and Game (now the California Department of Fish and Wildlife) and/or the U.S. Fish and Wildlife Service.

Response to Comment FOX3-10

The comment states, "George and Alex and Tom and the other guys, Ben, we all thought that back in 1776, this was not the best situation. It definitely isn't. It's going to it is not good for -- it causes the whining. People who get the subsidies are not able to foresee things; therefore, that's when, I think, a major reason we're not going -- people are not looking at getting more water to various ways of getting water to the state. They're looking at getting other people's water. It sounds like something in Wall Street. The problem is OP water, other people water. I think that's about it."

The comment is noted. No further response is necessary.

Response to Comment FOX3-11

The comment expresses concern that KWB operations may be causing subsidence and cracked slabs in Taft.

The Department disagrees. KWB operations are not causing subsidence; see Master Response 6: Land Subsidence.

Response to Comment FOX3-12

The comment expresses concern that KWB operations may affect flows and the geomorphism of the San Joaquin River.

There is no evidence whatsoever that KWB operations may affect flows and the geomorphism of the San Joaquin River. The San Joaquin River is too far from the KWB to cause a significant impact to San Joaquin River flows or geomorphism. No further response is necessary.

4.3.12 MERLO1 WRITTEN COMMENTS AT FRESNO PUBLIC HEARING AND RESPONSES

PUBLIC COMMEN **MERLO1**
for the Monterey Plus
Draft Revised Environmental Impact Report

Please check your affiliation:

- ☐ Federal
- ☐ State
- ☐ Elected Official
- ☐ Tribe
- ☐ Local Agency
- ☐ Organization
- ☑ Individual

Written comments can be submitted at the public meeting, mailed to the California Department of Water Resources (mailing address is on the back of this card), faxed 559-230-3301, or emailed to Karen.Dulik@water.ca.gov by 5 p.m. (PDT) on Monday, June 13, 2016.
Thank you.

(Please print clearly)

Name: Phillip Merlo

Organization and Address:

Phone (209) 670 -5828 FAX ( ) E-mail: Merlo, Phillip@gmail's

Comment here: June 1, 2016 — Lack of notice to Delta Parties
Date — Main Topic of Comments

The state of California's Water system connects all of California so when the DWR holds meetings that impact water and water usage there should be more outreach. Specifically as a citizen of Stockton, California I am frustrated that there was no broad outreach or notice about the open house or public comment meeting to interested parties in the Delta. ~~The~~ Kern ~~Water~~ County Water Bank operations ~~Bee~~ drive Delta Water exports. Delta communities should have been given visible notice of this meeting and the open house in Bakersfield. The lack of public notice ~~repres~~ in the Delta represents a failure on the part of the DWR. 1

All comments become part of the public record.

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California Department of Water Resources
3374 E. Shields Ave.
Fresno, CA 93726

Attn: Ms. Karen Dulik

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4.3.13 MERLO2 RESPONSE TO VERBAL COMMENTS AT FRESNO PUBLIC HEARING

Response to Comment MERLO1-1

The comment expresses concern that there should have more public outreach in additional areas of the state, because the KWB drives exports in the Delta.

CEQA does not require the lead agency to hold a public hearing at any stage of the environmental review process. (See CEQA Guidelines, § 15202, subd. (a).)

Nevertheless, the Department held two separate public meetings on the Draft REIR – one in Fresno and one in Bakersfield. Notices of the availability of the Draft EIR and the public meetings were published in 19 newspapers throughout California (Bakersfield Californian, Chester Progressive, Chico Enterprise-Record, Feather River Bulletin, Fresno Bee, Indian Valley Record, Los Angeles Times, Ontario Inland Valley Daily Bulletin, Oroville Mercury-Register, Portola Reporter, Riverside Press-Enterprise, Sacramento Bee, San Bernardino County Sun, San Diego Union-Tribute, San Francisco Chronicle, San Jose Mercury-News, Santa Barbara News Press, The Tribune (Newspaper of Central Coast), Ventura County Star); on the Department's project website; with 26 county clerks; with all agencies, organizations, and individuals that commented on the 2007 Monterey Plus DEIR; and with more than 20 Native American Tribes.

The commenter attended one of these public hearings. The public review process was open for a 45-day comment period at which time any member of the public could have submitted written comments on the Draft REIR.

Thus, no member of the public was denied an opportunity to meaningfully participate or comment on the Draft REIR's public review process. The Department met all CEQA requirements in notifying the public of the availability of the Draft REIR and the opportunity to comment on the Draft REIR at the two public meetings held in the general vicinity of the KWB.

Lastly, the KWB does not "drive exports in the Delta." See Master Response 2: Delta Impacts. The commenter provides no evidence to support this statement. No further response is required.

Phillip Merlo Verbal Comments at Fresno Draft REIR Public Hearing (see pages 4-103 through 4-104)

Response to Comment MERLO2-1

The comment expresses concern that there should have more public outreach in additional areas of the state, because of the importance of the KWB.

See Response to Comment MERLO1-1.

5. REFERENCES

5. REFERENCES

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5.2 CASES CITED IN THE FINAL REIR

5.2.1 STATE CASES

CDWA v. DWR, et al. cases (case numbers 34-2010-80000561 and 34-2010-80000703)

Central Delta Water Agency, et al. v. California Department of Water Resources, et al. (Sacramento Case No. 34-2010-80000561) and *Rosedale-Rio Bravo Storage District, et al. v. California Department of Water Resources, et al.* (Sacramento Co. Superior Court Case No. 34-2010-80000703; Findings and Peremptory Writ of Mandate, November 24, 2014, p.2, lines 26-28 – p. 3, lines 1-3.

Central Delta Water Agency, et al. v. DWR, et al., Sacramento County Superior Court Case No. 34-2010-80000561.

Central Delta Water Agency, et al. v. California Department of Water Resources, et al. (Sacramento Case No. 34-2010-80000561) and *Rosedale-Rio Bravo Storage District, et al. v. California Department of*

Water Resources, et al. (Sacramento Co. Superior Court Case No. 34-2010-80000703; Findings and Peremptory Writ of Mandate, November 24, 2014, p.2, lines 26-28 – p. 3, lines 1-3.

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Central Delta Water Agency, et al. v. DWR, et al., Sacramento County Superior Court Case No. 34-2010-80000561, Ruling on Submitted Matter, March 5, 2014, p. 17

Clover Valley Foundation v. City of Rocklin (2011) 197 Cal.App.4th 200, 236; *Oakland Heritage Alliance v. City of Oakland* (2011) 195 Cal.App.4th 884, 906

County of Inyo v. City of Los Angeles (1984) 160 Cal.App.3d 1178, 1185

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Sierra Club v. Board of Forestry (1994) 7 Cal.4th 1215, 1233

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APPENDICES

APPENDIX A. LETTER DATED JUNE 13, 2016 WITH ATTACHMENTS FROM CENTER FOR FOOD SAFETY, CALIFORNIA WATER IMPACT NETWORK, CALIFORNIA SPORTFISHING PROTECTION ALLIANCE, CENTER FOR BIOLOGICAL DIVERSITY, CENTRAL DELTA WATER AGENCY, AND SOUTH DELTA WATER AGENCY

CFS1

From:	Ryan Berghoff
To:	Dulik, Karen@DWR
Cc:	Adam Keats
Subject:	Monterey Plus - Comments on Draft Revised EIR
Date:	Monday, June 13, 2016 4:43:18 PM
Attachments:	2016-6-13 Comments to Revised KWB EIR_FINAL.pdf

Dear Ms. Dulik,

Please find attached a copy of Comments on the Department of Water Resources 2016 Monterey Plus Draft Revised Environmental Impact Report, submitted by Center for Food Safety (CFS), California Water Impact Network (CWIN), California Sportfishing Protection Alliance (CSPA), Center for Biological Diversity (CBD), Central Delta Water Agency (CDWA), and South Delta Water Agency (SDWA). Please confirm that you received this email.

If you have any questions regarding this matter, do not hesitate to call or email me. You can reach me by phone at (415) 826-2770 or by email at rberghoff@centerforfoodsafety.org.

Best,
Ryan Berghoff
Legal Fellow
Center for Food Safety

california water impact network CENTER FOR FOOD SAFETY

CENTRAL DELTA WATER AGENCY SOUTH DELTA WATER AGENCY

RECEIVED
JUN 13 2016
South Central Region

June 13, 2016

California Department of Water Resources
Attn: Karen Dulik
Environmental Program Manager I
3374 E. Shields Ave.
Fresno, CA 93726

Comments on the Department of Water Resources 2016 Monterey Plus Draft Revised Environmental Impact Report – Kern Water Bank Development and Continued Use and Operation

To Department of Water Resources ("DWR"):

The undersigned organizations submit these comments on DWR's 2016 Monterey Plus Draft Revised Environmental Impact Report ("Revised EIR") regarding the Kern Water Bank ("KWB") Development and Continued Use and Operation. These comments are submitted on behalf of the organizations themselves, as well as their members, volunteers, and employees.

The Center for Food Safety ("CFS") is a nonprofit, public interest advocacy organization dedicated to protecting human health and the environment by curbing the proliferation of harmful food production technologies and promoting sustainable agriculture, including impacts to water resources. In furtherance of this mission, CFS uses legal actions, groundbreaking scientific and policy reports, books and other educational materials, and grassroots campaigns on behalf of its 750,000 farmer and consumer members across the country.

The California Water Impact Network ("CWIN") is a nonprofit, public benefit corporation formed under the laws of the State of California for the purpose of protecting and restoring fish and wildlife resources, scenery, water quality, recreational opportunities, agricultural uses, and other natural environmental resources and uses of the rivers and streams of California, including the San Francisco Bay-Delta estuary, also known as the Sacramento-San Joaquin Bay-Delta ("Bay-Delta"), its watershed and its underlying groundwater resources.

The California Sportfishing Protection Alliance ("CSPA") is a nonprofit organization with more than 2,500 members throughout California dedicated to protecting, preserving, and enhancing the fisheries and associated aquatic and riparian ecosystems of California waterways, including the Central Valley rivers leading to the Bay-Delta. CSPA and its members actively

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participate in water rights and water quality processes, engage in education and organization of the fishing community, conduct restoration efforts, and vigorously enforce environmental laws enacted to protect fisheries, habitat, and water quality.

Center for Biological Diversity ("CBD") is a nonprofit, public interest corporation with over one million members and online activists dedicated to protecting diverse native species and habitats through science, policy, education, and environmental law. CBD and its members have a particular interest in protecting lands affected by the State Water Project, including Bay-Delta, for recreational, wildlife viewing, scientific, and educational purposes.

Central Delta Water Agency ("CDWA") is a political subdivision of the State of
California created under the Central Delta Water Agency Act, Chapter 1133 of the Statutes of 1
1973 as amended. The CDWA encompasses approximately 120,000 acres within San Joaquin
County, all of which is within the Bay-Delta. The water rights pertaining to the lands within CDWA jurisdiction are principally riparian and in-part covered by pre-1914,"prior vested" water rights, which enjoy seniority over post-1914 water rights and those of DWR. CDWA is empowered to assist landowners within its jurisdiction to protect and assure a dependable supply of water of suitable quality sufficient to meet present and future needs.

South Delta Water Agency ("SDWA") is a political subdivision of the State of California created by the California Legislature under the South Delta Water Agency Act, Chapter 1089 of the Statutes of 1973 as amended. The SDWA encompasses approximately 148,000 acres within San Joaquin County, of which is within the Bay-Delta. The water rights pertaining to the lands are principally riparian and are in-part covered by pre-1914, "prior-vested" water rights, which enjoy seniority over post-1914 water rights and those rights of DWR. SDWA is empowered to assist landowners within its jurisdiction to protect and assure a dependable supply of water of suitable quality to meet present and future needs.

I. INTRODUCTION

In the late 1980s and early 1990s, the State Water Project ("SWP") started to not be able to fulfill the maximum annual amount of SWP water that each water contractor applied for (then called entitlements, now "Table A amounts"). California experienced a drought from 1986 through 1991, forcing DWR in 1991 to reduce entitlement deliveries to agricultural contractors
to zero, pursuant to Article 18(a) of the State Water Project Long-Term Contracts. Article 18(a)
provided that in times of short-term deficits, agricultural contractors would have their deliveries 2
cut first, sparing the urban contractors (and their more permanent reliance on the deliveries) from diminished deliveries. This event gave rise to a dispute between agricultural and urban contractors, with the agricultural contractors threatening to invoke Article 18(b) of the long-term contracts. Article 18(b) provided that in the event of a permanent deficit in the SWP system, all contractors' entitlements would be reduced.

The invocation of Article 18(b) was anathema to the urban contractors, who had grown
dependent on the promise—if not the actual delivery—of their full entitlements of SWP water,
using this "paper water" (the difference between what was promised as "entitlements" based on a 3
proposed build-out of the SWP system that never occurred and what the SWP could actually

deliver in any given year within the confines of the actually-built-out system) as proof of water supplies in order to approve development projects that would become dependent on SWP water deliveries. With both sides finding fault with different contract provisions, a select group of urban and agricultural contractors secretly met with DWR representatives in Monterey, California, to hash out a compromise. cont. 3

The real cause of the dispute was neither the drought nor a general growing demand for limited water resources, but rather DWR's continued support for the paper water entitlements contained in the long-term contracts and DWR's failure to consistently and properly invoke both Articles 18(a) and 18(b). Rather than correcting the inflated entitlements (as Article 18(b) required) and consistently applying Article 18(a)'s provisions during drought periods, which not only would have addressed both the agricultural and urban concerns but also brought the SWP system closer to a sustainable operation, the Monterey parties decided to toss out these essential checks-and-balances and to restructure the rest of the contracts. This agreement became known as the Monterey Agreement, and resulted in the Monterey Amendment to the State Water Project Long-Term Contracts. 4

In addition to deleting Articles 18(a) and 18(b), the Monterey Amendment included a provision (relevant here) that provided for the transfer of the KWB from state control (DWR) to "local" control, in the form of an initial transfer to Kern County Water Agency ("KCWA") followed by a second transfer to the Kern Water Bank Authority ("KWBA"), officially a joint project between private and public entities but in fact an entity majority-controlled by a single corporate agribusiness interest. As citizen watchdogs and activists have since repeatedly argued and demonstrated, the transfer was made in exchange for illusory consideration: primarily the bogus "retirement" of 45,000 acre-feet ("AF") of Table A water amounts held by some of the KWBA member entities. 5

California has been suffering ever since.

The KWB is an approximately 20,000 acre alluvial groundwater reservoir in southern Kern County. DWR purchased the KWB lands in 1988 as part of a plan to develop a state-owned groundwater storage bank for the SWP, which DWR called the Kern Water Bank. Due primarily to intransigence on the part of the KCWA (which had a legislatively-granted veto over any statewide water facility within its service area), full operation of the KWB stalled. With KCWA holding the KWB hostage, DWR capitulated, agreeing to hand over the valuable resource to the "local" water interests as part of the Monterey Amendment. 6

The initial KWB Transfer was subject to the California Environmental Quality Act ("CEQA") review, which was performed as part of the review of the entire Monterey Amendment project in 1995. That EIR was challenged in court, and as a result of a successful lawsuit brought by the Planning and Conservation League and others, was decertified in 2003. As part of a settlement agreement in that case, DWR agreed to produce a new EIR, which it completed in 2010. Challenged again in court, this time by a coalition of nonprofit organizations, two Delta water agencies, and two individuals, this second EIR—the Monterey Plus FEIR—was also decertified. (*Central Delta Water Agency v. California Department of Water*, (Jan. 31, 2014) Sacramento Sup. Ct. No. 34-2010-80000561.) The superior court 7

concluded that DWR violated CEQA by failing to adequately describe, analyze, and (as
appropriate) mitigate the potential impacts of the Project associated with the anticipated use and
operation of the KWB. The court stated that the failure to include relevant information regarding cont.
KWB operations precluded informed decision-making and informed public participation, thereby 7
thwarting the statutory goals of the EIR process.

The superior court ordered DWR back to the drawing board, at least regarding its review to the KWB Transfer, and it is this EIR—the 2016 Monterey Plus Draft Revised EIR—that is the subject of these comments.

The Revised EIR reveals that KWB operations resulted in significant environmental 8
impacts that were not adequately described, analyzed, or properly mitigated. The Revised EIR 9
fails to analyze the significance that converting annual crops to permanent crops has on the water
supply and fails to analyze the significant impact that groundwater depletion has on nearby water 10
users and subsidence. The Revised EIR does not analyze any alternatives to avoid or lessen any 11
of the newly-identified significant impacts of the project, and the mitigation measures it analyzes
will not make the impacts less than significant. 12

II. DISCUSSION

An EIR is a "detailed statement prepared under CEQA describing and analyzing the
significant effects of a project and discussing ways to mitigate or avoid the effects." (CEQA
Guidelines, § 15362.) It must be organized and written in a manner that will be meaningful and
useful to decision-makers and to the public. (Pub. Resources Code, § 21003, subd. (b).) To serve
this purpose, the EIR must identify and focus on the possible significant environmental impacts
of the proposed project. (CEQA Guidelines, §§ 15126, subd. (a), 15126.2, subd. (a); Pub.
Resources Code, § 21100, subd. (b)(1).) A significant effect is any "substantial, or potentially 13
substantial, adverse change in any of the physical conditions within the area affected by the
project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic
and aesthetic significance." (CEQA Guidelines, § 15382.) At its most basic level, CEQA
compels government first to identify the significant environmental effects of projects, and then to
mitigate those adverse effects through imposition of feasible mitigation measures or through
selection of feasible alternatives. (*Sierra Club v. Board of Forestry* (1994) 7 Cal.4th 1215, 1233.)

The Revised EIR fails to analyze numerous significant effects including the conversion 14
from annual crops to permanent crops facilitated by the KWB transfer; the impacts of
groundwater depletion on nearby water users, state water resources, and subsidence; and the 15
cumulative impacts of KWB operations with other current water banking activities and other 16
water users. The Revised EIR also fails to identify feasible alternatives to avoid or lessen the 17
significant impacts, or properly analyze appropriate mitigation measures. For these reasons, the
Revised EIR is deficient. 18

a. Project Decision

The Revised EIR repeats a fundamental error made in the Monterey Plus FEIR, 19
describing DWR's decision on the Project as being "whether or not to continue the use and

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operation of the KWB by KWBA, after compliance with CEQA." (Revised EIR at ES-3.) The euphemistic "decision" to "continue the use and operation" represents a fundamental departure from the interactive process of review and decision required under CEQA, which requires the lead agency to complete its environmental review before making its final decision on the project as a whole. (See *County of Inyo v. City of Los Angeles* (1984) 160 Cal.App.3d 1178, 1185 [CEQA requires an "interactive process of assessment and responsive modification that must be genuine"].) As the Revised EIR admits, DWR must make its decision "after compliance with CEQA," which necessarily requires that a project approval follow environmental review, not precede it. (Revised EIR at ES-3.) Without a clear commitment to that process (and all indications in the Revised EIR are that DWR has no intention of following that correct procedure), the entire environmental review process represented by the Revised EIR will be nothing more than a sham. cont. 19

b. Agricultural Resources

The Revised EIR recognizes that KWB activities can facilitate and may already have facilitated the conversion of annual crops, which can be fallowed in dry years, to permanent crops, which require a dedicated water supply. But the Revised EIR erroneously concludes that this impact is not significant. A shift in crop patterns caused by the Project, even if the Project's contribution is only cumulatively significant, almost certainly impacts the state's water supply, particularly as it relates to groundwater depletion and Delta withdrawals, and the EIR must disclose and analyze this clearly significant impact. 20

i. Lack of Analysis Regarding Conversion to Permanent Crops

1. Appendix G of the CEQA Guidelines is Not Exhaustive

The Revised EIR must analyze all potentially significant impacts of the Project, even if not listed on Appendix G to the CEQA Guidelines. Appendix G provides an Environmental Checklist Form for assisting in the determination of the potential significance of a project impact. The form explicitly states that "[s]ubstantial evidence of potential impacts that are not listed on this form must also be considered." (CEQA Guidelines, Appendix G, at 1.) Thus, Appendix G serves as a starting point for determining the significance of a project; it is not exhaustive or exclusive. DWR must still identify and analyze all other potentially significant effects.

The Revised EIR identifies a "substantial" change in crop patterns since the transfer of the KWB, resulting in farmers shifting from annual crops to permanent crops. (Revised EIR at 7.6-13.) However, the Revised EIR concludes that the Project's "cumulatively considerable incremental contribution to this shift to permanent crops" is less-than-significant because it "does not exceed any of the Appendix G standards of significance in the CEQA Guidelines related to agriculture and forestry resources." (Revised EIR at 10.1-34.) The Revised EIR opines that this shift does not need to be evaluated because a "shift in crop patterns, in and of itself, is not a significant adverse environmental effect." (*Id.*) But merely because a shift in crop patterns is not listed in Appendix G of the CEQA Guidelines does not relieve DWR of its duty to analyze other potentially significant effects. Here, the Revised EIR identified a "substantial" change in crop 21 patterns, resulting in a shift from irrigated annual crops that can be "fallowed in dry/critically dry years" to permanent crops that require a "dedicated water supply." (Revised EIR at 7.6-13.) The impacts of this conversion must be analyzed. cont. 21

2. The Revised EIR Fails to Analyze Any of the Impacts From Conversion of Irrigated Annual Crops to Permanent Crops. 22

The Revised EIR concludes that "KWB activities could … potentially convert irrigated farmland to orchards, which could cause other indirect effects." (Revised EIR at 7.6-12.) Despite that recognition, the Revised EIR fails to analyze any impacts related to the conversion of crops.

Making unreliable seasonal water "reliable" by storing it in a water bank and knowingly permitting that water to be used for permanent crops is a significant effect that obviously and logically requires analysis. The Revised EIR identifies that there was only a relatively small increase in agricultural acreage in Kern County between 1996 and 2014, but the cropping patterns within the county changed "substantially." (Revised EIR at 7.6-13.) The acreage of total nut crops between 1996 and 2014 increased by approximately 206% and almonds accounted for more than 65% of the total nut crops in 2014. (*Id*; see Exhibits A-E.)[1] Combined acreages of seed crops, field crops, and vegetable crops all decreased during the same time period. (*Id.*; see Exhibit F.)[2] The Revised EIR further recognizes that KWB activities may have increased water supply reliability (at least in the short term, and only for the KWBA member entities), which has potentially resulted in changes from "irrigated crops or annual field crops on land that could be fallowed in dry/critically dry years to permanent crops like orchards and vines that require a dedicated water supply." (*Id.*) 23

Nonetheless, the Revised EIR does not analyze the effects of this crop conversion, stating that the change in farming practices is "consistent with the county-wide trend [] and with a state-wide trend even in areas that do not depend upon water banks for water storage." (*Id.*) That 24

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[1] *See* Dale Kasler, *California Almond Growers to Expand Orchards, Despite Drought*, The Sacramento Bee (Apr. 16, 2015) ("[T]he amount of California farmland devoted to almonds has nearly doubled over the past 20 years, to more than 900,000 acres"), http://www.sacbee.com/news/state/california/water-and-drought/article18716937.html (Attached as Exhibit A); *see also* Geissler & Horwath, *Almond Production in California*, UC Davis University of California (Jun. 2016) ("[W]hile the [almond] acreage remained relatively stable between 1985 and 1995, it increased again reaching a new high in 2011 with 760,000 acres of bearing orchards producing 2.02 billion pounds of almonds, which accounted for 84% of the global production."), https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Almond_Production_CA.pdf (Attached as Exhibit B); Robert Rodrigues, *California Almond Acreage Continues to Grow*, The Fresno Bee (Apr. 29, 2016) ("California almonds, ones of the state's largest crops, increased in acreage by 6 percent last year."), http://www.fresnobee.com/news/business/agriculture/article74770332.html (Attached as Exhibit C); Ari Phillips, *Thank Almonds, Pistachios, Wine, and Groundwater for California's Record Harvest*, Fusion (Aug. 27, 2015) ("The total increase in fruit and nut acreage since 2000 was 570,00 acres, or 24%, according to the [Pacific Institute] study." [citing Cooley et al., *Impacts of California's Ongoing Drought: Agriculture*, Pacific Institute (Aug. 2019), http://pacinst.org/app/uploads/2015/08/ImpactsOnCaliforniaDrought-Ag.pdf (Attached as Exhibit E)]), http://fusion.net/story/189826/california-record-harvest-due-to-excessive-groundwater-use/ (Attached as Exhibit D).

[2] *See* Philpott & Lurie, *Here's the Real Problem With Almonds*, New Republic (Dec. 31, 2015) ("California acreage devoted to alfalfa is expected to shrink 11 percent, and cotton acres look set to dwindle to their lowest level since the 1920s. Meanwhile, the market is pushing almonds and other nuts in the opposite direction."), https://newrepublic.com/article/125450/heres-real-problem-almonds (Attached as Exhibit F).

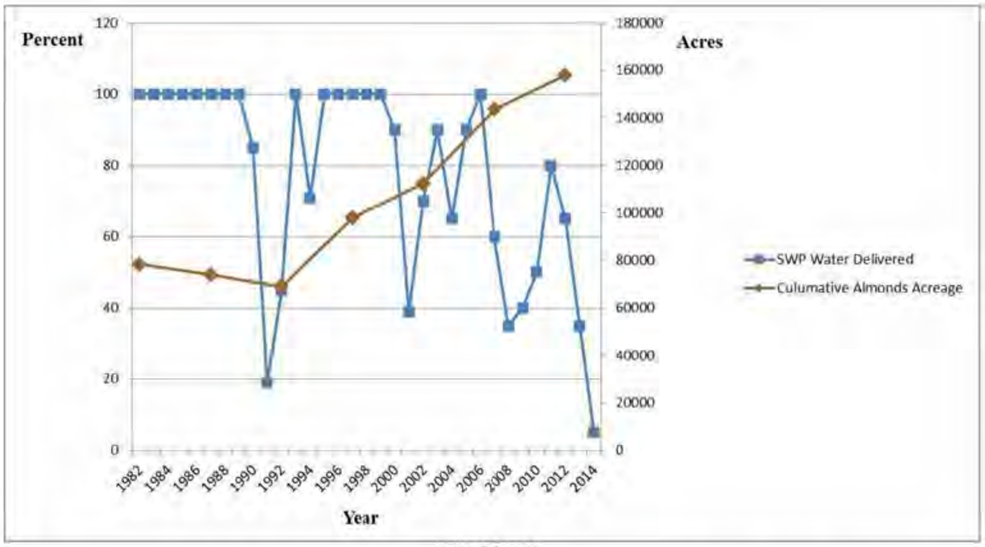
this conversion from annual crops to permanent crops may have been a county-wide trend does not prove that the KWB Transfer did not facilitate this conversion. The KWBA participants are part of Kern County, and their crop production between 1995 and 2014 accounts for more than a quarter of the increased nuts (65,900 acres/203,938 acres), half of the increased fruit (22,096 acres/50,269 acres) and nearly all of the increased citrus (17,442 acres/22,489 acres), all of which are permanent crops. (See Revised EIR at 7.6-7, Tables 7.6-5 and 7.6-6.) Thus, the Revised EIR's statement that conversion to permanent crops is less than significant because the "trend of replacing irrigated annual crops with permanent crops is expected to continue in the future with or without the KWB" is unfounded. (Revised EIR at 7.6-14.) There is a clear connection between the conversion of annual crops to permanent crops within Kern County and the KWB Transfer, and the Revised EIR must analyze the effects of this conversion. 24

The graphs in Appendix E of the Revised EIR illustrate the clear connection between the KWB Transfer and the region's conversion from annual crops to permanent crops. (See Revised EIR at E-43 to E-46.) This correlation is readily apparent in Tables 1 and 2, below. Table 1 depicts the cumulative growth in the total acreage of almonds in Kern County, based on the U.S. Department of Agriculture ("USDA") Census data from 1982 to 2012,[3] compared to the percentage of allocation (percentage of Table A requests delivered). (Revised EIR at E-44, Table 7.)[4] Table 2 depicts the amount of new almond acreage planted each year in Kern County[5] compared to the percent of SWP allocation. The tables show that the growth in cumulative acreage and increase in newly planted acreage of almonds in Kern County is an almost direct result of the KWB Transfer. (See Table 1 and 2.) 25

[3] USDA, *Census Publications – Census by State* (1982-2012), https://www.agcensus.usda.gov/Publications/2012/Full_Report/Census_by_State/.

[4] The percent of Table A requests from 1982 to 1994 were calculated from DWR, *CalSim II Simulation of Historical SWP/CVP Operations, Technical Memorandum Report*, at 29 (Table 4) (Nov. 2003), http://baydeltaoffice.water.ca.gov/swpreliability/HistoricalSimulationReport_111203.pdf.

[5] California Department of Food and Agriculture Cooperating with USDA, National Agricultural Statistics Service, Pacific Regional Office, *2015 California Almond Acreage Report* (April 27, 2016), https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/201605almac.pdf.

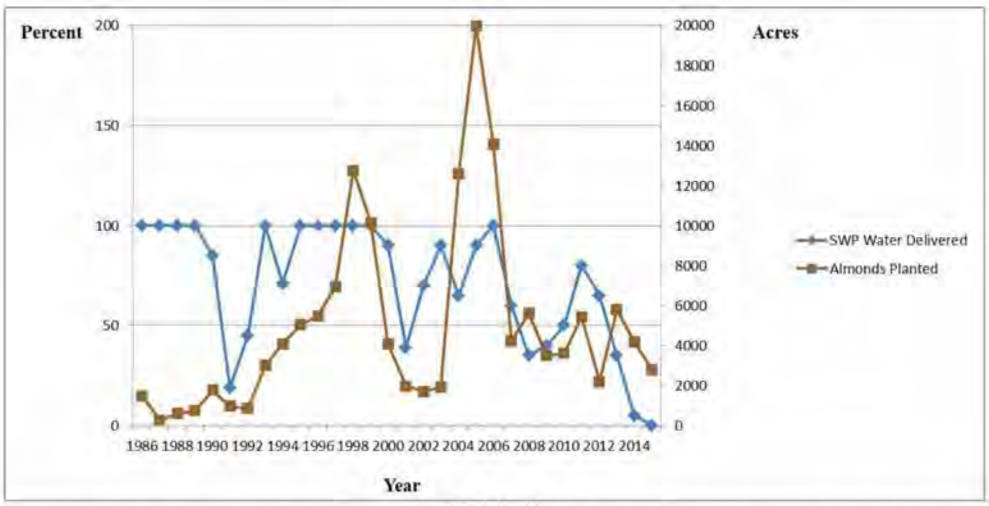


25

(Table 1)

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Cumulative Almonds	78,395					73,869					69,024					97,845	
SWP Water Delivered	100	100	100	100	100	100	100	100	85	19	45	100	71	100	100	100	100

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Cumulative Almonds				112,492					143,473					157,819		
SWP Water Delivered	100	90	39	70	90	65	90	100	60	35	40	50	80	65	35	5



(Table 2)

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Almonds Planted	1,454	277	586	746	1,768	963	856	3,009	4,089	5,050	5,473	6,940	12,758	10,156	4,073
SWP Water Delivered	100	100	100	100	85	19	45	100	71	100	100	100	100	100	90

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Almonds Planted	1,974	1,705	1,904	12,580	19,963	14,062	4,233	5,616	3,493	3,613	5,441	2,186	5,795	4,186
SWP Water Delivered	39	70	90	65	90	100	60	35	40	50	80	65	35	5

6.13.2016 Comments on Monterey Plus DREIR 8

For example, the years 2001 through 2005 witnessed a drought in which the total amount of Table A deliveries that was requested in Kern County was reduced due to a lack of available supply in the SWP system. (Tables 1 and 2.) Nonetheless, during that drought, there was a marked increase in Kern County in both the cumulative acreage as well as the amount of newly planted acreage of almonds. (*Id.*) Table 1 shows that cumulative acreage of almonds in Kern County decreased between 1982 and 1992, but between 1992 and 2012 the acreage of almonds nearly doubled, despite multiple droughts. (Table 1.) Table 2 shows that in 2004 only 65% of Table A requested water was delivered, but 12,580 new acres of almonds were planted. (Table 2.) In 2005, when only 90% of Table A water was delivered, 19,963 new acres of almonds were planted. (*Id.*) 26

In other words, while much of the state experienced water shortages, presumably leading to the fallowing of annual cropland to match agricultural needs with a diminished water supply, KWBA participants were enabled—by the KWB—to not only maintain their acreages of permanent crops but to plant more new permanent crops. (Table 1 and 2.) These trends continued during the most recent drought between 2007 and 2015, in which the state, for the first time in California history, ordered all urban water districts to reduce their water usage,[6] but KWBA participants maintained their water use and continued planting more permanent crops. (*Id.*; see Exhibit G.) What this means for California's water supply, and the other users throughout the state dependent on it, is not addressed at all in the Revised EIR, despite widespread acknowledgment that a conversion to permanent crops—and in particular almonds—may significantly impact California's water supply. (See Exhibit A, F, H-K.)[7] 27

Even if the KWB Transfer did not facilitate this conversion of crops—and the data presented indicates that it did—it would not relieve DWR of its duty to analyze the effects of the conversion of crops in the KWBA participants' service area. According to Table 7.6-6, permanent crops such as nuts, citrus, and fruit all increased by over 100%, while all annual crops 28

[6] Executive Order B-29-15, https://www.gov.ca.gov/docs/4.1.15_Executive_Order.pdf (Attached as Exhibit G).

[7] *See* Kasler, *supra* note 1 ("[A]lmonds are permanent crops. They can't be fallowed in dry years, unlike rice, tomatoes, and other annual crops. Much of the increased planting in recent years has occurred on the west side of the San Joaquin Valley, where water supplies have become among the most fragile in California."); *see also* Philpott & Lurie, *supra* note 2 ("Unlike other crops, almonds always require a lot of water—even during drought. Annual crops like cotton, alfalfa, and veggies are flexible—farmers can fallow them in dry years. That's not so for nuts, which need to be watered every year, drought or no, or the trees die, wiping out farmers' investments."); *see also* United States Geological Survey (USGS), *Changing California Land Uses Will Shape Water Demand in 2062* (May 18, 2016) ("If past patterns of California land-use change continue, projected water needs by the year 2062 will increase beyond current supply."), https://www.usgs.gov/news/changing-california-land-uses-will-shape-water-demands-2062 (Attached as Exhibit H); *see also* Lei Wang, *California's Insane Nut Boom, in 3 Simple Charts*, Mother Jones (Nov. 3, 2014) ("A single almond requires a gallon of water to grow."), http://www.motherjones.com/environment/2014/11/almonds-water-walnuts-pistachios-california-drought-charts (Attached as Exhibit I); *see also* Eric Holthaus, *Stop Vilifying Almonds*, Slate (Apr. 17, 2015) ("Almonds use about as much water each year as the entire city of Los Angeles does in three, and about two-thirds of those nuts are exported … [a]lmonds use 10 percent of California's agricultural water supply."), http://www.slate.com/articles/business/moneybox/2015/04/almonds_in_california_they_use_up_a_lot_of_water_but_they_deserve_a_place.html (Attached as Exhibit J); *see also* Peter Fimrite, *California Drought: how Water Crisis is Worse for Almonds*, SF Gate (Mar. 4, 2014) ("A huge shift away from annual crops to nut trees has transformed the California farm belt over the past two decades and left farmers perilously vulnerable to the severe drought that is currently gripping the state."), http://www.sfgate.com/science/article/California-drought-How-water-crisis-is-worse-for-5341382.php (Attached as Exhibit K).

decreased by over 50%. (See Revised EIR at 7.6-7, Table 7.6-6.) The Revised EIR recognizes
that annual field crops can be fallowed in dry/critically dry years, but permanent crops require a
dedicated water supply. (Revised EIR at 7.6-13.) The Revised EIR further acknowledges that cont.
the "KWB increases the reliability of water supplies to its participants … [and] it is possible that 28
KWB activities could result in additional land being converted to permanent crops." (Revised
EIR at 7.6-14.) Nonetheless, the Revised EIR improperly states that this conversion is less than
significant, without actually analyzing the impacts.

Data indicates that at a county scale, annual cropland losses to permanent cropland and
development drive net increases in water demand. (Exhibit L.)[8] Net declines in water demand
are only projected where losses of annual cropland exceed gains of permanent cropland and new
developed land.[9] The Revised EIR shows that the gains in permanent cropland far exceeded the
losses of annual cropland subsequent to the KWB Transfer. (Revised EIR at 7.6-7, Table 7.6-6.) 29
In addition, there has been a significant increase in almonds, and almonds are the fourth most
water intensive crop in California.[10] The Revised EIR identifies that groundwater resources may
be depleted, but fails to analyze how a shifting to permanent crops may contribute to that
depletion. (See Revised EIR at 7.1-33; see Exhibit M.)[11] The Revised EIR clearly fails to
analyze the significant effects that conversion of annual cropland to permanent cropland has on
California's water supply.

Once the Revised EIR recognizes that irrigated annual crops were converted to
permanent crops, it must identify and analyze the impacts of that conversion to determine
whether it is significant. It is impossible to mitigate the effects of converting to permanent crops
that require a dedicated source of water without first identifying the significant environmental 30
impacts of that conversion. (See *Sierra Club v. Board of Forestry* (1994) 7 Cal.4th 1215, 1233
[CEQA compels government first to identify the significant environmental effects of projects,
and then to mitigate those effects through imposition of feasible mitigation measures or through
selection of feasible alternatives].) The Revised EIR must determine whether there is any effect
on the availability of water resources in the region and the flexibility of the water supply. We
believe that the significance of this impact is obvious: by making the region's water supply 31
seemingly more reliable, at least in the short term (since water bank withdrawals can be used to
compensate for large drops in SWP deliveries during short-term droughts), the unfettered
operation of the KWB hardens the demand for Delta water pumping. The Revised EIR must

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[8] Wilson et al., *Future Land-Use Related Water Demand in California*, Environ. Res. Lett. 11: 054018, at 8 (May 18, 2016), http://iopscience.iop.org/article/10.1088/1748-9326/11/5/054018 (Attached as Exhibit L); USGS, *supra* note 6 ("Assuming a 'business-as-usual' scenario of future land-use change, we show that the current pattern of increasing development and additional perennial cropland (orchards and vineyards) will lead to loss of grassland habitat and increased water use.").

[9] Wilson, *supra* note 8, at 8.

[10] *Id.* at 9.

[11] *See also* Gillis and Richtel, *Beneath California Crops, Groundwater Crisis Grows*, New York Times (Apr. 5, 2015) ("Even as the worst drought in decades ravages California, and its cities face mandatory cuts in water use, millions of pounds of thirsty crops like oranges, tomatoes and almonds continue to stream out of the state and onto the nation's grocery shelves. But the way that California farmers have pulled off that feat is a case study in unwise use of natural resources, many experts say. Farmers are drilling wells at a feverish pace and pumping billions of gallons of water from the ground, depleting a resource that was critically endangered before the drought."), http://www.nytimes.com/2015/04/06/science/beneath-california-crops-groundwater-crisis-grows.html?_r=0 (Attached as Exhibit M).

explore this impact. It must ask whether permanent crops require greater amounts of water over time, and whether permanent crops have different impacts on water supplies than annual crops. 31

The Revised EIR must also expand its analysis to consider impacts to the Delta caused by increased Delta pumping that has resulted from and will result from the KWB Transfer. The Revised EIR improperly confines its analysis to the geographic area of KWB lands and groundwater impacts. But the hardening of demand caused by the shift to permanent crops has had devastating impacts on the Delta ecosystem, impacts not previously disclosed or analyzed. Increased demand due to the planting of permanent crops places pressure on SWP deliveries, which in turn increases demand pressures on the Delta, which in turn affects fisheries and in-Delta water right users. 32 Over the past few years of drought, the SWRCB has relaxed minimum in-Delta fishery and other water quality standards, primarily because exports were not decreased in prior years to plan for multiple drought years. The drought also resulted in SWRCB curtailment of senior right holders while exports continued. One cannot separate increased permanent demand created by the KWB from the ongoing stresses in the Delta and Delta water right holders.

Moreover, the recent decision in the Delta Stewardship Council Cases (Coordinated Case No. JCCP 4758, Sacramento Superior Court) concluded that the Delta Plan is required to specify decreases in exports from the Delta and that all areas served by export water were subject to Delta Plan mandates. As the KWB obtains the vast majority of its water from the SWP, it is 33 subject to these mandates. The Revised EIR must therefore consider the Delta Plan and all likely mandated decreases in exports that it mandates, and analyze what impacts that process will have on KWB operations.

As these impacts are directly connected to the new significant impacts identified in the Revised EIR, they must be analyzed. As it stands now, the Revised EIR's analysis on agricultural resources, and in particular its analyses regarding the conversion of irrigated annual 34 crops to permanent crops, is insufficient under CEQA.

ii. The Revised EIR Should Analyze the Significance of Article 21 and the KWB Transfer

The Revised EIR makes no revisions to Section 2, State Water Project; however, new data provided in the Agricultural Resources Section indicates that removal of Article 21(g)(1) from the baseline calculation was a significant impact that needs to be updated. Article 21(g)(1) provided for the delivery of surplus water to SWP contractors, but explicitly limited this water to non-permanent uses: DWR was required to refuse the delivery of such water to the extent that it determined such delivery would tend to encourage the development of an economy within the 35 area served which would be dependent upon the sustained delivery of surplus water. (Monterey Plus FEIR at 6.1-9.) The Monterey Plus FEIR concluded that deletion of Article 21(g)(1) would not have a significant impact on the baseline because there was no difference in the baseline demand before or after the Monterey Amendment. (*Id.*) The FEIR stated that Article 21(g)(1) was designed to prevent the establishment of permanent agricultural crops based on the delivery of *scheduled* surplus water. (*Id.*) Since scheduled surplus water had not been available for about nine years prior to the Monterey Amendment and unscheduled (interruptible) water was

infrequently available in the same period (1987-1995), DWR reasoned that it was unlikely that
anyone thought that intermittent Article 21 water would be used to support development of an 35
economy in agriculture or municipal and industrial areas. (*Id.* at 6.1-9 to 6.1-10.)

These earlier conclusions and assumptions must now be revisited. The Revised EIR's
data regarding the conversion of annual crops to permanent crops in Kern County, including
within the KWBA member agencies' service areas, proves that surplus water—both scheduled
and unscheduled/interruptible water—has been and likely will be used for growing permanent
agricultural crops. At its core, the development and operation of the KWB facilitates the use of 36
surplus water as irrigation for permanent crops, which is exactly what the Monterey Plus FEIR
admits Article 21(g)(1) was intended to prevent. The Monterey Plus FEIR's assumption that it
was unlikely that anybody thought that such water would be used for such a purpose has been
proven false and the Revised EIR must now address this issue.

Specifically, the data regarding conversion from annual to permanent crops indicates that
crop patterns changed substantially within the county between 1996 and 2014. (Revised EIR at
7.6-13.) Nuts, citrus, and fruit—all of which are permanent crops—increased by 189%, 238%,
and 141% respectively in that time period in the KWBA participants' service area. (*Id.* at 7.6-7,
Table 7.6-6.) What the Revised EIR does not analyze is how much surplus water—water that
was formerly subject to Article 21(g)(1)'s restrictions—has been used to recharge the KWB, and 37
thus how much surplus water has been used to irrigate permanent crops. There can be no
question that, if Article 21(g)(1)'s restrictions applied to any amount of recharged water stored in
the KWB, growers using KWB water may have made different crop selection decisions. The
Revised EIR needs to include this data and then disclose and analyze the significant impacts that
resulted and will result from the removal of Article 21(g)(1)'s restrictions.

c. Surface Water and Groundwater Hydrology

The Revised EIR admits to possible groundwater depletion as a result of the operation of
the KWB, but concludes that this is only a potentially significant impact and that mitigation
makes it less than significant. However, the Revised EIR explicitly states that relevant 38
information needed to determine the significance of groundwater depletion on nearby water users
was not gathered, despite acknowledgement that some wells have and will become inoperable.
(Revised EIR at 7.1-33 and 10.1-19.) Moreover, the proposed mitigation measures only monitor
groundwater depletion and pay for the damage after the fact, rather than mitigate the actual 39
impact of a depleting groundwater supply. By rubber-stamping the mitigation measures already
agreed to from the settlement agreement with the Rosedale parties, the Revised EIR ignores any
possible alternatives that could avoid the significant impacts in the first place. The Revised EIR
must identify and analyze alternatives in addition to mitigation measures; that the trial court in 40
the Monterey Plus case found no fault with the Monterey Plus FEIR's alternatives does not
absolve DWR from satisfying CEQA with regards to newly-identified significant impacts.

i. Groundwater Depletion

1. Lack of Analysis Regarding Groundwater Depletion

The Revised EIR does not contain the information necessary to determine the significance of groundwater depletion by KWB activities. In the Surface Water and Groundwater Hydrology Section, the Revised EIR recognizes that KWB operations could potentially deplete groundwater supplies so that a lowering of the local groundwater table level would occur (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted). (Revised EIR at 7.1-33.) However, the Revised EIR does not analyze the significance that lowering the groundwater table will have on nearby water users. Instead, the Revised EIR asserts that whether KWBA's operations cause an impact that actually is significant at a specific agricultural or domestic well would depend on several factors, such as location of the well, depth of the well, operational depth of the pump, pump efficiency, and pumping rate. (*Id.* at 7.1-38.) The Revised EIR states that since this information for each well is not known, the specific potential impacts of KWB activities with respect to lowering of the local groundwater table at specific wells cannot be determined through modeling alone; the Revised EIR then makes no attempt to gather the necessary information to analyze the significant effects. (*Id.*) 41

In its analysis of past operations (1995-2014), the Revised EIR recognizes that KWB operations could lower the groundwater table up to fifty-five feet outside of KWB lands. (*Id.* at 7.1-34.) The Revised EIR notes that most private wells are perforated up to approximately 400 feet below ground surface ("bgs") and produce water at rates that meet domestic water use requirements.[12] (*Id.* at 7.1-38.) The Revised EIR estimates that KWB activities lowered groundwater levels to approximately 260 feet bgs at the end of 2007-2009 recovery period and to approximately 300 feet bgs at the end of the 2012-2014 recovery, which left approximately 100 feet of screened well below the water level. According to the Revised EIR, this would provide adequate flow to support operations at sufficient production rates for private wells. (*Id.*) The Revised EIR therefore concludes that KWBA operations are not expected to have a significant effect on operation of neighboring private landowner wells under historical low groundwater conditions except on those wells that are perforated to a depth less than 300 feet. (*Id.*) 42

The Revised EIR also recognizes that future activities will further deplete groundwater sources. In its analysis of future operations (2015-2035) under existing conditions, the Revised EIR reveals that KWB activities could lower groundwater levels to approximately 340 feet bgs at the end of the 2015 recovery period and to approximately 310 bgs at the end of the 2033-2035 recovery period. (*Id.* at 7.1-39.) This would leave only approximately sixty feet of screened well below the water level, and the Revised EIR again concludes that this provides adequate flow to support operations at sufficient production rates for private wells. (*Id.*) For its future analysis under build out conditions—in which 862 acres of recharge ponds will be developed including additional wells for pumping groundwater—the Revised EIR estimates that KWB activities lower groundwater levels to approximately 360 feet bgs at the end of the 2015 recovery period and to approximately 340 feet bgs at the end of the 2033-2035 recovery period. (*Id.* at 7.1-40.) 43

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[12] No data is provided for the assumption that most private wells are perforated up to approximately 400 feet bgs.

DWR states that this would leave approximately forty feet of screened well below the water level, and again concludes that this would provide adequate flow to support operations at sufficient production rates for private wells. (*Id.*) cont. 43

Thus, the Revised EIR acknowledges that KWB activities will deplete groundwater sources, but concludes that no matter how much depletion occurs there will be adequate flow to support operations at sufficient production rates for private wells; however, this conclusion is impossible without gathering information for each well that will be impacted, which the Revised EIR explicitly states has not been done. (See *Id.* at 7.1-38.) To the contrary, the Revised EIR presents evidence that indicates the groundwater depletion on private wells is significant and the flow is not adequate to support operations at sufficient production rates for private wells. Even more illuminating is the cumulative impacts analysis, which states that KWB activities "may cause groundwater levels to decrease such that some existing wells in an area immediately outside KWB Lands could become *inoperable*." (*Id.* at 10.1-19)(emphasis added.) The Revised EIR therefore recognizes that its activities may dry up nearby wells, but inexplicably states in its analysis that there will always be an adequate flow. 44

Evidence in the Revised EIR illustrates that groundwater depletion can be substantial enough to require landowners to make claims regarding significant groundwater impacts. (See *Id.* at 7.1-38) In 2014, KWBA and Rosedale developed and implemented an Interim Operations Plan ("Interim Plan") which designates measures to be employed to prevent, eliminate, or mitigate significant adverse impacts resulting from KWB and Rosedale project operations. (*Id.*) The plan requires the formation of a Joint Operations Committee ("JOC") that oversees implementation of the plan, including the establishment of a process to respond to and evaluate landowner claims associated with project operations including claims made prior to the Interim Plan. (*Id.*) The JOC sent letters in 2010 to those who made claims of groundwater impacts. (*Id.*) The letters alerted them to the potential for groundwater level declines to affect their wells and that the groundwater bank participants may be able to provide funds to help alleviate those impacts. (*Id.*) As of December 31, 2015, the JOC has evaluated claims made prior to the Interim Plan and has received twenty-one new claims from 2015. (*Id.*) Of the pre-Interim Plan claims, the JOC processed eight for payment and eight were rejected. (*Id.*) Of the 2015 claims, thirteen have been processed for payment and six have been rejected. (*Id.*) At this point, the JOC has authorized payments totaling approximately $447,800 as mitigation for the processed claims. (*Id.*) 45

This information directly contradicts the Revised EIR's claim that current groundwater depletion provides adequate flow to support operations at sufficient production rates for private wells; in fact, it reveals the opposite to be true: groundwater depletion is having a significant effect on nearby landowners, resulting in nearly half a million dollars expended to alleviate the harm caused by that depletion. The Revised EIR states that the money paid out was used to provide a permanent connection to a municipal water supply, lowering pumps in existing wells, and drilling deeper wells, and that any future impacts are less likely to occur because wells vulnerable to declining groundwater levels have already been permanently mitigated. (*Id.* at 7.1-39.) Claiming that the money was used to help fix certain vulnerable wells by no means proves that the problem has been permanently mitigated for those wells, especially considering that the Revised EIR predicts that future KWB activities will continue to lower the groundwater 46 table. Moreover, since information regarding specific wells in nearby communities is not provided, it is impossible to conclude that all vulnerable wells have been permanently mitigated and future impacts are less likely to occur. This is particularly apparent considering that more than half of the groundwater claims occurred *after* 2015. cont. 46

Lastly, payment is not adequate mitigation to make the problem less than significant: private landowners may prefer maintaining their water supply instead of losing water in return for payment. Even if one could argue that the mitigation is sufficient, without a proper analysis of alternatives, the public and decision-makers have no way of knowing whether the impacts could be avoided in the first place, without having to resort to costly and possibly insufficient mitigation measures. 47

The Revised EIR must fully analyze alternatives to and mitigation measures for KWB's impact on groundwater depletion, with the goal of doing more than merely paying people for the Project's harms after the fact. To accurately determine the significance of groundwater depletion on private wells, the Revised EIR must include information regarding those wells. The Revised EIR's conclusions that there is adequate flow for private wells and vulnerable wells are permanently mitigated are erroneous without more information on nearby wells. The information on nearby wells is not difficult to ascertain, and the Revised EIR's analysis of groundwater depletion is insufficient. 48

2. Lack of Analysis Regarding Subsidence Due to Groundwater Depletion

In addition, groundwater depletion could lead to the significant effect of subsidence, in which the land above groundwater begins to sink, causing permanent damage. (Exhibit N.)[13] Subsidence is a particular concern when annual crops change to permanent crops because there is less flexibility for farmers during droughts, causing them to increase groundwater pumping.[14] The Revised EIR mentions that KWB activities can potentially cause or contribute to subsidence as a result of groundwater extraction, but concludes that this impact is less than significant because no subsidence has occurred in the KWB area. (Revised EIR at 7.8-10 to 7.8-11.) Just because subsidence has not yet occurred in the KWB area does not mean that it will not occur in the future. The Revised EIR models show that groundwater depletion is occurring and will continue to occur, but the Revised EIR does not use those models to evaluate potential subsidence in the area resulting from continued and increased groundwater depletion. The Revised EIR must analyze the potential for continued groundwater depletion to cause subsidence in the KWB and surrounding areas, rather than relying purely on the observation that no subsidence has yet occurred. 49

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[13] Amy Quinton, *USGS Study: 1200 Square Miles of Central Valley Land is Sinking*, Capital Public Radio News (Nov. 22, 2013) ("[E]xcessive groundwater pumping causes [] subsidence."), http://www.capradio.org/articles/2013/11/22/usgs-study-1200-square-miles-of-central-valley-land-is-sinking/ (Attached as Exhibit N).

[14] *Id.* ("[T]he subsidence area has seen more row crops change to permanent crops. 'That has the effect of providing less flexibility for farmers when there are droughts because these permanent crops will need water during droughts … if you have row crops then perhaps fallowing the land during drought would be an option.")

3. Lack of Cumulative Impact Analysis Regarding the Aquifer Deficit and Groundwater Depletion

The cumulative impact analysis regarding the aquifer deficit and depletion of groundwater supplies is also woefully inadequate. Under the CEQA Guidelines, an impact is cumulatively considerable when the "incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." (CEQA Guidelines, § 15064, subd. (h)(1).) The Revised EIR identifies current water banking activities within the area and recognizes that KWB activities may have cumulative impacts on the net aquifer deficit as well as groundwater depletion; yet the Revised EIR only analyzes KWB activities, failing to analyze the impacts of the other current regional water banking activities or activities of other nearby water users. Without analyzing the impacts of the other water banking activities or water users, it is impossible to determine the significant cumulative impacts of KWB activities. 50

a. Aquifer

The Revised EIR fails to analyze the cumulative impacts KWB operations has on the aquifer used by the KWBA participants. In its cumulative impact analysis regarding whether KWB activities, in combination with regional and local water banking projects, could potentially deplete groundwater supplies so that a net deficit in aquifer volume of stored groundwater would occur, the Revised EIR simply reiterates what it said in its non-cumulative impact analysis. (Revised EIR at 10.1-19.) The Revised EIR claims that there will not be a net deficit in aquifer volume of stored water because at the end of 1995-2014 historical KWB modeled operations, there was an accumulated balance of about 617,000 AF of stored water. (*Id.*) This number is based on a model of past operations between 1995 and 2014, in which DWR estimated a recharge of 2,006,372 AF at the KWB facilities, and estimated a recovery of only 1,389,113 AF, resulting in a net balance of 617,000 AF. (*Id.* at 7.1-30.) However, this number is based only on a model of KWB facilities. No information is provided regarding the other identified operations that use the same aquifer, and thus it is impossible to determine cumulative impacts, even if KWB modeled a net accumulation in its own water use. 51

More importantly, the Revised EIR does not contain an analysis of the actual needs of the KWBA participants to extract water from the KWB lands for recovery under different hydrologic cycles. As explained above, there is a growing trend in converting annual crops into permanent crops, but no information is presented regarding how that change impacts the water demands of KWBA participants. There is no way to determine how changing trends in crop patterns resulted in the net balance of 617,000 AF in a twenty year period, and whether it can be assumed that the next twenty years will be similar to the 1995-2014 analysis. In relation to the cumulative impacts analysis, the Revised EIR does not identify the other water users who use the aquifer or their changing water demands. Without information about KWBA participants' and other aquifer users' water demands, the Revised EIR cannot determine whether KWB activities are having a significant cumulative impact. 52

b. Groundwater

The Revised EIR also fails to properly analyze the cumulative impacts that KWB activities have on the depletion of groundwater resources. In its cumulative impact analysis regarding whether KWB activities, in combination with regional and local water banking projects, could potentially deplete groundwater supplies so that a lowering of the local groundwater table level would occur, the Revised EIR again only reiterates what it said in its non-cumulative impact analysis. (Revised EIR at 10.1-19.) The cumulative impact analysis recognizes that KWB activities may decrease water levels such that some existing wells in an area immediately outside KWB Lands could become "inoperable."[15] (*Id.*) But the Revised EIR then gives similar reasoning for why it cannot determine whether the impact is actually 53
significant: "whether the impact actually would be significant (i.e., substantial) would depend on several factors, including the specific field conditions and physical characteristics of the agricultural and domestic wells in the affected area." (*Id.*) The Revised EIR does not present any information regarding other agricultural and domestic wells in the affected area. The Revised EIR then makes the assumption that "all groundwater banks generally have similar operations: recharge when water supplies are available and recovery when water supplies are scarce." According to the Revised EIR, "numerous water banks adjacent to the KWB and in the same region would operate similarly and potentially result in an overall significant cumulative impact. Therefore, this would be a potentially significant cumulative impact." This is the extent of the analysis.

In the preceding groundwater analysis section, the Revised EIR recognizes that KWB activities *alone* will decrease the groundwater table; in fact, it will decrease so much that wells will become inoperable. This determination is made without analyzing other wells in the area or other water banking activities. If other water banking activities have similar impacts to KWB's activities, than it would presumably follow that many wells would become inoperable due to a severe depletion in groundwater. The Revised EIR identifies multiple other nearby banking projects, including the Pioneer Groundwater Recharge and Recovery Project; the Rosedale-Rio 54
Bravo Water Storage District Groundwater Storage, Baking, Exchange, Extraction and Conjunctive Use Program; Rosedale-Rio Bravo Water Storage District/ID4 Joint-Use Groundwater Recovery Program; Rosedale-Rio Bravo Water Storage District/Irvine Ranch Water District Integrated Banking Project; and the West Kern Water District/Buena Vista Water Storage District Joint-Use Recharge Facility; however, the Revised EIR does not provide information regarding the amount of groundwater depletion caused by any of those other water banks. (*Id.* at 10.1-9 to 10.1-10.) The Revised EIR nonetheless assumes that the cumulative impact of KWB activities to groundwater depletion is only a potentially significant impact.

In order to determine the significance of the cumulative impact of KWB activities, the Revised EIR must analyze the rate at which other banking activities and other water users deplete the groundwater. Without providing this information, which should be feasible, the 55
Revised EIR cannot determine the significance of the cumulative impact of KWB activities, and in turn cannot adequately identify necessary mitigation measures.

[15] It's worth noting that the Revised EIR recognizes wells will become inoperable, without evaluating the impacts of other regional or local water banks, but does not use the term "inoperable" in its preceding analysis of groundwater depletion.

4. Improper Mitigation Measures to Prevent Groundwater Depletion

The Revised EIR fails to adopt proper mitigation measures to prevent depletion of groundwater resources or make the impact less than significant. Agencies are required to adopt feasible mitigation measures in order to substantially lessen or avoid the otherwise significant adverse environmental impacts of proposed projects. (Pub. Resources Code, §§ 21002, 21081, subd. (a); CEQA Guidelines. §§ 15002, subd. (a)(3), 15021, subd. (a)(2), 15091, subd. (a)(1).) Mitigation measures should be capable of: (a) "[a]voiding the impact altogether by not taking a certain action or parts of an action;" (b) "[m]inimizing impacts by limiting the degree or magnitude of the action and its implementation;" (c) "[r]ectifying the impact by repairing, rehabilitating, or restoring the impacted environment;" or (d) "[r]educing or eliminating the impact over time by preservation and maintenance of operations during the life of the action." (CEQA Guidelines, § 15370.) The Revised EIR must set forth mitigation measures that decision-makers can adopt at the findings stage of the planning process. (Pub. Resources Code, § 21100, subd. (b)(3); CEQA Guidelines, §§ 15126, subd. (e), 15126.4.) 56

Here, the Revised EIR's improper analysis of groundwater depletion and lack of cumulative impact analysis illustrate the deficiency of the proposed mitigation measures. The Revised EIR's mitigation measures include monitoring and reporting groundwater conditions; implementing proactive measures such as identifying at risk wells; providing mitigation and/or compensation for adverse impacts cause by KWB activities; reducing or adjusting pumping at KWBA's option if necessary; and finding other suitable sources of water for a user who is adversely impacted. (Revised EIR at 7.1-49 to 7.1-54.) These mitigation measures do not avoid the impact, minimize the impact, rectify the impact by restoring the impacted environment, or reduce the impact overtime. 57

The Revised EIR merely commits to monitoring groundwater and essentially paying landowners when groundwater is depleted. The Revised EIR states that it will use a model to calculate a negative potential impact ("NPI") in which KWB operations deplete groundwater by at least thirty feet, but no commitment is made to mitigation measures other than KWBA participants reducing pumping at its option and/or KWBA participants compensating well owners based on submission of a claim. These mitigation measures do not prevent or mitigate the depletion of groundwater identified in the Revised EIR, nor do they make the impacts of KWB operations less than significant. Rather, these mitigation measures are designed to pay-off 58
nearby water users after depletion of groundwater has already occurred. Lastly, the Revised EIR states that "it is possible that a joint long-term agreement will be developed in the near future between KWBA, Rosedale, and the Pioneer Project for the coordinated implementation of a long-term banking operations plan that includes standards that address potential cumulative impacts of the participating water banks." (Revised EIR at 7.1-49.) Twenty years has passed in which these agencies could have identified mitigation measures, and assuming that KWBA may enter into a future long-term agreement to prevent cumulative impacts falls far short of measures necessary to mitigate cumulative groundwater depletion. 59

5. Failure to Evaluate Alternatives

The Revised EIR fails to analyze any alternatives that could avoid or lessen the significant impacts of the project. An EIR must describe a reasonable range of alternatives to the project, or to the location of the project, that could feasibly attain most of the basic objectives of the project while avoiding or substantially lessening any of the significant effects of the project. 60
(CEQA Guidelines, § 15126.6, subds. (a), (f).) Alternatives analyzed in the EIR need not be actually feasible, but rather need only be "potentially feasible." (CEQA Guidelines, § 15126.6, subd. (f)(1).) The Revised EIR identifies significant and potentially significant impacts from transferring the KWB, but does not include an analysis of any alternatives, relying completely on the alternatives analysis in the Monterey Plus FEIR, which provided four different variations of the "no project" alternative. That analysis fails to consider the significant impacts identified for the first time in the Revised EIR.

The Revised EIR recognizes that the KWB Transfer could result in a conversion of annual crops to permanent crops as well as a depletion of the groundwater table, but does not analyze alternatives that would avoid or lessen the harms caused by those impacts. For issues related to conversion of permanent crops that require a dependable water supply, the Revised EIR must evaluate an alternative that has safeguards for the use of surplus water to prohibit the creation of permanent economies, or limits the use of surplus water that could be used to create 61
permanent economies. An evaluation of alternatives that limits surplus water for use in permanent economies would allow for adequate analysis of the project's impacts on the state water supply. Here, the Revised EIR evaluates no alternatives, ignoring the widespread conversion to permanent crops that has occurred because of the KWB Transfer.

The Revised EIR must also analyze alternatives that avoid or lessen the significant impacts on groundwater resources. The Revised EIR should analyze alternatives that require a certain amount of water to be recharged before recovery, or set limits on the amount of water recovered, to ensure reliability of groundwater and aquifer resources; as it stands, there are no 62
actual limits to the amount of water that KWBA participants may withdraw, which the Revised EIR identifies has potentially significant impacts on the depletion of groundwater and net aquifer deficit.

6. Inadequate "No Project" Alternative

The Revised EIR must also update the "no project" alternatives based on the new data. The purpose of the "no project" alternatives is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. 63
(CEQA Guidelines § 15126.6, subd. (e).) Due to the unique nature of this EIR, in which the project took place prior to approval, there is data in the Revised EIR that will allow decision-makers to make a more informed decision.

Here, the Revised EIR indicates that since 1995 there has been a substantial change in crop patterns, in which annual crops that are capable of being fallowed in dry years have been converted to permanent crops that require a dedicated water supply. That impact must be 64
included in the "no project" alternatives to help decision-makers understand the impacts of approving the project. The Revised EIR additionally recognizes that the KWB transfer resulted 65

in a depletion of groundwater resources, and that data must be included in the "no project" alternatives. cont. 65

The lack of alternatives and the insufficient "no project" alternatives are clear deficiencies in the Revised EIR. 66

III. CONCLUSION

The Revised EIR is inadequate and based on incomplete analyses, lacks critical data, and ignores significant impacts. The Revised EIR's conclusions are erroneous and indicate DWR's failure to properly evaluate the impacts of transferring the KWB under CEQA. DWR must prepare an adequate EIR that evaluates the significant impacts identified, alternatives to avoid significant impacts, and proper mitigation. 67

Sincerely,

Ryan Berghoff **Center for Food Safety**	**Carolee Krieger** **California Water Impact Network**	**Bill Jennings** **California Sportfishing Protection Alliance**
John Buse **Center for Biological Diversity**	**Dante Nomellini** **Central Delta Water Agency**	**John Herrick** **South Delta Water Agency**

EXHIBIT A

WATER & DROUGHT APRIL 16, 2015 3:32 PM

California almond growers to expand orchards, despite drought

HIGHLIGHTS

California's almond farmers have been criticized in some quarters for using too much water. A new report says growers will continue to expand their orchards. The Almond Board said the industry shouldn't be blamed for the drought.

1 of 2

BY DALE KASLER
dkasler@sacbee.com

Almond orchards have become ground zero in the debate over California's epic drought, the focal point of criticism that agriculture uses too much water.

The response? More almond trees.

California's almond farmers are likely to continue planting new orchards in the coming years, increasing production by 2 percent to 3.5 percent a year over the next decade, one of the state's leading farm economists said Thursday.

"Higher prices and good profits for California almond growers will continue to encourage more planting of almond orchards," economist Vernon Crowder, senior vice president at Rabobank, said in a report released by the bank. "Nurseries report very little slowing in orders of new trees."

Representatives of the state's almond farmers defended the decision to expand California's orchards, saying growers with adequate water supplies are making rational economic decisions based on the price they can get for their crop.

"That's the American economic system," said Richard Waycott, chief executive of the Almond Board of California, in a conference call Thursday with reporters.

"It's basically 6,500 farmers making these decisions," he added. "Nobody's telling them to do that."

Agriculture in general is under fire as the drought worsens. Critics say farmers use 80 percent of the water dedicated to human use in California but generate only about 2 percent of the state's economic output. Gov. Jerry Brown has defended his decision to exempt agriculture from his recent executive order mandating a 25 percent cut in consumption by urban water agencies statewide, saying farmers already have had their surface supplies curtailed considerably.

On Thursday, Brown argued against any effort to curtail production of water-intensive crops. "That's a 'Big Brother' move, and we're not in that position," Brown told reporters after a drought-related meeting at the Capitol.

"Agriculture is an important pillar of California," Brown said, "and I think we have to be very slow to be starting to pick" among crops, with policies favoring one over another.

Farmers also say that the 80 percent figure is misleading. When environmental uses are taken into account, agriculture's share of California's water supply falls to around 40 percent.

The state's agricultural industry, and almonds in particular, have nonetheless taken a public relations beating in recent weeks. As the nut's popularity has boomed, the amount of California farmland devoted to almonds has nearly doubled over the past 20 years, to more than 900,000 acres. The state's almond crop is worth more than $4 billion a year as prices have risen to nearly $4 a pound, record territory.

That's proved controversial in an epic drought because almond trees are permanent crops. They can't be fallowed in dry years, unlike rice, tomatoes and other annual crops. Much of the increased planting in recent years has occurred on the west side of the San Joaquin Valley, where water supplies have become among the most fragile in California.

Growers who have planted orchards in the San Joaquin area "are finding out that you can get burned," Crowder said.

What's more, almonds get criticized for using lots of water. An oft-quoted statistic says it takes a gallon of water to produce a single almond. Many in California agriculture say that's too simplistic a statistic.

But there is little dispute that almonds are among the thirstiest crops in California. Almond trees require about 4 acre-feet of water a year for every acre planted, according to data gathered by David Goldhamer, a water management specialist emeritus with the UC Cooperative Extension. Tomatoes and grapes take about half as much water, as does cotton – a crop that has seen its acreage diminish as almond orchards have spread. Among major crops, only alfalfa takes more water per acre than almonds.

Almond farming has hardly been immune to the effects of the drought. Yields fell, and the crop shrank by 12 percent last year despite the growth in acreage, Crowder said.

Nor have farmers been oblivious to the state's water woes, Waycott said. The growers are converting to highly efficient irrigation systems, and some of them have had to rip out their trees when they've been unable to get water.

"We do have areas where people have thrown in the towel and orchards have been abandoned," Waycott said. "That is a trend. It's not a huge trend yet."

The almond boom in California is in many respects an international phenomenon. Almonds have become enormously popular as snack foods and cooking ingredients in Western Europe, China, India and other growth markets. California produces about 80 percent of the world's supply, and exports have grown 40 percent in three years.

Crowder said he expects prices to moderate before too long, but almonds will continue to be a very profitable crop for most farmers. That suggests most farmers will find a way to stay in the almond business.

"These guys are in the business of making money on farming," Crowder said. "They know what they need to do to make a living, and it's selling almonds to the world."

EXHIBIT B

A collaboration between:

Almond Production in California

Daniel Geisseler and William R. Horwath

Background

Almonds were planted in California as early as 1853 [12]. The varieties used were of European origin. In many locations they seem to be poorly adapted to the climatic conditions and were irregular bearers [12]. Many almond trees, especially those planted in the south, were thus either grafted over into prunes or plums or were made into firewood. The varieties, however, were not alone to blame. The lack of knowledge about the need for cross-pollination also contributed to the unsatisfactory results. In the 1880s, local varieties, more adapted to the climatic conditions, became available and allowed for profitable production of high quality almonds [12]. In 1886 A.T. Hatch of Suisun presented a number of varieties at the Citrus Fair in Sacramento, including Nonpareil and Ne Plus Ultra [12]. These two varieties are still planted today, with Nonpareil still being the dominant variety [1]. Furthermore, the need for cross-pollination with compatible cultivars was established in the early 1900s. This greatly improved production [7].

Initially, almonds were mainly planted on higher lands in coastal valleys, free from fog and protected from direct wind, as well as in the interior valleys and foothills. Almonds were recommended to be planted on light soil. They were expected to produce good crops on soils that are too sandy and dry to grow peaches or nectarines. Most often, almonds were produced without irrigation [12]. With adapted varieties available, almond production increased steadily. While the statewide production was about 250 tons in 1888, it averaged 2250 tons between 1910 and 1914 and 4600 tons between 1915 and 1919 [10, 13]. Even though it was recognized early that irrigated almond trees produce larger crops, growers did not start to apply irrigation water until the 1930s [14]. The almond acreage continued to increase slightly, reaching 100,000 acres of bearing almond trees in 1964. In this period fell the shift from hand to mechanical harvest [6]. A mayor expansion of almond production took place between 1964 and 1985 when the area increased to more than 400,000 acres. Product development and marketing contributed significantly to this increase in acreage, with innovative new products leading to expanded markets of almond products [4]. A second factor was the increase in the irrigated area in the San Joaquin Valley, where soils and climatic conditions are ideal for almond production [4].

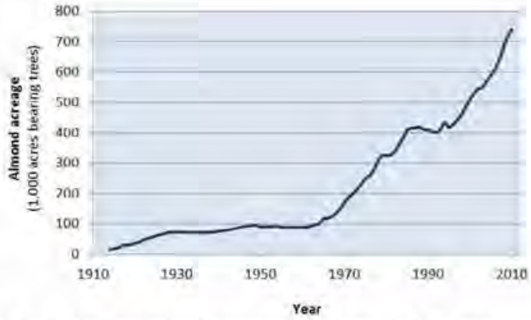

Figure 1: Area of bearing almond trees in California since 1914 [10, 14].

While the acreage remained relatively stable between 1985 and 1995, it increased again reaching a new high in 2011 with 760,000 acres of bearing orchards producing 2.02 billion pounds of almonds, which accounted for 84% of the global production [1].

Production area

In the 1930s, almonds were grown from Shasta county in the north to Riverside and San Diego counties in the south, with the main production areas being the Sacramento Valley, San Luis Obispo county and the northern San Joaquin Valley [14]. In 1950, 50% of California's almonds were still produced in the Sacramento Valley, while the San Joaquin Valley and the coastal counties contributed 25% each [5]. However, by 1970, the major areas of almond production had moved to the San Joaquin Valley, and most of the expansion since then has taken place there [4]. Today, Kern, Fresno, Stanislaus, Merced and Madera counties together produce three thirds of California's almonds (Figure 3) [11]. The shift in production was due California Water Project, which increased the availability of irrigation water in the San Joaquin Valley [4]. Better soils and a more favorable climate with less rainfall and warmer temperatures at bloom have also contributed to the popularity of almonds in the San Joaquin Valley [4].

Figure 3: Location of the five leading almond producing counties in California [11]

Yield

The early almond plantings were seen as unreliable and did not seem to be adapted to California's conditions [2]. The development of local varieties and the recognition, that almond are self sterile, were two important steps towards stable yields and profitable almond production. The yield of almonds has increased tremendously over the years. From 1915 to 1935 the average yields in California's almond orchards remained relatively stable at approximately 210 lbs/acre shelled almonds [10]. By 1960, the yield had more than tripled. The increased use of irrigation contributed significantly to the higher yields during this period. Since the 1960s, the yield has increased even faster, reaching an average of 2100 lbs/acre in the period from 2006 to 2010 [10]. The relatively large yield fluctuations are mainly due to the effects of varying late winter and spring weather conditions, with rain and cool temperatures during bloom resulting in lower yields [7].

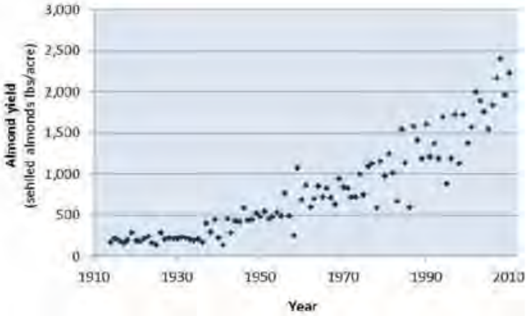

Figure 2: Almond yield since 1914 in California [10, 14]

Several factors have contributed to the astonishing yield increase, including practices to maximize cross-pollination, selection of adapted rootstocks, as well as improved fertilization, irrigation and pest management [4, 2]. Compared to many other crops, the genetic improvement of varieties is likely of lesser importance. The major variety "Nonpareil", which accounts for 39% of the almonds produced in 2011/12 [1], was already introduced in 1886 [12].

Fertilization

Different surveys about almond fertilization have been carried out since the late 1990s. Based on a survey conducted by the USDA in 1999, California almond growers applied some 134 lbs N/acre. In the same year, the potassium (K_2O) and phosphate (P_2O_5) applications reached 127 and 85 lbs/acre [9]. Nitrogen was applied by more than 90% of the growers, while potassium and phosphorus were applied by one out of four growers [9].

In a FREP-funded survey conducted in the San Joaquin Valley in 1999, King found that all growers interviewed applied N fertilizer to almonds between March and September. The application rate ranged from 50 to 350 lbs/acre, averaging 150 lbs/acre [3]. The most widely used fertilizer was UN32, followed by CAN 17. More than half of the growers applied N via a pressurized irrigation system, while a third used broadcast application. Shanking the N in or applying it with flood irrigation were other practices reported. About a third of the growers reported applying N during the winter months with an average application rate of 70 lbs/acre [3]. Similar results in terms of preferred N fertilizers and application time were obtained in a survey carried out in 2007 by a research team led by Patrick Brown among California Almond growers [8]. In addition, the survey revealed that potassium sulfate was the preferred K fertilizer, followed by potassium thiosulfate and potassium chloride. The proportion of growers using fertigation had grown to two thirds and 80 to 90% of growers reported applying foliar N, P and K at least once a year [8].

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The document has been prepared within the project "Assessment of Plant Fertility and Fertilizer Requirements for Agricultural Crops in California", funded by the California Department of Food and Agriculture Fertilizer Research and Education Program (FREP).

This document is available online at https://apps1.cdfa.ca.gov/FertilizerResearch/docs/Almond_Production_CA.pdf

Last update: June, 2016

EXHIBIT C

AGRICULTURE APRIL 29, 2016 4:18 PM

California almond acreage continues to grow

HIGHLIGHTS

California almond acreage grew by 6 percent in 2015

Fresno County is one of the leading almond growers in the state

But Fresno County farmer George Goshgarian raises alarms about industry's immediate future

BY ROBERT RODRIGUEZ
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California almonds, one of the state's largest crops, increased in acreage by 6 percent last year.

Statewide, a recent federal survey estimates the acreage to be 1.1 million acres. Of that, 890,000 acres of trees are producing nuts and 220,000 acres are young trees.

The leading almond growing counties include Kern, Fresno, Stanislaus, Merced and Madera. The five counties represent 73 percent of the producing acreage in the state.

In 2015, Fresno County had 110,995 acres of trees in production and 15,552 acres of non-bearing trees. Madera had 79,092 bearing acres and 10,039 non-bearing acres.

Almond industry officials say the growth represents strong demand from domestic and overseas consumers. But that red-hot market began to cool last year as the industry's major export markets, including China and India, bought less. A strong U.S. dollar also hurt sales.

Fresno County farmer George Goshgarian estimates the price of a pound of almonds has tumbled at least 60 percent since September.

"Right now, we may be averaging about $2," Goshgarian said. "And some guys are getting really close to being in the negative."

And it remains to be seen if the decline in prices will significantly slow the planting of new acreage.

60 percent

Drop in the price of processed almonds since September, Fresno County farmer George Goshgarian estimates

The preliminary acreage estimate for 2016 is 900,000, according to the U.S. Department of Agriculture's National Agricultural Statistics Service.

Goshgarian hopes the foreign markets will rebound, and he isn't convinced prices have stabilized.

Many in the industry are waiting for the USDA's "subjective" estimate of the 2016 crop. That report, expected May 10, will help dictate the direction of the market.

Later in the season, the government will issue a more thorough estimate known as the "objective" estimate. That is due in June.

One factor that could slow almond expansion is the availability of water. The state recently emerged from four consecutive dry years that cost farmers deeply. With a lack of surface water, farmers spent millions to dig new wells or repair old ones. The industry also suffered from a public backlash for how much water it used to grow nuts.

Industry officials have tried to combat the bad publicity with figures showing that the shift to higher value crops, like almonds, has not led to a rise in agricultural water use.

According to figures from the California Department of Water Resources, water used by agriculture has held steady since 2000 and declined over a longer period of time because of higher efficiency irrigation systems.

"Because of the industry's commitment to research and efficiency, growers use 33 percent less water to grow a pound of almonds than they did two decades ago," said Richard Waycott, chief executive officer of the Almond Board of California.

Robert Rodriguez: 559-441-6327, @FresnoBeeBob

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EXHIBIT D

REAP WHAT YOU SOW 8 (http://fusion.net/2015/08/)/27 (http://fusion.net/2015/08/27/)/15 (http://fusion.net/2015/) 1:19 PM

Thank almonds, pistachios, wine, and groundwater for California's record harvest

By Ari Phillips (http://fusion.net/author/ari-phillips/)

(http://fusion.net/video/308961/tcgs-paul-

TCGS Season 2: Paul Scheer & Jason Mantzoukas in "One Man's Trash" (http://fusion.net/video/308961/tcgs-paul-scheer-jason-mantzoukas/)

(http://fusion.net/video/303660/trump-vs-bernie-shout-

'Trump vs. Bernie' return with Chris Matthews and Rachel Maddow (http://fusion.net/video/303660/trump-vs-bernie-shout-the-vote-chris-matthews-rachel-maddow/)

chris-matthews-rachel-maddow/)

Photo by Justin Sullivan/Getty Images

(http://fusion.net/story/301594/lin-manuel-miranda-hamilton-puerto-rico/)

Lin-Manuel Miranda says Donald Trump is spreading 'a virulent strain of a virus' (http://fusion.net/story/301594/lin-manuel-miranda-hamilton-puerto-rico/)

By Ari Phillips (http://fusion.net/author/ari-phillips/)

By Ari Phillips (http://fusion.net/author/ari-phillips/)

A new study (http://pacinst.org/wp-content/uploads/sites/21/2015/08/ImpactsOnCaliforniaDrought-Ag.pdf) this week from the Pacific Institute, an Oakland-based environmental think tank, has found that even as California undergoes an extreme drought, agricultural output—which accounts for (http://www.washingtonpost.com/blogs/govbeat/wp/2015/04/03/agriculture-is-80-percent-of-water-use-in-california-why-arent-farmers-being-forced-to-cut-back/) 80% of California's water use—is at a record level.

The report determined that crop revenue peaked in 2013 at $34 billion, the highest level in the state's history, before declining slightly in 2014 by 1.4%, still the second-highest year on record. These numbers are good for industry jobs and economic indicators—the state is the country's largest agricultural producer—but they are built upon an unstable foundation, according to the report, which concludes that:

> California's agriculture sector has exceeded expectations during the most severe drought in recorded history at the cost of massive but unsustainable groundwater pumping. Continued groundwater overdraft…has shifted the burden to others, including current and future generations forced to dig deeper wells, find alternative drinking water sources, and repair infrastructure damaged by subsidence.

Evidence of excessive groundwater use in California has recently been documented by sinking farmland (http://www.christiantoday.com/article/california.is.sinking.faster.than.thought.as.drought.leads.to.massive.groundwater.loss/63104.htm) in the Central Valley, where the massive pumping of well water has led to land subsistence, or sinking, of up to two inches a month in some areas.

The Pacific Institute study, which is the first comprehensive analysis of the impacts of the drought on California agriculture through 2014, also determined that crop revenue stability is not only a result of groundwater overdraft, but also a shift to higher-value crops such as almonds, pistachios, and wine grapes. The total increase in fruit and nut acreage since 2000 was 570,000 acres, or 24%, according to the study. Nut orchards, unlike vegetable crops, can't be left fallow during dry years, which presents a long-term challenge for agricultural water use in the region.

"In the longer term, we really do need to make sure that we recharge groundwater in wetter years," Jay Lund, director of the Center for Watershed Sciences at UC Davis, told (http://www.usatoday.com/story/money/business/2015/08/26/california-drought-agriculture/32443709/) the AP. "So that we have it available to keep these much more profitable permanent crops going through dry years."

"The drought has certainly bitten us, but California agriculture by and large is still thriving in most places," Lund continued. "We think that both the jobs and the revenues would be quite a bit more if it weren't for the drought."

There are a number of other factors feeding into this perseverance. Crop productivity, or tonnage per acre, has also increased for some important crops, such as strawberries, tomatoes, and walnuts, according to the study. Crop prices have also generally increased over the last decade.

Increases in efficiency, which include a shift towards drip irrigation, have actually made it so that a full million acres less of cropland was harvested in 2014 compared to 2000, according to the study. In 2014, farmers harvested 640,000 fewer acres, or nearly 10%, less than when compared to pre-drought levels, even as revenue remained strong.

The Pacific Institute also estimated that farmers choosing to voluntarily sell their water to non-agricultural users such as municipalities, industries, and environmental flows, boosted revenue by at least $66 million in 2014.

When it comes to jobs, the study found that statewide agriculture-related jobs also reached a record-high of 417,000 people in 2014. However a recent study (http://www.scribd.com/doc/275033974/Aug-2014-Final-Drought-Report) from the University of California, Davis, found that more than 21,000 farm workers are out of work in 2015 due to California's drought. It also found that those with a job are working harder and making less money. A big part (http://www.npr.org/sections/thesalt/2015/08/27/434763709/farmworkers-see-jobs-earnings-shrivel-in-california-drought) of this problem is smaller fruit, due to the drought, which takes longer to gather and yields less value. The analysis determined that losses to all economic sectors because of the 2105 drought will be as high as $2.74 billion.

Regardless the authors of the Pacific Institute study state that "ultimately, California agriculture is changing in many ways to withstand the ongoing drought."

"The study's results provide critical insight into how the state can maintain a healthy agriculture sector in a future likely to see less water, more extreme weather, and greater uncertainty," they state.

There may be some short term relief in sight, as forecasters are predicting (http://news.yahoo.com/drought-plagued-california-readies-el-nino-storms-060555034.html) a record-setting El Niño, or warming of the Pacific Ocean, to bring heavy rain to the drought-ridden state over the winter. Mike Halpert, deputy director of the National Oceanic Atmospheric Administration's Climate Prediction Center, told (http://news.yahoo.com/drought-plagued-california-readies-el-nino-storms-060555034.html) the AP that California would need 1.5 times its average rainfall to emerge from the extended drought, an amount he thinks is unlikely.

Some things that are likely if there is a strong El Niño: flooding, landslides, and a return to the current hot and dry conditions that scientists have confirmed have been heavily influenced by climate change. Just last week a comprehensive study was released (http://thinkprogress.org/climate/2015/08/20/3692972/quantifying-climate-change-in-californias-drought/) showing that climate change was likely responsible for worsening the current drought by 15 to 20%.

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EXHIBIT E

IMPACTS OF CALIFORNIA'S ONGOING DROUGHT: Agriculture

Heather Cooley
Kristina Donnelly
Rapichan Phurisamban
Madhyama Subramanian

PACIFIC INSTITUTE

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ABOUT THE PACIFIC INSTITUTE

The Pacific Institute envisions a world in which society, the economy, and the environment have the water they need to thrive now and in the future. In pursuit of this vision, the Pacific Institute creates and advances solutions to the world's most pressing water challenges, such as unsustainable water management and use, climate change, environmental degradation, food, fiber, and energy production, and basic lack of access to fresh water and sanitation.

Since 1987, the Pacific Institute has cut across traditional areas of study and actively collaborated with a diverse set of stakeholders, including leading policy makers, scientists, corporate leaders, international organizations such as the United Nations, advocacy groups, and local communities. This interdisciplinary and independent approach helps bring diverse groups together to forge effective real-world solutions.

More information about the Pacific Institute and its staff, board of directors, and programs can be found at www.pacinst.org.

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Kristina Donnelly is a Research Associate with the Pacific Institute's Water Program. Her research interests include: the social, economic, and policy aspects of water conservation; conflict and conflict management over transboundary water resources; low-impact development and green infrastructure policy and planning; and U.S. water policy and economics. Ms. Donnelly received a B.S. in Mathematics from American University and an M.S. in Natural Resources and Environment from the University of Michigan. Ms. Donnelly was selected as the 2008/09 Sea Grant Fellow with the Great Lakes Commission in Ann Arbor, Michigan. Prior to joining the Institute, she worked for the Arava Institute for Environmental Studies in southern Israel, conducting transboundary water research and organizing educational opportunities for Israelis, Jordanians, Palestinians, and other nationalities.

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Rapichan Phurisamban is a Research Assistant with the Pacific Institute's Water Program, where her primary work centers on the economic analysis of California's water supply and storage initiatives and efficiency measures. She brings experience in California water rights law, climate change adaptation in water resources management, and international development. Prior to joining the Pacific Institute, she was a research consultant and project coordinator at a Thai nonprofit organization, working to promote sustainable food and agricultural systems. Ms. Phurisamban holds a B.A. in Economics from the University of British Columbia and an M.A. in Public Policy from the University of California at Berkeley.

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Madhyama Subramanian is a sustainability professional with over nine years of experience in project management, research, and communications for various projects. She has worked with multilateral organizations, NGOs, and corporations in South Asia, Israel, and the United States. Ms. Subramanian received a B.A. in Visual Communication Design from the National Institute of Design in Delhi and an M.S. in Master of Development Practice from the University of California at Berkeley.

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Contents

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INTRODUCTION

California is one of the world's most productive agricultural regions. The state is the nation's largest agricultural producer, supplying both U.S. and international markets with more than 400 different farm products. In 2013, total California farm output was valued at $50.2 billion, or about one-tenth of the total for the entire nation.[1] Of this amount, $33.5 billion was from crops; $13 billion from livestock, poultry, and livestock products; and $2.4 billion from nursery, greenhouse, and floriculture (NASS 2015a, 2015b). California is the nation's largest agricultural exporter, with exports reaching a record $21.5 billion in 2013 (CDFA 2015).

Several factors are putting pressure on the state's agricultural economy: California has the most variable climate in the United States (Dettinger et al. 2011) and is prone to extreme hydrologic events, including multiyear droughts. The most significant statewide droughts have occurred during the six-year period from 1929 to 1934, the two-year period from 1976 to 1977, and the six-year period from 1987 to 1992 (DWR 2015a). More recently, California experienced a relatively modest drought from 2007 to 2009 and, as of this writing, is in the midst of a major drought that began in 2012.

The current drought is the most severe in nearly 120 years of instrumental record.[2] California has a Mediterranean climate, receiving very little precipitation during the summer months. California's "water year" starts on October 1 and ends on September 30. The 2014 water year was the third driest on record, and 2012–2014 was the driest three-year period in the instrumental record. At 25% of average, the snowpack in 2014 was then the lowest ever recorded, but even this record was broken in 2015, when the snowpack reached a new low of 5% of average. The drought has also been extraordinarily warm. Dry conditions across the state have been exacerbated by high temperatures, with 2014 the hottest year on record and 2012–2014 the hottest three-year period on record (Mann and Gleick 2015).

Droughts have wide-ranging effects. However, assessing their impact is challenging because there is no standard methodology for measuring and comparing diverse impacts, data are often lacking, and it is difficult to isolate drought from other factors. Despite these difficulties, several studies have conducted retrospective analyses of the impacts of past droughts on the state's agricultural sector (e.g., Gleick and Nash 1991; Christian-Smith

1 All monetary values have been adjusted for inflation and are stated in year 2015 dollars, unless specified otherwise.

2 While some weather data are available from the mid-1800s and even earlier, consistent, high-quality instrumental data on temperature and precipitation typically date from around 1895. These data are maintained by the National Climate Data Center of the National Oceanic and Atmospheric Administration, www.ncdc.noaa.gov

et al. 2015; Michael et al. 2010; Dziegielewski et al. 1993). Most recently, Christian-Smith et al. (2015) evaluated the agricultural acreage, yield, and revenue during the 2007–2009 drought, which at the time was the state's 12th driest three-year period on record. The authors found that in 2009, gross revenue from California farms and ranches was the third highest on record, behind only 2007 and 2008. Not surprisingly, however, impacts varied within and between counties. For example, gross revenue increased by 2% in Fresno County during the drought years but declined by 9% and 19% in neighboring Kern and Kings Counties, respectively.

The resilience of the agricultural sector during the 2007–2009 drought was due to several factors, including the sector's strong financial position before the drought began, high crop prices, and the variety of response strategies employed. In particular, growers changed crops, improved their irrigation practices, fallowed land, engaged in water transfers, received insurance payments, and pumped more groundwater. These strategies helped buffer the state's agricultural sector from drought-period losses and contributed to far fewer job losses than had been projected (Michael et al. 2010; Howitt et al. 2011). Christian-Smith et al. (2011), however, noted that "some of the response strategies such as groundwater mining were short-term fixes that would not provide water security in the face of a longer or more severe drought."

The current drought is much more severe than the 2007–2009 drought, and its full impacts are not yet known. In a recent modeling effort, Howitt et al. (2014) projected that the 2014 drought would reduce surface water availability for agriculture by 6.6 million acre-feet but that these reductions would be partially offset by increased groundwater pumping of 5.1 million acre-feet. They then projected that the resulting water shortage of 1.5 million acre-feet would cause losses of $810 million in crop revenue and $203 million in dairy and other livestock value and that the added groundwater pumping would impose additional costs of $454 million on agriculture. Those projections did not incorporate the financial impact of crop and insurance programs or declines in other expenses (such as chemical, fertilizer, or labor costs), nor did it attempt to estimate the economic costs and benefits of market trades in water. That modeling study was completed in July 2014, but no detailed assessment of the actual agricultural impacts has yet been completed until this current study.

SCOPE AND OBJECTIVE

This report examines the impacts of the ongoing drought on California's agricultural sector through 2014. This analysis reports acreage (harvested cropland) and gross crop revenue (the total market value of agricultural products) for 2000–2014, based on data from the USDA National Agricultural Statistics Survey. All monetary values here are reported in year 2015 dollars. The value of production represents the gross revenue of agricultural commodities—the units produced multiplied by their per-unit market value in a given year. It does not include other sources of income (e.g., direct payments from the government, sales of farm-related goods and services, or noncash income such as the value of home consumption of self-produced food). Nor does it include cash and noncash expenses. It therefore does not reflect net farm income.

We limit our analysis to impacts on three major crop categories: field crops; vegetables and melons; and fruits and nuts.[3] We do not examine

3 Field crops are crops other than fruits and vegetables that are grown for agricultural purposes and include corn, alfalfa, cotton, rice, grains, etc.

the impacts on animal products (e.g., livestock and dairy) or nursery products, because complete data for 2014 are not yet available for these sectors. Moreover, we focus on data aggregated at the state level because complete county and regional data are not yet available. We note, however, that there will certainly be important differences between and within counties due to water availability. As these data are made available, we will provide a more detailed analysis of regional impacts.

BACKGROUND: WATER SUPPLIES FOR CALIFORNIA AGRICULTURE

Water for California agriculture comes from three key sources: surface water, groundwater, and recycled water. Of these, surface water is the largest source, providing about 60% of the agricultural water supply in an average year. While some farmers and irrigation districts hold surface water rights, which are administered by the State Water Resources Control Board, others have contracts from the federal Central Valley Project (CVP) or the State Water Project (SWP). Those contracts are administered by the U.S. Bureau of Reclamation (USBR) and the California Department of Water Resources (DWR), respectively. Contracts do not represent a water right. Rather, a contract is signed between a water right holder and an entity taking delivery of the water diverted under a particular water right. For example, the SWP district has a contract with DWR specifying the amount of water it is entitled to if full allocations are available. The SWP district then has contracts with landowners for distribution of the water it receives.

Total demand for water in the form of water rights claims greatly exceeds surface water availability in all years (Grantham and Viers 2014), and the allocation of available water is largely determined by California's complex water rights system. Under this system, senior water rights holders (those with riparian rights and pre-1914 appropriative water rights) are given higher priority than junior water rights holders.[4] During a drought, those with junior water rights (also referred to as post-1914 water rights) are more likely to be subject to cutbacks to protect senior right holders. Likewise, there is a hierarchy of water contracts within the CVP and SWP (Table 1). Nearly all the users who receive priority deliveries from the CVP are agricultural users, and while USBR may reduce their supply during drought conditions, it has done so only six times since 1977. Similarly, while some users of SWP water will receive less than their contracted amount, the supply to others is near guaranteed even in times of drought. Even during a prolonged drought, substantial volumes of surface water are delivered through the state and federal systems (Table 2).

Groundwater is the second key water source for California farmers, accounting for nearly 40% of the water used for irrigation in 2010 (USGS 2014). State totals, however, hide regional dependence on groundwater. Groundwater accounts for more than 90% of irrigation withdrawals in ten counties, most of which are located along the coast. Large volumes of groundwater are also used for irrigation in Tulare, Kern, and Fresno Counties, which together account for more than a quarter of the state's irrigated area. During drought years, when surface supplies are limited, groundwater becomes an important supplemental supply for farmers. However, the current use of groundwater far exceeds the natural rate of recharge. This has resulted in a decline of groundwater levels across large parts of the state, saltwater intrusion and other water-quality impairments, land subsidence, lost storage, and increased energy costs, among

4 Riparian rights are tied to property that is connected to a stream or river. Appropriative water rights are based on the "first in time, first in right" principle, in which pre-1914 rights have priority over post-1914 rights.

Table 1.

Comparison of senior and junior CVP contract holders' annual water supply allocations received as a percentage of maximum contract quantities, 2005–2014

CVP Contractor (Sacramento Valley Water Year Hydrologic Classification)	2005 (AN)	2006 (W)	2007 (D)	2008 (C)	2009 (D)	2010 (BN)	2011 (W)	2012 (BN)	2013 (D)	2014 (C)
San Joaquin Exchange/ Sacramento River Settlement Contractors	100%	100%	100%	100%	100%	100%	100%	100%	100%	65%/75%
Friant Division										
Class I	100%	100%	65%	100%	77%	100%	100%	50%	62%	0%
Class II	100%	100%	0%	5%	18%	15%	20%	0%	0%	0%
Other Contractors										
North-of-Delta Agriculture	100%	100%	100%	40%	40%	100%	100%	100%	75%	0%
North-of-Delta Urban	100%	100%	100%	75%	75%	100%	100%	100%	100%	50%
South-of-Delta Agriculture	85%	100%	50%	40%	10%	45%	80%	40%	20%	0%
South-of-Delta Urban	100%	100%	75%	75%	60%	75%	100%	75%	70%	50%

Notes: Sacramento Valley hydrologic classification abbreviations: W: wet; AN: above normal; BN: below normal; D: dry; C: critical. The Friant Division delivers water to contractors from Millerton Reservoir, and that water is allocated according to two classes: Classes 1 and 2. Class 1 water is the firm supply of up to 800,000 acre-feet, while Class 2 is the next increment of supply of up to 1,400,000 acre-feet and is only allocated once Class 1 needs are met.

Source: USBR 2015a

Table 2.

Total annual deliveries from the SWP and contract deliveries from the CVP, 2005-2014 (in acre-feet)

Year	State Water Project	Central Valley Project
2005	4,726,363	6,375,091
2006	4,827,082	6,237,911
2007	4,061,696	5,586,232
2008	2,838,128	5,316,167
2009	2,918,056	4,900,789
2010	3,505,140	5,590,610
2011	4,630,798	6,328,195
2012	3,967,453	4,648,840
2013	3,343,134	4,764,307

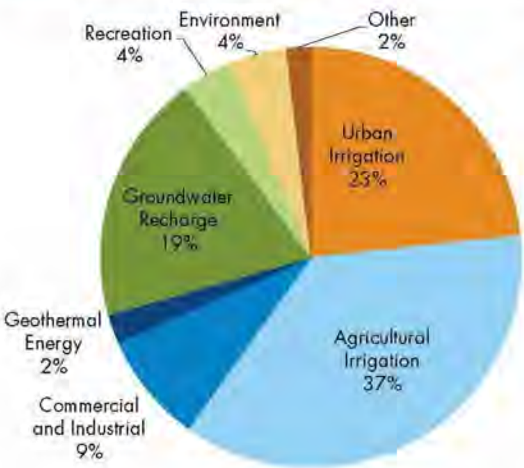
Note: An acre-foot is a quantity of water that would flood an acre of land one foot deep, or 325,851 gallons. The CVP data shown here are for contract deliveries only and exclude deliveries for other types of water, e.g., 215 water, spill water, well water, water rights-storage, and water transported under the Warren Act, because these are not considered contracted deliveries. The SWP data shown here cover all deliveries, including Table A, Article 21, Feather River diversions, and other SWP water deliveries.

Source: USBR 2015b; DWR 2015b; SWP data for 2013–2014 provided by DWR other adverse impacts. According to DWR (2014), "about 76 percent of the average annual groundwater extraction goes toward agricultural uses, with about 22 and 2 percent going toward urban and managed wetland uses, respectively."

Recycled water also represents a modest additional water supply for California agriculture. The most recent statewide recycled-water survey, conducted in 2009, found that the annual reuse of municipal wastewater was 670,000 acre-feet, of which 245,000 acre-feet (37%) was for agriculture (Newton et al. 2012) (Figure 1).[5] Additionally, recycled water used to recharge groundwater basins near agricultural areas indirectly supplies irrigation water to farmlands. Although agriculture is the single largest user of recycled water and has been using it as a supply for more than 100 years, it currently meets less than 1% of total agricultural water demand.

Figure 1.

Municipal wastewater recycling by end use, 2009



Source: Newton et al. 2012

5 An acre-foot is the quantity of water that would flood an acre of land one foot deep, or 325,851 gallons.

AGRICULTURAL PRODUCTION AND THE DROUGHT

California's agricultural sector is dynamic, responding to a host of local, national, and global conditions that change over time. We focus here on recent trends affecting harvested acreage, cropping patterns, production, and revenue. We also describe the impacts of the drought on food prices and employment.

HARVESTED ACREAGE

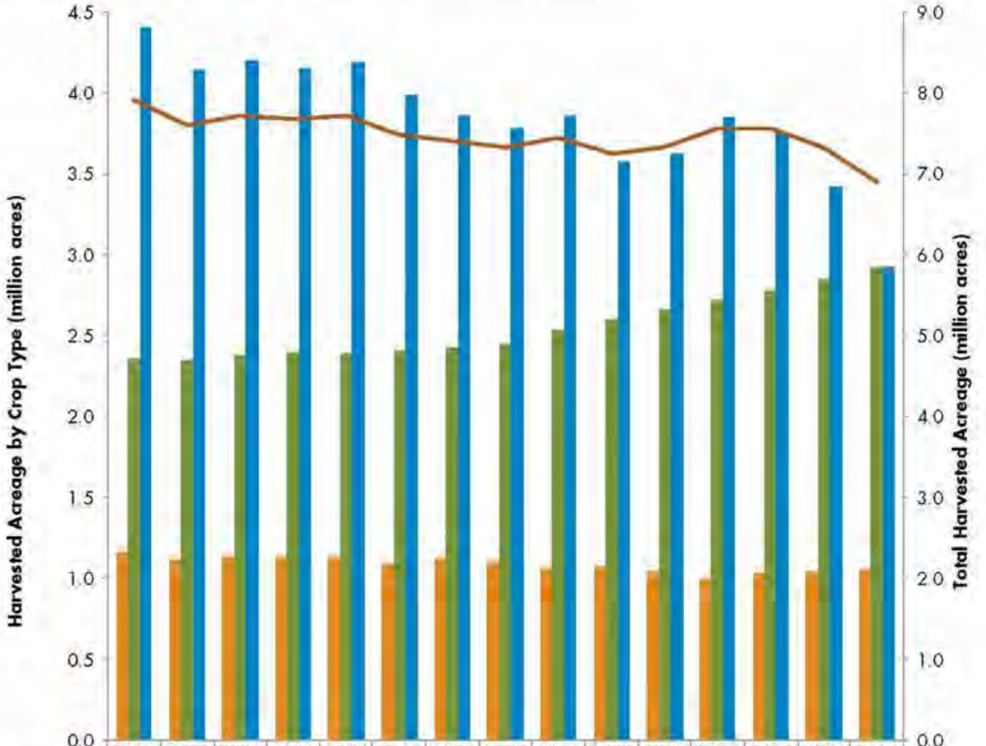
In 2000, nearly 7.9 million acres of land were harvested in California for a wide variety of vegetable, fruit and nut, and field crops (Figure 2). Between 2000 and 2011, annual harvested acreage averaged 7.5 million acres, with a slight downward trend over this period. Compared to this 12-year average, harvested acreage was 23,000 acres higher in 2012 but down by 216,000 acres in 2013 and 640,000 acres in 2014. By 2014 harvested acreage was 6.9 million acres, its lowest level in the past 15 years.

The types of crops grown in California have changed over the past 15 years, with reductions in the land area devoted to field crops, vegetables, and melons and an expansion of fruit and nut acreage. Between 2000 and 2011, total field crop acreage declined by 550,000 acres, or 13%. While the area planted with some types of field crops increased during this period (e.g., corn, wheat, and rice), others experienced large reductions. For example, cotton lost 460,000 acres, a 50% reduction; alfalfa lost 140,000 acres, a 14% reduction; and sugar lost 67,000 acres, a 73% reduction. During the drought, these trends accelerated, with field crops declining by an additional 930,000 acres (or 24%) between 2011 and 2014.

Vegetable and melon acreage has also been declining. Between 2000 and 2011, vegetable and

Figure 2.

California harvested acreage by crop type, 2000–2014 (in million acres)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Vegetables and Melons	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0
Fruits and Nuts	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.9
Field Crops	4.4	4.1	4.2	4.2	4.2	4.0	3.9	3.8	3.9	3.6	3.6	3.9	3.8	3.4	2.9
Total	7.9	7.6	7.7	7.7	7.7	7.5	7.4	7.3	7.4	7.2	7.3	7.6	7.6	7.3	6.9

Source: See Appendix 1 for data sources

melon acreage declined by about 160,000 acres, or 14%. During this period, the largest reductions were for melons (32,000 acres), tomatoes (28,000 acres), and asparagus (26,000 acres). Since 2011, however, vegetable and melon acreage has increased by 48,000 acres, much of which can be attributed to a large increase (34,000 acres) in tomato acreage. The increase in vegetable and melon acreage during the drought was not sufficient to offset the losses that occurred before the drought, resulting in an overall reduction in vegetable and melon acreage since 2000.

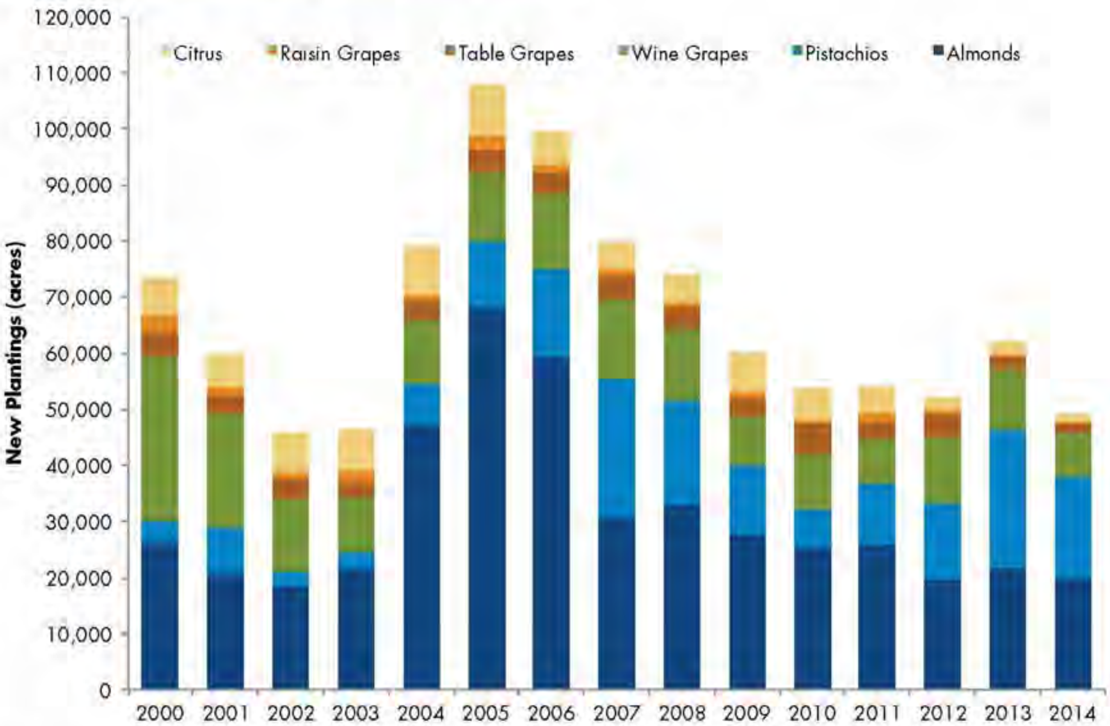
Fruit and nut acreage has increased steadily over the past 15 years, even during the current drought. In 2000, fruit and nut bearing acreage was 2.4 million acres, and by 2011, this number had increased to 2.7 million acres, a 15% increase. Between 2011 and 2014, fruit and nut acreage increased by an additional 210,000 acres, or 8%. The total increase in fruit and nut acreage since 2000 has been 570,000 acres, or 24%. While the bearing acreage of some types of fruit and nut crops declined (e.g., raisins and prunes), these losses were offset by large increases in acreage for other fruit and nut crops, especially almonds, pistachios, and wine grapes.

It is important to note that some of the increase in bearing acreage seen during the drought was the result of plantings in previous years. It often takes several years for trees and vines to become established and bear a crop that can be harvested (in what is referred to as "bearing acres"). Therefore, the change in the number of bearing trees and vines from year to year reflects young trees and vines going from "nonbearing" to "bearing" and old trees and vines being taken out of production. While data on new plantings are limited, information is available for some crops, including almonds, grapes, pistachios, and citrus (Figure 3). We found that new plantings have occurred every year since 2000, although there have been fewer new plantings during drought years for all of these crops, except pistachios. It is unclear to what extent these new plantings represent new acreage under development or whether they simply replaced old or unproductive trees and vines.

Both the type and the extent of harvested acreage in California are dynamic, affected to some degree by water availability and price but also by global

Figure 3.

New plantings for selected crops, 2001–2014 (in acres)



Note: These are gross, not net, annual plantings. Some of these plantings contribute to the expansion of fruit and nut acreage seen across the state, but others reflect the replacement of trees that are no longer productive.

Source: See Appendix 1 for data sources market conditions, including crop prices. The long-term trends include a slight reduction in harvested acreage and large changes from field to fruit and nut crops. These trends have accelerated during the drought. Much of the recent reductions in harvested acreage are due to short-term fallowing. Farmers fallow land for a variety of reasons, including a lack of water, low crop prices, and soil recovery. They may even sell water to another user. Most fruits and nuts are perennials that require water year-round and remain productive for many years. Thus, they cannot be fallowed when water is limited. Most field, vegetable, and melon crops, by contrast, are annuals that can be fallowed if needed. While vegetables and melons can be fallowed, they are generally of higher value than field crops and are thus less likely to be fallowed. Indeed, nearly all of the reductions in harvested acreage that have occurred since 2011 were field crops.

CROP REVENUE

Revenue from crops has increased markedly over the past 15 years. Figure 4 shows California's crop revenue between 2000 and 2014 (adjusted for inflation and shown in year 2015 dollars). Between 2000 and 2011, crop revenue increased from $21 billion to $28 billion. During 2012 and 2013—the first two years of the drought—crop revenue continued to grow, reaching a record high of $34 billion in 2013. In 2014, crop revenue declined by $480 million, representing a 1.4% reduction from 2013 levels. Thus even during the most severe drought on record, agricultural revenue from crop production in 2013 and 2014 was the highest and second highest, respectively, in California history.

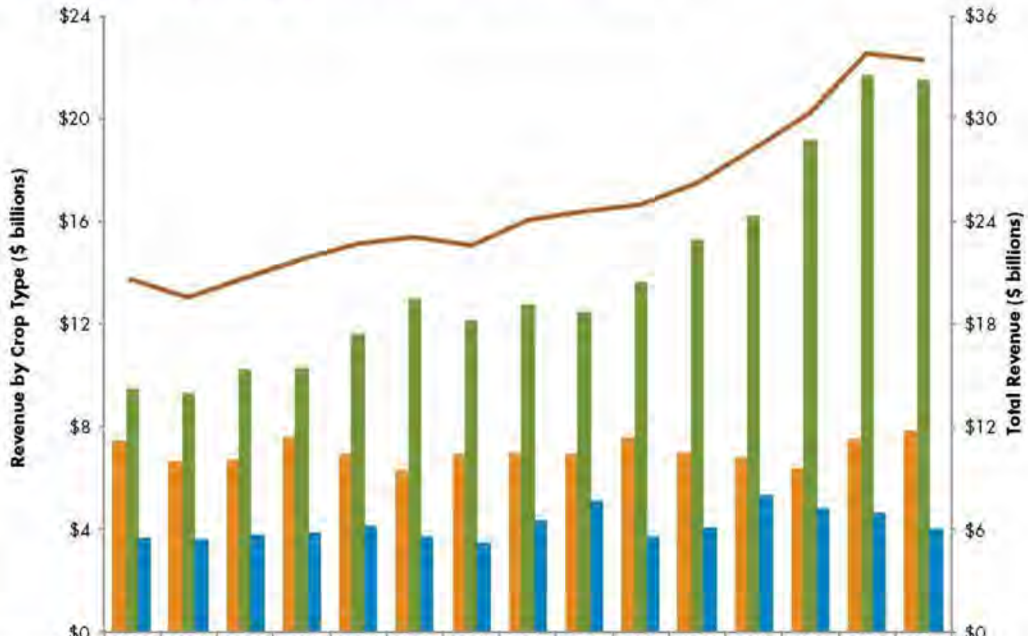
Higher crop revenue can largely be attributed to the expansion of fruit and nut crop acreage and strong market prices. Revenue from fruit and nut crops increased from $9.5 billion in 2000 to $16 billion in 2011. Fruit and nut revenue continued to grow in 2012 and 2013, but declined slightly (by $140 million, or less than 1%) from 2013 to 2014. Despite this decline, fruit and nut revenue in 2014 was still higher than it was during the pre-drought period. Much of the increased revenue between 2000 and 2014 can be attributed to almonds (whose revenue increased by $5.0 billion) and to a lesser degree walnuts ($1.4 billion), strawberries ($1.4 billion), pistachios ($1.3 billion), citrus ($1.1 billion), and table grapes ($980 million).

By contrast, revenue from vegetables and melons has been fairly steady over the past 15 years, increasing in some years and decreasing in others. For example, in 2011, vegetable and melon revenue was down slightly from 2000 levels but then increased moderately in 2013 and 2014. Prior to the drought, revenue from field crops had generally been increasing despite reductions in field crop acreage; since 2011, however, field crop revenue has declined every year, although it remained higher in 2014 than it has been in seven of the past 15 years.

The long-term increase in crop revenue was driven by several factors. First, as noted above, there has been a shift from lower- to higher-value crops, as evidenced by the reduction in field crop acreage and the expansion of fruit and nut acreage. In 2014, for example, field crops generated $1,300 per acre, while vegetables generated $7,600 per acre and fruits and nuts generated $7,300 per acre. Second, the productivity—as measured by the tonnage produced per acre—has increased for some key crops, including almonds, rice, strawberries, tomatoes, and walnuts. Tomato productivity, for example, was 35 tons per acre in 2000 but increased to 45 tons per acre in 2014. Third, crop prices have increased for most crops grown in California. For example, almonds generated $2,600 per ton in 2000 but $6,400 per ton in 2014. Likewise, table

Figure 4.

California crop revenue, by crop type, 2000–2014 (in billions of dollars)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Vegetables and Melons	$7.5	$6.6	$6.7	$7.6	$6.9	$6.3	$6.9	$7.0	$6.9	$7.6	$7.0	$6.8	$6.4	$7.5	$7.9
Fruits and Nuts	$9.5	$9.3	$10.2	$10.3	$11.6	$13.0	$12.1	$12.7	$12.5	$13.6	$15.2	$16.2	$19.1	$21.6	$21.5
Field Crops	$3.7	$3.6	$3.8	$3.9	$4.1	$3.8	$3.5	$4.3	$5.1	$3.7	$4.1	$5.3	$4.8	$4.7	$4.0
Total	$20.6	$19.5	$20.7	$21.8	$22.7	$23.1	$22.6	$24.1	$24.5	$24.9	$26.3	$28.2	$30.3	$33.8	$33.4

Note: All values have been adjusted for inflation and are shown in year 2015 dollars. Revenue from livestock, poultry, and products, as well as from nursery, greenhouse, and floriculture are not included here because these data are not yet available for 2014.

Source: See Appendix 1 for data sources

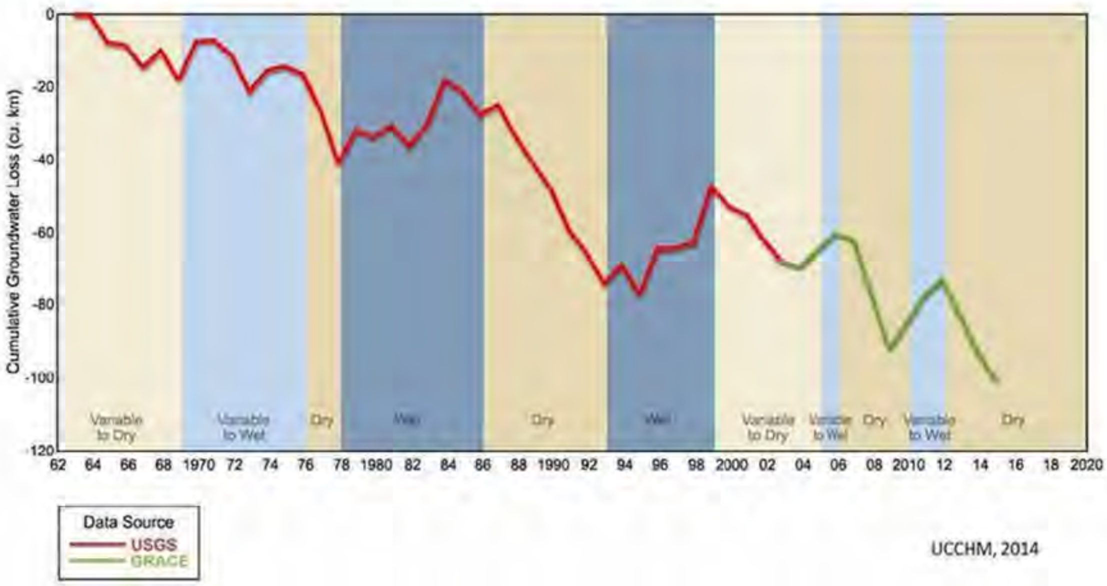
grapes generated $780 per ton in 2000 and $1,400 per ton in 2014. These factors have helped buffer the agricultural sector from the impacts of water shortages during the current drought.

In addition to these economic factors, farmers have increased groundwater pumping. California agriculture relies on groundwater for 40% of its water supply in average years and much more in dry years. Indeed, Howitt et al. (2014) projected that groundwater extraction in 2014 would increase by 5.1 million acre-feet statewide to offset an estimated 6.6 million acre-feet reduction in surface water availability. While data on actual groundwater usage are not available, recent satellite data indicate significant groundwater depletion in some areas both over the long term and especially in response to the current drought (Figure 5). Long-term declines in groundwater levels and a host of associated adverse impacts have underscored the fact that current levels of groundwater use in California are unsustainable.

Continued groundwater overdraft, while reducing

Figure 5.

Cumulative groundwater depletion in the Central Valley since 1962 (in cubic kilometers)



UCCHM, 2014

Note: The red line shows data from USGS-calibrated groundwater model simulations (Faunt 2009) from 1962 to 2003. The green line shows GRACE-based estimates of groundwater storage losses from Famiglietti et al. (2011) and updated through November 2014. Background colors represent periods of drought (dark tan), of variable to dry conditions (light tan), of variable to wet conditions (light blue), and of wet conditions (dark blue).

Source: Figure courtesy of Jay Famiglietti, University of California at Irvine and NASA Jet Propulsion Laboratory. USGS data from Claudia Faunt.

the economic impacts of the drought for the agricultural sector now, has shifted the burden to others. Individuals and communities whose wells have run dry have been forced to dig deeper wells or find alternative drinking water sources. Municipalities and other public entities must repair infrastructure damaged by subsidence. Moreover, future generations will pay more to access groundwater from greater depths and have less water available to meet their needs. The economic costs of these additional impacts are not included in this analysis, and no good estimate is available.

DROUGHT AND FOOD PRICES

California is a major agricultural producer, and for some crops, such as broccoli, grapes, almonds, and pistachios, the state accounts for more than 90% of the nation's production (Table 3). Thus, concerns have been raised about the impact of the drought on food prices, especially as agricultural lands are fallowed and production costs rise (Koba 2014). Despite this concern, the U.S. Department of Agriculture (USDA) Economic Research Service (ERS) found that crop prices have seen both increases and decreases, but no evidence that increases are associated with the drought:

"Increases in the retail prices for fresh fruits and vegetables in 2014 were primarily driven by an increase in the price for citrus fruit. However, rising citrus prices were reflective of two factors unrelated to the California drought. The first was the ongoing greening disease of Florida citrus commodities, which has damaged or destroyed substantial portions of the orange crop. The second was the December 2013 freeze in southern California that reduced the U.S. fresh orange crop. In 2014 fresh vegetable prices deflated 1.3 percent, despite the drought. Prices for fresh vegetables fell in 2014 after seeing higher than average price increases in 2013" (USDA 2015a).

While final data on 2015 food prices are not yet available, the USDA ERS projects that retail food price inflation will be normal to slightly lower than average due in part to the strength of the U.S. dollar and lower oil prices (USDA 2015a).

AGRICULTURAL EMPLOYMENT

An initial modeling effort by Howitt et al. (2014) projected that the drought would result in a loss of 17,100 seasonal and part-time jobs. New employment data from 2014 suggest that the actual impact of the drought on agricultural employment was much less than had been initially projected. Indeed, in 2014, California

Table 3.

California share of U.S. production for select fruit, nut, and vegetable crops (in percentages)

	California share of U.S. production		California share of U.S. production		California share of U.S. production
Artichokes*	100%	Strawberries*	90%	Oranges	27%
Dates*	100%	Cauliflower*	88%	Onions *	26%
Figs*	100%	Leaf lettuce, *	86%	Pears	25%
Kiwifruit*	100%	Avocados*	86%	Cabbage	25%
Olives*	100%	Carrots*	83%	Sweet potatoes	24%
Almonds*	100%	Romaine lettuce*	76%	Sweet cherries	22%
Pistachios*	100%	Head lettuce*	75%	Sweet corn	22%
Walnuts*	100%	Honeydew*	73%	Squash	17%
Garlic*	98%	Peaches*	72%	Watermelon	17%
Plums and prunes*	97%	Tangerines and	69%	Pumpkins	16%
Broccoli*	95%	mandarins*		Grapefruit	14%
Celery*	95%	Spinach*	63%	Snap beans	13%
Lemons*	93%	Chili peppers*	60%	Cucumbers	10%
Apricots*	90%	Raspberries*	57%	Blueberries	8%
Tomatoes	90%	Bell peppers*	56%	Potatoes	3%
Grapes*	90%	Asparagus*	47%	Apples	3%

Notes: Calculated based on production in 2011–2013. Crops shown with an asterisk indicate those for which California ranks first in U.S. production.

Source: USDA 2015b

agriculture employed a record-high 417,000 people (California Employment Development Department 2015a). According to the California Employment Development Department (2015b), agricultural employment in the third quarter of 2014—the period of peak farm employment—increased by 3,100 jobs from the same quarter in 2013. The agency further found that agricultural employment has increased every year since 2010 by an average of 9,000 jobs per year, although the increase in 2014 was less than in other years during that period. Agricultural employment was higher in 2014 than 2013 in the state's coastal and desert areas, as well as in the Sacramento Valley. In an example of the regional differences in drought impacts, agricultural employment was lower in the San Joaquin Valley, which had more land fallowed than other parts of the state.

While employment data suggest that overall agricultural employment has reached record-high levels, agricultural employment would likely have been even higher if there had been less fallowing. Water availability, however, is only one factor affecting agricultural employment. The total number of jobs also depends on the types of crops grown. As shown in Figure 6, the shift away from field crops and toward tree crops and tomatoes, for example, has likely contributed to the growth in agricultural employment. Moreover, as recently as 2012, a survey by the California Farm Bureau Federation found that "farmers in every growing region of California reported having a difficult time hiring enough employees to work in agriculture and harvest their crops" (California Farm Bureau 2012).

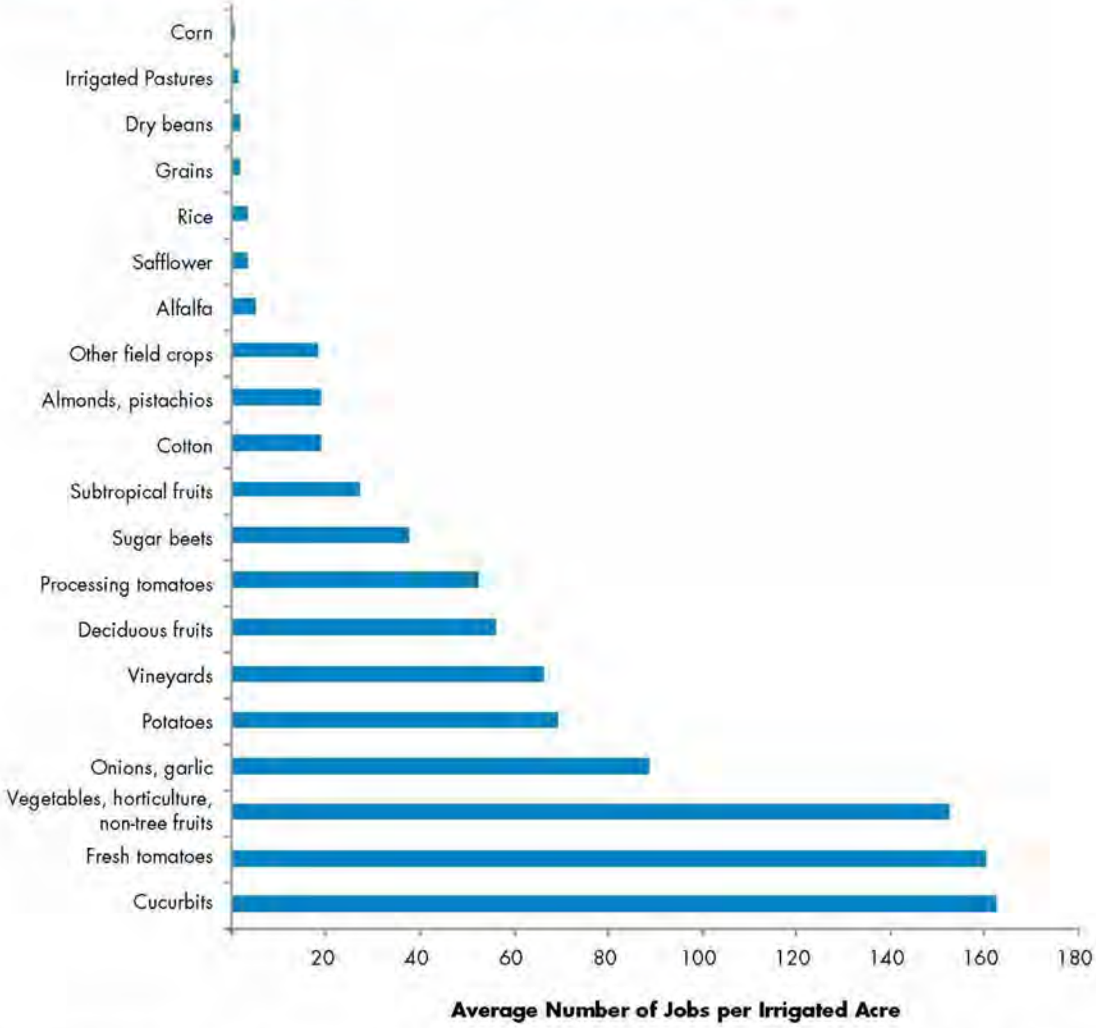
WATER TRANSFERS

Some California water analysts have proposed using expanded water markets and water transfers as tools for addressing water shortages and improving allocations. California has for several decades maintained a limited water market that allows for the temporary, long-term, or permanent transfer of the right to use water in exchange for compensation. Early efforts to facilitate the trade of water began in the late 1970s in response to a severe drought (DWR 1978). Market activity was slow in the early 1980s, with an annual average of 100,000 acre-feet in traded volume. Spurred by state and federal agencies' dry-year purchases of water for resale and environmental protection, a voluntary water market expanded significantly after the 1987–1992 drought. Between 2003 and 2011, an average of 2.1 million acre-feet was committed annually for sale or lease, with 1.4 million acre-feet actually moving between parties (Hanak and Stryjewski 2012). The volume of water traded was 3.2% of statewide water use during that period. Hanak and Stryjewski (2012) found that long-term and permanent trades are becoming more common, accounting for more than half of the water actually traded and three-quarters of the water committed. An informal market also operates in California whereby farmers may sell their water to other farmers within the same region, but data on these trades are not available because farmers are not required to report to, or gain approval from, water authorities to complete these transactions.

For this analysis, we examine the extent to which water transfers have been used to mitigate the economic impact of the current drought on California's agricultural sector. Since the onset of the drought, efforts have been made to improve the water-transfer process. For example, in May 2013, Governor Jerry Brown issued an executive order to streamline approvals for water transfers. However, the lack of a statewide database on water transfers is a major barrier to a comprehensive analysis of the voluntary reallocation of water between competing uses. Our analysis relies

Figure 6.

Average number of jobs produced per acre of irrigated land, by major crop type



Note: Crop categories are defined by DWR. Cucurbits refer to melons, squash, and cucumbers. Other field crops include flax, hops, grain sorghum, sudan, castor beans, miscellaneous fields, sunflowers, hybrid sorghum/sudan, millet, and sugar cane. Deciduous fruits include apples, apricots, cherries, peaches, nectarines, pears, plums, prunes, figs, walnuts, and miscellaneous deciduous. Subtropical fruits include grapefruit, lemons, oranges, dates, avocados, olives, kiwis, jojoba, eucalyptus, and miscellaneous subtropical fruit.

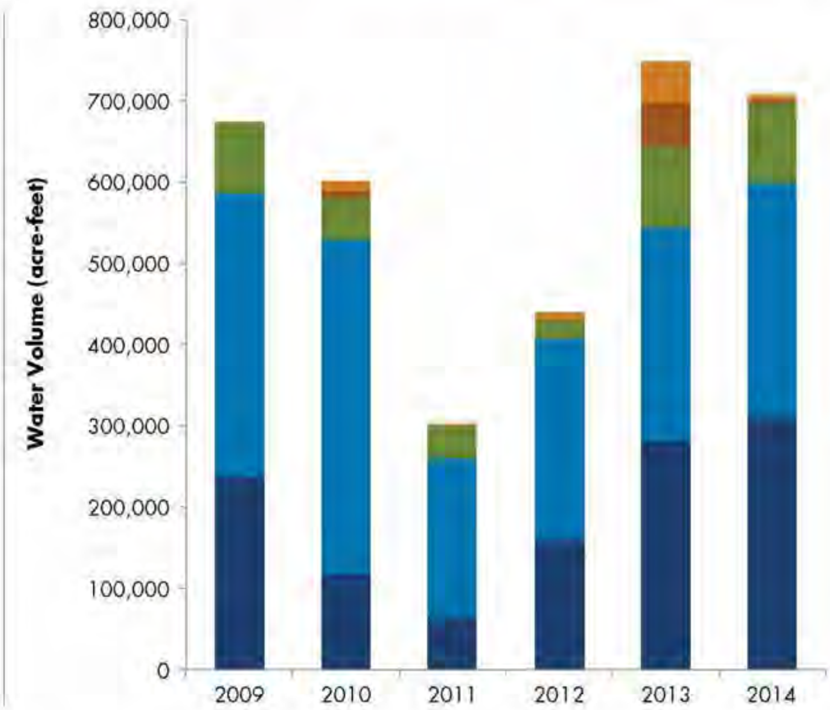
Source: Data on irrigated crop acreage for 2010 are from the DWR. Employment estimates are from Medellín-Azuara et al. 2015 and based on data from the California Employment and Development Department and IMPLAN economic model.

Figure 7.

Total volume of water transfers, 2009–2014 (in acre-feet)

- M&I to F&W
- M&I to M&I
- M&I to Ag
- Ag to F&W
- Ag to M&I
- Ag to Ag

Note:
Ag = agriculture
M&I = municipal and industrial
F&W = fish and wildlife



on data from several sources. They include the State Water Board's temporary water transfer orders; DWR's record of transfers that used SWP Delta export facilities;[6] purchases by State Water Contractors;[7] the Mojave Basin Watermaster; and major water sellers and buyers (e.g., Glenn Colusa Irrigation District, Yuba County Water Agency, Kern County Water Agency, Merced Irrigation District, and the San Luis and Delta Mendota Water Agency). While we have attempted to capture key data sources, actual transfer volumes likely exceed our current estimates. Thus, our results are minimum estimates of water transfer activities for the agricultural sector over the past six years.

Figure 7 shows the water transfer volumes between 2009 and 2014. Water transfer volumes are variable and are typically higher in dry years. From the available data, we estimate that water transfers in 2014 exceeded 710,000 acre-feet, which was 40,000 acre-feet less than was transferred in 2013 but more than in previous years. Of the transfers in 2014, 45% (or 310,000 acre-feet) were within the agricultural sector (i.e., between farmers or irrigation districts), while 38% (or 290,000 acre-feet) were transfers from agriculture to municipal and industrial users and 14% (97,000 acre-feet) from agriculture to fish and wildlife. A small amount of water was transferred between municipal and industrial users (4,800 acre-feet) and even less (4,000 acre-feet) from municipal and industrial users to agriculture.

Figure 8 shows water transfer volumes by hydrologic region. Note that all regions have had transfers at some time during this six-year

6 Only available for 2014. These kinds of transfers can occur only when the DWR has met all operational and regulatory requirements and additional conveyance is available.

7 Only available for 2014 from the State Water Contractors. Other records were obtained from sellers transferring water to the agency's members.

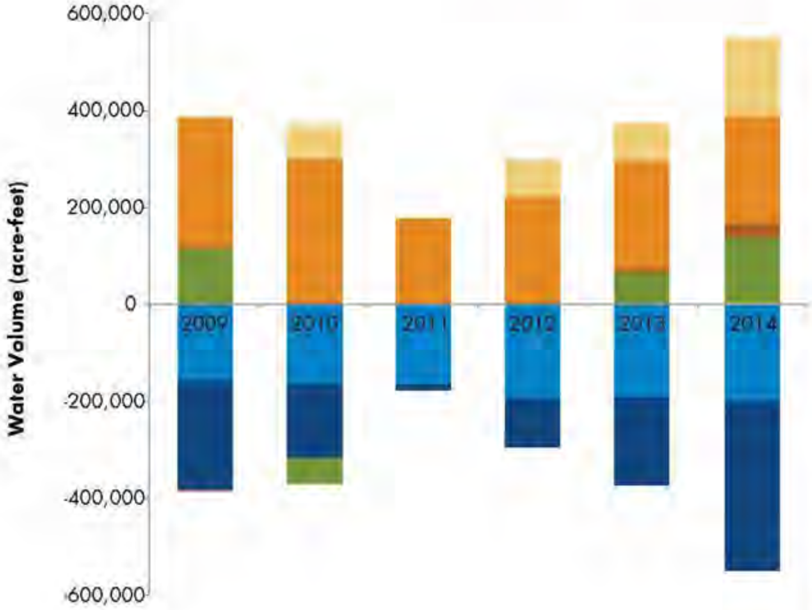


Figure 8.

Water transfers by hydrologic region, 2009–2014 (in acre-feet)

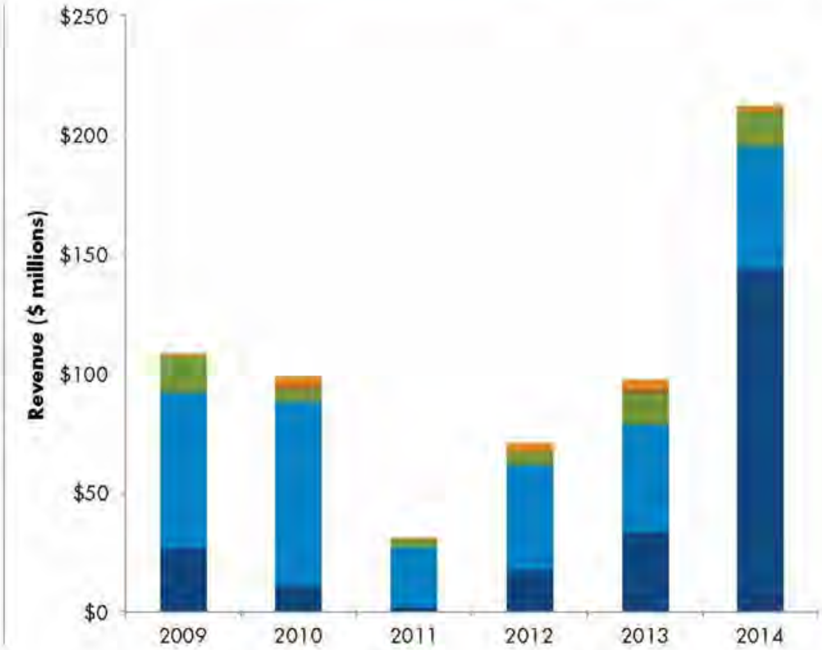
Note: Transfers involving the 2009 Water Bank, pools, or multiple entities where sources and destinations of water could not be identified have been excluded from this chart. Negative values indicate net water exporters, and positive values indicate net water importers.

period. In some cases, transfers were into a region, sometimes out of a region, and many times both. We show here the net transfers, with negative values indicating net water exporters, and positive values net water importers. Given California's unique hydrology and relatively abundant surface water supplies in the northern and mountainous areas of the state, much of the water transferred is from users in the Sacramento River region. For example, in 2014, net water transfers out of the Sacramento River region were 350,000 acre-feet, 92% more than in 2013. Net transfers from the Colorado River hydrologic region, largely a result of long-term water transfer contracts, have ranged from 165,000 to 200,000 acre-feet over the past six years. As the drought has intensified, the number of regions importing water from other parts of the state has increased. In particular, a large volume of water has been transferred to the Tulare Lake and San Joaquin River regions, the nation's leading agricultural areas. However, the South Coast is the largest net importer of water, averaging 230,000 acre-feet per year. While transfers to the San Francisco Bay hydrologic region are generally small, they increased considerably during 2013 and 2014 in response to the drought.

Water markets serve as a mechanism to mitigate drought-induced losses. Figure 9 shows the value of water transfers between 2009 and 2014, where the value is based on the volume of water sold and the price for that water. The value of water transfers in 2014 was $210 million, much higher than in previous years, even though the volume of transferred water was less than it was in 2013 and only slightly more than it was in 2009. This was due to the relatively high price for water in 2014. The average price for water transfers in 2014 was $370 per acre-foot; it was $170 per acre-foot in 2013.

Figure 9.

Revenue generated from water transfers, 2009–2014 (in millions of dollars)



Note: All values have been adjusted for inflation and are shown in year 2015 dollars.
Ag = agriculture
M&I = municipal and industrial
F&W = fish and wildlife

As described earlier, the agricultural sector was involved in about 99% of the water transfers in 2014, in some cases as buyers but in other cases as sellers. Of the $210 million in water transfers in 2014, nearly 70% (or $144 million) represented a transfer within the agricultural sector, likely from lower- to higher-value crops, helping to minimize losses in agricultural revenue. While agriculture paid nearly $640,000 to purchase water from municipal and industrial users, agriculture received nearly $66 million by selling water to other users. This represents another source of revenue for the agricultural sector that offset some of the crop revenue losses seen in 2014.

SUMMARY AND CONCLUSIONS

California is one of the most productive agricultural regions in the world, and that productivity has been made possible by a vast and integrated water infrastructure network that provides large volumes of water to the agricultural sector. The state, however, is prone to multi-year droughts. Indeed, California is in the midst of the most severe drought in nearly 120 years of instrumental record. The drought, which began in 2012, is having far-reaching effects that will intensify as the drought continues. This report examines the impacts of the ongoing drought on California's agricultural sector through 2014. Our focus is on changes in total harvested acreage, gross crop revenue, and agricultural employment over the past 15 years and is based on data from the USDA National Agricultural Statistics Survey and the California Employment Development Department. We do not examine production costs, impacts on animal or nursery products, or regional impacts, as these data are not yet available.

We find that while harvested acreage in California has declined during the drought, agricultural revenue remains high. In 2014, harvested acreage was 6.9 million acres, lower than at any time in the past 15 years. Reductions in field crops accounted for nearly all the cuts in harvested acreage since 2011. Bearing fruit and nut acreage, however, continued to increase, especially for almonds, pistachios, and wine grapes. While some of these were planted before the drought began, farmers have continued to plant new fruit and nut crops throughout the drought. Crop revenue was at its highest level in California's history, peaking in 2013 at $34 billion. In 2014, crop revenue declined by $480 million, but it remained the second highest ever recorded.

California farmers have employed a range of strategies to respond to the drought, including under-irrigating their fields, fallowing land, shifting crops, purchasing insurance, and pumping more groundwater. Water transfers have also mitigated the impact of the drought. In some cases, farmers with lower-value crops sold their water to farmers with higher-value crops, thereby reducing total losses in agricultural revenue. Some farmers also sold their water for use by municipalities, industry, or the environment. These sales represent another source of revenue for the agricultural sector. Although data are incomplete, we estimate that voluntary sales from agriculture to non-agricultural users boosted agricultural revenue by at least $66 million in 2014, offsetting some of the losses from fallowing. These water transfers, however, may have resulted in socio-economic and environmental impacts that are not well understood or quantified. For example, while farmers may have received compensation for selling water, a farm worker may simply be out of a job. The impacts of water markets on California's agricultural sector, society, and the environment are not well established and require further analysis.

Concerns have also been raised about the impacts of the drought on agricultural employment and food prices. Employment has increased in every year since 2010 by an average of 9,000 jobs, although the annual increase in 2014 was less than in other years during that period. By 2014, California's agricultural sector employed a record-high 417,000 people. However, as an example of the regional differences, agricultural employment was up in the state's coastal and desert areas and in the Sacramento Valley, but down in the San Joaquin Valley. Food prices appear to be largely unaffected by the drought. Although final data on 2015 food prices are not yet available, the USDA projects that retail food price inflation will be normal to slightly lower than average due in part to the strength of the U.S. dollar and lower oil prices.

It is important to note that statewide and even regional estimates can hide local variability. State agricultural revenue and employment remain high, but there are undoubtedly winners and losers. County-level acreage and revenue data are not yet available; however, the drought is very likely having a real impact on local economies in some areas, especially those areas with extensive fallowing. Fallowing means fewer employment opportunities for farm workers in those areas, and while some may be able to find work elsewhere, others may not.

Pressures on California agriculture are not merely a result of the drought. Rather, the drought is highlighting water management problems that have persisted for decades. For example, it is widely recognized that groundwater pumping rates are unsustainable in some major agricultural centers, such as the Tulare Lake and southern San Joaquin River hydrologic regions. In these areas, pumping will have to be slowed and recharge expanded to bring these aquifers back to a more sustainable balance. Moreover, climate change is making California's temperature and precipitation patterns more variable, leading to more frequent and intense floods and droughts and even higher crop water demands.

We conclude that the impacts of the drought on California's agricultural sector through 2014 were less than expected. The current boon can be explained in part by the increased, but unsustainable, groundwater pumping. Continued groundwater overdraft, while reducing the economic impacts of the drought for the agricultural sector now, has shifted the burden to others, including current and future generations forced to dig deeper wells, find alternative drinking water sources, and repair infrastructure damaged by subsidence. Water transfers have also played a role; however, the broader social and environmental impacts of these transfers are not well understood. Finally, short- and long-term shifts in the types of crops grown and improvements in irrigation technologies and practices have also improved the resilience of the state's agricultural sector to extreme weather events. The impacts of the drought on California agriculture and its response provide insight into how the state can maintain a healthy agricultural sector in a future likely to see less water, more extreme weather, and greater uncertainty.

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APPENDIX 1:
Data Sources

FIGURE 2 – HARVESTED ACRES

- Vegetable and melon acreage totals represent the sum of harvested acreage for the state's principal fresh market and processing vegetable crops.
  - 2000–2012 data are contained in the report "Vegetables - Final Estimates," published every five years by NASS (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1525).
  - 2013 and 2014 data are contained in the 2015 report "Vegetables Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1183).
- Field crop acreage totals represent the sum of harvested acreage for the state's principal field crops.
  - 2000–2012 data are contained in the report "Field Crops Final Estimates," published every five years (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1529).
  - 2013 and 2014 data are contained in the January 2015 report "Crop Production Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1047).
- Fruit and nut acreage was calculated by summing individual acreage for the following crops (values indicate acres bearing unless otherwise specified): almonds, apples, apricots, avocados, blueberries (acres harvested), sweet cherries, citrus (oranges, grapefruit, lemons, tangelos, and tangerines), dates, figs, grapes (raisin, table, and wine), kiwifruit, nectarines, olives, peaches, pears, pecans, pistachios, plums, prunes, raspberries (acres harvested), strawberries (acres harvested), english walnuts.
  - 2000–2012 data are contained in the reports "Citrus Fruits - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1515) and "Noncitrus Fruits and Nuts - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1511). Avocado acreage was not available in 2012. Therefore, acreage value was carried forward from the previous year.
  - 2013 and 2014 data are contained in the reports "Citrus Fruits" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1031) and "Noncitrus Fruits and Nuts" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1113).

FIGURE 3 – NEW PLANTINGS

- Grapes: California Grape Acreage Bulletins, 2007–2015. http://www.nass.usda.gov/Statistics_by_State/California/Publications/Grape_Acreage/Reports/index.asp.
- 2014 California Almond Acreage Report, 2015. http://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/201505almac.pdf.

- Pistachio Report from the Administrative Committee for Pistachios. http://www.acpistachios.org/pdf/2014Statistics.pdf.
- California Citrus Acreage Reports, 2006–2014. http://www.nass.usda.gov/Statistics_by_State/California/Publications/Acreage/index.asp. Citrus includes grapefruit, lemons, limes, oranges, pummelos and hybrids, and mandarins and mandarin hybrids.

FIGURE 4 – REVENUE

- Revenue totals by crop type:
  - 2000–2012 data taken from "Crop Values Final Estimates," published every five years (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1513).
  - 2013 and 2014 data taken from "Crop Value Annual Summary Reports" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1050)
- Vegetable and melon revenue totals for each individual crop:
  - 2000–2012 data taken from "Vegetables Final Estimates," published every five years (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1525)
  - 2013 and 2014 data taken from "Vegetables Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1183).
- Field crop revenue totals for each individual crop:
  - 2000–2012 data taken from "Crop Values Final Estimates," published every five years (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1513).
  - 2013 and 2014 data taken from "Crop Values Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1050). Sugarbeet revenue was not available for 2014. Sugarbeet revenue was estimated using 1,003,000 tons at $52 per ton (2012 and 2013 price = $52.10) (NASS 2015a; NASS 2015c). Corn silage revenue was excluded from field crop revenue totals as it is generally just used on the farm and not sold as a product.
- Fruit and nut revenue totals for each individual crop:
  - 2000–2012 data are contained in the reports "Citrus Fruits - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1515) and "Noncitrus Fruits and Nuts - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1511). Avocado acreage was not available in 2012. Therefore, revenue value was carried forward from the previous year.
  - 2013 and 2014 data are contained in the reports "Citrus Fruits" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1031) and "Noncitrus Fruits and Nuts" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1113).

PRODUCTION

- Vegetable and melon production totals for each individual crop:
  - 2000–2012 data taken from "Vegetables Final Estimates," published every five years (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1525)
  - 2013 and 2014 data taken from "Vegetables Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1183).
- Field crop production totals for each individual crop:
  - All production data from "Crop Production Annual Summary" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1047).
- Fruit and nut production totals for each individual crop:
  - 2000–2012 data are contained in the reports "Citrus Fruits - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1515) and "Noncitrus Fruits and Nuts - Final Estimates" (http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1511). Avocado production was not available in 2012. Therefore, production value was carried forward from the previous year.
  - 2013 and 2014 data are contained in the reports "Citrus Fruits" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1031) and "Noncitrus Fruits and Nuts" (https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1113).
  - The following conversion factors were used to convert all production values into tons:
    - 1 hundredweight (cwt) = 0.05 short ton
    - 1 pound (lb) = 0.0005 short ton
    - 1 bushel barley = 48 lbs = 0.024 short ton
    - 1 bushel oats = 0.016 short ton
    - 1 bushel corn grain = 56 lb = 0.028 short tons
    - 1 bushel wheat = 60 lb = 0.03 short tons
    - 1 bushel oats = 32 lb = 0.016 short tons
    - 1 bale cotton = 480 lb = 0.24 short tons

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EXHIBIT F

RAVEENDRAN/AFP/Getty Images

Here's the Real Problem With Almonds

BY **TOM PHILPOTT** AND **JULIA LURIE**

December 31, 2015

Almonds: crunchy, delicious, and...the center of a nefarious plot to suck California dry? They certainly have used up a lot of ink lately—partly inspired by Mother Jones's reporting over the past year. California's drought-stricken Central Valley churns out 80 percent of the globe's almonds, and since each nut takes a gallon of water to produce, they account for close to 10 percent of the state's annual agricultural water use—or more than what the entire population of Los Angeles and San Francisco use in a year.

As *Grist*'s Nathanael Johnson put it, almonds have become a scapegoat of sorts—"the poster-nut for human wastefulness in California's drought." Or, as Alissa Walker put it in *Gizmodo*, "You know, ALMONDS, THE DEVIL'S NUT." It's not surprising that the almond backlash has inspired a backlash of its own. California agriculture is vast and complex, and its water woes can't hang entirely on any one commodity, not even one as charismatic as the ~~devil's nut~~ almond.

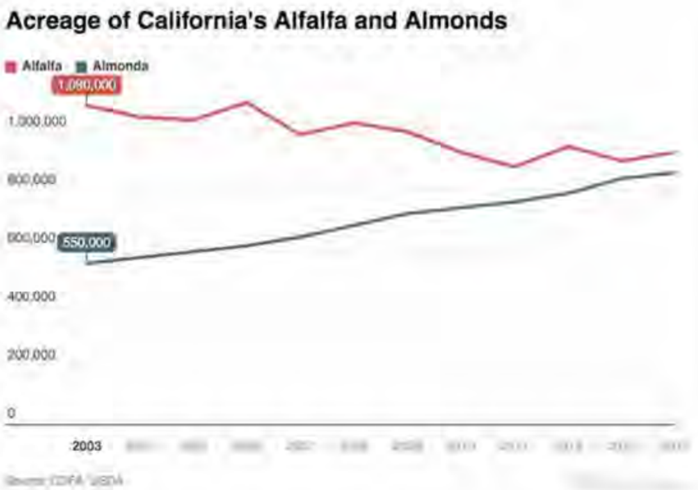
And as many have pointed out, almonds have a lot going for them—they're nutritious, they taste good, and they're hugely profitable for California. In 2014, almonds brought in a whopping $11 billion to the state's economy. Plus, other foods—namely, animal products—use a whole lot more water per ounce than almonds.

So almonds must be worth all the water they require, right? Not so fast. Before you jump to any conclusions, consider the following five facts:

1. Most of our almonds end up overseas. Almonds are the second-thirstiest crop in California—behind alfalfa, a superfood of sorts for cows that sucks up 15 percent of the state's irrigation water. *Gizmodo*'s Walker—along with many others—wants to shift the focus from almonds to the ubiquitous feed crop, wondering, "Why are we using more and more of our water to grow hay?" Especially since alfalfa is a relatively low-value crop—about a quarter of the per acre value of almonds—and about a fifth of it is exported.

It should be noted, though, that we export far more almonds than alfalfa: About two-thirds of California's almond and pistachio crops are sent overseas—a de facto export of California's overtapped water resources.

2. While alfalfa fields are shrinking, almond fields are expanding—in a big way. The drought is already pushing California farmers out of high-water, low-value crops like alfalfa and cotton, and into almonds and two other pricey nuts, pistachios and walnuts. This year, California acreage devoted to alfalfa is expected to shrink 11 percent, and cotton acres look set to dwindle to their lowest level since the 1920s.



Mother Jones

Meanwhile, the market is pushing almonds and other nuts in the opposite direction. At a confab in California's nut-rich, water-challenged San Joaquin County, Stewart Resnick, chief of Paramount Farms, by far the state's largest nut grower, explained why in a speech, as documented by an account in the trade journal *Western Farm Press*. Almonds, he said, deliver farmers an average net return of $1,431 per acre. Pistachios, another fast-expanding nut hotly promoted by the Paramount farming empire, net even more: $3,519 per acre.

Given that Paramount reportedly manages 50,000 acres of combined almonds and pistachios, it's safe to say there's big profits in growing those nuts. And the company, which also buys and processes nuts from other farmers and sells them under the Wonderful brand, plans to expand by 50 percent in the next five years. Currently the company farms 30,000 acres on its own and buys pistachios from farms occupying another 100,000 acres. By 2020, the company's "goal is 150,000 partner acres, 33,000 Paramount acres," which would be a 40 percent jump in just five years. And that's on top of the 118 percent expansion in pistachio acres over the past decade, according to figures Resnick delivered at the conference.

3. Unlike other crops, almonds always require a lot of water—even during drought. Annual crops like cotton, alfalfa, and veggies are flexible—farmers can fallow them in dry years. That's not so for nuts, which need to be watered every year, drought or no, or the trees die, wiping out farmers' investments.

Already, strains are showing. Back in 2013, a team led by US Geological Survey hydrologist Michelle Sneed discovered that a 1,200-square-mile swath of the southern Central Valley—a landmass more than twice the size of Los Angeles—had been sinking by as much as 11 inches per year, because the water table had fallen from excessive pumping. In an interview last year, Sneed told me the ongoing exodus from annual crops and pasture to nuts likely played a big role.

4. Some nut growers are advocating against water regulation—during the worst drought in California's history. "I've been smiling all the way to the bank," one pistachio grower told the audience at the Paramount event, according to the *Western Farm Press* account. As for water, that's apparently a political problem, not an ecological one, for Paramount. "Pistachios are valued at $40,000 an acre," Bill Phillimore, executive vice president of Paramount Farming, reportedly told the crowd. "How much are you spending in the political arena to preserve that asset?" Apparently, he meant: protect it from pesky regulators questioning your water use. He "urged growers to contribute three-quarters of a cent on every pound of pistachios sold to a water advocacy effort," *Western Farm Press* reported.

5. Mostly, it's not small-scale farmers that are getting rich off the almond boom. With their surging overseas sales, almonds and pistachios have drawn in massive financial players hungry for a piece of the action. As *Mother Jones* reported last year, Hancock Agricultural Investment Group, an investment owned by the Canadian insurance and financial services giant Manulife

Financial, owns at least 24,000 acres of almonds, pistachios, and walnuts, making it California's second-largest nut grower. TIAA-CREF, a large retirement and investment fund that owns 37,000 acres of California farmland, and boasts that it's one of the globe's top five almond producers.

Then there's Terrapin Fabbri Management, a private equity firm that "manages more than $100 million of farm assets on behalf of institutional investors and high net worth clients" and says it's "focused on capitalizing on the increasing global demand for California's agricultural output." In a piece earlier this year, *The Economist* pointed out that Terrapin had "bought a dairy company and some vineyards and tomato fields in California, and converted all to grow almonds, whose price has soared as the Chinese have gone nuts for them." The magazine added that "such conversions require up-front capital"—e.g., to drop wells—"and the ability to survive without returns for years." Those aren't privileges many small-scale farmers enjoy.

This story was originally published by Mother Jones and is reproduced here as part of our Climate Desk collaboration.

EXHIBIT G

Executive Department
State of California

EXECUTIVE ORDER B-29-15

WHEREAS on January 17, 2014, I proclaimed a State of Emergency to exist throughout the State of California due to severe drought conditions; and

WHEREAS on April 25, 2014, I proclaimed a Continued State of Emergency to exist throughout the State of California due to the ongoing drought; and

WHEREAS California's water supplies continue to be severely depleted despite a limited amount of rain and snowfall this winter, with record low snowpack in the Sierra Nevada mountains, decreased water levels in most of California's reservoirs, reduced flows in the state's rivers and shrinking supplies in underground water basins; and

WHEREAS the severe drought conditions continue to present urgent challenges including: drinking water shortages in communities across the state, diminished water for agricultural production, degraded habitat for many fish and wildlife species, increased wildfire risk, and the threat of saltwater contamination to fresh water supplies in the Sacramento-San Joaquin Bay Delta; and

WHEREAS a distinct possibility exists that the current drought will stretch into a fifth straight year in 2016 and beyond; and

WHEREAS new expedited actions are needed to reduce the harmful impacts from water shortages and other impacts of the drought; and

WHEREAS the magnitude of the severe drought conditions continues to present threats beyond the control of the services, personnel, equipment, and facilities of any single local government and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the Government Code, I find that conditions of extreme peril to the safety of persons and property continue to exist in California due to water shortage and drought conditions with which local authority is unable to cope; and

WHEREAS under the provisions of section 8571 of the California Government Code, I find that strict compliance with various statutes and regulations specified in this order would prevent, hinder, or delay the mitigation of the effects of the drought.

NOW, THEREFORE, I, EDMUND G. BROWN JR., Governor of the State of California, in accordance with the authority vested in me by the Constitution and statutes of the State of California, in particular Government Code sections 8567 and 8571 of the California Government Code, do hereby issue this Executive Order, effective immediately.

IT IS HEREBY ORDERED THAT:

1. The orders and provisions contained in my January 17, 2014 Proclamation, my April 25, 2014 Proclamation, and Executive Orders B-26-14 and B-28-14 remain in full force and effect except as modified herein.

SAVE WATER

2. The State Water Resources Control Board (Water Board) shall impose restrictions to achieve a statewide 25% reduction in potable urban water usage through February 28, 2016. These restrictions will require water suppliers to California's cities and towns to reduce usage as compared to the amount used in 2013. These restrictions should consider the relative per capita water usage of each water suppliers' service area, and require that those areas with high per capita use achieve proportionally greater reductions than those with low use. The California Public Utilities Commission is requested to take similar action with respect to investor-owned utilities providing water services.

3. The Department of Water Resources (the Department) shall lead a statewide initiative, in partnership with local agencies, to collectively replace 50 million square feet of lawns and ornamental turf with drought tolerant landscapes. The Department shall provide funding to allow for lawn replacement programs in underserved communities, which will complement local programs already underway across the state.

4. The California Energy Commission, jointly with the Department and the Water Board, shall implement a time-limited statewide appliance rebate program to provide monetary incentives for the replacement of inefficient household devices.

5. The Water Board shall impose restrictions to require that commercial, industrial, and institutional properties, such as campuses, golf courses, and cemeteries, immediately implement water efficiency measures to reduce potable water usage in an amount consistent with the reduction targets mandated by Directive 2 of this Executive Order.

6. The Water Board shall prohibit irrigation with potable water of ornamental turf on public street medians.

7. The Water Board shall prohibit irrigation with potable water outside of newly constructed homes and buildings that is not delivered by drip or microspray systems.

8. The Water Board shall direct urban water suppliers to develop rate structures and other pricing mechanisms, including but not limited to surcharges, fees, and penalties, to maximize water conservation consistent with statewide water restrictions. The Water Board is directed to adopt emergency regulations, as it deems necessary, pursuant to Water Code section 1058.5 to implement this directive. The Water Board is further directed to work with state agencies and water suppliers to identify mechanisms that would encourage and facilitate the adoption of rate structures and other pricing mechanisms that promote water conservation. The California Public Utilities Commission is requested to take similar action with respect to investor-owned utilities providing water services.

INCREASE ENFORCEMENT AGAINST WATER WASTE

9. The Water Board shall require urban water suppliers to provide monthly information on water usage, conservation, and enforcement on a permanent basis.

10. The Water Board shall require frequent reporting of water diversion and use by water right holders, conduct inspections to determine whether illegal diversions or wasteful and unreasonable use of water are occurring, and bring enforcement actions against illegal diverters and those engaging in the wasteful and unreasonable use of water. Pursuant to Government Code sections 8570 and 8627, the Water Board is granted authority to inspect property or diversion facilities to ascertain compliance with water rights laws and regulations where there is cause to believe such laws and regulations have been violated. When access is not granted by a property owner, the Water Board may obtain an inspection warrant pursuant to the procedures set forth in Title 13 (commencing with section 1822.50) of Part 3 of the Code of Civil Procedure for the purposes of conducting an inspection pursuant to this directive.

11. The Department shall update the State Model Water Efficient Landscape Ordinance through expedited regulation. This updated Ordinance shall increase water efficiency standards for new and existing landscapes through more efficient irrigation systems, greywater usage, onsite storm water capture, and by limiting the portion of landscapes that can be covered in turf. It will also require reporting on the implementation and enforcement of local ordinances, with required reports due by December 31, 2015. The Department shall provide information on local compliance to the Water Board, which shall consider adopting regulations or taking appropriate enforcement actions to promote compliance. The Department shall provide technical assistance and give priority in grant funding to public agencies for actions necessary to comply with local ordinances.

12. Agricultural water suppliers that supply water to more than 25,000 acres shall include in their required 2015 Agricultural Water Management Plans a detailed drought management plan that describes the actions and measures the supplier will take to manage water demand during drought. The Department shall require those plans to include quantification of water supplies and demands for 2013, 2014, and 2015 to the extent data is available. The Department will provide technical assistance to water suppliers in preparing the plans.

13. Agricultural water suppliers that supply water to 10,000 to 25,000 acres of irrigated lands shall develop Agricultural Water Management Plans and submit the plans to the Department by July 1, 2016. These plans shall include a detailed drought management plan and quantification of water supplies and demands in 2013, 2014, and 2015, to the extent that data is available. The Department shall give priority in grant funding to agricultural water suppliers that supply water to 10,000 to 25,000 acres of land for development and implementation of Agricultural Water Management Plans.

14. The Department shall report to Water Board on the status of the Agricultural Water Management Plan submittals within one month of receipt of those reports.

15. Local water agencies in high and medium priority groundwater basins shall immediately implement all requirements of the California Statewide Groundwater Elevation Monitoring Program pursuant to Water Code section 10933. The Department shall refer noncompliant local water agencies within high and medium priority groundwater basins to the Water Board by December 31, 2015, which shall consider adopting regulations or taking appropriate enforcement to promote compliance.

16. The California Energy Commission shall adopt emergency regulations establishing standards that improve the efficiency of water appliances, including toilets, urinals, and faucets available for sale and installation in new and existing buildings.

INVEST IN NEW TECHNOLOGIES

17. The California Energy Commission, jointly with the Department and the Water Board, shall implement a Water Energy Technology (WET) program to deploy innovative water management technologies for businesses, residents, industries, and agriculture. This program will achieve water and energy savings and greenhouse gas reductions by accelerating use of cutting-edge technologies such as renewable energy-powered desalination, integrated on-site reuse systems, water-use monitoring software, irrigation system timing and precision technology, and on-farm precision technology.

STREAMLINE GOVERNMENT RESPONSE

18. The Office of Emergency Services and the Department of Housing and Community Development shall work jointly with counties to provide temporary assistance for persons moving from housing units due to a lack of potable water who are served by a private well or water utility with less than 15 connections, and where all reasonable attempts to find a potable water source have been exhausted.

19. State permitting agencies shall prioritize review and approval of water infrastructure projects and programs that increase local water supplies, including water recycling facilities, reservoir improvement projects, surface water treatment plants, desalination plants, stormwater capture, and greywater systems. Agencies shall report to the Governor's Office on applications that have been pending for longer than 90 days.

20. The Department shall take actions required to plan and, if necessary, implement Emergency Drought Salinity Barriers in coordination and consultation with the Water Board and the Department of Fish and Wildlife at locations within the Sacramento - San Joaquin delta estuary. These barriers will be designed to conserve water for use later in the year to meet state and federal Endangered Species Act requirements, preserve to the extent possible water quality in the Delta, and retain water supply for essential human health and safety uses in 2015 and in the future.

21. The Water Board and the Department of Fish and Wildlife shall immediately consider any necessary regulatory approvals for the purpose of installation of the Emergency Drought Salinity Barriers.

22. The Department shall immediately consider voluntary crop idling water transfer and water exchange proposals of one year or less in duration that are initiated by local public agencies and approved in 2015 by the Department subject to the criteria set forth in Water Code section 1810.

23. The Water Board will prioritize new and amended safe drinking water permits that enhance water supply and reliability for community water systems facing water shortages or that expand service connections to include existing residences facing water shortages. As the Department of Public Health's drinking water program was transferred to the Water Board, any reference to the Department of Public Health in any prior Proclamation or Executive Order listed in Paragraph 1 is deemed to refer to the Water Board.

24. The California Department of Forestry and Fire Protection shall launch a public information campaign to educate the public on actions they can take to help to prevent wildfires including the proper treatment of dead and dying trees. Pursuant to Government Code section 8645, $1.2 million from the State Responsibility Area Fire Prevention Fund (Fund 3063) shall be allocated to the California Department of Forestry and Fire Protection to carry out this directive.

25. The Energy Commission shall expedite the processing of all applications or petitions for amendments to power plant certifications issued by the Energy Commission for the purpose of securing alternate water supply necessary for continued power plant operation. Title 20, section 1769 of the California Code of Regulations is hereby waived for any such petition, and the Energy Commission is authorized to create and implement an alternative process to consider such petitions. This process may delegate amendment approval authority, as appropriate, to the Energy Commission Executive Director. The Energy Commission shall give timely notice to all relevant local, regional, and state agencies of any petition subject to this directive, and shall post on its website any such petition.

26. For purposes of carrying out directives 2–9, 11, 16–17, 20–23, and 25, Division 13 (commencing with section 21000) of the Public Resources Code and regulations adopted pursuant to that Division are hereby suspended. This suspension applies to any actions taken by state agencies, and for actions taken by local agencies where the state agency with primary responsibility for implementing the directive concurs that local action is required, as well as for any necessary permits or approvals required to complete these actions. This suspension, and those specified in paragraph 9 of the January 17, 2014 Proclamation, paragraph 19 of the April 25, 2014 proclamation, and paragraph 4 of Executive Order B-26-14, shall remain in effect until May 31, 2016. Drought relief actions taken pursuant to these paragraphs that are started prior to May 31, 2016, but not completed, shall not be subject to Division 13 (commencing with section 21000) of the Public Resources Code for the time required to complete them.

27. For purposes of carrying out directives 20 and 21, section 13247 and Chapter 3 of Part 3 (commencing with section 85225) of the Water Code are suspended.

28. For actions called for in this proclamation in directive 20, the Department shall exercise any authority vested in the Central Valley Flood Protection Board, as codified in Water Code section 8521, et seq., that is necessary to enable these urgent actions to be taken more quickly than otherwise possible. The Director of the Department of Water Resources is specifically authorized, on behalf of the State of California, to request that the Secretary of the Army, on the recommendation of the Chief of Engineers of the Army Corps of Engineers, grant any permission required pursuant to section 14 of the Rivers and Harbors Act of 1899 and codified in section 48 of title 33 of the United States Code.

29. The Department is directed to enter into agreements with landowners for the purposes of planning and installation of the Emergency Drought Barriers in 2015 to the extent necessary to accommodate access to barrier locations, land-side and water-side construction, and materials staging in proximity to barrier locations. Where the Department is unable to reach an agreement with landowners, the Department may exercise the full authority of Government Code section 8572.

30. For purposes of this Executive Order, chapter 3.5 (commencing with section 11340) of part 1 of division 3 of the Government Code and chapter 5 (commencing with section 25400) of division 15 of the Public Resources Code are suspended for the development and adoption of regulations or guidelines needed to carry out the provisions in this Order. Any entity issuing regulations or guidelines pursuant to this directive shall conduct a public meeting on the regulations and guidelines prior to adopting them.

31. In order to ensure that equipment and services necessary for drought response can be procured quickly, the provisions of the Government Code and the Public Contract Code applicable to state contracts, including, but not limited to, advertising and competitive bidding requirements, are hereby suspended for directives 17, 20, and 24. Approval by the Department of Finance is required prior to the execution of any contract entered into pursuant to these directives.

This Executive Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given to this Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 1st day of April 2015.

EDMUND G. BROWN JR.
Governor of California

ATTEST:

ALEX PADILLA
Secretary of State

EXHIBIT H

USGS
science for a changing world

Changing California Land Uses will Shape Water Demands in 2062

Release Date: May 18, 2016

If past patterns of California land-use change continue, projected water needs by the year 2062 will increase beyond current supply.

If past patterns of California land-use change continue, projected water needs by the year 2062 will increase beyond current supply. If historical trends of land use changes to or from urban, agricultural or other uses continue, the result will be increased water-use demand beyond what existing supplies can provide. Large uncertainties associated with weather and climate variability have the potential to exacerbate the problem.

Scientists with the U.S. Geological Survey (http://www.usgs.gov) and the Nature Conservancy (http://www.nature.org) calculated historical trends of land-use change, urbanization, agriculture expansion and contraction from 1992 to 2012, and then used those trends to project future land-use patterns and water demand from 2012 to 2062 in California's Central Valley and foothills, Central Coast and South Coast. These new projections are detailed in the paper, "Future land-use related water demand in California (http://iopscience.iop.org/article/10.1088/1748-9326/11/5/054018)" published this week in the journal Environmental Research Letters.

Assuming no new storage, efficiency or technology is created to improve California's water supply, the study results indicate that the current 25 percent urban water-use restrictions called for in Governor Edmund G. Brown's Executive Orders B-29-15 (https://www.gov.ca.gov/docs/4.1.15_Executive_Order.pdf) and B-37-16 (https://www.gov.ca.gov/docs/5.9.16_Executive_Order.pdf) would need to be maintained through 2062 for future water demand to remain at or below 2012 demand, unless restrictions were put in place on other water uses. Water use in 2012 was already proven unsustainable given the ongoing multi-year drought, which led to mandated statewide urban-use restrictions in 2015.

In the long term, drought, highly variable rainfall from year to year, and the real possibility of future warming and drying of climate combine to create potential water supply limitations. Coupled with population increases and shifting agricultural practices (from annual crops to orchards and vineyards) there can be enormous uncertainty in planning for future water supply and demand.

"Modeling the future based on historical trends is not a prediction of what will happen, though patterns do emerge that can help guide water-use policies," said Tamara Wilson, USGS research geographer and lead author of the study.

"In many ways, the recent drought is prologue to confronting the challenges that climate change presents for all of us. The reality is California's water demands outpace supply, and the precipitation this winter did not change that," said co-author Dick Cameron, Associate Director for Science, Land Conservation Program at the Nature Conservancy in California. "Assuming a 'business-as-usual' scenario of future land-use change, we show that the current pattern of increasing development and additional perennial cropland (orchards and vineyards) will lead to loss of grassland habitat and increased water use."

Projecting land-use change data for California over the 50 years from 2012 to 2062 revealed the following potential changes:

- Large increase in urban area: 2 million acres of newly developed land cover over 50 years – a net increase of 40,000 acres a year – the equivalent of adding an area just larger than the city of Stockton each year.

- Large amount of grassland habitat loss of 1.1 million acres over 50 years, despite continued protection at the historical rate. This loss will also exacerbate challenges in preserving and recharging aquifers.

- An overall 4 percent increase in water supply demand (applied water) within the study area due to urbanization and expansion of orchards and vineyards.

- Large shifts from annual to perennial crops, which removes flexibility in irrigation demand during drought. While annual-crop water demand dropped 30 percent, perennial-crop demand increased 37.5 percent. Given the difference in area between these types, net agricultural water demand decreased nearly 8 percent over current demand.

- There will be a large shift toward developed-land water uses from the agriculture sector: Urban water use in 2062 is projected to increase to 27 percent of overall water use in the study area (from 18 percent in 2012).

- A net increase in overall projected water use in 38 of the 46 California counties in the study area by 2062.

(/media/images/land-use-and-land-cover-change-california)
Land-use and land-cover change for the historical period (1992–2012) and the projected period (2012–2062) in California's Central Valley and Oak Woodlands regions under a business-as-usual scenario.
(/media/images/irrigation-ditch-alongside-agricultural-field-californias-central-valley)
Irrigation systems in Central California Valley Ecoregion: Single-field irrigation ditch.
Public domain
(/media/images/grasslands-and-agricultural-fields-housing-development-hills-beyond)
Conversions of grassland/shrubland and agriculture to developed land were two common land-cover changes in Southern and Central California Chaparral and Oak Woodlands Ecoregion.
Public domain

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Partners

(/partners/nature-conservancy)

The Nature Conservancy (http://www.nature.org/)

EXHIBIT I

Mother Jones

California's Insane Nut Boom, In 3 Simple Charts

Almonds, walnuts, and pistachios are making bank in the Golden State—but the groundwater supply is paying the price.

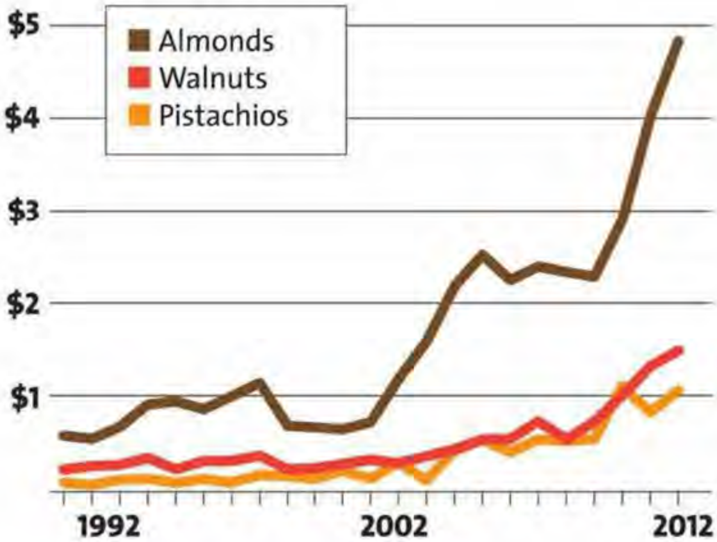
LEI WANG NOV. 3, 2014 6:00 AM

mamma_mia (http://www.shutterstock.com/...)/Shutterstock

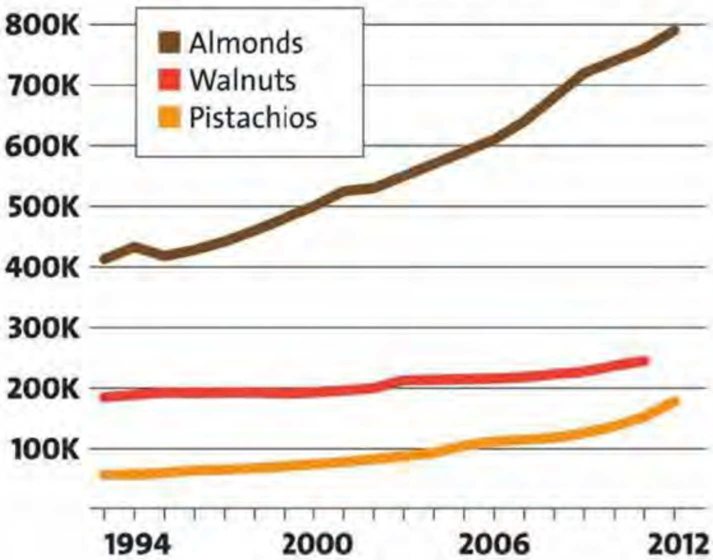
California has entered the age of King Nut: The state produces more than 80 percent of the world's almonds, and roughly 30 and 40 percent of the world's pistachios and walnuts, respectively. Most of the production takes place in the Central Valley, a swath of farmland in California's midsection.

A single almond requires a gallon of water (http://www.motherjones.com/environment/2014/02/wheres-californias-water-going) to grow—bad news in the midst of California's worst drought in half a millennium (http://www.motherjones.com/environment/2014/02/california-drought-matters-more-just-california). But with ever-rising demand in a nut-crazed world, farmers continue to expand orchards, pumping water out of the ground to make up for the dried-up surface water. These charts tell the story:

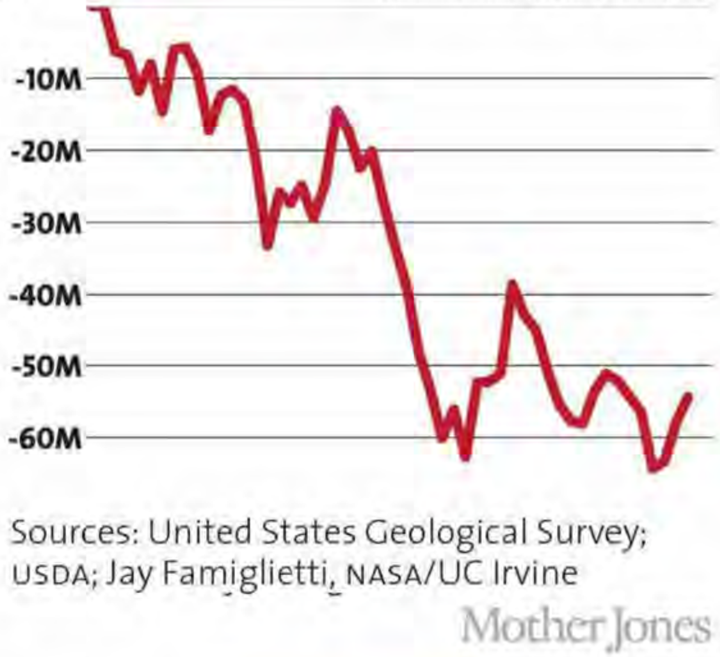
California's Nut Boom
(in billions of dollars)



As the State's Orchards Keep Expanding... (in acres)



...the Central Valley's Groundwater Keeps Dwindling (in acre-feet)



Charts by Lei Wang and Julia Lurie

As my colleague Tom Philpott recently reported (http://www.motherjones.com/tom-philpott/2014/10/california-groundwater-withdrawal-china-india-middle-east)., Since 2011, central California has lost "more water than all 38 million Californians use for domestic and municipal supplies annually—over half of which is due to groundwater pumping in the Central Valley."

Groundwater is the stuff of centuries: rain percolating for ages through pores of soil and rock, coming to rest in aquifers. In wet seasons, water generally begins its slow trickle-down journey to replenish the aquifers (the small upward spikes in the third chart above). But as Jay Famiglietti, the NASA water scientist who gathered the groundwater data, has stated, "The downs are way bigger than the ups, which means that groundwater levels are on a one-way journey to the very bottom of the Central Valley."

LEI WANG

Lei Wang is a former editorial fellow at Mother Jones.

EXHIBIT J

MONEYBOX COMMENTARY ABOUT BUSINESS AND FINANCE.

APRIL 17 2015 7:17 PM

Stop Vilifying Almonds

Yes, they use up a lot of water in drought-afflicted California. But the story gets a lot more complicated from there.

By Eric Holthaus

In California, water-intensive almonds have become an easily vilified, easily visualized scapegoat.

Photo by Dolores Giraldez Alonso/Shutterstock

This year's "rainy" season is over, and California is **beginning to accept** its fate: **Business-as-usual** farming in the Golden State **may soon become** a thing of the past. The drought is now **so far** beyond **the bounds of normal** it's become at least temporarily **self-sustaining.** Extreme heat begets more evaporation, and dry ground heats up more quickly than wet soil. Add in a dash of global warming, and you have a recipe for **a megadrought** that may last decades. For a state whose decades-long water-fueled bender has made it the **most important agricultural producer in the country**, one that **leads the nation** in countless water-intensive food crops, that's all pretty terrifying.

It also explains the heated debate we've been having recently over, of all things, almonds—or "THE DEVIL'S NUT," **as *Gizmodo*** facetiously called them recently. Amid the massive new water restrictions now in place in California, water-intensive almonds have become an **easily vilified**, easily visualized scapegoat.

It's true that California has to get smarter—fast—about using what little water it has left. But we should recognize that the state has other, much sillier uses of water than almonds—like depleting California's desert aquifers to grow hay and corn to fatten cows. (Nebraska already does a pretty good job at that.) I'm by no means an almond apologist, but all this recent **almond-shaming** demands some context. And, in fact, there's a strong case that it makes great sense for almonds to remain central to the future of California agriculture.

For now, California's unique Mediterranean climate is **almost ideal** for almonds to flourish. Yes, almonds use a lot of water, but that's not necessarily a bad thing. Almonds are much more efficient water-users, per calorie, **than dairy** or **beef**, for example. (As a Wisconsin resident, I feel duty-bound to remind everyone at this point that dairy farming can be done almost anywhere—and indeed, dairies in search of more reliable water **are leaving California** because of the current drought.) Replacing a glass of cow's milk with almond milk is a net gain for the environment. But almond trees, which must be watered even when they're not producing, have been gradually displacing fields of row crops that can be fallowed when the weather turns dry. That means by planting almonds, farmers are locking in future water use for decades to come—a troubling trend.

Mother Jones has owned the almond beat **for more than a year** now. The magazine has helped us learn that it takes **about a gallon of water** to grow a single almond, and the state's **expanding class of almond tycoons** are increasingly eager to use almonds to **convert the state's dwindling water supplies to cash**. Almonds use **about as much water** each year as the entire city of Los Angeles does in three, and **about two-thirds** of those nuts are exported. As long as the world wants almonds, California will be happy to oblige—that fact **is increasingly clear**.

Last year at this time, I was in the midst of **a 12-part series** on water issues in the West. One statistic I calculated during that time has since gone viral: **Almonds use 10 percent** of California's agricultural water supply.

Hoping to update that statistic, I recently got in touch with the Almond Board of California—a voice for the industry (its Twitter handle is **@almonds**). The group agreed that the statistic was essentially correct—though it stressed that the range is probably somewhere between 8 and 11 percent, depending on how much rain and snow fall in a given year. We put our heads together to come up with an updated version of my calculation, with numbers specific to this winter.

First, some background. California's agricultural water supply can be broken into **three major sources**: snowpack, reservoirs, and groundwater, which provide roughly equal amounts of water in a normal year. In drought years like this one, farmers rely more intensely on groundwater to make up for what didn't fall from the sky—meaning aquifers are being drained even more quickly.

Here's the amount of water California's agricultural sector has to work with this year, calculated in million acre-feet, one of which equals 325,000,000,000 gallons, 1,200 Empire State Buildings **full of water**: The **snowpack** is at record lows, just **5 percent of normal** (0.75 MAF, 14.25 MAF less than normal). **Reservoirs** are doing a bit better, at about two-thirds of normal (13.2 MAF, 6.8 MAF less than normal). **Groundwater** has made up some of the difference, and is being pumped at a rate about 34 percent above normal (19.8 MAF, 5.1 MAF more than normal). That means the total agricultural water supply this year is 33.75 MAF.

Of the 33.75 million acre-feet of water available to agriculture in 2015 (enough water to supply the entire San Francisco Bay area for more than 30 years), almonds are on track to use 3.6 million acre-feet, or 11 percent.

The California almond industry has doubled its acreage since 2005. But whether almonds are the best use of a dwindling supply, factoring in climate change projections, is a different question. These are trees, remember, which have a productive lifespan of 20 to 25 years. They're going to be there until it's not economical for them to be there anymore.

Over the last few decades, there's been a shift from low value (cotton, rice) to high value (almonds, pistachios) agriculture in California as the effective cost of water has increased. (Though water typically isn't metered, **it's become extremely expensive** to dig deeper wells.) In a real sense, the almond industry is the future of California agriculture—high value, **high efficiency**, but still high consuming. That's not necessarily a bad thing, as it makes most sense to use a scarce resource for the highest value application possible.

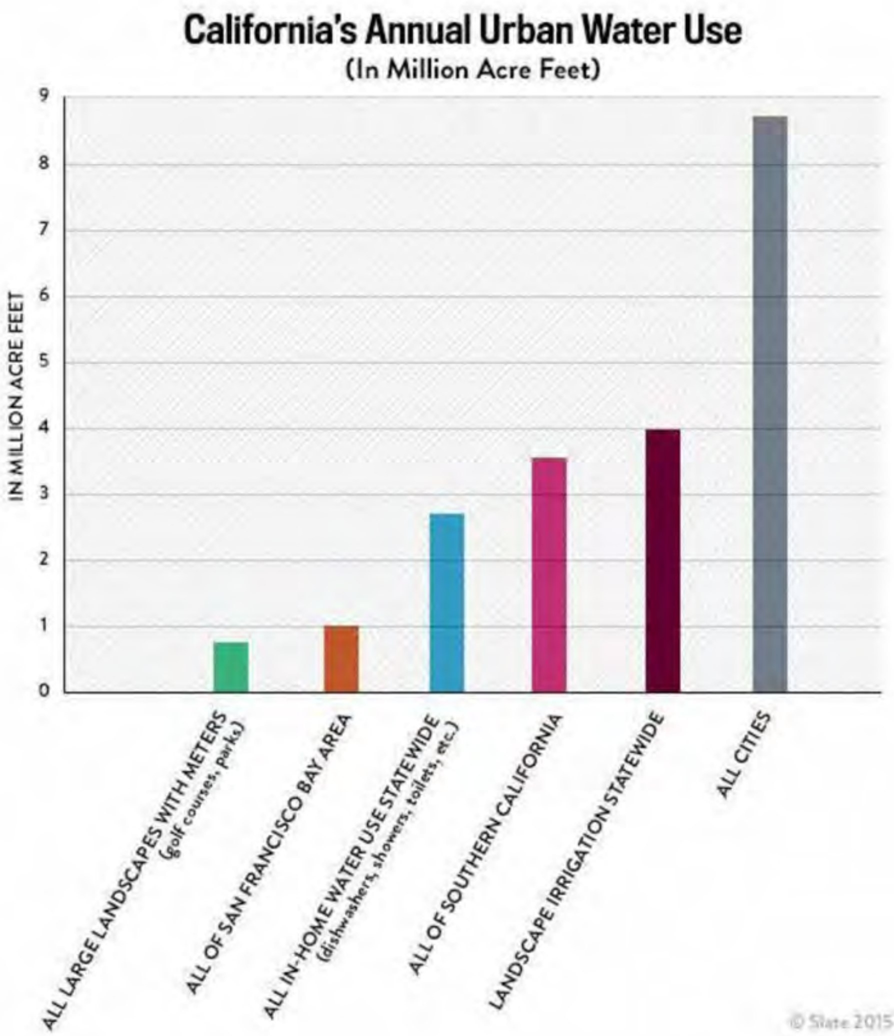
The problem is that, thanks to the current drought, the water supply is going away faster than expected. The almond industry is an indicator of how difficult it might be to adapt to climate change, economically and environmentally.

What we're witnessing in California right now is **a glimpse into the future**. California has now endured drought in **11 of the last 15 years**, and there's every reason to believe **this is just the beginning**.

There's a lot of debate over which atmospheric forces **kicked off** this particular round, but there's little doubt that **climate change has made things worse**. A very warm winter pushed the state's snowpack to a **shocking new low**, prompting the first-ever **mandatory statewide water restrictions** earlier this month. But as has been **much-reported**, those new rules **didn't do much** to stem water usage in the state's massive agricultural sector, which currently uses about **80 percent** of California's water supply.

Here's a shocking statistic that doesn't get enough attention: nearly one-half of California's farms still use "flood irrigation," **a 7,000-year-old technique** for watering crops. That technique is exactly what it sounds like: diverting canals to flood their fields. While that may have worked well in prehistoric Mesopotamia, irrigation technology has come a long way since then.

A **joint study** last summer by the Natural Resources Defense Council and the Oakland-based Pacific Institute found that by instituting basic modern-era water-saving technologies, like wastewater recycling, stormwater capture, drip irrigation and replacement of urban lawns with native landscaping, the state **could save enough water** to reverse its dramatic groundwater decline with loads of water left over.* The problem is, the state's **antiquated system of water rights** isn't giving the most wasteful farmers any incentive to change their ways.


California's Annual Urban Water Use
(In Million Acre Feet)
IN MILLION ACRE FEET
0
1
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8
9
ALL LARGE LANDSCAPES WITH METERS (golf courses, parks)
ALL OF SAN FRANCISCO BAY AREA
ALL IN-HOME WATER USE STATEWIDE (dishwashers, showers, toilets, etc.)
ALL OF SOUTHERN CALIFORNIA
LANDSCAPE IRRIGATION STATEWIDE
ALL CITIES
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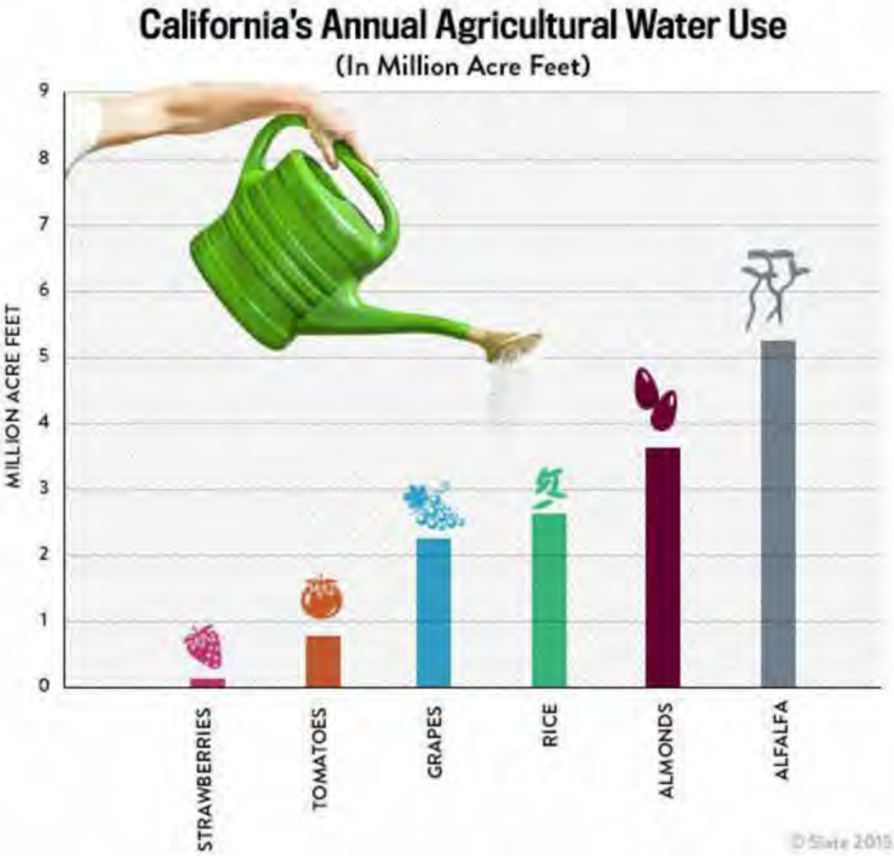

When you remember that all agriculture, despite using 80 percent of the state's water, produces only about 2 percent of the state's GDP, it's easy to make the case that urban water use is much more economically efficient. But then again, we have to eat, right?

The main questions everyone's asking, I think, are: Do I have to give up almonds? Is almond farming compatible with climate change?

We can imagine a water-constrained future in which groundwater pumping is enforced (no extra pumping in drought years is allowed, as it is now) and a near-zero snowpack becomes the norm. That would probably result in a permanent loss of about one-third to one-half of California's water.

While cities, industry, and the rest of agriculture **have become more efficient** in their water use, total water use for almonds has expanded rapidly over the last decade or so as almond acreage in California doubled. Almonds, too, are **using water more wisely**—but their explosive growth has dwarfed efficiency gains. On the other hand, total acreage for hay, including alfalfa—California's No. 1 agricultural water user—is **on a steady decline** as fields become more productive and dairy farmers **bid up the price** in drought years. That long-term trend of fallowing low-value crops (like hay and rice) is leaving more vacant ground for (you guessed it) more almonds.

California is expecting 11 million more people **in the next 20 years**—though at current rates of increasing efficiency, we can expect cities to use about the same amount of water in 2035 as now. At the same time, temperature and precipitation trends point toward an intensification of drought risk **for the forseeable future**. It's clear California will need to do more with less, but that burden will fall almost entirely on agriculture.

Top Comment

I work for a John Deere dealership in the heart of California's San Joaquin Valley. We sell this moisture probe called Field Connect that's absolutely amazing. There are 4-6 sensors on each probe that monitor moisture level at increasing depths. More...

-JStevens

196 Comments **Join In**

If almonds continue to expand, at some point, it becomes a value judgment whether we want to devote 15 or 20 percent of the water in the most productive region of the United States to them. If that comes at the expense of the relatively less efficient uses like the dairy industry, I'm all for it. But if almonds farmers challenge urban areas for water, you can bet they'll be in for a fight.

Correction, April 20, 2015: *This article originally misidentified the Natural Resources Defense Council as the National Resourced Defense Council. (**Retrun**.)*

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SFGATE
http://www.sfgate.com/science/article/California-drought-How-water-crisis-is-worse-for-5341382.php

California drought: How water crisis is worse for almonds

By Peter Fimrite Updated 10:47 am, Monday, March 24, 2014

IMAGE 1 OF 23 Buy Photo

An almond tree is lifted into a wood chipper after farmer Barry Baker decided to sacrifice 1,000 acres of trees to save water in Firebaugh (Fresno County).

Atwater, -- Merced County - A huge shift away from annual crops to nut trees has transformed the California farm belt over the past two decades and left farmers perilously vulnerable to the severe drought that is currently gripping the state.

California farmers have spent past years busily ripping out lettuce, tomatoes and other annual crops in an attempt to sate the nation's growing appetite for almonds, pistachios and other nuts.

The delicious perennials are lucrative, but the vast orchards that have been planted throughout the Central Valley require decades-long investments, year-round watering and a commitment from Mother Nature that she is evidently unwilling to make.

The crisis is a matter of crop flexibility. During droughts, farmers can fallow fields of lettuce and other crops, then replant them years later, picking up pretty much where they left off. That's not an option for nut trees, which need 10 years of growing and a steady supply of water before they yield enough to pay for themselves.

"These orchards are more profitable, which is why the farmers do it," said Jay Lund, the director of the Center for Watershed Sciences at UC Davis. "It brings more money into California so there are a lot of good things about it, but the farmers have to be careful because a drought can be very tough on them."

The result is that about one-third of California's agricultural land is, Lund said, "very hard to fallow."

Farmers are scrounging for every drop of water they can find - digging wells, tapping aquifers and finding alternative sources. But some are coming to the stark realization that, no matter what they do, there won't be enough water to keep their trees alive.

Barry Baker has decided to sacrifice 1,000 acres of his Fresno County almond orchard so that he can keep the remaining 4,000 acres alive.

'Huge economic loss'

"It's a huge economic loss," said Baker, who looked on forlornly this past week as workers felled his beloved trees. "That's probably $10 million in revenue I lost right there, but with the price of water today, up to $2,500 per acre-foot, there is no way I could have found the water this year. A lot of guys are going to have to make that decision in the next couple of weeks."

Baker is actually one of the lucky ones. He has enough well water on his property to keep his remaining trees alive without having to break the bank buying overpriced water from irrigation districts. A great many farmers south of the delta don't have that luxury.

"I think we're going to see a lot of trees die," he said. "It's going to break a lot of farmers."

The switchover from annual crops to nuts has, by all accounts, been highly profitable. Nut production in California brings in $7 billion in sales every year, with almonds by far the biggest money maker, at $4.35 billion. Only grapes, which generated $4.45 billion, sold more.

The growth is, at least in part, because of the popularity of the Mediterranean diet, which may also explain why U.S. consumption of olive oil has tripled over the past twenty years. The average American eats 1.8 pounds of almonds, according to the U.S. Department of

Agriculture. That's a 36 percent increase since 2008. Consumption of walnuts, pistachios and pecans has also increased.

Extreme drought areas

Most of the orchards have been planted in areas suffering from what meteorologists call "extreme drought."

"An increase in the planting of permanent crops since California's last drought episode in 2009 is one reason we have concerns that this drought has the potential to be significantly worse," said Steve Lyle, the spokesman for the California Department of Food and Agriculture.

About 3 million of the 9 million or so acres of irrigated agriculture in California are now orchards and vineyards, according to the experts. The Golden State is the nation's top producer of tree nuts, with almonds far outpacing everything else.

There are more than 800,000 acres of almonds in California compared with 418,000 acres in 1995. Production also doubled, from 912 million pounds in 2006 to 1.88 billion in 2013. California produces 82 percent of the world's almonds, which are neck and neck with grapes as the highest valued crop in the United States.

Meanwhile, most field crops have been cut back. There was, for instance, 1.5 million acres of cotton in California 25 or 30 years ago. Now there is only 300,000 to 400,000 acres, said Daniel Sumner, of the Agricultural Issues Center at the University of California at Davis.

Dairymen, ranchers hurt

The situation is also bad for dairy farmers and ranchers, according to Pete Craig, who owns a large cattle ranch near Lake Berryessa. He said the planting of almond orchards has taken thousands of acres of grazing land away from ranchers, many of whom are selling cattle because of a lack of feed.

"My company has lost over 8,000 acres of grasslands that I leased for cattle grazing to almonds in the last year alone," said Craig, who believes it is bad for the environment to replace California's diverse grassland ecosystem with a monoculture. "It is impossible to

compete against a very realistic $5,000 acre net return for a tree farmer, versus a $15 acre return on native rangeland, and perhaps a $100 acre return on irrigated ground to a cattle rancher. If you were a landowner, what would you do?"

Almonds have always been big in California. The Golden State, with its Mediterranean climate, is the world's top producer of the nut. Still, the recent expansion of the almond industry has been unprecedented, and there lies the problem.

Almond trees must get 3 to 4 acre-feet of water per acre every year or nut production will decrease for an extended period of time. An acre-foot is enough water to cover an acre of land in a foot of water.

"When you cut back on water, it stresses the tree, and when an almond tree is under stress, it produces fewer nuts," said David Baker, the director of member relations for Blue Diamond Growers, an agricultural cooperative that specializes in marketing almonds. "The problem is, they will not recover for 3 or 4 years even if the drought breaks."

Replacing almonds with a different crop is not normally a viable option. It costs as much as $6,000 an acre to plant an almond orchard and raise the trees until they are 5 years old, about the time it takes them to begin producing almonds. It takes about a decade before the orchard produces enough almonds to pay for itself, according to farmers.

"Almonds are a huge investment," said Craig Arnold, who grows almonds on 800 acres of his 1,200-acre farm in Atwater (Merced County) that his great grandfather, Lawrence, built after leaving San Francisco following the earthquake in 1906.

The Merced Irrigation District, which gets its water from nearly empty Lake McClure, recently told Arnold he would be getting only about 6 inches of water per acre this year. Arnold said almonds and peaches require at least 30 inches of water per acre, which is the amount he received last year.

Can't afford to let trees die

"We have been trying to figure out what we are going to do," Arnold said recently as he stood near the family farmhouse, which he oversees with his father and uncle. "It's the almonds and the peaches that I worry about. I can choose not to plant everything else for a year, but I can't afford to let the trees die."

Arnold's plan right now is to leave fallow 250 acres of sweet potatoes and squash and use

the water to keep his almonds and peaches alive. He has already converted 75 percent of his orchards to low volume drip or micro sprinkler irrigation and recently hired workers to refurbish an old well on his property that hasn't been used in decades.

Farmers are, in fact, sinking a large number of new wells across the state, but irrigating with well water can be problematic. Harmful salts and minerals from the aquifer can kill trees and damage crops. Wells can also cause the water table to drop, creating a whole new set of problems.

Nut prices to rise

It is a balancing act that thousands of farmers are now facing. One thing that is certain is that there will be huge economic losses and the price of almonds and other nuts will go up as production goes down.

"I have heard that between 200,000 and 250,000 acres will have significant reductions in production as a result of water shortages," said Dan Cummings, who grows 4,000 acres of almonds in Butte, Colusa and Glenn counties. "California produces almost 2 billion pounds of almonds. Think about it. If 200 million pounds of that is not produced, that's $700 million that doesn't go to the farmer. It's huge."

And it could actually get worse before it gets better.

"Another year of this and you will see even the people who planned ahead getting hurt really bad," said Baker, the farmer who cut down 1,000 acres of orchard just so he could stay afloat another year. "It will really be a disaster next year."

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EXHIBIT L

Future land-use related water demand in California

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LETTER

Future land-use related water demand in California

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Supplementary material for this article is available online

Abstract

Water shortages in California are a growing concern amidst ongoing drought, earlier spring snowmelt, projected future climate warming, and currently mandated water use restrictions. Increases in population and land use in coming decades will place additional pressure on already limited available water supplies. We used a state-and-transition simulation model to project future changes in developed (municipal and industrial) and agricultural land use to estimate associated water use demand from 2012 to 2062. Under current efficiency rates, total water use was projected to increase 1.8 billion cubic meters (+4.1%) driven primarily by urbanization and shifts to more water intensive crops. Only if currently mandated 25% reductions in municipal water use are continuously implemented would water demand in 2062 balance to water use levels in 2012. This is the first modeling effort of its kind to examine regional land-use related water demand incorporating historical trends of both developed and agricultural land uses.

1. Introduction

In 2010, California used an estimated 45.6 billion cubic meters (Bm^3) of water for public supplies, irrigation, and livestock [1], more than any other state in the US. Surface water rights are approximately five times the states' mean annual runoff while substantial uncertainty surrounds actual use estimates, especially for groundwater [2]. California's complex, intensively developed water storage and delivery system depends almost entirely on the collection and redistribution of winter precipitation, surface runoff, and groundwater. Persistent drought conditions since 2011 led to passage of the first urban water use restriction law in the state's history [3], mandating a 25% reduction in municipal use. The mandated reduction will minimally impact statewide demand overall as the agriculture sector dominates consumption (~80% of statewide totals, predominantly irrigated in the study region). Developed water use (i.e. urban/suburban residential, commercial, industrial) only consumes an estimated 17.6% [4, 5]. The drought has become so severe that in June 2015, state water board officials mandated cuts to senior agriculture water rights holders for the first time since the 1970s [6]. Longer term management plans are now seen as critical for California's water future as evidenced by the 2014 Sustainable Groundwater Management Act, the first groundwater management legislation in state history. Groundwater supplies an estimated one-third of total statewide water used in an average year, increasing to more than one-half during drought years when other supplies are limited [7].

Water supply and demand imbalances are likely to intensify in coming decades, due to population growth, land-use intensification [8], a projected warming and drying climate [9–11], earlier spring snowmelt [12], increasing likelihood of persistent drought conditions [13–15], existing restrictions in surface-water deliveries [2], and unsustainable groundwater extraction rates [16, 17]. Highly variable annual water supplies will likely increase competition among developed, agriculture, and environmental sectors for both surface water and groundwater resources [8]. California's population is projected to increase to 52.6 million by 2060 [18] from an estimated 38 million in 2012 [19]. Without extensive water use efficiency improvements across sectors, new storage capacity (e.g. reservoirs, groundwater storage), new supplies (e.g. desalinization, groundwater recharge), or improved delivery efficiencies, new demand will need to be met by reallocation from existing uses [2]. If not, overall demand could potentially exceed supply this century.

The aim of this research was to quantify future land-use related water demand in California under a 'business-as-usual' (BAU) scenario. The BAU scenario assumes land use and land cover (LULC) dynamics from the historical period persist into the projected period, including historical rates of land conservation. We compiled historical LULC change data as well as water use information from both remote sensing and tabular datasets for use in a state-and-transition simulation model (STSM) [20–22]. Changes in LULC were modeled annually at 1 km by 1 km spatial resolution for the baseline period (1992–2012) using the historical data. For the projection period (2012–2062), the model randomly sampled from the historical distribution of LULC change while tracking water use for developed (municipal and industrial) and agricultural (annual and perennial cropland) land uses. The resulting model output included annual LULC and water use projections to the year 2062 across 40 Monte Carlo simulations. Examination of land-use related estimates of future water demand in California are needed to develop effective water resource management plans, given highly variable inter-annual supplies and future climate uncertainty.

2. Methods

We used the LUCAS STSM [20, 21] to project land-use change over a 70 year period (1992–2062) across 40 Monte Carlo simulations to estimate associated water use demand in Mediterranean California. Projections of land use were developed under BAU conditions where future changes were based on recent historical rates of land-use change and land protection. The LUCAS model is a form of non-stationary, Markov Chain model, where the landscape is divided into a set of simulation cells with each cell assigned a discrete state (i.e. LULC class). Transitions targets were developed using a time-series of historical data describing the rate of change between land-use and land-cover classes and were used within the model to move cells between states over time. For a more thorough description of the STSM framework see Daniel and Frid [22] and Sleeter *et al* [21].

2.1. Study area

The spatial extent of the model included two ecoregions in central and southern California, defined by the US Environmental Protection Agency as the Central California Foothills and Coastal Mountains (hereafter called 'Oak Woodlands') and the Central California Valley (hereafter called the 'Central Valley') [23] (figure 1). Ecoregions were selected as the primary spatial stratification unit as they have proven useful in the analysis of LULC change [24, 25]. Ecoregions are characterized by similar biotic, abiotic, aquatic, and physical characteristics and therefore similar land-use potential [26]. All 46 counties contained within the two ecoregions were used as a secondary spatial stratification unit (figure 1). Overall, the study area was subdivided into 1 km by 1 km simulation cells resulting in a total area of 146 410 km^2, with each cell assigned an ecoregion (primary stratum) and county (secondary stratum).

2.2. State variables

We used the 1992 National Land Cover Dataset (NLCD92) [27] to define our initial LULC state class categories. The 20 original NLCD92 LULC categories were aggregated into primary LULC categories as defined in table 1. To identify areas with high levels of protection, where future land use activities would be limited or prohibited, we used data from the US Geological Survey's Protected Area Database [28] to classify rangeland and forest into protected versus unprotected. The LULC state of each cell was then based on a nearest neighbor resampling of the NLCD92 (30 m) and protected areas maps to 1 km^2. A total of 1104 unique state class combinations were available, as a result of combining 12 LULC classes from table 1 with the two ecoregions and 46 counties. For the perennial cropland class we tracked both age and time-since transition (TST).

2.3. Model process overview

LUCAS simulates transitions between LULC state classes in annual timesteps. For this model we defined 6 transition types and 332 transition pathways (table 2). The processes represented by these pathways include changes between agricultural classes, agricultural expansion, agricultural contraction, orchard removal, urbanization, and protection of rangeland and forest. Within a given timestep, the order at which transitions occur is random for each Monte Carlo simulation.

2.4. Model parameterization

2.4.1. Transition targets

State class transition targets were used to model agricultural expansion, agricultural contraction, urbanization, land protection, and conversions from annual to perennial cropland. Transition targets for the agricultural expansion, agricultural contraction, and urbanization transition types were based on a time series derived from the California Farmland Mapping and Monitoring Project (FMMP), which provides land-use transition amounts for each of the 46 counties in the study area on a biannual basis for the historical 1992–2012 period (figure S1) [34, 35]. The FMMP data was directly used in the model for the 1992–2012 period. For the projected period (2012–2062) we randomly selected one of the FMMP historical years (and its corresponding change rates) for each timestep in each Monte Carlo. By randomly sampling one of the historical years we preserve the covariance of change rates between counties, as opposed to sampling each county independently.

There were no data available documenting the historical rate of change between annual and perennial cropland in California. Agricultural statistics indicate a trend towards increasing perennial and decreasing annual cropland over the last half of the 20th century [36], however, statistical surveys alone do not indicate the source of these trends, specifically the rate of individual class conversions. Within the model we assumed changes from annual cropland to perennial cropland occur at an average rate of $100\,km^2\,yr^{-2}$ (standard deviation of $50\,km^2$) from which we sample across every timestep and Monte Carlo simulation.

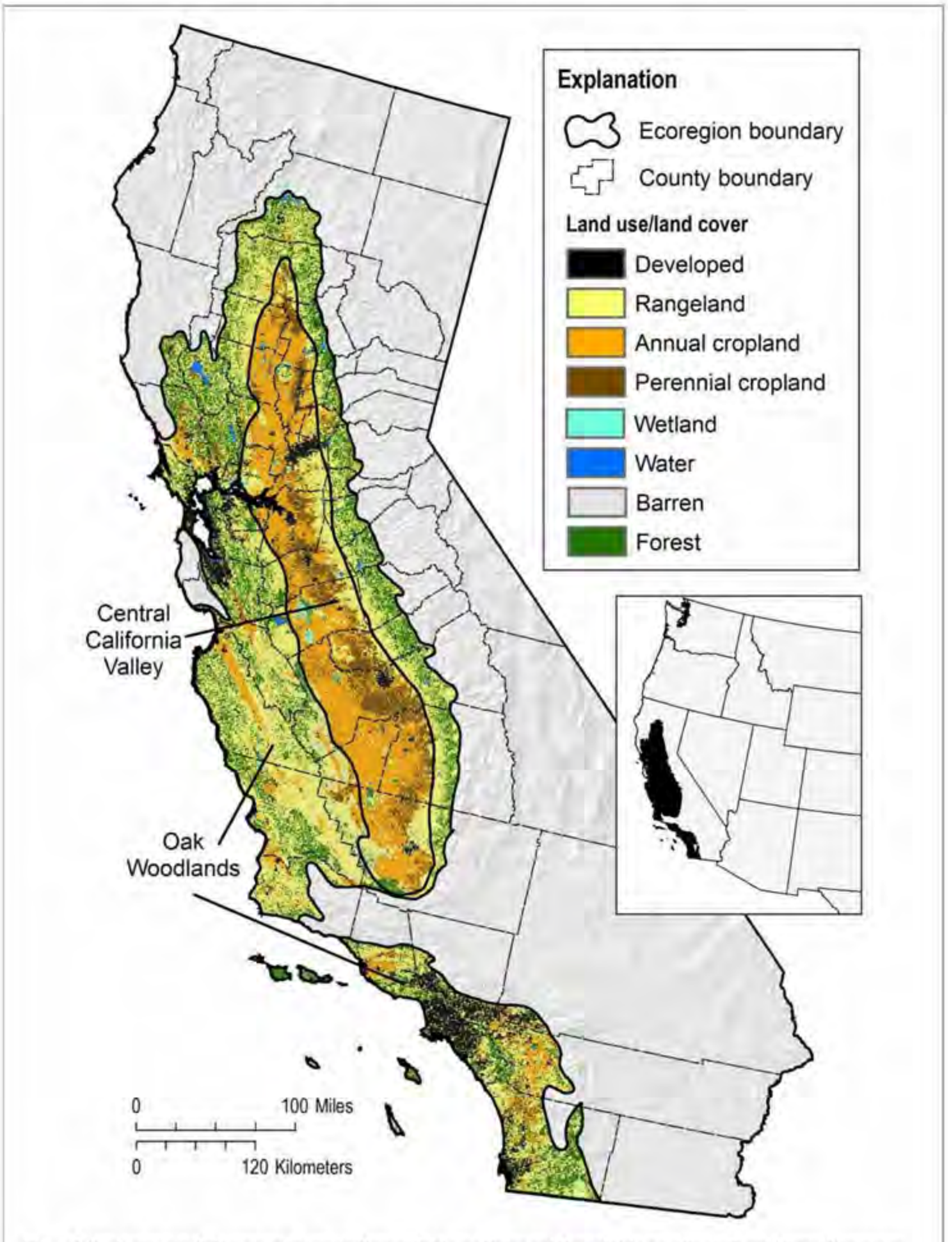

Figure 1. Study region in California including the Central California Valley and Central California Foothills and Coastal Mountains EPA Level III ecoregions [23], associated counties (outlined in light black) included in the study area, and 1992 land use and land cover.

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Table 1. State classes and the corresponding classes from the 30 m National Land Cover Dataset. Descriptions closely follow those outlined in Anderson *et al* [illegible] and Sleeter *et al* [illegible].

State class	Area (km^2)	% of study region	NLCD classes	Description
Rangeland	52 866	36.1%	Grasslands/herbaceous shrublands	Land where potential natural vegetation is predominantly grasses, grass-like plants, forbs, shrubs, or brush and where natural herbivory was an important influence in its pre-civilization state. The vegetated cover must comprise at least 10% of the area.
Rangeland (protected)	11 217	7.7%	Grasslands/herbaceous shrublands	Same as the rangeland class but set aside for permanent exclusion from conversion to an alternate land-use or land-cover state.
Annual cropland	33 127	22.6%	Pasture/hay row crops small grains/fallow	Non-woody cropland or pastureland in either a vegetated or non-vegetated state used for the production of food and fiber.
Perennial cropland	10 550	7.2%	Orchards/vineyards/other	Woody cropland persisting over multiple growing seasons used for the production of food, drink, and fiber, that does not get destroyed or removed during harvest.
Forest	16 761	11.4%	Deciduous forest, evergreen forest, mixed forest	Tree-covered land where the tree-cover density is greater than 10%.
Forest (protected)	7071	4.8%	Deciduous forest, evergreen forest, mixed forest	Same as the Forest class but set aside for permanent exclusion from conversion to an alternate land-use or land-cover state.
Developed	9500	6.5%	Low intensity residential, high intensity residential, commercial/industrial/transportation, urban recreational grasses	Areas of intensive use with much of the land covered with structures (e.g., high density residential, commercial, industrial, transportation, mining, confined livestock operations), or less intensive uses where the land cover matrix includes both vegetation and structures (e.g., low density residential, recreational facilities, cemeteries, etc), including any land functionally attached to the urban or built-up activity or in a non-native vegetation state for human recreation.
Barren	2642	1.8%	Bare rock/sand/clay	Land comprised of natural occurrences of soils, sand, or rocks where less than 10% of the area is vegetated.
Water	1897	1.3%	Open water	Areas persistently covered with water, such as streams, canals, lakes, reservoirs, bays, or oceans.
Wetland	719	0.5%	Woody wetlands, emergent herbaceous wetlands	Lands where water saturation is the determining factor in soil characteristics, vegetation types, and animal communities. Wetlands are comprised of water as well as vegetation.

Table 2. The set of all possible state class transition pathways developed for the model, organized by transition type, number of pathways, spatial stratification and the 'from' and 'to' LULC state class. The (All) value means that the transition pathways is applied to both the Central Valley and Oak Woodlands ecoregions; the (N/A) value represent a transition pathway not applicable at the given spatial stratification level.

		From states			To state
Transition type	# of Path-ways	Ecoregion	County	State class	State class
Agricultural change	4	(All)	(N/A)	Perennial Annual	Annual Perennial
Agricultural expansion	92	(N/A)	(All)	Rangeland	Annual perennial
Agricultural contraction	92	(N/A)	(All)	Annual Perennial	Rangeland
Urbanization	138	(N/A)	(All)	Annual Perennial Rangeland	Developed
Orchard removal	2	(All)	(N/A)	Perennial	Perennial (age reset to zero)
Protection	4	(All)	(N/A)	Rangeland Forest	Protected rangeland Protected forest

For the protection transition pathway, a map of areas protected between 1992 and 2011 was created and used to constrain the spatial location of rangeland and forest protection over the first 18 years of the simulation [28, 38–40]. For the future projections, a map of critical and priority areas for protection [41] was used to constrain the spatial location of new protected areas. Additionally, historical data on forest and rangeland protection were analyzed to produce a patch size class distribution of protected areas (table S1) to guide patch size of newly protected lands over the model period (2012–2062).

2.4.2. Transition probabilities

For the perennial cropland state class we tracked the age and TST for every cell to project the amount of orchard removal as well as transitions from perennial to annual cropland. No data exists on the age structure of perennial croplands in California, therefore age was initialized randomly for each cell using a uniform distribution between ages 1 and 45. In California, orchards are removed and/or replanted at an average age of 25 years, a decrease from ~35 year old maturity in the 1980s [37]. As a result, the following parameters for orchard removal were established: (1) the minimum age of an orchard is 20, and (2) for each timestep and Monte Carlo simulation, the annual transition probability is sampled from a uniform distribution corresponding to a cumulative transition probability of 0.95 for ages 20 and 45 resulting in transition probabilities of 0.0228 and 0.0950, respectively. We assume orchard removal is followed immediately by replanting resulting in the state class remaining unchanged but with the age reset to zero. For the perennial to annual cropland pathways, we set a transition probability of 0.05 for all cells classified as perennial cropland and with a TST for orchard removal of 1 year. The effect of these parameters results in a 5% probability of orchards converting to annual cropland within 1 year of an orchard being removed. Lastly, we prohibit perennial cropland from transitioning to rangeland (agricultural contraction) or to annual cropland (agricultural change) until they are at least 20 years old.

2.4.3. Spatial multipliers

Spatial multipliers were used to constrain the location of allowable land-use change in two ways. First, we defined spatial adjacency rules for the agricultural change, expansion, contraction, and urbanization pathways. The probability of a cell experiencing any one of those transitions was calculated as a linear function of the proportion of the eight neighboring cells classified as the 'to class'. For example, the probability of a cell converting into developed (urbanization) was calculated based on the number of adjacent cells already classified as developed; the higher the number of adjacent cells classified as developed, the higher the calculated probability. If a cell has no neighbors classified in the 'to class' then the transition probability was set to zero.

In addition to the adjacency multipliers, spatial multipliers were used to constrain transitions on protected and managed lands [29, 30]. Spatial multipliers allow or constrain state class transitions and can be implemented on specific pathways. We set the probability of conversion for the agricultural expansion and urbanization pathways to zero for federal lands, including military installations and tribal lands [31], and protected areas where there was a management plan in place prohibiting anthropogenic land use [28]. In addition, we set the transition probability for urbanization to zero for agriculture lands currently enrolled in the Williamson Act, a conservation program within the State of California which provides economic incentives to agricultural land holders to maintain an agricultural land use [32].

2.5. Water use

In addition to tracking state class variables, the model was parameterized to track water use by county and state class type. To calculate average county applied water use for the annual and perennial cropland classes we: (1) determined the area of each crop type by county from the USDA Cropland Data Layer (CDL) [42]; (2) 'crosswalked' the CDL cropland types to the cropland categories associated with the California Department of Water Resources Agricultural Land & Water Use 1998–2010 dataset (CDWR) [43] (table S2); (3) collapsed the CDWR data into annual and perennial cropland classes and assigned an area-weighted average applied water use value for each combination of county and state class type (table S3). For the developed class, applied water use was derived from a national dataset of water use by various sectors [1].

Applied water use for the developed state class was calculated as follows:

$$\text{DevAW}_{\text{CTY1..}n} = \frac{\text{Public supply freshwater} + \text{industrial self supplied}}{\sum \text{Developed}},$$

where $\text{DevAW}_{\text{CTY1}\ldots n}$ is developed state class (Dev) average applied water (AW) use for each county ($_{\text{CTY1}\ldots n}$), 'public supply-freshwater' (i.e. public supplied total freshwater withdrawals in kl yr^{-1}) and 'industrial self-supplied' (i.e. industrial self-supplied total freshwater withdrawals in kl yr^{-1}) are categories tracked within the CDWR data corresponding to urban and suburban, commercial, and industrial sectors, and *Developed* corresponds to the total developed area in each county based on the NLCD 2011 [46] developed state class (section 2.2, table 1).

2.6. Simulation experiments

The analysis described in this paper is the result of a single 'BAU' scenario. The BAU scenario was run over 70 timesteps (1992–2062); the first 20 years refer to the baseline historical conditions represented in the years 1992 through 2012. Projections were developed from 2012 through 2062. We ran 40 Monte Carlo simulations of the BAU scenario to reflect the variability in historical change rates and uncertainties associated with various model parameters.

2.7. Model validation

A pixel-level validation of the model used for this analysis was not possible due to the lack of a reference condition time series. The NLCD92 map used to establish initial conditions within the model represents a single date product, not directly comparable to later versions of NLCD due to changes in mapping methodology and classification scheme [27, 44–46]. However, we could validate that the internal calculations of the model functioned as expected by comparing the input transition demand to model simulation output. Additionally, we compared our simulated results over the baseline period with regional-scale data describing trends in land-use classes, providing important insight into the robustness of the modeling framework.

Structurally, the model consistently produces the expected outcome by matching the input transition target amounts. Figure S1 shows a comparison of the transition targets used to derive the BAU projections with the model simulations over the same temporal period (1992–2012). Mean model estimates are consistent with the transition targets; variability around the modeled mean results from the underlying sampling algorithm.

We compared our estimates of cropland (total, annual, and perennial) with statistical estimates from the National Agricultural Statistical Service (NASS) for the period 1992–2009 (figure S2) [36]. NASS estimated a net decline of 3.0% in harvested area, with a 13.6% decline in field crops and a 28.6% increase in fruit and nut crops. For comparison, LUCAS model simulations estimate a 2.4% decline in total agricultural land use, with a 10.2% decline in annual crops and a 22.0% increase in perennial crops. A true comparison is complicated due to definitional differences between crop categories, however, the overall modeled trends in agricultural land use are consistent with the broad trends identified in statistical estimates.

Additional comparisons were made for the rangeland and developed classes. For developed area we compared model estimates to the total estimated change from the FMMP data. FMMP projected an increase of 3152 km^2 between 1990 and 2010 while our model estimated a net increase of 3328 km^2 between 1992 and 2010. Rangelands were more difficult to compare since the definition of what lands are included in the category often vary. Furthermore, comparison using satellite data are problematic due to the change in mapping method between NLCD92 and versions from 2001 forward. For this reason we compared changes in rangeland (herbaceous grassland and shrub/scrub classes from NLCD) between 2001 [27] and 2011 [46] with our modeled estimates. NLCD estimated a net decline of −0.6% and the model produced an estimated net decline of − 1.2%.

3. Results

Between 2012 and 2062 in the BAU scenario, developed land cover was projected to increase 62.9% from an average 12 978 km^2 to an average 21 141 km^2 (figures 2(a) and (b)). Annual cropland was projected to decline an average 30.3% (8822 km^2). Conversion of annual cropland into perennial cropland and encroachment of perennial crops into rangeland resulted in perennial cropland increasing 39.1%

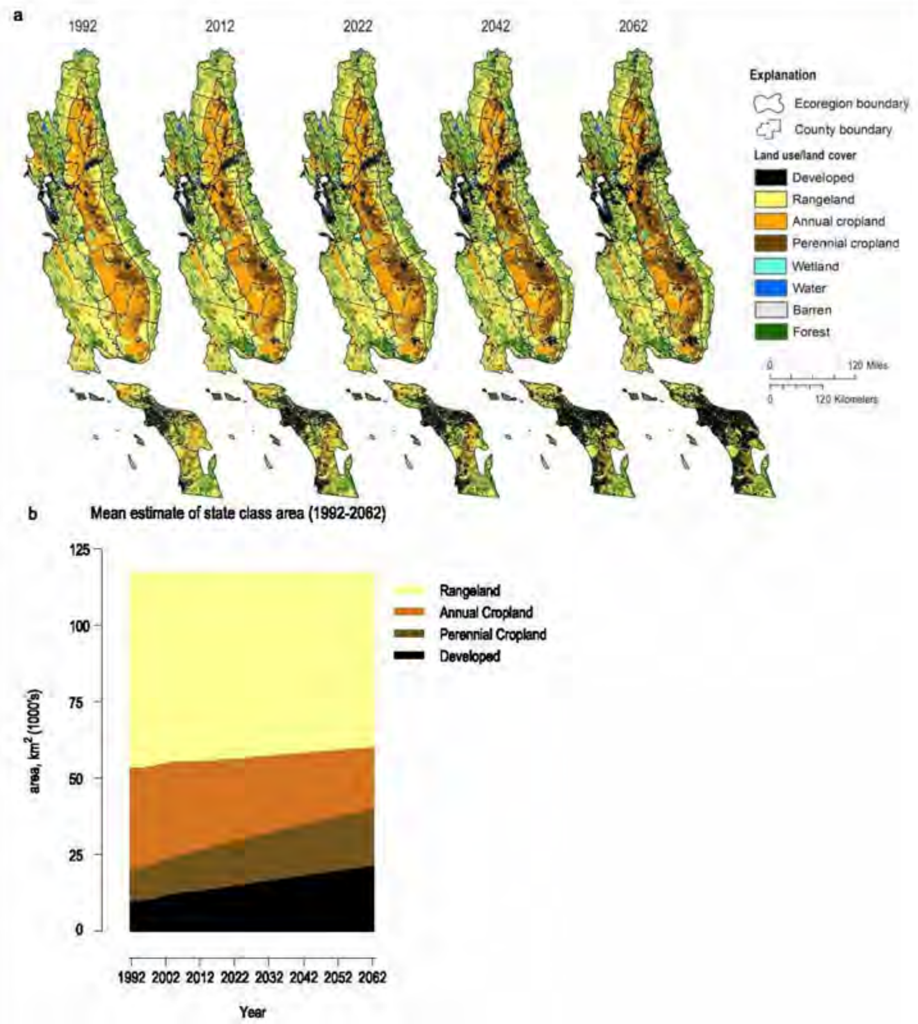

Figure 2. (a) Projected land-use and land-cover (LULC) change for the historical period (1992–2012) and the projected period (2012–2062) in California's Central Valley and Oak Woodlands regions under a business-as-usual (BAU) scenario. The 2012 and 2062 LULC maps represent one out of 40 possible Monte Carlo iterations modeled for each time step. See table 1 for a full explanation of the LULC classification scheme. (b) Trends in mean LULC change over the historical and projected period by LULC class.

(5192 km^2). Overall, anthropogenic land uses increased over 8.2% (4533 km^2) from 2012 levels at the expense of rangelands while total cropland area declined 8.6%. Continued additions of protected rangeland at the historical rate did not abate continued losses through mid-century. Rangelands continued to decline (−7.3%) despite the addition of 3211 km^2 of protected rangeland in the BAU scenario.

Historical land use transitions persisted into the future under the BAU scenario. Conversions into developed land uses came predominantly from rangelands in the Oak Woodlands ecoregion (figure 3(a)) and from annual and perennial cropland in the Central Valley (figure 3(b)). Conversions from annual cropland into perennial cropland had the highest annual average LULC transition rate in the Central Valley. Rangelands across the study area were also converted to agricultural uses, with large amounts of land fluctuating annually between rangeland and annual cropland as some areas are cultivated while others are idled [47, 48].

By 2062, water use was projected to increase by 1.8 billion cubic meters (Bm^3; +4.1%) over current use estimates (figure 4). Within the developed sector, water use demand was projected to increase 4.6 Bm^3 (+59.1%) from an average 7.9 Bm^3 (range of 7.8–7.9 Bm^3) in 2012 to an average 12.5 Bm^3 (range of 12.0–13.0 Bm^3) in 2062. This represents a 9.4%

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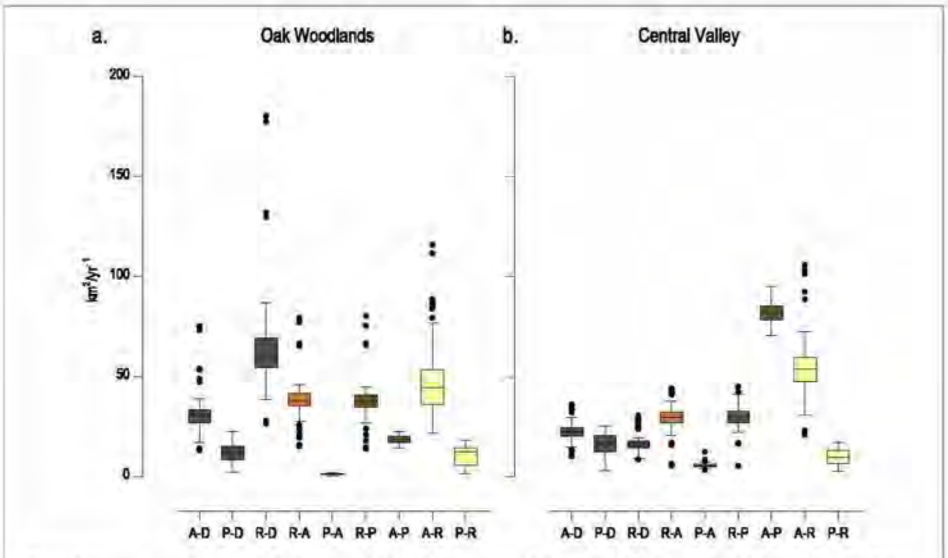

Figure 3. Average annual land-use and land-cover (LULC) change in square kilometers (km^2) over the modeled period (2012–2062) for the (a) Oak Woodlands and (b) Central California Valley ecoregions as defined 'from' and 'to' LULC classes for transitions between annual cropland (A; orange), perennial cropland (P; brown), rangeland (R; yellow), and developed (D; gray) classes (e.g. A–D represents transitions from annual crops to developed land with box fill color representing the 'to' LULC class). Boxes indicate the 'to' LULC class and the 25%–75% range and median (line), box fill color represents the 'to' class for the transition, while whiskers indicate the 5%–95% range and dots represent outlier county values.

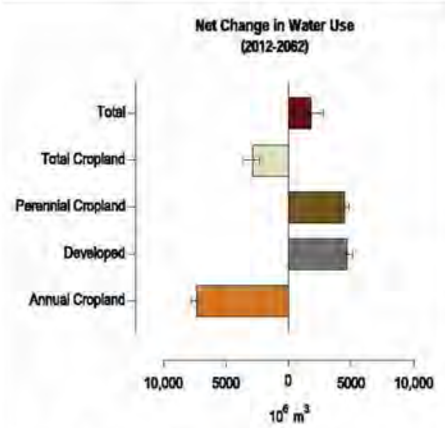

Figure 4. Projected net change in water use demand from 2012 to 2062 for agriculture and developed (municipal and industrial) water use expressed in millions of cubic meters (10^6 m^3), including average (bar) and maximum and minimum value ranges across 40 Monte Carlo simulations.

increase (from 17.8% to 27.3%) in the develop sectors proportion of total regional water use. For the annual cropland sector, water use was projected to decline nearly 30.2% or an estimated 7.3 Bm^3 (range of −6.8 to −7.9 Bm^3) while perennial cropland water use was projected to increase by 4.5 Bm^3 (range of 3.9–5.1 Bm^3) or 37.5%. Combined, total cropland water use was projected to decline 2.8 Bm^3 from an average 36.2 Bm^3 in 2012 to 33.4 Bm^3 in 2062 representing a 7.8% decrease in agriculture water use (figure 4).

At the county scale, annual cropland losses to perennial cropland and development drove net increases in water demand. Large gains in developed land use led to net increases in water use in Alameda, Los Angeles, Orange, Riverside, Sacramento, San Diego, and Ventura counties, where urbanization of rangelands was projected to occur and large population centers already exist (figure 5(a)). San Diego County exhibited the highest net increase in projected water use, almost entirely attributed to the development of rangelands (see also figure 2). In 82% of counties, net demand for water increased (figure 5(b)). Net declines in water demand were projected where losses of annual cropland exceeded gains of perennial cropland and new developed land (e.g. Kern and Kings Counties).

4. Discussion and conclusions

The results presented in this research highlight several key issues likely facing California water users and managers in the future, if current trends persist. In 38 of 46 counties our model results show a net increase in overall projected water use. Our results indicate that currently mandated 25% municipal water use restrictions would need to be maintained through 2062 for future water demand to remain at or below 2012 demand. Water use in 2012 was already proven unsustainable given the ongoing multi-year drought,

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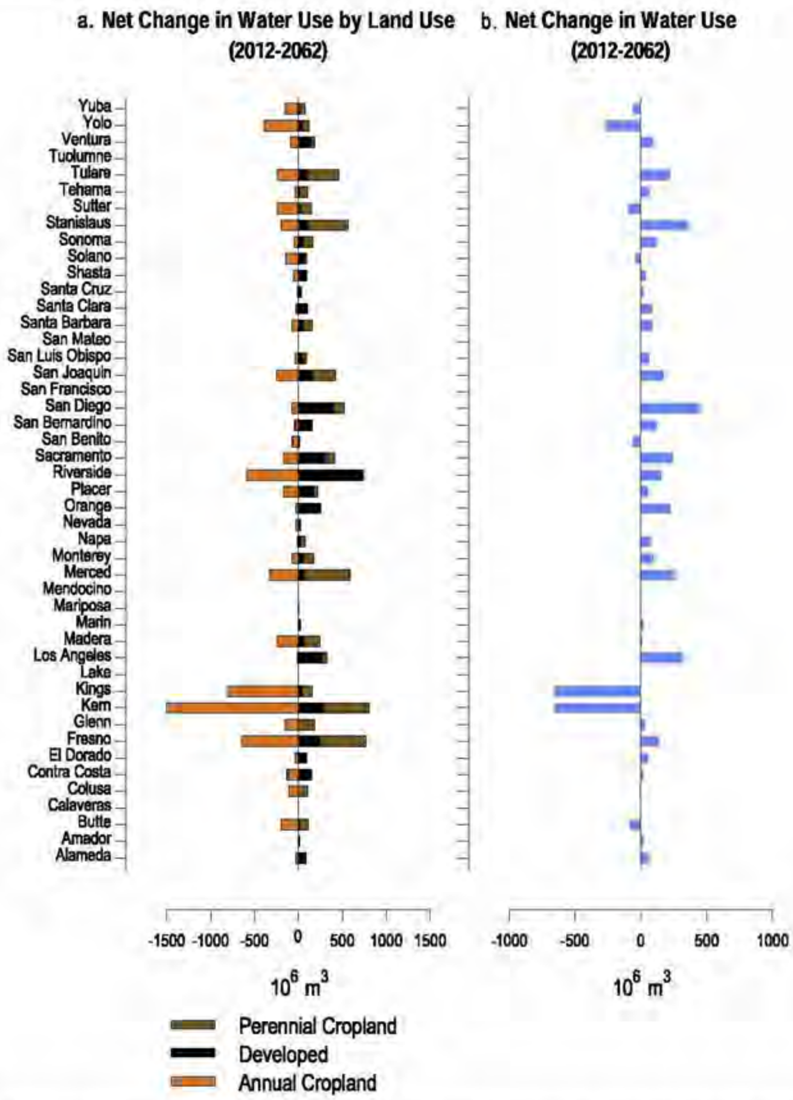

Figure. 5. Average change in water use demand between 2012 and 2062 in cubic meters for each county in the study region by (a) land use category and (b) net change in overall water use. Boxes indicate the mean (+), median (line), and 25%–75% range, while whiskers indicate the 5%–95% range and dots represent outlier county values.

which lead to mandated municipal use restrictions in 2015. Reaching current 2015 use levels in 2062 would require some combination of increased use efficiencies across sectors and/or new supplies [51]. It has been estimated that nearly one-third of municipal water use in California could be saved if all existing technologies were implemented [52]. Current data indicate perennial cropland expansion continues, driven by increases in the total value of almonds from \$4.8 billion in 2012 to \$6.4 billion in 2013, followed by grapes at \$5.6 billion [53]. California's continued population growth projections will undoubtedly lead to new developed land use as well [18]. It is important to note that any new demand for water will also require additional energy for transport and delivery. Storage and redistribution of California's water already consumes nearly 20% of the state's electricity and 30% of its natural gas [54].

The projected trend in declining agricultural water use reflects the observed historical trend of regionally intensive urbanization of farmland, as well as the trend towards more high risk and high value perennial crops [36]. Almonds are the fourth most water intensive crop in California and the state's largest agricultural export by value, second only to hay in total acreage planted [50]. As a result, in only 16 of 46 counties was historical perennial cropland water use lower than water use for annual crops. Improvements or changes in water use efficiency and crop yields were not considered in this study and reflect a key uncertainty when projecting future water use demand. Since 1992, the water use efficiency of orchards and vineyards has increased 28% and 33% respectively [49] while crop yields have also increased [56]. The BAU scenario assumes no additional improvements in efficiency due to technological advancements.

There was considerable uncertainty associated with transitions within the agricultural sector, specifically the conversion between annual and perennial cropland categories. Additionally, little is known about the current age structure of orchards in California. As orchards reach maturity and decline in production, land owners must decide whether to replant perennial crops or switch to a different land use. Improved mapping techniques using remotely sensed data should be evaluated as they mature to better inform some of the important data gaps associated with LULC change in California.

Future climate variability can also have positive and/or negative impacts on water use, in terms of reduced water availability due to decreased precipitation and higher evaporative loss due to temperature increases, but may also result in increased production due to warming and the effect of CO_2 fertilization. Furthermore, climate can have positive and/or negative feedbacks on future land use (e.g. less precipitation, less water availability, more applied water use per crop, lower potential for agricultural expansion). While the 1992–2012 FMMP land change data do include two drought episodes, including the 2007 onset of the current, extreme drought, land use decisions based on long-term water shortages were not fully captured. These are important considerations which were outside the scope of this study, yet need to be recognized as important limitations and uncertainties which should be incorporated into future work.

Future changes in land use were based on a 20 year historical record which spans a wide range of climatic and socioeconomic conditions. The projections derived from these data cover a wide range of future conditions, but do not represent all future possibilities. Additional work should be undertaken to develop alternative 'what-if' scenarios to explore how significant departures from historical conditions (extreme events) could impact regional water use demand. One such example would be if California entered into a prolonged long-term drought. Even short duration events (4–6 years) have shown to have strong feedbacks on land-use change dynamics [57].

Land-use projections provide a previously unseen view into potential water use futures. This information is essential for water management agencies and a broad array of stakeholders given the state's economic dependency on this already over-allocated resource [2]. Agriculture use values are often grossly underestimated by as much as 20%–30% [49, 55], as they are often not measured directly, but calculated based on crop acreage, crop coefficients, stage ratios, irrigation-system efficiency, and precipitation [1]. Estimates on public water use are generally more accurate and based primarily on site-specific information [1]. Considering probable underestimation, increasing demand for water in coming decades is likely greater than our projections indicate. This may eventually force a reconciling of human and ecosystem water needs, particularly in the face of projected climate-driven declining supplies.

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Model and data access

All modeling for this study was done using the ST-SIM software application which can be downloaded free of charge from APEX Resource Management Solutions (http://apexrms.com). All model parameters are available as (1) a Microsoft Excel file and (2) a database containing all model inputs and outputs (http://geography.wr.usgs.gov/LUCC/).

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EXHIBIT M

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SCIENCE | THE PARCHED WEST

Beneath California Crops, Groundwater Crisis Grows

By JUSTIN GILLIS and MATT RICHTEL APRIL 5, 2015

Even as the worst drought in decades ravages California, and its cities face mandatory cuts in water use, millions of pounds of thirsty crops like oranges, tomatoes and almonds continue to stream out of the state and onto the nation's grocery shelves.

But the way that California farmers have pulled off that feat is a case study in the unwise use of natural resources, many experts say. Farmers are drilling wells at a feverish pace and pumping billions of gallons of water from the ground, depleting a resource that was critically endangered even before the drought, now in its fourth year, began.

California has pushed harder than any other state to adapt to a changing climate, but scientists warn that improving its management of precious groundwater supplies will shape whether it can continue to supply more than half the nation's fruits and vegetables on a hotter planet.

As a drilling frenzy unfolds across the Central Valley, California's agricultural heartland, the consequences of the overuse of groundwater are becoming plain to see.

In some places, water tables have dropped 50 feet or more in just a few years. With less underground water to buoy it, the land surface is sinking as much as a foot a year in spots, causing roads to buckle and bridges to crack. Shallow wells have run dry, depriving several poor communities of water.

Scientists say some of the underground water-storing formations so critical to California's future — typically, saturated layers of sand or clay — are being permanently damaged by the excess pumping, and will never again store as much water as farmers are pulling out.

"Climate conditions have exposed our house of cards," said Jay Famiglietti, a NASA scientist in Pasadena who studies water supplies in California and elsewhere. "The withdrawals far outstrip the replenishment. We can't keep doing this."

Cannon Michael, a farmer who grows tomatoes, melons and corn on 10,500 acres in the town of Los Banos, in the Central Valley, has high priority rights to surface water, which he inherited with his family's land. But rampant groundwater pumping by farmers near him is causing some of the nearby land to sink, disturbing canals that would normally bring water his way.

"Now, water is going to have to flow uphill," said Mr. Michael, who plans to fallow 2,300 acres this year.

In the midst of this water crisis, Gov. Jerry Brown and his legislative allies pulled off something of a political miracle last year, overcoming decades of resistance from the farm lobby to adopt the state's first groundwater law with teeth. California, so far ahead of the country on other environmental issues, became the last state in the arid West to move toward serious limits on the use of its groundwater.

Last week, Mr. Brown imposed mandatory cuts in urban water use, the first ever. He exempted farmers, who already had to deal with huge reductions in surface water from the state's irrigation works. Mr. Brown defended the decision on ABC's "This Week" on Sunday, saying, "They're providing most of the fruits and vegetables of America to a significant part of the world."

In normal times, agriculture consumes roughly 80 percent of the surface water available for human use in California, and experts say the state's water crisis will not be solved without a major contribution from farmers.

California's greatest resource in dry times is not its surface reservoirs, though, but its groundwater, and scientists say the drought has made the need for better controls obvious. While courts have taken charge in a few areas and imposed pumping limits, groundwater in most of the state has been a resource anyone could grab.

Yet putting strict limits in place is expected to take years. The new law, which took effect Jan. 1, does not call for reaching sustainability until the 2040s. Sustainability is vaguely defined in the statute, but in most basins will presumably mean a long-term balance between water going into the ground and water coming out. Scientists have no real idea if the groundwater supplies can last until the 2040s.

"I wish we could do it faster," Mark Cowin, director of California's Department of Water Resources, said in an interview. "I wish we would have started decades ago."

But Mr. Cowin noted that the state, after neglecting groundwater management for so long, had a lot of catching up to do. Years of bureaucratic reorganization and rule-drafting lie ahead. "This is the biggest game-changer of California water management of my generation," Mr. Cowin said.

In the near term, as the drought wears on and the scramble for water intensifies, farmers are among the victims of the drilling frenzy, as well as among its beneficiaries.

Growers with older, shallower wells are watching them go dry as neighbors drill deeper and suck the water table down. Pumping takes huge amounts of electricity to pull up deep water, and costs are rising. Some farmers are going into substantial debt to drill deeper wells, engaging in an arms race with their neighbors that they cannot afford to lose.

"You see the lack of regulation hurting the agricultural community as much as it hurts anybody else," said Doug Obegi, a lawyer with the Natural Resources Defense Council in San Francisco.

Against this backdrop, water-thirsty crops like almonds are still being planted in some parts of the Central Valley to supply an insatiable global demand that is yielding high prices.

The land devoted to almond orchards in California has doubled in 20 years, to 860,000 acres. The industry has been working hard to improve its efficiency, but growing a single almond can still require as much as a gallon of California's precious water.

The expansion of almonds, walnuts and other water-guzzling tree and vine crops has come under sharp criticism from some urban Californians. The groves make agriculture less flexible because the land cannot be idled in a drought without killing the trees.

Not even the strongest advocates of water management foresee a system in which California farmers are told what they can plant. As the new system evolves, though, the growers might well be given strict limits on how much groundwater they can pump, which could effectively rule out permanent crops like nuts and berries in some areas.

"We want to be careful in dealing with this drought not to go down the command-and-control route if we can avoid it," said Daniel Sumner, professor of agricultural and resource economics at the University of California, Davis. "It interrupts the flexibility, the creativity and the resilience that people in agriculture have already been using to deal with severe water cutbacks."

So far, the over-pumping of groundwater has helped farmers manage through three parched growing seasons.

They were forced to idle only about 5 percent of the state's irrigated land last year, though the figure is likely to be higher in 2015. The farmers have directed water to the highest-value crops, cutting lesser crops like alfalfa.

They have bought and sold surface water among themselves, making the best use of the available supply, experts like Dr. Sumner say. And the farmers' success at coping with the drought has meant relatively few layoffs of low-income farmworkers.

Still, costs are up and profits are down for many farmers and the thousands of small businesses that depend on them, spreading pain throughout the Central Valley and beyond. "It's been a tough couple of years, and it's just getting tougher in rural parts of California," said Dave Kranz, a spokesman for the California Farm Bureau Federation, a growers' organization.

Because groundwater has helped keep production up, replacing a large proportion of the surface water farmers have lost, the drought has not led to big price increases at the national level, even for crops that California dominates.

Once the drought ends, a growing population and a climate altered by human-caused global warming will continue to put California's water system under stress, experts say. A major question is how to manage the groundwater to get Californians through dry years.

Meeting that goal may have as much to do with how surface water is managed as with how much is pumped from the ground.

Several California experts used the metaphor of a bank account to describe the state's groundwater supply. Deposits need to be made in good times, they said, so that the water can be withdrawn in hard times.

Yet for decades, California farmers have been overdrawing many of the state's water-holding formations — its aquifers — even in years when surface water for irrigation was plentiful, the equivalent of overdrawing a checking account.

That will need to change, the experts said, with pumping being limited or even prohibited in wet years so that the underground water supply can recharge. Some land may need to be flooded on purpose so the water can seep downward.

The need for groundwater recharge may ultimately limit how much water farmers can have from the surface irrigation system, even in flush years — the same way that deposits in a bank account limit how many fancy dinners one can eat. Yet in a state where irrigation rights have been zealously guarded for generations, such limitations may not go down easily.

"It would be silly to think you are not going to have any fights," said Denise England, the water expert for Tulare County, toward the southern end of the Central Valley. She cited an aphorism of the West: "Whiskey's for drinking, and water's for fighting over."

John Schwartz and Nelson D. Schwartz contributed reporting.

The Parched West: Articles in this series are exploring the impact of the drought that has hit states from the Pacific Coast to the Great Plains.

A version of this article appears in print on April 6, 2015, on page A1 of the New York edition with the headline: Beneath California Crops, Groundwater Crisis Grows.

EXHIBIT N

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USGS Study: 1200 Square Miles of Central Valley Land Is Sinking

Amy Quinton
Friday, November 22, 2013 | Sacramento, CA | Permalink

LISTEN 3:51

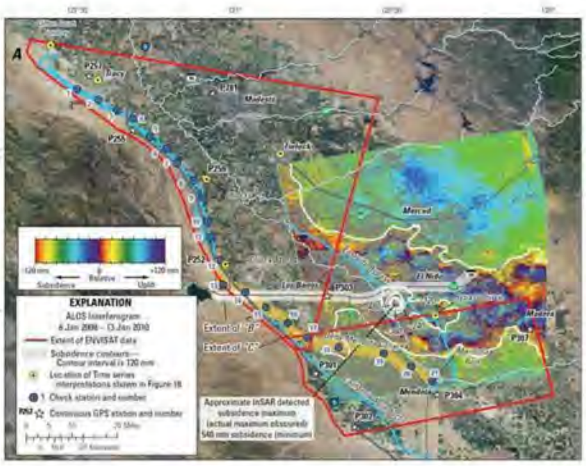
USGS Hydrologist Michelle Sneed stands next to the Delta Mendota Canal in the Central Valley pointing to an area where the concrete lining is cracked and buckled.

Sneed says it's likely caused by subsidence, when the ground sinks.

(Cracks and buckle along Delta Mendota Canal. Photo By Amy Quinton)

But according to her study (http://pubs.usgs.gov/sir/2013/5142/), the center of the subsidence problem is about 15 miles to the north, near a town called El Nido.

"It's so large, it's 1200 square miles that were affected by subsidence over a two year period that we have measurements for," she says. "This area where we're standing now is just on the edge of that bowl so the Delta Mendota Canal is being affected by this large bowl, but it's relatively minor."



(ALOS interferogram with subsidence contours showing vertical changes in land surface in the central San Joaquin Valley area, California, during January 8, 2008–January 13, 2010)

Sneed measures groundwater levels next to the canal using a metal field tape she drops down a well.

"We found in the study, that much of this area, not necessarily where we're standing now, but closer to the center of the subsidence bowl, water levels have reached historic lows," she says. " That means as long as we've been measuring them they've never been lower than they have been recently."

She says excessive groundwater pumping causes the subsidence.

(USGS Hydrologist Michelle Sneed checking data by Delta Mendota Canal. Photo By Amy Quinton)

Drought and regulatory requirements that reduce the amount of surface water sent down the Delta Mendota canal and the California Aqueduct has some farmers turning to groundwater wells.

When releasing her study, Sneed said the subsidence area has seen more row crops change to permanent crops.

"That has the effect of providing less flexibility for farmers when there are droughts because these permanent crops will need water during droughts," said Sneed. "If you have row crops then perhaps fallowing the land during drought would be an option."

She said it wasn't just the sheer size of the subsidence area that surprised her about the study.

"We were also surprised by the high rate of subsidence about 11 inches a year, nearly a foot a year is among the fastest rates ever measured in the San Joaquin Valley," said Sneed.

"This is similar to the rates in the 50's and 60's before the California Aqueduct became an available water resource."

(Yellow part of map indicates where new subsidence is occuring. The darkest color near El Nido is where the subsidence rate is highest. USGS)

But finding a solution to the problem won't be easy.

Chase Hurley, General Manager of the San Luis Canal Company in Dos Palos is trying to come up with a plan for his region.

The irrigation company's dam that pushes water into the canal system is sinking six inches a year.

He takes me to farmland on the other side of the San Joaquin River that has no surface water supply.

"A lot of this land has been farmed since the 30's or 40's especially the stuff right along the river," says Hurley. "And they've historically managed it well so that they could use the shallow and deep aquifer."

But he says some of the land was rangeland and is now being used for row crops and the acreage has increased for permanent crops.

"So it's a lot of new demand on a system that historically didn't have it, a groundwater system, so when it gets developed, they were putting in wells both shallow and deep," says Hurley.

Hurley has been trying to organize local farmers to come up with a plan.

"We didn't say you've got to stop doing what you're doing, but you've got to look at the way you're doing it and let's all try to come up with a solution."

He says farmers realize subsidence isn't someone else's problem – it's damaging their wells and pipelines.

"We have guys out here that are spending $200,000 to 300,000 for a deep well and if the well only lasts 3 or 4 years because subsidence is just wrecking it , that's a huge amount of money that he has to reinvest again," says Hurley.

Subsidence already places a significant part of the Central Valley at greater risk for flooding.

Subsidence has damaged crops, stalled restoration projects, and can be a problem for anything built in its path.

Subsidence is spreading, and once it happens, it's permanent.

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