Comment Letters

Tentative Waste Discharge Requirements General Order for Growers Within the Tulare Lake Basin Area that are Members of a Third-Party Group

	Commenter
1	Doug Anderson - AMA Pistachio Development
2	John and Mary Andreas - John Andreas Ranch
3	Daniel Andrews - Dan Andrews Farms
4	Joy E. Ash, Johnson Drilling, Corp.
5	Eric L. Averett - Kern River Watershed Coalition Authority
6	Eric L. Averett - Kern River Watershed Coalition Authority
7	David Bell - Leland Bell Farms, Inc.
8	Jeremy Blackwell - Pioneer Nursery
9	Steve Collup - Arvin Edison Water Storage District
10	Casey Creamer - Agricultural Organizations
11	Steven C. Dalke - Kern-Tulare Water District
12	Richard Diamond - North Kern Water Storage District
13	Peter Ermigarat
14	Ray Etcheverry - Edison Highway Ranch, LLC
15	Ray Etcheverry - Agro Farming, Corp.
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17	Ray Etcheverry - SVS Viticulture, LLC
18	Laurel Firestone and Jennifer Clary - Environmental Justice Organizations
19	Kari E. Fisher - California Farm Bureau Federation
20	Matthew Fisher
21	Tom Fry
22	Paul Giboney - M. Caratan, Inc.
23	Jeff Gilcrease – Excelsior/Kings River Resource Conservation District
24	Jeffrey Giumarra – Giumarra Vineyards
25	Tim Holtermann
26	Warren Hutchings and Nathan Heeringa – Innovative Ag Services, LLC
27	Wayde Kirschenman – Way Gin, LP
28	Wayde Kirschenman – Wayde S. Kirschenman, Et. al
29	Wayne Kirschenman – Sonshine Properties, LLC
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32	Kirschenmann Farms
33	Arnold S. Kirschenmann – California Grape Co., LLC
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36	Joseph MacIlvaine – Paramount Farming Company
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38	Catalino Martinez – Val-Mar Farms, LLC
39	Darrell McElwee – Carreon Vineyards, Inc.
40	Eric J. Miller – South Valley Farms
41	Gwendolyn Neufeld
42	Hannah M. Neufeld

43	Jim Neufeld
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56	Louis Stull – Stull Farms
57	William Thomas – Best Best & Krieger Attorneys at Law
58	Daniel Tran – LT Farms, Inc.
59	Donald Urfrig
60	Stanley D. Wilson – Handel and Wilson Farms, LLC
61	Geordy Wise – Gardiner Farms
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68	Cliff Woolley – Munger Farms

Letter 1

April 10, 2013

Central Valley Regional Water Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers Within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board members:

My family has been farming on the west side of Kern County since 1969, and we now farm 140 acres of Pistachios within the boundaries of the Lost Hills Water District.

I am writing to express my opposition to the tentative waste discharge requirement order for growers within the Tulare Lake Basin. It is my opinion that the four Westside districts, Brenda Mesa Water District, Lost Hills Water District, Dudley Ridge Water District , as well as Belridge Water Storage District should be excluded from this order. There are very few usable underground aquifers under the four districts on the west side of Kern County.

The growers in these districts utilize some of the highest tech irrigation systems that are available in the industry. We monitor evapo-transpiration rates, we maintain neutron probes in the fields to monitor soil moisture, and we have installed the latest technology in drip irrigation all in an effort to assure that every drop of water is utilized to its fullest.

Water is just too valuable of a commodity to allow any surface runoff from any of our farms in these four Westside districts. It is because of this fact that I believe the Order is not a reasonable regulation that should be put on the growers and districts on the Westside. We are continually striving to improve our farming techniques and our water management. We simply do not need another regulatory agency constantly looking over our shoulders.

Thank you very much for your consideration,

Doug Anderson, Partner
AMA Pistachio Development

DA/lm

Letter 2

APRIL 15, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I am an almond grower farming near Delano within the Delano-Earlimart Irrigation District. My family has farmed in this valley since very early in the 1900's, growing a variety of row crops over the years, table and raisin grapes, beans, cotton and small grains. Our desire and mission has always been about "care taking" as we are privileged to live in this incredible world and have been charged with its care. We have the desire to pass it to another generation as it was given to us. We have grown sustainably since the 1980's, always looking for products and tools to minimize fertilizer inputs, and actually grew organic raisin grapes starting in the "70's" before it was "the thing to do".

We are writing to express our objection to the Tentative Order. Our farm is located within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. We don't believe the tentative Order is appropriate for our area, which we understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Because of this farms long history of sustainability, we do nothing without sound reason, i.e. spoon feeding fertilizer applications through micro sprinkler irrigation for greatest efficiency, nitrogen applications based on multiple tissue tests per year; yearly soil testing to back up tissue testing; regular use of mineral inputs to balance and strengthen trees and minimize the need for excessive nitrogen rates; heavy reliance on carbon based and soil biological products for blending with nitrogen materials to complex the nitrogen, minimize the leaching and hold the product in the root zone; and oversight by a CCA as we monitor the needs of our orchard. The cost of farming, fertilizer and other inputs is too high to not put great thought and care in the use of such expensive materials, including precious water.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. With today's low volume irrigation systems, it is difficult enough to meet the trees water needs and keep soil wet to a depth of 3 feet without applying so much water as to drive contaminants into the aquifer. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Best Regards,

John & Mary Andreas
John Andreas Ranch

Andrews, Daniel.txt

From: Dan Andrews [mailto:dan@danandrewsfarms.com]
Sent: Friday, April 12, 2013 8:58 AM
To: Sholes, David@Waterboards
Subject: comments re: tentative waste discharge requirments

April 12, 2013
Via Email To:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare
Lake Basin that are Members of a Third-Party Group (March 15, 2013)
Dear Board members:
My name is Daniel Andrews, and I am a third generation grower packer shipper of lettuce and melons in
the southern end of Bakersfield, CA. My operation has no water wells and obtains water from the
Wheeler Ridge Maricopa Water Storage District via the California Aqueduct.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed
Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the
tentative Order is appropriate for our area, which I understand was first developed for the East San
Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.
My neighbors and I carefully manage our water supply, especially this year when our allotment from the
state has been reduced. I have fallowed 120 acres of prime farm land, set up drip irrigation on another
120 acre parcel to save water and fertilizer usage, and I have 5 tail pond reservoirs throughout the ranch
that collect water and redistribute to the land for late season final irrigation's rather than using state
water or turnout water to reduce my usage.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal
experience, current farming practices are not having an adverse impact on groundwater quality. It may
be that in the past farming practices did contribute to nitrate contamination of groundwater (along with
other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming
practices.
I ask that you not adopt the Tentative Order and instead you develop in cooperation with our
representatives an alternative that makes sense for our area.
Sincerely,
Daniel Andrews
Owner
Dan Andrews Farms LLC
--
Danny Andrews
Dan Andrews Farms
8924 Bear Mountain Blvd.
Bakersfield, CA 93311
office (661) 832-1100
fax (661) 832-1114

cell (661) 331-0723
www.DanAndrewsFarms.com

Letter 4

JOHNSON DRILLING CORP

PO BOX 769
McFarland, CA 93250

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I am a landowner in Kern County; currently I do not irrigate my property, however when I do it is for livestock pasture. I am also one of the owner/operators of a water well drilling company that services the Central Valley. I have a vested interest in the quality of our ground water not only for my own economical means, but also for the health of my family and community.

I am writing to express my objection to the Tentative Order. My property is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal & professional experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Joy E. Ash

Joy E. Ash

Letter 5

Kern River Watershed Coalition Authority

A joint powers authority to serve as coordinator and coalition group under the Irrigated Lands Regulatory Program in the Kern River watershed portion of Kern and Tulare Counties

Business Address:
c/o Rosedale Rio-Bravo Water Storage District
P.O. Box 20820, Bakersfield, CA 93390-0820
661-589-6045

Financial Address:
c/o Wheeler Ridge-Maricopa Water Storage District
12109 Highway 166, Bakersfield, CA 93313-9630
661-858-2281

President: Eric Averett
Vice-President: Jason Gianquinto
Treasurer: Robert Kunde
Secretary: Lori Honea

APRIL 4, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Karl Longley, Chair
Jennifer Moffitt, Vice Chair
Jon Costantino, Board Member
Sandra Meraz, Board Member
Carmen Ramirez, Board Member
Robert Schneider, Board Member
Pamela Creedon, Executive Officer
Clay Rodgers, Assistant Executive Officer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Kern River Watershed Coalition Authority/Request for Cessation of Comment Period and Further Processing of Proposed General Order for Growers within the Tulare Lake Basin

Dear Board Chair, Vice Chair, Members, Ms. Creedon and Mr. Rodgers:

On behalf of the Kern River Watershed Coalition Authority ("Authority"), I write this letter to respectfully request that the Regional Board suspend further processing of the proposed General Order for the Tulare Lake Basin Area pending compliance with the California Environmental Quality Act by way of a Return to the Writ of Mandate to be issued shortly by Sacramento Superior Court Judge Timothy M. Frawley.

As the Board is aware, Judge Frawley's Tentative Ruling grants significant portions of the relief sought by both the California Sportfishing Protection Alliance and the San Joaquin County Resource Conservation District in their respective Petitions for Writ of Mandate. It is apparent, by any account of the proceedings on Friday, March 29, 2013, that the Court is likely to issue a Writ which is consistent with (or even expands upon) the grounds for relief sought in the respective petitions. This will necessitate significant revisions to the PEIR as well as the Irrigated Lands Regulatory Program itself.

It is also worth noting that the Tentative Ruling contemplates issuance of a Writ of Mandate commanding the Board to prepare, circulate and certify "**a legally adequate**

EIR...before proceeding with any additional project approvals". (Tentative Ruling p.22) (emphasis added). Certainly, continuing the process of drafting, circulating, soliciting public input and responding to comments on a series of proposed General Orders which themselves recite full CEQA compliance constitutes "proceeding" with additional project approvals, and is manifestly inconsistent with the Court's ruling.

In light of the above, and in order to eliminate any perception that the PEIR is little more than a post-hoc rationalization of a predetermined result, the Board should immediately suspend processing of the proposed General Order until it has satisfied the requirements of the Writ of Mandate, and made such revisions to the overall Irrigated Lands Regulatory Program as are necessary in light of the Court's ruling and the revised PEIR.

The Authority has expended thousands of hours, and significant funds, in responding to and commenting upon the proposed General Order. With the deadline for public comment less than two weeks away, and significant work to be performed by our consultants, we see little value in commenting upon an order which will almost certainly be significantly revised. It is a waste of scarce resources, on the part of all parties, to continue the current effort.

Accordingly, we would respectfully request the immediate cessation of processing of the proposed General Order for the Tulare Lake Basin Area pending compliance with the California Environmental Quality Act and the Return to the Writ of Mandate. Thank you for your time and consideration of this request. We look forward to your prompt reply.

Sincerely,

Eric L. Averett, President

Letter 6

APRIL 15, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Karl Longley, Chair
Jennifer Moffitt, Vice Chair
Jon Costantino, Board Member
Sandra Meraz, Board Member
Carmen Ramirez, Board Member
Robert Schneider, Board Member
Pamela Creedon, Executive Officer
Clay Rodgers, Assistant Executive Officer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Chair, Vice Chair, Members, Ms. Creedon and Mr. Rodgers:

Introduction/Summary

As you are aware, the Kern River Watershed Coalition Authority ("KRWCA") is a joint power authority comprised of most of the agricultural water districts within that portion of Kern County that would be subject to the above referenced draft order, including portions of southern Tulare County within multi county districts. It administers the existing surface water program under the Coalition Group Conditional Waiver for the Kern River Sub-watershed ("Kern") of the Southern San Joaquin Valley Water Quality Coalition ("SSJ Coalition"), of which we are a part. The Kern area includes the watershed areas of the Kern River, Poso Creek, Rag Gulch and White River.

This letter consists of two separate parts. In the first section of the letter, we will address the unique characteristics of the Kern sub-basin, and how those unique characteristics render the proposed General Order both unnecessarily costly and ineffective from a regulatory standpoint. In the second section of the letter, we will briefly summarize how the Nitrate Hazard Index ("NHI"), which is more specifically described in Dr. Joel Kimmelshue's report, is a more effective tool for characterizing each and every parcel of land within the Kern sub basin, and prioritizing the regulatory scheme. We specifically propose the use of the NHI to exempt from the General Order those parcels with little or no potential to negatively impact groundwater, and the implementation of the NHI as a "pilot project" which can be used for future comparison with the general orders issued in other regions.

For sake of brevity, we incorporate by reference the comments submitted by the SSJ Coalition, dated April 15, 2013, and supplement them as follows, as it relates to the Kern area. This letter further supplements our letter of August 10, 2012 regarding an earlier draft of the proposed Order.

The KRWCA and its public agency water districts are concerned with water quality in our area. After all, it is our landowners and residents that drink the water and use it for beneficial uses outside of agricultural uses. Our member districts have for many decades been engaged in monitoring of groundwater levels and quality and have implemented some of the most state-of-the-art water management and water banking programs within the State. As the local officials charged with managing water resources in Kern, we are the best prepared to address water quality issues in our area and are doing so.

We have provided extensive comments and technical information in the past, including our letter of August 10, 2012 on a draft very similar to the Tentative Order, and provided expert testimony at the November 30, 2012, workshop in Bakersfield, along with verbal testimony and information at various workshops and meetings. The Board and staff in public meetings have provided assurances that different situations in the Central Valley will be taken into account and that a "cookie cutter" approach will not be followed. Unfortunately, that is absolutely what is presented in the Tentative Order—a draft that is almost identical to the Order adopted for East San Joaquin watershed, with apparently no further consideration of the significant information we and others in the SSJ Coalition have presented.

Our consistent position has been that the Order should be based on sound science and be practical and cost effective to implement. As will be demonstrated below and in the Exhibits hereto, the Tentative Order is not based on sound science and will result in unnecessary regulatory costs without meeting the objective to protect water quality. Below we will provide for your consideration an alternative approach that we believe is more workable for Kern and based on sound science.

As we have previously noted, this **Tentative Order appears to be a "rush to regulate".** Normally, to solve a problem, the first step is to educate others affected as to the existence, extent and gravity of a problem. This would usually be followed by a request for input and suggestions from those affected as to how to solve the problem. Voluntary attempts to solve the problem would then be encouraged. If these voluntary approaches do not work, then it would be time to ask for or propose regulation. The Regional Board has followed none of these preliminary steps. Aside from the November 30th workshop (and we appreciate you accommodating our request in that regard) the only interaction with the agricultural community in the KRWCA area to date has been initiated by us.[1]

[1] Further evidence of the Board's apparent rush to regulate is found in its refusal to suspend, even temporarily, the public review process for the Tentative Order in light of Judge Frawley's Tentative Ruling granting significant portions of the relief sought by both the California Sportfishing Protection Alliance and the San Joaquin County Resource Conservation District in their respective Petitions for Writ of Mandate. The Court is likely to issue a Writ which is consistent with (or even expands upon) the grounds for relief sought in the respective petitions. This will necessitate significant revisions to the PEIR as well as the ILRP itself.

Background—Characteristics of the Kern Area
There are approximately 1,000,000 irrigated acres in the Kern sub-watershed area, of which approximately 325,000 acres are enrolled in the present surface water program under the Conditional Waiver. The limited area under the present surface water program is because there are very few streams and creeks in our area (and is probably "overly inclusive" as many growers out of an abundance of caution enrolled in the waiver program that probably didn't need to). The present surface water program is successfully being implemented. We have actionable "exceedances" only in one area and for that area a Management Plan has been approved by the Regional Board and is being implemented.

Other distinguishing characteristics of the Kern area include:

1. We have some of the most advanced and clearly the largest water banking projects in the world in Kern. (Attached as **Exhibit A** is a map showing the location and general characteristics of each.) Some of these projects are "partnerships" with urban agencies throughout the State. Some of the projects involve pumping stored groundwater back to facilities owned and/or operated by the State of California and the Federal Government. All return water is already subject to guidelines to insure that it meets water quality criteria developed by the respective agencies. The fundamental purpose of these banks would be threatened by the intrusion of poor quality groundwater. This clearly creates motivation within Kern to protect our groundwater quality. It is also noted that banking programs cause increased horizontal flows adding complexity to any groundwater monitoring program (See Exhibit D, p. 4-4).

2. There are a few areas (approximately 4% of Kern area water systems serving about 0.2% of the overall population) on the valley floor, where communities have drinking water systems which have delivered water that exceeded the nitrate MCL since 2005. In conjunction with EPA's Safe Drinking Water Search (SDWIS) database and the California Department of Public Health (CDPH), we have compiled a table, attached as **Exhibit B,** summarizing water systems within the KRWCA area with reported nitrate MCL exceedances in the last seven years, along with resolution of each, if known.[2] In several instances, these issues have already been addressed and <u>in all cases a solution has been identified</u> and CDPH or the County are working with the system operators to implement the solution. Fortunately in Kern, most of our population is in larger metropolitan areas or towns where there has been adequate funding to address water quality issues, although the record will show most of the problems are for constituents other than nitrates. We are prepared to assist with resolution of any remaining issues. "Bottom line", this multi-million dollar per year regulatory program will do very little if anything to provide safe drinking water to our residents!

3. In areas where drinking water sources have in the past had higher nitrate levels exceeding the MCL, it is evident that much of that "pollution" came from sources other than agriculture. The most significant area of nitrates in drinking water is the Rosedale area,

[2] There have been several instances where inaccurate reports and press releases concerning conditions in the Kern sub-watershed have been published—this information is accurate as recently verified by the affected agencies.

generally west of the City of Bakersfield, which for the most part is in an unincorporated non-sewered area, with residents relying on septic systems. This has been substantiated by the Kern County Public Health Department.

4. Essentially the entire Kern sub-watershed is "covered" with organized water and similar districts and agencies (see attached map), those being the members of the KRWCA. All of these agencies manage groundwater as part of their responsibilities, to the extent that they have usable supplies. Most of them have long adopted AB 3030 or SB 1938 groundwater management plans that include groundwater quality monitoring components (the only districts without such plans are the Westside districts as they have no usable groundwater).

We also note, although not unique necessarily to our area, to the extent the Regional Board and staff may place any reliance on the report entitled "Addressing Nitrate in California's Drinking Water" (Harter and Lund, January, 2012), many of the assumptions and calculations in that report are clearly in error. Please refer to our letter of May 23, 2012, to the State Board providing our preliminary review, a copy of which is attached as **Exhibit C**.

It should also be noted that in limited areas of the Kern sub-watershed, as an example the historic Buena Vista and Kern Lake bed region, high salinity shallow groundwater is present due to the accumulation of salt over the millennia. This accumulated salt in the lake bed(s) deposits and shallow groundwater is due to the very thick stratified layers of heavy clay soil, closed nature of the basin(s) and the past evaporation of water. The clay and other fine-grained layers are effective confining beds that limit the downward flow of water to greater depths. Because of these features, the first encountered groundwater is very shallow (6 to 20 feet below surface) and is very saline, yet due to the arbitrary MUN beneficial use classification of this groundwater, operators in the areas will be subjected to burdensome regulatory oversight, including but not limited to monitoring and reporting requirements.

Shortcoming of Tentative Order as Applied to KRWCA.

We have retained Robert M. Gailey, P.G., C.HG. of the Source Group, Inc, and Dr. Joel Kimmelshue of NewFields Agricultural and Environmental Resources to evaluate the Tentative Order and provide recommendations. You heard their preliminary results at the November 30th workshop in Bakersfield. Attached as **Exhibits D and E** are their respective final reports. We will summarize their recommendations for an alternative regulatory program for Kern below. First we summarize their findings as to the unique conditions in Kern:

In summary, Mr. Gailey notes:

1. "From a hydrogeologic perspective, the KRWCA area is notably different from the other parts of the Tulare Lake Hydrologic Region (TLHR) and also the East San Joaquin Watershed (ESJW) . . ."(p. 2-1). In particular he points to (a) much less rainfall, (b) much greater groundwater recharge and extractions, (c) significantly greater groundwater depths than to the north, and (d) less pronounced nitrate impacts than to the north (p. 3-3);

2. In part because of significantly deeper groundwater in Kern, there are significant transit times between surface water application and any changes in groundwater quality (p. 4-1/2). He calculated the following average depth to groundwater (p. 3-4):

East San Joaquin Watershed	88'
Kings Subbasin	87'
Kaweah subbasin	102'
Tulare Lake Subbasin	77'
Tulare subbasin	159'
Kern Subbasin	**265'**

3. About 85% of the groundwater in the Kern area is at depths greater than previous studies cited in the draft Order as the basis for the regulation (p. 4-1, Figure 11).

In summary, Dr. Kimmelshue notes:

1. "For a variety of reasons (e.g. water availability, water cost, soil type, crop mix, market conditions, effective rainfall, etc.) the relative water use and nitrogen use in the Kern Sub-Basin is generally more efficient as compared to other areas of the Southern San Joaquin Valley and the remainder of the Central Valley as a whole. This is also supported by research conducted by others. . .." (p. 1-2) He notes that average annual precipitation is as follows (p. 45):

Sacramento	18.7"
Merced (in ESJ watershed)	13.1"
Fresno	11.1"
Bakersfield	6.5"

2. "A preliminary NHI [Nitrate Hazard Index] was developed for the Kern Sub-Basin (specific to its conditions) and compared to previous years. In relative comparisons, the potential for nitrate leaching [in the KRWCA area] has decreased significantly over the past 20 years <u>and in many areas is negligible</u> due to the rapid conversion to highly-efficient irrigated perennial crops from historic surface irrigated row and field crops." (p. 3, emphasis added)

3. "In general, results confirm that perennial crops on high efficiency irrigation systems (common to the Kern sub basin), result in limited return flows to groundwater. Largest return flows occur under corn/wheat, sudan/wheat or alfalfa crop rotations that are commonly associated with feeding operations for dairies. The majority of these systems are currently regulated under the Dairy General Order (2007-035)." (p. 3)

In addition to their descriptions of the unique characteristics of the KRWCA, Messrs. Gailey and Kimmelshue describe various shortcoming of the Tentative Order, at least in so far as meeting what we understand to be its principal objective, to protect water quality.

Mr. Gailey notes, among other things that nitrates residing in the unsaturated zone are a significant ongoing and legacy source for years to come, regardless of current farming practices (p. 4-2/3). He also concludes the Tentative Order would result in significant costs (with

KRWCA area costs being significantly higher because of deeper groundwater), and not achieve the objectives of the draft Order (p. 4-5). He concludes, "A trend monitoring program conducted under such conditions cannot meet the monitoring goals of the tentative order because there is a temporal disconnect between actions at ground surface and reactions in groundwater located at depth. Changing current irrigation and fertilization practices cannot affect what has occurred in the past" (p. 4-2).

Dr. Kimmelshue notes, among other things that the Nitrate Hazard Index (NHI), which he describes in great detail, is more reflective of what potential risks are actually posed to groundwater in the KRWCA area than the approach in the Tentative Order. He points out his conclusions are similar to those reached by other researchers (some of which has been funded by the State Board), although his analysis is specific to the KRWCA area.[3] He notes that NHI studies demonstrate that the nitrate risk to groundwater in the KRWCA area is clearly much less than other areas to the North. (p. 30-31)

These observations point to the broader, more **fundamental problem** with the Tentative Order as applied to the KRWCA; namely, its presumption that every irrigator in the SSJ Coalition is a "discharger" and subject to this Order or the Individual Order (for example see finding 12 at 3-4). However, other portions of the Tentative Order seem to recognize that every irrigator may not be a "discharger" subject to regulation, particularly Finding 20 (at page 6, emphasis added) providing:

"Whether an individual discharge of waste from irrigated lands may affect the quality of the waters of the state depends on the quantity of the discharge, quantity of the waste, the quality of the waste, the extent of treatment, soil characteristics, distance to surface water, depth to groundwater, crop type, management practices and other site-specific factors. These individual discharges may also have a cumulative effect on waters of the state. Waste discharges from some irrigated lands have impaired or degraded and will likely continue to impair or degrade the quality of the waters of the state within the Central Valley Region if not subject to regulation pursuant to the Porter-Cologne Water Quality Control Act (codified in California Water Code Division 7)."

We certainly agree with statement at Finding 20 and believe it is appropriate. However, the problem is there is **no objective standard** for an individual grower to determine, or for a coalition or even the Regional Board staff, to advise a grower whether he/she meets the standard, taking into account all the factors listed at Finding 20. This places the growers, our Coalition and the Regional Board in an untenable position which will undoubtedly lead to mass confusion and probably non-compliance with the Order, as growers will take the position they are not "dischargers" under the Order, without any objective standard.

Accordingly, we propose that a Nitrate Hazard Index be developed and used as a pilot , to establish an objective standard to determine which growers will not be subject to the Order,

[3] Although as noted above and at Exhibit C hereto many of the assumptions and calculations in the Harter and Lund report are clearly in error, we note that they did focus on the NHI and noted (Tehcnical Report 3 at p. 15):
"The authors of the HI proposed that fields identified as having an overall index below 20 are of low concern and that average management practices are usually adequate. As such, although continued vigilance is necessary for all fields, attention to optimizing NUE via good management practices is best focused in areas with greater risk for leaching"

which will be in a Low Vulnerable area and which in a High Vulnerable area, as described further below under "Our Proposal."

Cost Estimates Inaccurate.

In Finding 39 (at p. 11) of the Tentative Order, the staff provides a startling estimate that the incremental "total annual cost of compliance with this Order" will be approximately $1.90 per acre. As you are aware dramatically varying estimates in the cost of implementing the Tentative Order have been prepared and published by the Regional board staff throughout this process. (Those Staff estimates have varied from $70/ac/yr based on the July 2010 staff report, to $120/ac/yr based on the July 2012 draft for our area, to $3.40/ac/yr based on a September 28, 2012 Q&A posted to the web.) The dramatic variation in the Staff's estimates illustrates the great uncertainty of estimated costs.

We have engaged Provost and Pritchard Consulting Group to provide a cost estimate and their report is attached as **Exhibit F**. Their approach was to focus only on the cost to implement the Tentative Order, both costs incurred at a Coalition level and a grower level (including his/her time to comply), and assume no costs for implementation of new management practices, as it is believed in Kern most growers are already implementing the most effective practices available.[4] They conclude that in the Kern area, the average total cost to implement the Order will be $16.04 per acre per year, with $2.08 attributed to Coalition efforts (which ultimately is paid by the growers) and the balance of $13.96 attributed to direct grower costs and time.

Regulation Must be "Reasonable"

To state the obvious, this proposed regulation is subject to a "reasonableness" standard. Among other things Water Code section 13263, under which this proposed General Order would be advanced, provides in part "The requirements shall implement any relevant water quality control plans that have been adopted, and shall take into consideration . . . the provisions of Section 13241." Water Code Section 13241 in turn provides in pertinent part that water quality control plans are to "ensure the <u>reasonable</u> protection of beneficial uses. . .however, it is recognized that it may be possible for the quality of water to be changed to some degree without <u>unreasonably</u> affecting beneficial uses." Similarly, Water Code section 13050(l) defines "pollution", which is what the Regional Board is to prevent, in part as the "alteration of quality of waters of the state by waste to a degree which <u>unreasonably affects</u>. . .waters for beneficial uses" (emphasis added).

Furthermore, in Finding 21 and 22 (at page 6) of the Tentative Order, Water Code Section 13267 is cited as partial source of authority for the proposed order. Along the same lines of the cited authorities above requiring "reasonableness," it is noted that Section 132367(b)(1) provides in

[4] A number of assumptions are identified in Provost and Pritchard's report, based on, among other things, information developed by the Regional Board and their own experience in implementing other orders of the Regional Board. Included in the assumptions is that the templates and process submitted to the Executive Officer on April 11, 2013 by the East San Joaquin Water Quality Coalition would be accepted and applicable in the Kern sub-watershed—if it is not accepted and more onerous requirements required by the Executive Officer, of course the estimated cost would exceed the estimates in the Report.

part "The burden, including costs of these reports shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports" (emphasis added).

That is, the Board's authority to adopt a general order pursuant to section 13263 is subject to providing "reasonable protection" of beneficial uses of groundwater and it does not have the authority to adopt regulations that do not reasonably protect groundwater from some "waste". Based on the facts as we know them to be in our area, we do not believe anyone can credibly assert that the Tentative Order meets this standard, at least as it applies to the Kern area, particularly taking into account the costs to implement the program, estimated to be $ $16,700,000 per year (based on the Provost and Prichard estimate).

In light of this extreme cost , and lack of any clearly defined benefits to be obtained through the Tentative Order as documented by our experts (at least as applied to Kern), how can it be said that the proposal meets the legal standard of a "reasonable" regulation of water quality?

Failure to Comply with CEQA

It would also appear that the Tentative Order is fundamentally flawed, because it was prepared based on the Regional Board's certification of a "Final Program Environmental Impact Report for the Long-Term Irrigated Land Regulatory Program" (Resolution No. R5-2011-0017) ("PEIR") in violation of the California Environmental Quality Act, Public Resources Code section 21000 et seq. ("CEQA"). As you know, Petitioners San Joaquin County Resource Conservation District, et al. ("Ag. Coalition") and Petitioners California Sportfishing Protection Alliance, et al. ("CSPA"), filed separate petitions for writ of mandate against the Regional Board alleging, among other things, that the PEIR violates CEQA (Sacramento County Superior Court, Case Number 34-2012-80001186 [Consolidated Case Number RG12632180]). On Friday, March 29, 2013 the Honorable Judge Timothy M. Frawley issued a Tentative Ruling in those matters. The Tentative Ruling was to grant Ag. Coalition's Petition because the PEIR violated CEQA and to issue a:

> "writ of mandate ...commanding the Board to set aside its certification of the PEIR, and to prepare, circulate, and certify a legally adequate EIR (consistent with this ruling) before proceeding with any additional project approvals." (Tentative Ruling, p. 22.)

The matters were heard on Friday, March 29, 2013. While the Court has not yet issued a final ruling or judgment, the Judge gave no indication that he was going to change his opinion that the PEIR must be set aside for violating CEQA and that a new EIR will need to be prepared before any additional project approvals (such as the proposed Order) are made by the Regional Board. This is entirely consistent with CEQA. It would defeat the purposes of CEQA to require environmental review to be performed after project approval (*Save Tara v. City of West Hollywood* (2008) 45 Cal.4th 116, 130 [purpose of EIR is to inform the public and its responsible officials of the environmental consequences of their decisions before they are made]; *Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal 3d 553, 564 [same]; see also *Laurel Heights*

Improvement Assn. v. Regents of University of California (1988) 47 Cal.3d 376, 394 [at a minimum an EIR must be performed before a project is approved, because if post-approval environmental review were allowed, EIR's would likely become nothing more than post hoc rationalizations to support action already taken].) Therefore, if the Regional Board approves the Tentative Order or issues any approval based on the flawed PEIR, the approval will be without proper CEQA review, illegal and void.

As illustrated by the above CEQA case law, the Regional Board's decision with respect to potential approval of any new order must *follow* – not proceed – certification of the new EIR as required by CEQA. Otherwise, the Regional Board's new EIR will be nothing more than a post hoc rationalization to support decisions already made. Therefore, in light of the likely invalidity of the PEIR, the most prudent course at this point in time would be for the Regional Board to vacate or stay it consideration of approval of the Tentative Order pending final judgment in the existing litigation, and not develop or consider approval of the Tentative Order or any long-term ILRP general order until any required additional CEQA review has been completed to the satisfaction of the Court.

We reserve the right to proivde further comments on the Tentative Order, pending the outcome of any revisions of the PEIR that is ordered by the Court.

Our Proposal

For the reasons stated above, we do not believe the Tentative Order can be justified, nor meet the "reasonable" standard required by the Porter-Cologne Act and otherwise as a matter of law. The KRWCA believes that a more scientifically based approach will allow for a more results based regulation. As such, we propose a pilot program within the KRWCA area, without waiving any rights we and our growers may have.

Our proposal would be for the KRWCA area only and would be adopted on a trial basis for 7 to 10 years, subject to specific review at that time for the Regional Board to determine its effectiveness in light of our unique conditions in Kern. The key elements are:

1. The NHI would be utilize to assess risks of current farming practices for leaching of nitrates to groundwater. Attached as **Exhibit G** is a technical memorandum prepared by Dr. Kimmelshue summarizing the NHI and its benefits, and outlining how it would be developed and implemented for use in Kern. The final components would be developed in consultation with the Regional Board staff and subject to approval of the Executive Officer. In general, lands would be classified as follows:
    a. Exempt Lands —These lands, the lowest risk under the NHI classification system and lands that do not overly usable groundwater, would be classified as exempt and would not be subject to further regulation as they would fit the definition of Finding 20 of the Tentative Order as not reasonably being considered a potential "discharger" to groundwater, subject to written confirmation by the Grower that the crops and irrigation practices in the NHI data base are correct;
    b. Moderate Risk—These lands would be in the middle range of the NHI and treated as Low Vulnerability under the Tentative Order;

c. Higher Risk—These lands would be the higher risk under the NHI and treated as Vulnerable under the Tentative Order.

2. For the reasons documented by Mr. Gailey, except possibly limited areas with shallow groundwater, trend monitoring is of little benefit in Kern and very expensive because of groundwater depths, and is not reflective of current farming practices. We propose that monitoring continue utilizing wells that have historically been monitored by our district members and other agencies (and where we have historic data which would be more usefully to estimate trends), but not develop a new program which would be very costly and not provide meaningful information.

3. The Management Practices Evaluation Program as applied to reflect Kern's unique conditions may have to be "customize" and we assume the language of the Tentative Order is intended to provide that flexibility.

Conclusion

For reasons noted above, we do not believe the Regional Board has jurisdiction to impose the Tentative Order upon the Kern area as it relates to groundwater and/or that the Tentative Order would constitute an unlawful overly burdensome and unreasonable regulation. If, however, the Regional Board provides for an Order applicable to the Kern area, we request that it be modified as described above , which reflect a more reasonable and scientific approach based on advice of experts, in light of Kern's unique conditions as compared to other portions of the Central Valley. Finally, the processing of the proposed Order should be suspended pending full compliance with CEQA.

We stand ready to work with you and your staff to implement such an approach.

Thank you for consideration of our views.

Very truly yours,

Eric Averett, Chairman

cc:
Senator Jean Fuller
Assemblywoman Shannon Grove
Assemblyman Rudy Salas
Kern County Board of Supervisors
David Orth, Coordinator SSJ Coalition

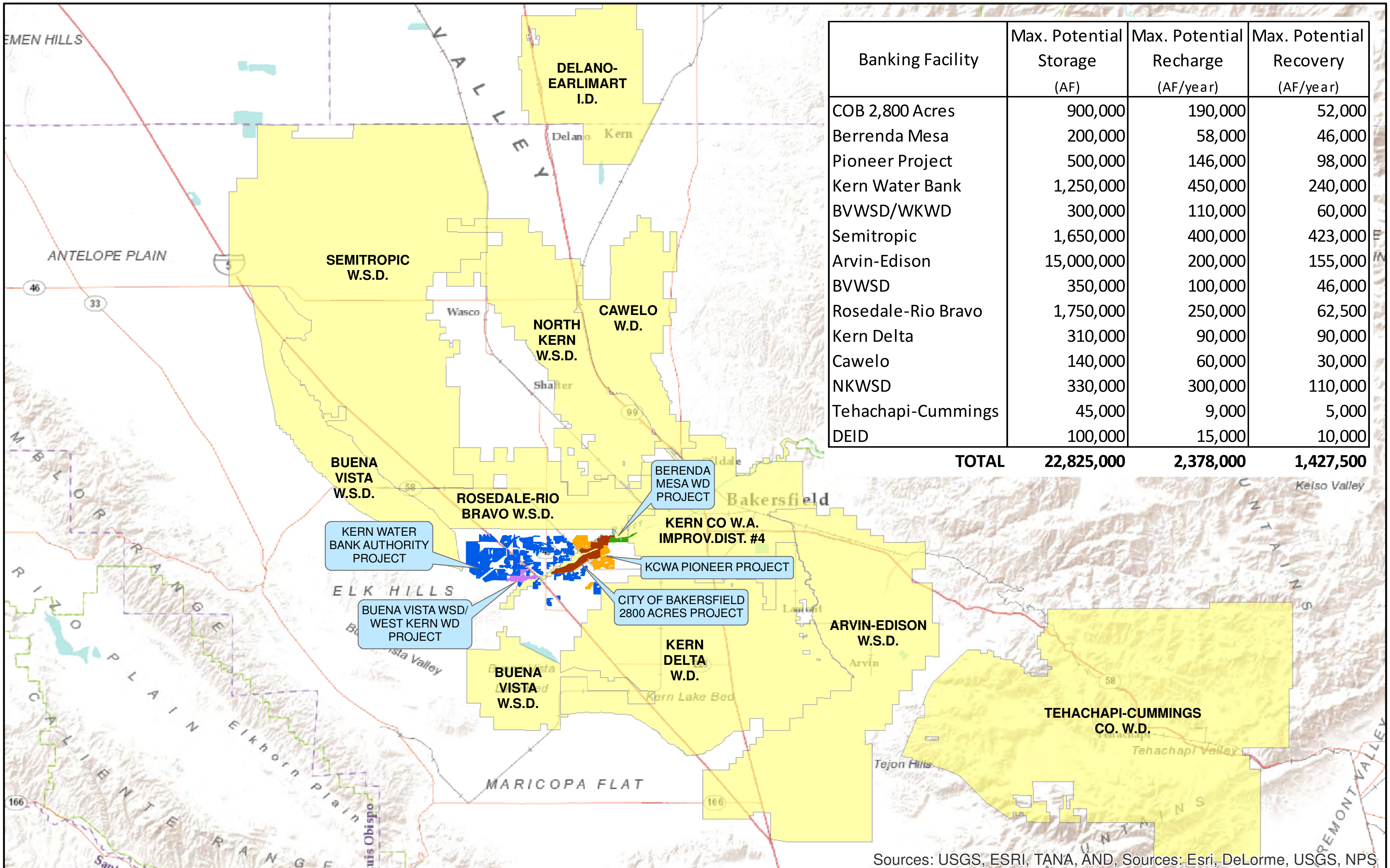
Exhibit A-Map of Groundwater Banking Projects
Exhibit B-Table of Water Systems within the KRWCA with Nitrate Exceedences
Exhibit C-Letter to Regional Board Dated 5/23/2012
Exhibit D-Report by Robert M. Gailey, P.G., C.HG of the Source Group, Inc.

Exhibit E- Report by Dr. Joel Kimmelshue of NewFields Agricultural and Environmental Resources

Exhibit F-Cost Estimate Prepared by Provost & Pritchard Consulting Group

Exhibit G-White Paper/Technical Memorandum on the Nitrogen Hazard Index by Dr. Joel Kimmelshue of NewFields Agricultural and Environmental

Banking Facility	Max. Potential Storage (AF)	Max. Potential Recharge (AF/year)	Max. Potential Recovery (AF/year)
COB 2,800 Acres	900,000	190,000	52,000
Berrenda Mesa	200,000	58,000	46,000
Pioneer Project	500,000	146,000	98,000
Kern Water Bank	1,250,000	450,000	240,000
BVWSD/WKWD	300,000	110,000	60,000
Semitropic	1,650,000	400,000	423,000
Arvin-Edison	15,000,000	200,000	155,000
BVWSD	350,000	100,000	46,000
Rosedale-Rio Bravo	1,750,000	250,000	62,500
Kern Delta	310,000	90,000	90,000
Cawelo	140,000	60,000	30,000
NKWSD	330,000	300,000	110,000
Tehachapi-Cummings	45,000	9,000	5,000
DEID	100,000	15,000	10,000
TOTAL	22,825,000	2,378,000	1,427,500



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Legend

Districts With Groundwater Banking Programs

Kern River Watershed Coalition Authority

Districts with Groundwater Banking Facilities and Other Regional Banking Facilities

4/12/2013: V:\Clients\Kern River Watershed Coalition Authority-3484\348412V1-ILRP 2012\GIS\Map\WaterBanking\Location.mxd

Exhibit B

Status of Solutions for Kern Systems with Nitrate Exceedances

Water System Name	Population Served[1]	No. of Connections[2]	Number of Exceedances				Most recent NO_3 conc.[1], ppm NO_3	Compliance Period[1]	Solutions Identified[2]
			2005-2007	2008-2010	2011	2012			
Anthony Vineyard Water System	104	8	6	11	3	3	50		Handwashing permit recently revoked due to changing regulations. Bottled water currently provided, POU with RO being considered.
Arvin Community Services District	14,713	3,536	2	2					Issue resolved, as affected well is offline. Replacing when funds are available.
Brock Mutual WC[3]	500	155		2					Consolidating with Vaughn Water Co. Well
East Wilson Road Water Company	35				4	1	54	1st Qtr 2012	Connection to East Niles CSD. They got a planning grant and are extending a pipeline and will abandon affected wells.
Enos Lane Public Utility District	270	82	1				52.1	2nd Qtr 2007	Options: Nitrate blending treatment OR consolidate w Vaughn Water Co.
Farmer John Egg Ranch #2	30	6	3	10	4	6	97	2nd Qtr 2012	Bottled water provided until permanent solution determined
Golden State Vintners-Franzia McFarland	35	1	11	8	4	3	85.6		Recently had handwashing permit revoked due to changing regulations. Bottled water provided as interim solution
Gooselake Water Company	80	32		1			48.3	4th Qtr 2008	Options: Drill 2nd well OR consolidate w nearby water system.
Grimmway Farms Frozen Foods[4]	300	7				3	54	3rd Qtr 2012	Solution being identified.
Heck Cellars Water System	45	8	5	8		3	60	2nd Qtr 2012	Bottled water provided until permanent solution determined
I & I Farms Inc.	50		1		3	1	74	1st Qtr 2012	RO treatment (assumed)
Murray Family Farms Fruit Stand	50			1		1	50	1st Qtr 2012	RO treatment (assumed)
Orange Grove RV Park[3]	200	180	2						Considering connection to East Niles CSD.
San Joaquin Estates Mutual Water Co	165				2	1	57	1st Qtr 2012	Options: Consolidate w East Niles, drill new well, OR treat water
Seventh Standard Mutual	66	22	2	2	1	1	46	1st Qtr 2012	Install water delivery pipeline & new lines & meters to residents. Consolidating with Oildale Mutual.

Exhibit B

Status of Solutions for Kern Systems with Nitrate Exceedances

Water System Name	Population Served[1]	No. of Connections[2]	Number of Exceedances				Most recent NO_3 conc.[1], ppm NO_3	Compliance Period[1]	Solutions Identified[2]
			2005-2007	2008-2010	2011	2012			
Son Shine Properties	500	106		2	1		49	4th Qtr 2011	Consolidation with Arvin CSD pending.
Sun Pacific Shippers - Maricopa Water Sys	350				2	1	48	1st Qtr 2012	RO treatment (assumed)
Sun World International, Inc. Com Center	80	6	9	9	2	5		2nd Qtr 2012	Bottle water provided until permanent solution determined
Sunview Cold Storage Water System	130	4	8						RO treatment provided since2006
Sycamore Canyon Golf Course	400	1	10	3	3	4	47	2nd Qtr 2012	Bottle water provided currently for purchase. Potential connection with Arvin CSD for solution
Wheeler Farms Headquarters	25	13			4	1	140	1st Qtr 2012	RO treatment (assumed)
Wilson Road Water Community	72			3	4	1	76	1st Qtr 2012	Options: water treatment or intertie with East Niles CSD
Total Exceedance by Year			**54**	**51**	**34**	**32**			

[1] Information from database search on EPA's SDWIS website (http://oaspub.epa.gov/enviro/sdw_form_v2.create_page?state_abbr=CA)

[2] Information from database search from CA Dept. of Public Health for unincorporated water systems

[3] Water system added from database search from CA Dept. of Public Health for incorporated water areas

[4] Grimmway Farms exceedance occurred late in 2012 and a compliance order has just been sent to them

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May 22, 2012

Charles R. Hoppin, Chairman and Members
State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Re: Comments on UC Davis Report On Nitrate In Groundwater

Dear Chair Hoppin and Members of the Board :

I am a registered agricultural and civil engineer with extensive experience with water quality issues, including assisting numerous dairymen with the Dairy General Order. I represent the Kern River Watershed Coalition Authority that currently administers the surface water program in Kern County.

As we consider promising options to deal with nitrate issues, I urge you to keep in mind that agriculture is an important industry and has a part in this issue. While water quality is very important, we need to maintain competitiveness and the viability of agriculture in the state. The potential options being considered portend radically higher operating costs. If the rationale for action is in this UC Davis report, we need to look at the report very carefully. Wise decisions must be made based on sound data to ensure good results, finding the optimal and reasonable path forward. The UC Davis report was a monumental effort and it has been a big undertaking just to review it. We have only begun to review the report. The following are some preliminary comments and observations of fundamental shortcomings and incorrect assumptions on which the report relies—based on additional review we will undoubtedly have further comments.

We are concerned about the design of the study: leaching to groundwater is deduced by subtracting estimates of other outputs from estimated inputs, with attendant errors. We fear that errors can be magnified in this way. Direct empirical analysis regarding leaching is lacking. The report suggests that approximately $200 million per year is wasted over 3.12 million acres. It is difficult to believe that farmers could waste an average of $64/ac. This averages out to 137 lb/ac/yr N going to groundwater, a very large number compared to typical nitrogen fertilizer recommendations. See attachment A. The report notes that there is significant uncertainty (+/- 30%) in the 195 Gg N/yr leaching estimate to groundwater. Based on my review of the assumptions below, I submit that this must be much lower.

The report lacks measurements and makes many significant assumptions. One of these assumptions was that the growth of the dairy industry created an excess pool of nitrogen that is unabsorbed by crops. The report fails to take into account that dairies are under a General Order of Waste Discharge Requirements which includes mandatory nutrient management plans (NMPs). The report acknowledged that little is known about the amount of synthetic fertilizer applied on fields receiving manure, but assumed that much of the manure applied on and off dairies was not used beneficially. Largely, it was assumed that crop needs were met by synthetic fertilizer and much of the manure was applied as surplus.

Figure ES-2 in the UC Davis report suggests that nitrogen from land-applied dairy manure is nearly enough to meet the harvest uptake of 3.12 million acres of crops. Assuming an uptake of 425 lb N/ac for double cropped wheat and corn (attachment A) and 10% atmospheric losses, the 127 Gg N/yr of land-applied dairy manure can be utilized on approximately 423,000 acres. This is 32% more than the 320,000 acres that is estimated to be under dairy management. See equation 1.

$$127\ Gg\ N * 90\% * \frac{lb}{453.6\ g} * \frac{ac}{425\ lb} * \frac{1}{1.4} = 423{,}000\ ac$$

Equation 1

The 320,000 acres of dairy land that is available can harvest 62 Gg N/yr. See equation 2.

$$320{,}000\ ac * \frac{425\ lb\ N}{ac} * \frac{453.6\ g}{lb} = 62\ Gg\ N$$

Equation 2

The 381 Gg N/yr applied over 3.12 million acres averages out to 242 lb N/ac/yr. This seems in the acceptable range given the table of nitrogen uptake values in attachment A. The simple average of all crop uptakes in this table is 200 lb/ac. However, looking at the average harvest uptake over the study area raises some doubt. 130 Gg N/yr averaged over 3.12 million acres yields 92 lb N/ac/yr. See equation 3. This is very low, perhaps 1/2 to 1/3 of what it should be, judging by the nitrogen uptake values in attachment A.

$$\frac{130\ Gg\ N}{yr} * \frac{1}{3{,}120{,}000\ ac} * \frac{lb}{453.6\ g} = \frac{92\ lb}{ac * yr}$$

Equation 3

If dairy land and the associated harvest uptake (calculated in equation 2) is taken out and averaged over the remaining acres, it further supports that the harvest value is significantly underestimated. See equation 4. This is much less than the lowest values on the table in attachment A.

$$\frac{(130 - 62)\ Gg\ N}{yr} * \frac{1}{2{,}800{,}000\ ac} * \frac{lb}{453.6\ g} = \frac{54\ lb}{ac * yr}$$

Equation 4

The data that this report is based on is five years old. Several notable changes have occurred in this time, and would likely affect the data. The Dairy General Order has been implemented and data is being collected that could potentially address some of the assumptions that were made. There has been increased adoption of subsurface drip irrigation (SSDI) and other low volume irrigation methods with higher irrigation efficiencies and precision water and nutrient application. Higher irrigation efficiencies result in less deep percolation and less opportunity for nutrients to leave the root zone.

It is important to note that the whole study area is not homogeneous. The Kern sub-watershed is different in several ways. The study assumed a typical groundwater recharge rate of 1 ac*ft/ac/yr. I submit that the average in Kern is significantly less than that, due to good irrigation efficiency and even regulated deficit irrigation. Due to reductions in available water supplies, Kern is chronically water-short. Water is rationed and valuable, and the same is true for nitrogen fertilizers. I believe that the state of nutrient management in the Kern sub-watershed is good, as farmers already have a profit motivation to be good stewards. There are other unique issues in Kern such as moisture deficient soils, aquitards, and naturally occurring brackish waters that all indicate a low threat to groundwater quality, even if deep percolation existed.

Altogether, this report raises questions regarding conclusions that can be made about current impacts. What we are seeing in groundwater now are legacy issues. In light of the questions that we have and the importance of the subject, we would like to have more outreach sessions regarding assumptions that were made and how the conclusions may be different with different assumptions. We'd like an opportunity to help with better assumptions. One of the biggest assumptions that we've questioned above has been regarding manure applications. We submit that synthetic applications likely went down as manure became available. We are concerned whether similar assumptions were applied to sludge applications as well. We do not agree with assumptions that manure or other resources are not being used beneficially by farmers, especially in light of the Dairy General Order. With indicated harvest uptake numbers likely underestimated, leaching has to be much lower than 138 lb/ac/yr. Agriculture can't be wasting an average of $64/ac/yr.

Please continue to strive for a true assessment of legacy vs. current issues and use good data and conclusions to make wise, optimal, and reasonable decisions.

Respectfully,

John Schaap

John Schaap
RAE 563, RCE 61754

Attachment A. Table of nitrogen uptake for various crops.

Attachment A

Plant Food Utilization by Various Crops
Western Fertilizer Handbook, 8th edition

Crop	N, lb/ac	
Field crops		
Barley	160	
Canola (whole plant)	240	
Corn (grain)	240	
Corn (silage)	250	
Cotton (lint)	180	
Grain sorghum	250	
Oats	115	
Rice	110	
Safflower	200	
Sugar Beets	255	
Wheat	175	
		198 average
Vegetable crops		
Asparagus	95	
Beans (snap)	175	
Broccoli	80	
Cabbage	270	
Celery	280	
Lettuce	95	
Potatoes (Irish)	270	
Squash	85	
Sweet potatoes	155	
Tomatoes	180	
		169 average
Fruit and nut crops		
Almonds (in shell)	200	
Apples	120	
Cantaloupes	220	
Grapes	125	
Oranges	265	
Peaches	95	
Pears	85	
Prunes	90	
		150 average
Forage crops		
Alfalfa	480	
Bromegrass	220	
Clover-grass	300	
Orchardgrass	300	
Sorghum-sudan	325	
Timothy	150	
Vetch	390	
		309 average
Average	201	

COMMENTS ON HYDROGEOLOGIC POINTS OF CONCERN FOR THE KERN RIVER WATERSHED COALITION AUTHORITY AREA

Regarding Monitoring and Reporting Program Tentative Order R5-2013-XXXX Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of Third-Party Group

01-KRW-001

Prepared For:

Ernest A. Conant of Young Wooldridge, LLP

Counsel for Kern River Watershed Coalition Authority

Prepared By:

THE SOURCE GROUP, INC.
3478 Buskirk Avenue, Suite 100
Pleasant Hill, CA 94523

April 10, 2013

Robert M. Gailey, P.G., C.HG.
Principal Hydrogeologist

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1.0 INTRODUCTION

My name is Robert M. Gailey. I am licensed as a Professional Geologist and Certified Hydrogeologist in the state of California. Having practiced in the field of hydrogeology since 1985, my technical background includes both contaminant and water supply hydrogeology applied to urban, industrial and rural settings. I have technical degrees in Geology/Biology (Bachelor of Science) and Applied Hydrogeology (Master of Science), as well as a Master of Business Administration. My curriculum vitae is attached as Appendix A.

I have been retained on behalf of the Kern River Watershed Coalition Authority (KRWCA) to review and comment on the Monitoring and Reporting Program portion of *Tentative Order R5-2013-XXXX, Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third-Party Group* dated March 2013. My area of focus is how hydrogeologic characteristics specific to the KRWCA area relate to the groundwater monitoring requirements, specifically the management practice evaluation and trend monitoring requirements for nitrate, stated in the tentative order.

The following information is a brief presentation of my review to date. My evaluation of the salient issues is ongoing and I may present additional comments in the future.

2.0 SUMMARY OF COMMENTS

From a hydrogeologic perspective, the KRWCA area is notably different from other parts of the Tulare Lake Hydrologic Region (TLHR) and also the East San Joaquin Watershed (ESJW) with respect to groundwater basin configuration, hydrologic stresses and depth to first-encountered groundwater. These hydrogeologic differences have the potential to greatly complicate groundwater monitoring as described in the tentative order. Among the issues that require additional consideration before the order is finalized are:

1. Time lags between agricultural activities at ground surface and changes in groundwater quality as a result of a thick unsaturated zone,
2. Nitrate residing in the unsaturated zone that acts as an ongoing source to groundwater years after nitrogen is applied at ground surface,
3. Processes acting on return flows during transit through the unsaturated zone,
4. Horizontal migration within the saturated zone and the resulting difficulty in attributing observed nitrate to specific source areas, and
5. The potential costs of an insufficiently planned groundwater quality monitoring program and the need for further study, or a pilot program as an interim regulatory step before any full-scale monitoring occurs.

The above-referenced points call into question the scientific basis, efficacy and cost effectiveness of groundwater monitoring as currently required in the tentative order and should be addressed in finalizing the tentative order.

3.0 PHYSICAL BACKGROUND

Figure 1 indicates the boundary of the KRWCA area. This area, a subsection of the South San Joaquin Valley Water Quality Coalition (SSJVWQC) and TLHR areas, contains a significant portion of Kern County and small portions of Tulare and Kings Counties, and is based upon water district boundaries. The primary groundwater subbasin in the KRWCA area as defined by the California Department of Water Resources (DWR) is the Kern County Subbasin (DWR Subbasin 5-22.14); however, small portions of the Tulare Lake and Tule subbasins (DWR Subbasins 5-22.12 and 5-22.13) are also included in the northern portion of the area. While Attachment A of the tentative order (Information Sheet) provides a brief summary of the geology, hydrogeology and groundwater quality for the TLHR area as a whole, the following sections present pertinent information on these topics specific to the KRWCA area.

3.1 Geology

The KRWCA area geology consists of sedimentary deposits located in the southernmost portion of the San Joaquin Valley that have been derived from the surrounding mountain ranges. The shallower deposits are continental in origin with a range of types that generally include alluvial fan, lacustrine and river (Page, 1986 and Gronberg et al, 1998). These deposits are as much as 15,000 feet thick resulting from structural deepening of the basin (Lofgren, 1975 and Page, 1986). The combination of deposits throughout the KRWCA area is a heterogeneous assemblage of alluvial fan deposits, both coarse- and fine-grained, interfingered with valley stream (coarser) and lake (finer) deposits (i.e., Wood and Dale, 1964; Dale et al, 1966; Croft, 1972) formed by processes that responded to changes in glacial activity in the Sierra Nevada as described by Weissmann et al (2002).

3.2 Groundwater Hydrology

The KRWCA area is part of a closed groundwater basin (Croft, 1972 and Bertoldi et al, 1991). Natural patterns and rates of groundwater flow, recharge and discharge have been significantly changed as a result of groundwater pumping, surface water importation, crop irrigation and artificial recharge (Bertoldi et al, 1991, Gronberg et al, 1998 and DWR, 2006)[1]. Groundwater pumping performed by, among others, agricultural, municipal and water banking operations extracts in excess of 2 million acre feet of groundwater per year (KCWA, 2008) from locations spread throughout the KRWCA area (Boyle et al, 2012). Recharge operations performed by many water storage districts and other entities (DWR, 2006; KCWA, 2008) introduce water to the subsurface through natural channels, irrigation canals, spreading basins. From 1971 through 2008, recharge operations introduced in excess of 27 million acre feet of water to the subsurface. In addition, some amount of groundwater recharge occurs as a result of irrigation return flows. Locally,

[1] See Figure 2 from Shelton et al (1998) for a graphical depiction of the extensive area within the KRWCA area that is involved in groundwater banking operations.

groundwater generally flows toward locations of groundwater pumping and away from locations of groundwater recharge.

First-encountered groundwater is relatively deep in the KRWCA area. Figures 2a and b display depth to water contours for first-encountered groundwater during the spring of 2010 as determined by the DWR and Kern County Water Agency (KCWA), respectively[2]. The depth to water ranges from as little as approximately 50 feet to as much as approximately 700 feet. Water in much of the area is between 150 and 300 feet deep. Figure 3 displays depth to water contours for first-encountered groundwater during the spring of 1988 as determined by the DWR. Comparison of Figures 2a and 3 indicates that first encountered groundwater is currently deeper than it was approximately two decades ago.

3.3 Groundwater Quality and Potential Sources of Nitrate

Nitrate in first-encountered groundwater is the primary focus of the tentative order. Boyle et al (2012) summarized information on nitrate concentrations in groundwater for the TLHR including the KRWCA area. Burton et al (2012) also investigated the occurrence of nitrate in groundwater in these areas. Several other studies have also investigated nitrate in groundwater in the San Joaquin Valley[3]; however, these studies focused on locations north of the KRWCA area (in other parts of the TLHR and in the ESJW) where, as discussed in later sections of this report, first-encountered groundwater is shallower and water quality impacts appear to be more pronounced.

Potential anthropogenic sources of nitrate to groundwater in the KRWCA area include: confined animal feeding operations, crop agriculture (past and current), dairies, municipal and industrial wastewater and sludge disposal, and septic systems[4]. Figure 4 indicates the current locations of various potential anthropogenic sources of nitrate throughout the KRWCA area, and Figure 5 (adapted from Harter et al, 2012) indicates the relative magnitudes of various sources at present[5]. While crop agriculture is a significant potential source, manure from dairies and other operations is also a significant potential source. Moreover, consideration of current potential sources is not sufficient to fully assess the potential sources of the observed nitrate in groundwater. Because the KRWCA is part of a closed groundwater basin, impacts accumulate over time (KCWA, 2008). Accordingly, Figure 6 builds upon Figure 5 by adding past potential sources starting in 1945 using

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2 The contours presented are for the geographically extensive first-encountered groundwater and do not include the limited areas of shallow groundwater outlined on Figure 2a.

3 These studies include Botros et al (2012), Botros et al (2009), Burow et al (1998), Burton and Belits (2008), Domagalski et al (2008), Dubrovsky et al (1998), Dubrovsky et al (2010), Fischer and Healey (2008), Green et al (2008a), Green et al (2008b), Harter et al (2005), Landon et al (2010), Lindsey and Ruperet (2012), Onsoy et al (2005), Puckett et al (2008), Schmidt et al (2011), Singleton et al (2011) and Tesoriero (2007).

4 Burton et al (2012) used available data sets from the KRWCA area to document statistical correlations between nitrate concentrations in groundwater and 1) dissolved oxygen content and 2) proximity to only certain types of crop agriculture (orchards and vineyards) and septic systems.

5 The results of Harter et al (2012) are presented for discussion purposes. That work has not been reviewed in detail.

the information plotted on figures 7 through 10[6]. When accumulation over time is considered[7], past potential sources related to crop agriculture and manure are revealed as the most significant potential sources with approximately 79 percent of the total potential source contribution. Clearly, understanding the distribution of nitrate in groundwater in the KRWCA area must include consideration of historic activities. While the Central Valley Regional Water Quality Control Board has stated the order will not address the legacy issue in terms of regulating groundwater impacts from past land use practices, these impacts will affect groundwater quality monitoring conducted under the order.

3.4 Differences between KRWCA Area and Areas to the North

The KRWCA area differs from areas located farther north in the San Joaquin Valley: 1) the rest of the SSJVWQC/TLHR area and 2) the East San Joaquin Water Quality Coalition (ESJWQC)/ESJW area. The three points discussed below will be considered in the following sections of this report.

First, the depth to groundwater in the KRWCA area is significantly greater than in the areas located to the north. Table 1 compares the depths to first-encountered groundwater for the groundwater subbasins in the areas being discussed. Groundwater in the KRWCA area is by far the deepest based upon both the averages and maximum data. Boyle et al. (2012) graphically depict this condition (see Figure 2 of the cited document). As a result, it takes longer for agricultural return flows, where they exist, to reach first-encountered water in the KRWCA area.

Second, nitrate impact to first-encountered groundwater is less pronounced in the KRWCA area than it is to the north. Boyle et al. (2012) provide a graphical comparison of the areas (see Figures 41 through 44 of the cited document). Burton et al. (2012) provide statistics that support this conclusion. The aggregate conditions in the KRWCA area (i.e. hydrogeologic conditions and agricultural management practices) appear to be more protective of groundwater quality than is the case for areas located to the north.

Finally, there are significant hydrologic stresses imposed upon the groundwater system in the KRWCA area. With rainfall being approximately one-half to one-third of that for the above-referenced areas located to the north (Williamson et al, 1989; Gronberg et al., 1998), a substantial amount of groundwater pumping occurs in order to meet the water demand. Given the demand on the groundwater resource and decline in water levels over time mentioned in Section 3.2, a substantial amount of groundwater recharge has been performed to maintain the resource. These

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[6] Estimation of past potential nitrate sources (crop, manure and other) for Figure 6 involved scaling the values presented by Harter et al (2012). The scaling value for each category was calculated as the ratio of past (1945 to 2002) to current (2003 to 2007) for an indicator variable that was summed over the two time intervals. For the Crop category, the indicator variable was the product of acres in production (Figure 7) with synthetic nitrogen applied (Figure 8). For the Manure category, the indicator variable was the manure nitrogen applied (Figure 9). For the Other category, the indicator variable was the Kern County population (Figure 10).

[7] It is assumed that all nitrogen is converted to nitrate and there are no losses over time.

pumping and recharge operations have created the potential to induce lateral flow of groundwater and migration of dissolved constituents over significant distances.

Table 1

Summary of Depth to First-Encountered Groundwater within the ESJW and TLHR Areas

DWR Groundwater Subbasin or Group	Minimum	Average	Maximum
East San Joaquin Watershed (ESJWQC)	1	88	277
Kings Subbasin	0	87	254
Kaweah Subbasin	6	102	214
Tulare Lake Subbasin	1	77	309
Tule Subbasin	2	159	440
Kern County Subbasin (KRWCA)	100	265	634

Notes:
1) Results are in feet and rounded to the nearest foot.
2) Analysis performed on DWR monitoring data for spring 2010.
3) Averages were calculated on data declustered at the township-range level.
4) East San Joaquin Watershed water level data from the following DWR groundwater subbasins were used: Chowchilla, Madera, Merced, Modesto and Turlock
5) Consistent with Figures 2a, 2b and 3, the KRWCA entries do not address the limited areas of shallow groundwater outlined in Figure 2a.

4.0 SCIENTIFIC CHALLENGES FOR MONITORING GROUNDWATER QUALITY IN THE KRWCA AREA

The premise for groundwater quality monitoring in the tentative order is that collecting information will allow the effectiveness of irrigation and fertilizer management practices to be evaluated and improved where necessary in order to protect the quality of first-encountered groundwater. However, there are several aspects the hydrogeology in the KRWCA area that will complicate interpretation of the collected monitoring data. As observed in a United States Geological Survey (USGS) study conducted in both the TLHR and the ESJW areas by Burow et al. (2008), "Protection of groundwater for present and future use requires monitoring and understanding of the mechanisms controlling long-term quality of groundwater." The following sections identify some of the more important mechanisms that influence groundwater quality and discuss the implications for the Management Practice Evaluation and Groundwater Trend Monitoring programs required by the tentative order.

4.1 A Thick Unsaturated Zone Creates Time Lags Between Activities at Ground Surface and Changes in Groundwater Quality at Depth

As indicated on figures 2a and b, the depth to first-encountered groundwater in the KRWCA area varies greatly. Table 1, presented previously, summarizes the range in depth to water across the area and compares this condition to other areas within the TLHR and ESJW areas. Most of the studies conducted in the San Joaquin Valley and cited in the tentative order as a basis for regulating irrigated agriculture have been conducted in areas other than the KRWCA area, in areas where groundwater is much shallower. As indicated on Figure 11, the depth to first-encountered groundwater in the vast majority of the KRWCA area is much greater than that in the types of studies referenced in the tentative order[8]. The significant distance between ground surface and first encountered groundwater over much of the KRWCA area (hundreds of feet) increases transit times for return flows migrating down through the unsaturated zone to saturated groundwater. This condition creates a time lag between 1) irrigation and nitrogen management activities at ground surface and 2) changes in the quality of first-encountered groundwater[9].

Appendix B presents the results of nitrate travel time calculations for bulk flow through the unsaturated zone under the range of conditions that occur in the KRWCA area. Both agronomic factors (return flow and nitrogen lost below root zone) and hydrogeologic factors (unsaturated zone stratigraphy and depth to first encountered groundwater) were considered. The results indicate that nitrate may reach first-encountered groundwater in as little as 10 to 15 years in some areas, but requires many decades to several centuries for the migration path to be completed in other

[8] See references in Footnote #3.

[9] This condition may exist in other parts of the TLHR and in some parts of the ESJW as well. However, the greater depths to groundwater in the KRWCA area make the condition more significant to the interpretation of groundwater quality in the KRWCA area.

areas where first encountered groundwater is deeper. It is acknowledged that a variety of processes may lead to a range of travel times with migration occurring faster or slower than the estimates presented here[10]. However, it appears that the processes are very site-specific and those which might lead to faster migration are not likely to occur consistently over significant unsaturated zone thicknesses and across changes in lithology (i.e., interlayered sands and clays). This view is consistent with research conducted on relatively thick unsaturated zones[11]. Furthermore, these calculations are consistent with the observation that water quality is less impacted in the KRWCA area than in the northern portion of the TLHR and the ESJW where groundwater is generally shallower (see Section 3.4).

The implication of the presence of a thick unsaturated zone across much of the KRWCA area is that a significant portion of the nitrate from past fertilization practices currently remains in-transit in the unsaturated zone. As a result, current changes in groundwater quality are associated with return flows resulting from past farm practices as opposed to current practices. A trend monitoring program conducted under such conditions cannot meet the monitoring goals of the tentative order because there is a temporal disconnect between actions at ground surface and reactions in groundwater located at depth. Changing current irrigation and fertilization practices cannot affect what has occurred in the past.

4.2 Nitrate in the Unsaturated Zone Acts as an Ongoing Source to Groundwater

In situations where transit times from ground surface to first-encountered groundwater are significant (many years or more), the unsaturated zone effectively acts as a reservoir for nitrate to be released to groundwater at a later time. This condition complicates trend monitoring and makes effective regulation of current farm practices very difficult.

While some researchers have interpreted data for shallow groundwater sites to indicate that nitrate migrates through the unsaturated zone quickly and leaves little residual, this does not appear to be the case in much of the KRWCA area partly because first-encountered groundwater is deep and the unsaturated zone has a significant storage capacity. Figure 12 demonstrates that the unsaturated zone can, in fact, act as a long-term reservoir for nitrate. The monitored site was farmed until approximately the year 2000 and then converted into a spreading ground for groundwater recharge. The nitrate concentration in groundwater when the land was used for farming was slightly below the drinking water Maximum Contaminant Level of 45 milligrams per liter (mg/l). After groundwater recharge operations began, the concentration rose to a high of

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[10] For faster migration, these processes may include anion exclusion, fingering, funneling and flow along high hydraulic conductivity pathways. For slower migration, these processes may include physical interaction with soil, diffusion into slow velocity or immobile zones and denitrification under some conditions (Kung, 1990a and 1990b; Green and Bekins, 2010).

[11] McMahon et al. (2006) evaluated the transit times for chemicals through thick unsaturated zones in the High Plains region of the United States. For irrigated croplands with unsaturated zone thicknesses ranging from approximately 55 to 160 feet, they found that travel times to groundwater varied between approximately 50 and 370 years.

slightly more than 80 mg/l, and the elevated concentrations persisted for more than a decade as the newly established recharge operation continued. A reasonable interpretation of this information is that 1) the downward migration rate through the unsaturated zone increased as a result of the recharge operation, 2) groundwater concentrations increased as a result of the large amount of nitrate from past farming migrating downward at an increased rate and 3) the increased nitrate concentrations persisted because the reservoir of nitrate in the unsaturated zone was large[12]. Most recently, the nitrate concentrations in groundwater have begun to decrease. This development may be the result of the nitrate reservoir in the unsaturated zone being depleted over time by the flushing associated with the recharge operation.

Figure 13 presents data from an area not used as a spreading ground. Here, there is clearly a positive correlation between water level and nitrate concentration. Although the monitoring data early in the period of record are sparse, a reasonable interpretation of this information is that the unsaturated zone acts as a reservoir for nitrate which is released to groundwater during periods of high water levels when saturated groundwater conditions rise up into previously unsaturated sediments. As a result, in order for groundwater quality trend monitoring to be effective, the legacy issue discussed above must be considered and incorporated into the approach before the tentative order is finalized.

4.3 Processes Acting on Return Flows During Transit Through the Unsaturated Zone Can Affect Trends Observed in First-Encountered Groundwater

As noted above, several processes can lead to a range of travel times through the unsaturated zone beneath a single parcel. When thick unsaturated zones and long travel times to groundwater are also involved, there is the potential to mix older and younger return flows at the point where faster and slower migration paths terminate (first-encountered groundwater). To the extent that these flows are significantly different in age, they may have originated during times of different nitrogen management practices. Mixing of such flows could blur differences in water quality trends associated with past and current management practices that might otherwise be apparent.

The processes involved in creating the different flows may include 1) for faster migration, anion exclusion, fingering, funneling and flow along high hydraulic conductivity pathways and 2) for slower migration, physical interaction with soil, diffusion into slow velocity or immobile zones (Green et al., 2005) and denitrification under some conditions[13] (Dubrovsky et al., 2010; Landon et al., 2010; Schmidt et al. 2011). However, a USGS study conducted in the SSJVWQC area (Burow et al., 2008) noted that “few wells have been sampled over time spans long enough to assess the

[12] This example should not be interpreted as an indication that all recharge operations flush nitrate into the saturated zone. Land use history is a very important factor that must be considered. The purpose of this discussion is to provide evidence that past farming practices, as opposed to current farming practices, have added large amounts of nitrate to the unsaturated zone.

[13] For instance, above clay strata where the moisture content may increase and contact with air in the pore space may decrease. The decrease in dissolved oxygen and long travel times could create conditions conducive to nitrate loss by denitrification.

relation between regional management practices and potential long-term degradation of water quality in the eastern San Joaquin Valley aquifer system." So, it isn't clear what unresolved scientific questions may be encountered as the monitoring data are collected. Successful water quality trend analysis requires a favorable signal to noise ratio, and concentration data effectively contain noise when they are affected by processes that are not understood. Therefore, travel through a thick unsaturated zone is expected to increase the noise and complicate interpretation of actual trends unless the processes acting on the return flows are understood. The complexities that may be encountered during monitoring should be considered before the large-scale monitoring program in the tentative order is finalized. One approach for acquiring the necessary experience with monitoring deep groundwater would be to conduct a pilot monitoring program in a small portion of the KRWCA area.

4.4 Horizontal Flows in Subbasin Can Complicate the Attribution of Observed Nitrate to Specific Source Areas

As noted in Section 3 above, the KRWCA area is located within a closed groundwater basin that experiences relatively large artificial hydrologic stresses in the forms of water supply well pumping and recharge operations. In addition, many potential sources of nitrate are located close together (Figure 4). Under these conditions, nitrate from different sources likely mixes. In fact, a study of domestic well water quality in the SSJVWQC area (Singleton et al., 2011) found that many wells contained mixtures of nitrate from many sources (manure, fertilizer and septic/community wastewater). This finding is consistent with a USGS study conducted in the SSJVWQC area (Burow et al., 2008) that noted "Predicting the long-term fate of nitrate and pesticides in ground water in this region is difficult owing to intensive ground water pumping, mixed sources of recharge water, and complex flow paths through heterogeneous alluvial fan sediments." This situation can make the Management Practice Evaluation Program quite difficult to implement as existing water quality impacts may not be attributable to the monitored, or even specific, locations.

In addition, horizontal migration can induce changes in concentrations over time and complicate Trend Monitoring. Figure 14 provides an example. Two fairly similar periods of high water are contained in the plotted record; however, the concentration responses during those periods are quite different. The history of extraction and recharge in this part of the subbasin is indicated along the top of the figure.` While changes in the locations of extraction and recharge are not indicated, it is clear that there are differences in timing, duration and the cumulative magnitude of the hydrologic stresses. A reasonable interpretation of this information is that nitrate in the saturated zone migrates horizontally under the influence pumping and recharge.

In another USGS study that included locations in the San Joaquin Valley, Rupert (2008) noted the complexities associated with evaluating trends in groundwater quality data. Two of the points made were that 1) it is difficult to evaluate trends unless the recharge age is known so that correlation with changes in land use can be made and 2) changes in oxidation-reduction conditions can significantly affect trends. These are just some of the complexities that should be considered and evaluated before the large-scale monitoring program in the tentative order is finalized.

4.5 The Potential Costs of Insufficiently Planned Groundwater Quality Monitoring are Significant

Evaluations of potential costs associated with the monitoring programs required in the tentative order have been made on behalf of the State and continue to be revised. While a final assessment of the costs has not yet been prepared, it is clear that the program will be costly. Moreover, costs in the KRWCA area are likely to be higher than the average for the SSJVWQC area because the depth to first-encountered groundwater is greater than in other parts of the SSJVWQC area. Given the costs, details of the monitoring program should be carefully planned to increase the likelihood of successful implementation. Consideration of the issues raised above should be incorporated into that planning. The primary implication of these issues is that the monitoring program goals (evaluating the effectiveness of irrigation and fertilizer management practices and improving them where necessary in order to protect the quality of first-encountered groundwater) may not be achievable through the monitoring programs required in the tentative order. That possibility stems from problems with data interpretation that may be encountered, for the reasons stated above, when trying to attribute water quality conditions to farming activities at specific locations and times.

Potentially more costly than implementation of a flawed monitoring program would be regulatory required changes in farm management practices based upon incorrect conclusions from an insufficiently planned monitoring program (i.e., possibly contained in Groundwater Quality Management Plans). Acting on false positives would not achieve the goals of the monitoring program and would create additional costs (both direct costs associated with compliance activities and opportunity costs associated with any decreases in yield) for farmers. Further study or, possibly, a pilot program as an interim regulatory step should be considered before creating a comprehensive set of monitoring regulations given the, as yet, rudimentary understanding of how nitrate moves through subsurface in the KRWCA area.

5.0 COMMENTS ON SPECIFIC ASPECTS OF THE ORDER

The following sections highlight some of the more obvious shortcomings of the tentative order if it were applied to the KRWCA area. These comments are not intended to be presented as a comprehensive evaluation of the tentative order.

5.1 General Order

The details set forth in Section VIII (Required Reports and Notifications – Third Party) D (Groundwater Quality Assessment Report and Evaluation/Monitoring Workplans) involve 1) evaluation of groundwater quality vulnerability to impacts from irrigated agriculture (Management Practice Evaluation) and 2) observation of current and future groundwater quality trends attributable to irrigated agriculture (Trend Monitoring). It is important to note that complications associated with identifying sources, or potential sources, of groundwater contamination - both in space (i.e., impacts that migrate away from source locations) and time (i.e., the legacy issue) as noted in Section 4 of this report - will likely be encountered during the performance of the required work. Furthermore, it is likely that more questions than answers will be encountered in many instances. Some recognition of and allowance for these potential technical complications should be included in the tentative order. For example, the development of a Groundwater Quality Management Plan (Section VIII.H.2) should not be required of a current irrigated agricultural operation if there is evidence that an exceedance may have resulted from past (legacy) activities.

5.2 Attachment B – Monitoring and Reporting Program

The reasoning upon which the groundwater portion of this section of the tentative order is based follows from previous sections where there appears to be an implicit assumption that groundwater quality responds to activities occurring at ground surface over a relatively short time period[14]. As an example, Section IV (Groundwater Quality Monitoring and Management Practice Assessment, and Evaluation Requirements) requires that "The third party must collect sufficient data to describe irrigated agricultural impacts on groundwater quality and to determine whether existing or newly implemented management practices comply with the groundwater receiving water limitations of the Order." This task may require decades or more for areas where first-encountered groundwater is located deep beneath the ground surface and transit times are long. (See Section 4.1 of this report for supporting discussion.) Therefore, allowance for potentially long monitoring periods must be reflected in compliance schedules.

As stated above in these comments, there are several complex processes occurring in the KRWCA area that must be interpreted before attempting to link current changes in the quality of first encountered groundwater with current irrigation and fertilizer management practices. As a result, difficulties associated with identifying sources of groundwater contamination – both in space

[14] For the purposes of developing the tentative order, a very simple conceptual model of cause and effect has been applied to a situation where the aggregate effect of active transport processes could be significantly more complicated.

and time – will likely be encountered during the performance of the required work in many instances. Some recognition of and allowance for these potential technical complications should be noted.

Large-scale implementation of the monitoring concept is not appropriate for much of the KRWCA area without further consideration of the issues presented in these comments. Rather, a phased approach should be implemented with initial work being performed on a limited group of areas where technical interpretation of the water quality data is anticipated to be the least complicated. Areas of shallowest first-encountered groundwater may be appropriate candidates for the initial phase of work.

5.3 Appendix MRP-1, Management Plan Requirements, Surface Water and Groundwater

The details presented in Section I (Management Plan Development and Required Components) D (Monitoring Methods) 3 (Groundwater – Additional Requirements) involve evaluation of groundwater quality trend monitoring data in order to draw conclusions regarding additional monitoring requirements. As discussed above, there may be difficulties interpreting the data as a result of unique technical challenges that exist for the KRWCA area. Some recognition of and allowance for these potential technical complications should be noted.

Section I (Management Plan Development and Required Components) G (Source Identification Study Requirements) allows for the identification of sources other than irrigated agriculture that are responsible for groundwater quality impacts. The text should state that past irrigated agriculture is a potential source that is distinct from current irrigated agriculture. It is appropriate to include past irrigated agriculture as a distinct potential source because regulation of current agricultural practices will have no effect on impacts resulting from past practices.

5.4 Appendix MRP-2, Monitoring Well Installation and Sampling Plan and Monitoring Well Installation Completion Report

The reasoning upon which this section of the tentative order is based follows from previous sections where there appears to be an implicit assumption that groundwater quality responds to activities occurring at ground surface over a relatively short time period. As an example, Section II (Monitoring Well Installation and Sampling Plan), A (Stipulations), 4 states that “Groundwater monitoring shall…be of sufficient frequency to allow for evaluation of any seasonal variations.” This assumption is flawed. Please refer to the discussion of complexities associated with the KRWCA area presented above.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the information and analysis presented in the preceding sections of this report, it is clear that hydrogeologic characteristics specific to much of the KRWCA area will greatly complicate and impede implementation of the groundwater monitoring requirements stated in the tentative order. Moreover, the information presented in this report calls into question the scientific basis, efficacy and cost effectiveness of groundwater monitoring as currently required in the tentative order. These points should be addressed in finalizing the tentative order.

It should be noted, however, that there are some relatively small areas within the KRWCA area where the hydrogeology may not impede implementation of monitoring requirements as presented in the tentative order. In areas of shallow first-encountered groundwater (identified approximately with red dashed lines on figures 2a and 3), the depth to groundwater ranges between approximately 0 and 20 feet deep. Given the shallow depth to groundwater in these areas, any water quality responses to current irrigation practices may occur with little delay and trend monitoring may reflect the effects of current irrigation activities. However, impacts to groundwater quality in these areas may have accumulated over time, and current water quality conditions may reflect a combination of effects from past and current irrigation practices. Therefore, it is important that the language in the Tentative Order regarding source identification be modified to categorize past irrigation practices as sources separate from current irrigation operations (see second paragraph of Section 5.3 above).

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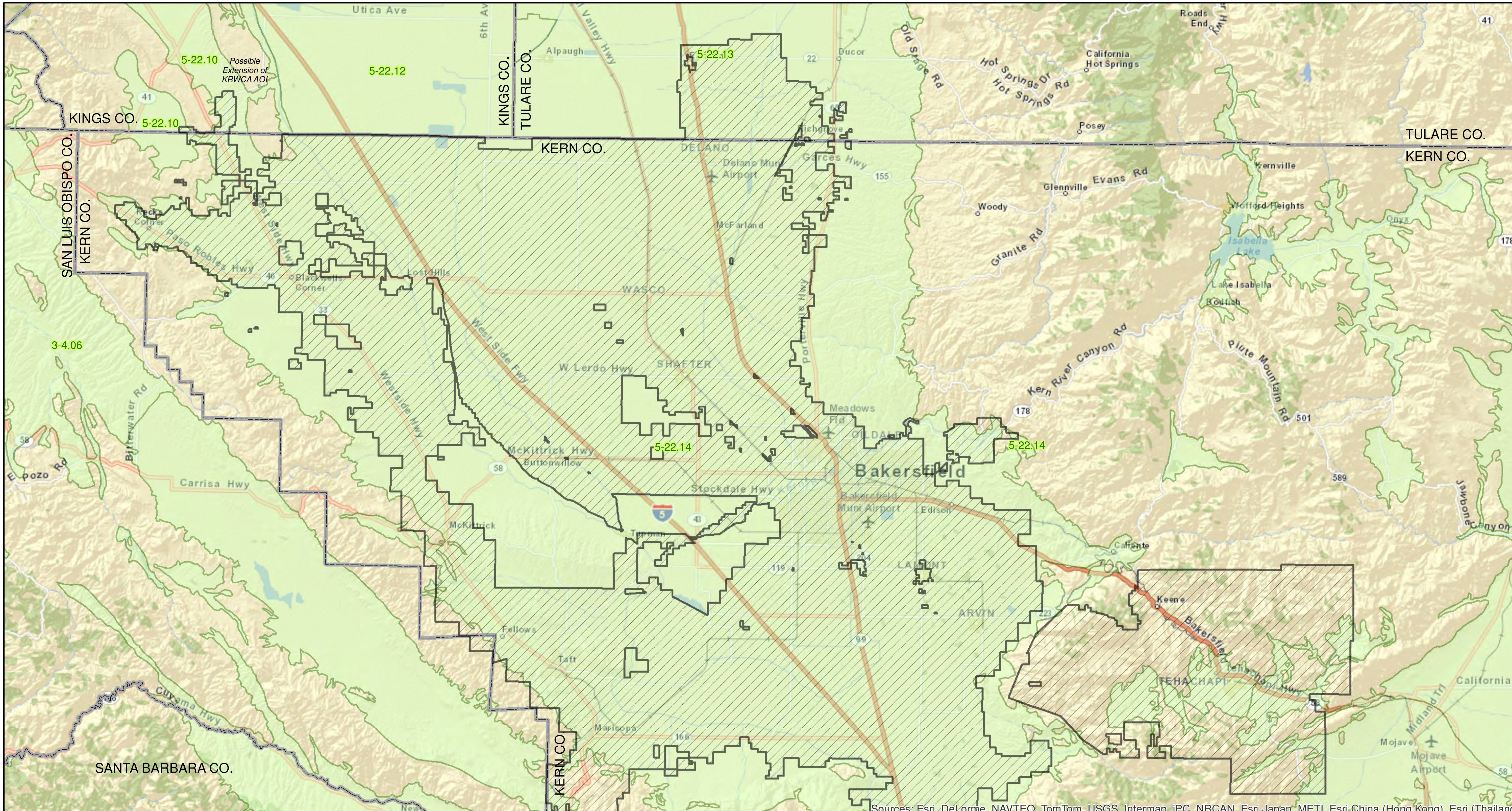
FIGURES



0 5 10 Miles

DWR Groundwater Basin/Subbasin (ID Label)
County
KRWCA Boundary

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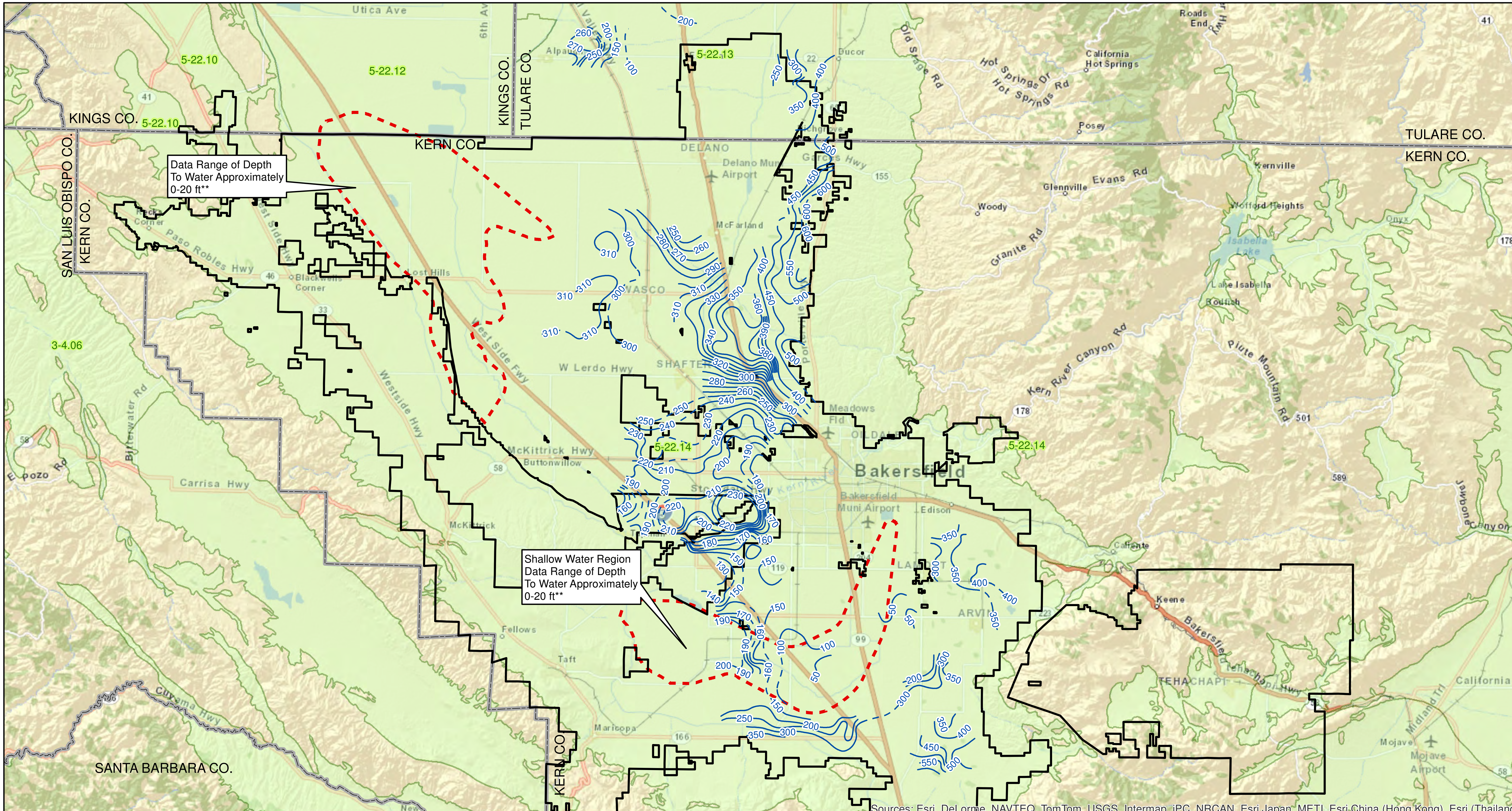
Kern County Irrigated Lands Program
Kern Sub-Watershed

KRWCA Area

FIGURE 1



0 5 10 Miles

DWR Groundwater Basin/Subbasin (ID Label)

County

KRWCA Boundary

Shallow Water Region - Approximate**

Depth To Water - Unconfined Aquifer***

High Degree of Confidence

Inferred

Data References:

**Areas digitized from CA DWR "Present and Potential Drainage Problem Areas" survey map, 2010
http://www.water.ca.gov/pubs/drainage/2010_shallow_groundwater_map__san_joaquin_valley/sgw10.pdf

***Isopleth lines from CA DWR "Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 2010"
http://www.water.ca.gov/groundwater/data_and_monitoring/south_central_region/images/groundwater/sjv2010spr_unc_depth.pdf

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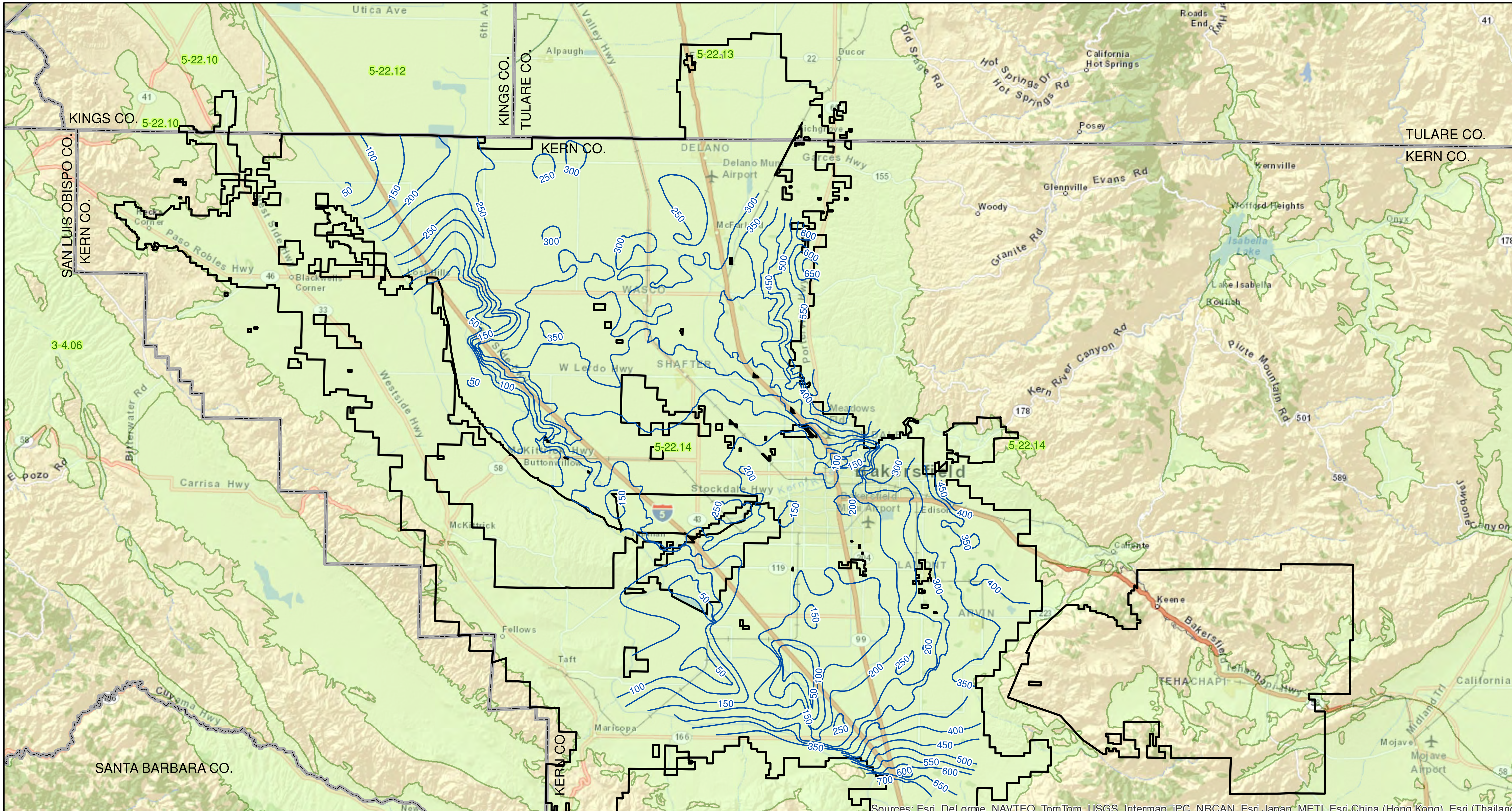
Kern County Irrigated Lands Program
Kern Sub-Watershed

Spring 2010
Depth To Water In Wells
DWR Representation

FIGURE 2A



0 5 10 Miles

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DWR Groundwater Basin/Subbasin (ID Label)

County

KRWCA Boundary

Depth to Water - KCWA Spring 2010, 50 ft interval**

Data References:

**Isopleth lines digitized from Kern County Water Agency, published map of Depth to Groundwater, Unconfined Aquifer, Spring 2010. Published 07/2010.

Kern County Irrigated Lands Program
Kern Sub-Watershed

Spring 2010
Depth To Water In Wells
KCWA Representation

FIGURE 2B

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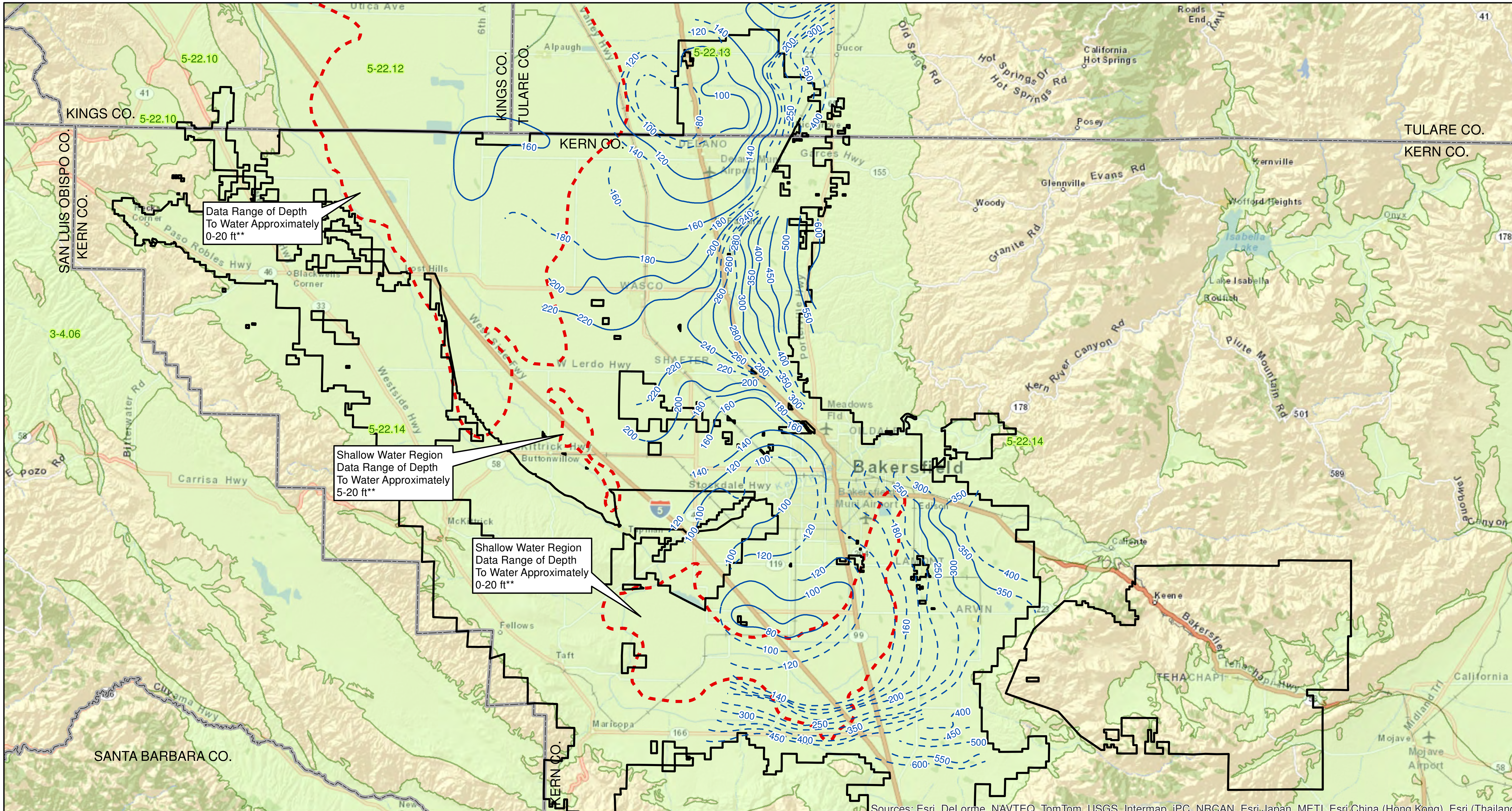

0 5 10 Miles

DWR Groundwater Basin/Subbasin (ID Label)

County

KRWCA Boundary

Shallow Water Region - Approximate**

Depth To Water - Unconfined Aquifer***

High Degree of Confidence

Inferred

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Data References:

**Areas digitized from CA DWR "Present and Potential Drainage Problem Areas" survey map, Figure 4, data from 1986. Map dated April 1987. Report dated April 1988.
http://www.water.ca.gov/pubs/drainage/1986_drainage_monitoring_report__san_joaquin_valley/86dmr.pdf

***Isopleth lines from CA DWR "Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 1988"
http://www.water.ca.gov/groundwater/data_and_monitoring/south_central_region/images/groundwater/sjv1988spr_unc_depth.pdf

Kern County Irrigated Lands Program
Kern Sub-Watershed

Later 1980's
Depth To Water In Wells
DWR Representation

FIGURE 3

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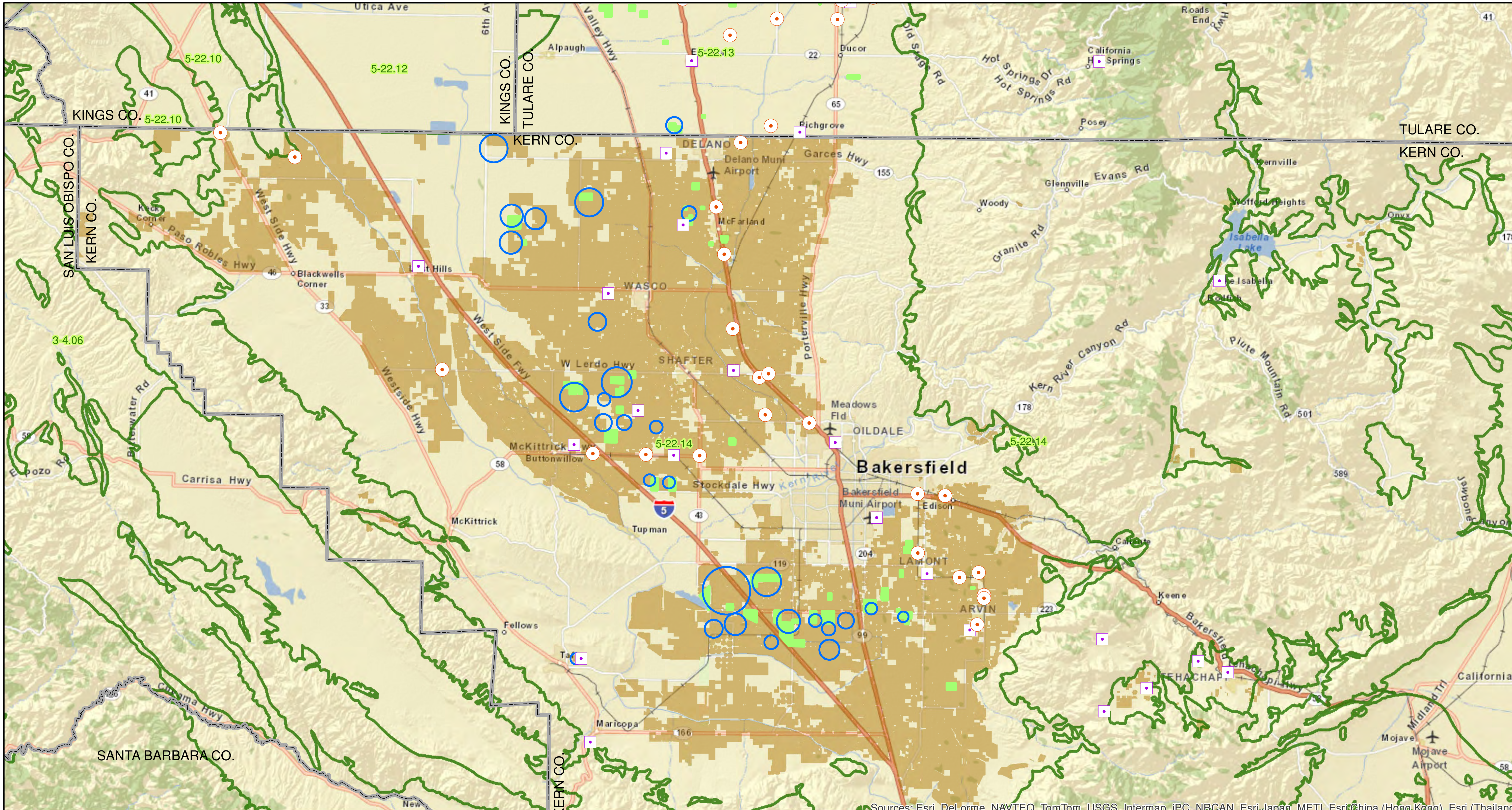

0 5 10 Miles

Food Processor (Approx. Location)*
Waste Water Facility (Approx. Location)**
Effluent, Biosolids, and On-Dairy Manure N for Cropland Application***
Dairy Facility****
Irrigated Lands - Kern County Crop Survey 2011
DWR Groundwater Basin/Subbasin (ID Label)
County

Data References:

* Approximate locations. UC Davis Report for the SWRCB SBX2 1 Report to the Legislature, Addressing Nitrate in California's Drinking Water. Technical Report 2. Hater et al. July 2012. Appendix Fig. 1.

**Approximate locations. UC Davis Report for the SWRCB SBX2 1 Report to the Legislature, Addressing Nitrate in California's Drinking Water. Technical Report 2. Hater et al. July 2012. Appendix Fig. 2.

***Generalized areas of modeled Nitrate applied to croplands, kg N/ha/yr >500 . UC Davis Report for the SWRCB SBX2 1 Report to the Legislature, Addressing Nitrate in California's Drinking Water. Technical Report 2. Hater et al. July 2012. Fig. 11.

****SWRCB draft dairy facilities parcels.

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Kern County Irrigated Lands Program
Kern Sub-Watershed

Potential Nitrate Sources

FIGURE 4

4/5/2013: V:\Clients\Kern River Watershed Coalition Authority-3484\348412V1-ILRP 2012\GIS\Map\DataProcessingForRobGailey\ReportFigs\figure4.mxd

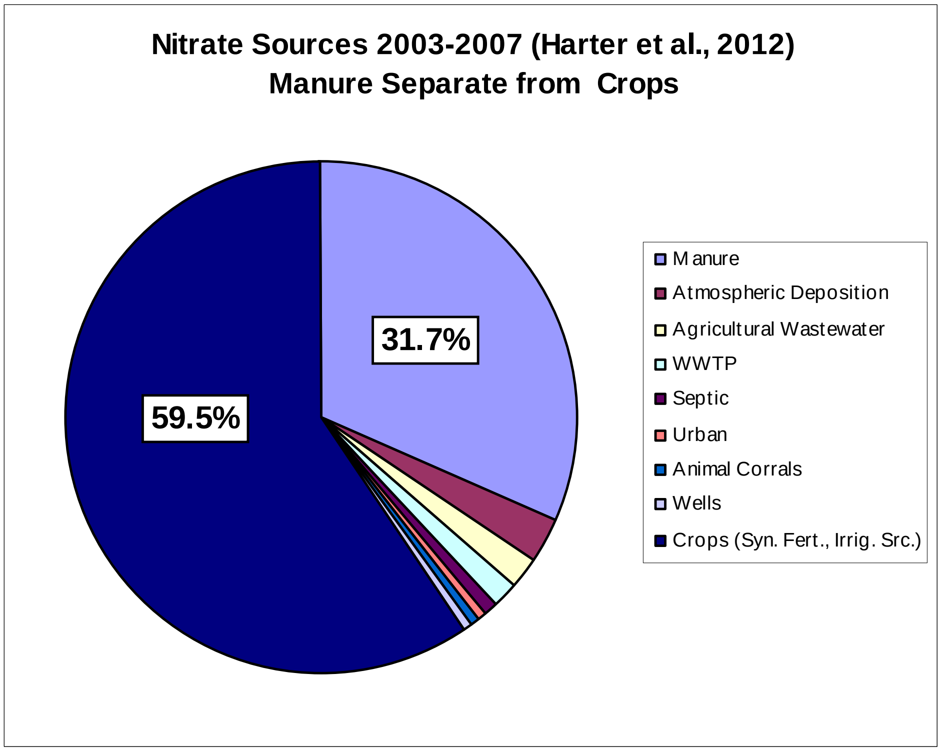


Figure 5: Current Nitrate Sources 2003 – 2007

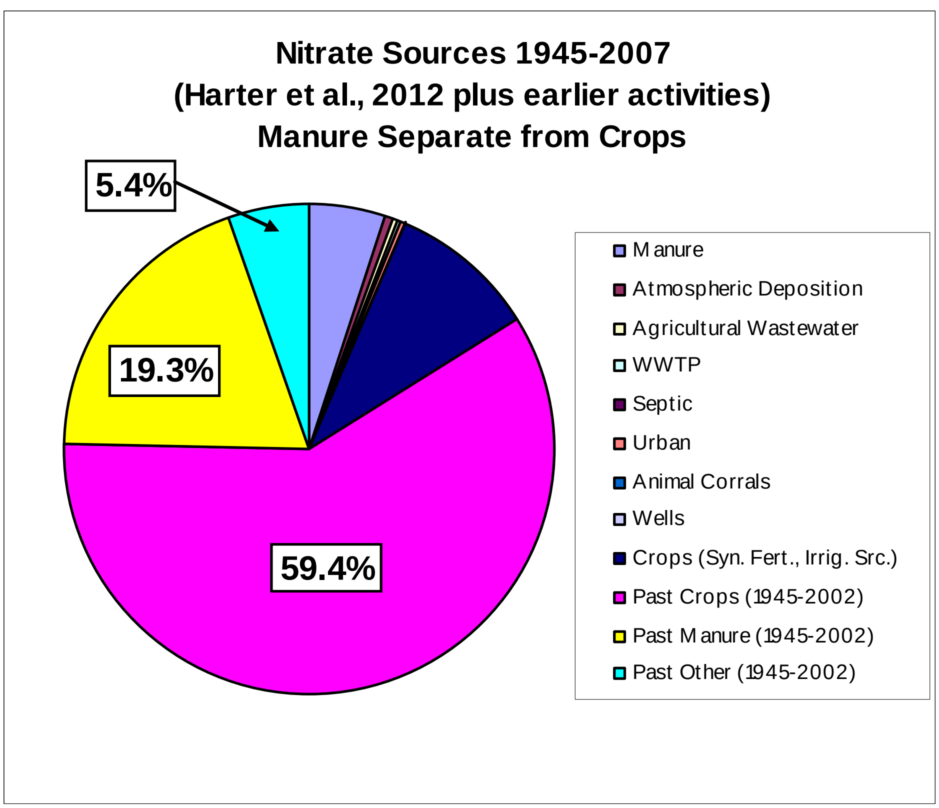


Figure 6: Current and Past Nitrate Sources 1945 – 2007

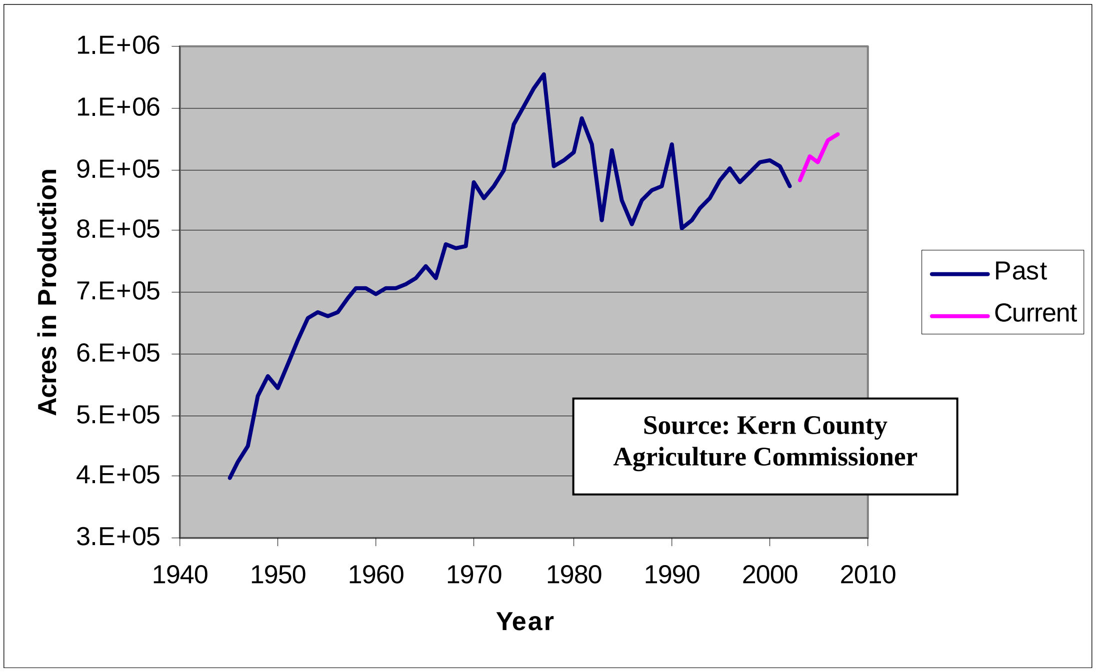


Figure 7: Historical Record of Kern County Acres in Crop Production

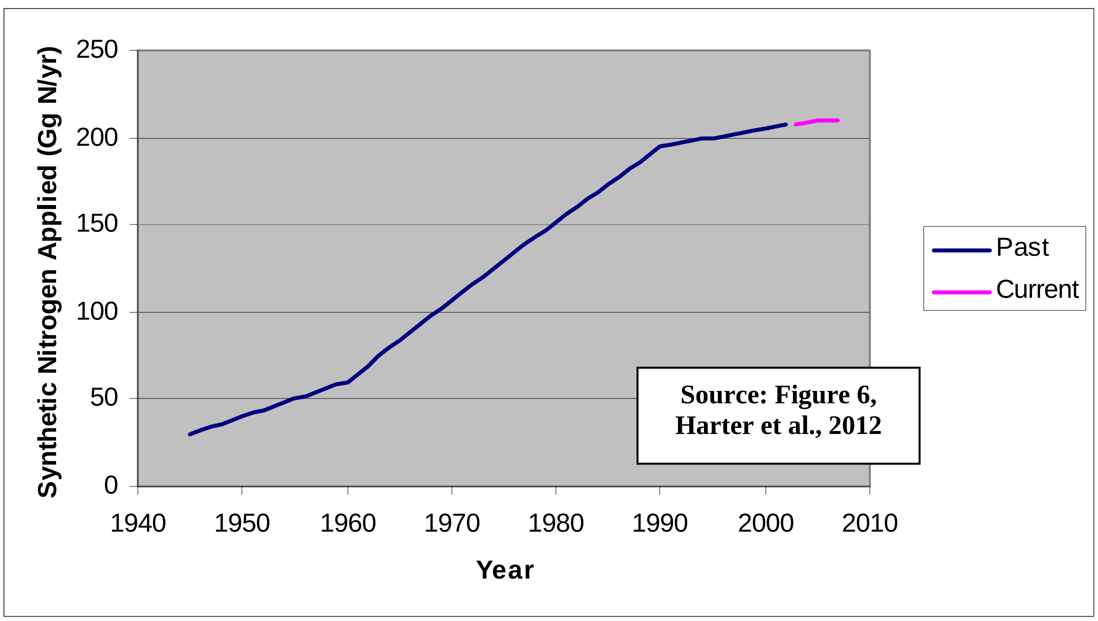


Figure 8: Historical Record of Fertilizer Nitrogen Applied to Crops in the United States

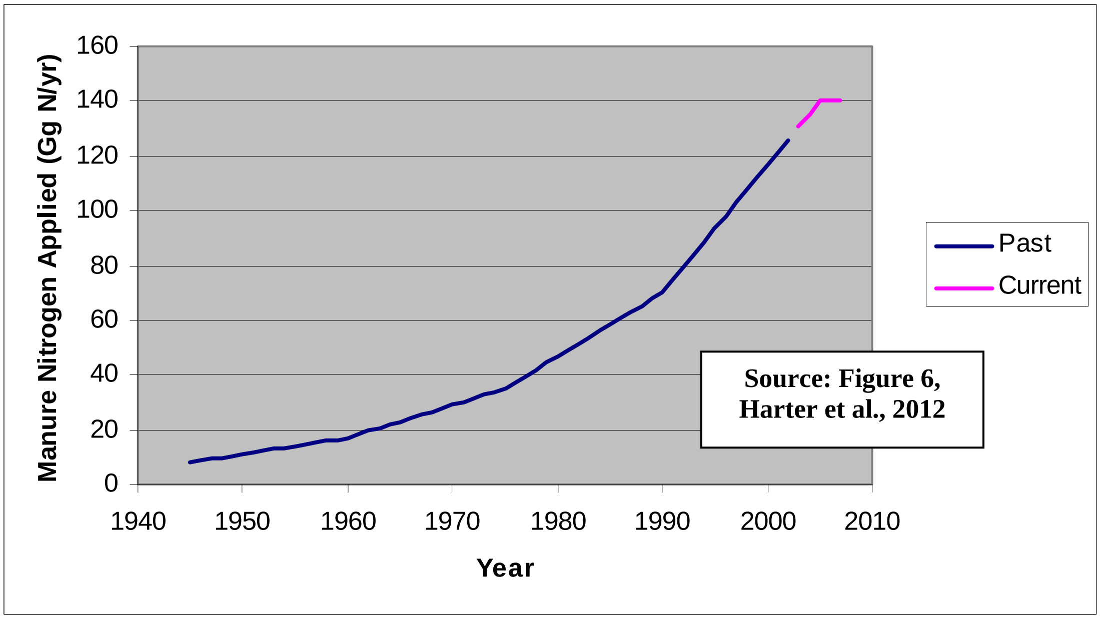


Figure 9: Historical Record of Manure Nitrogen Applied to Crops in the United States

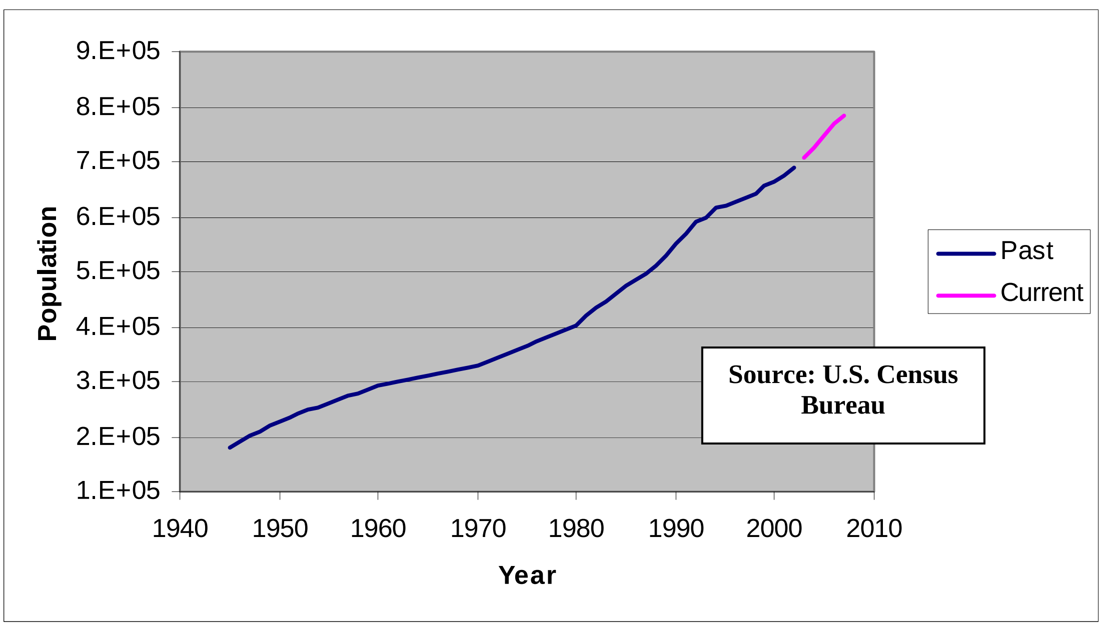


Figure 10: Historical Record of Kern County Population

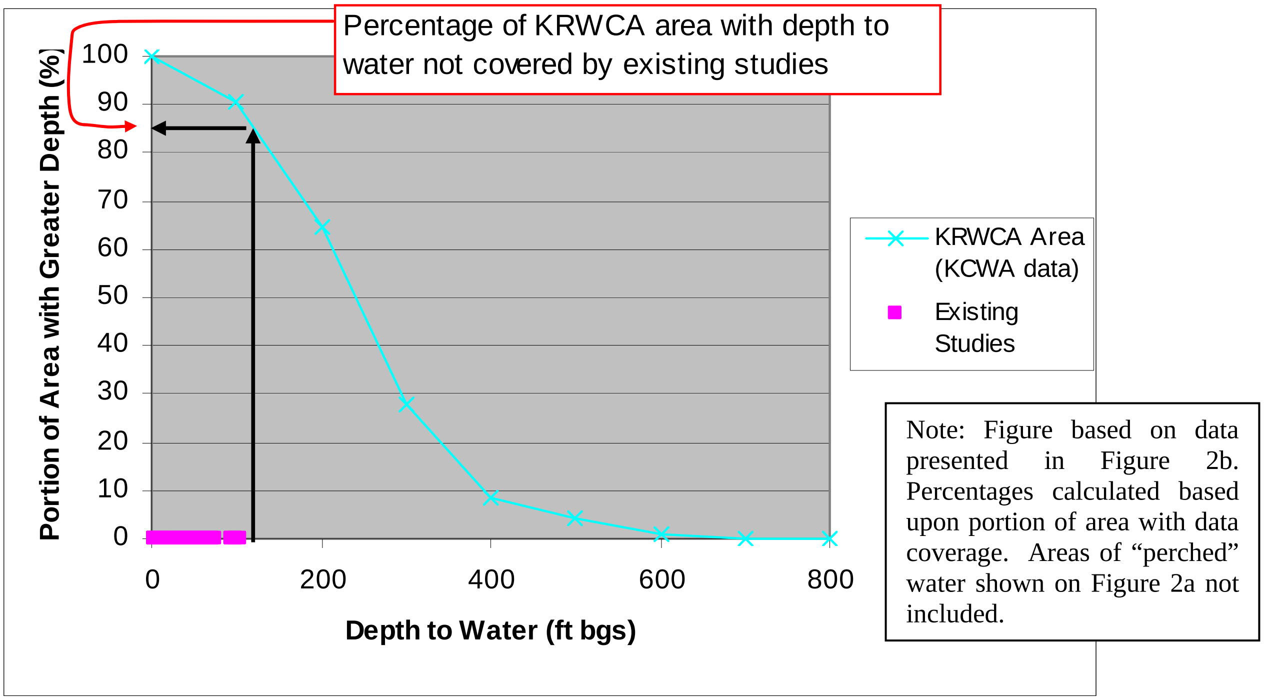
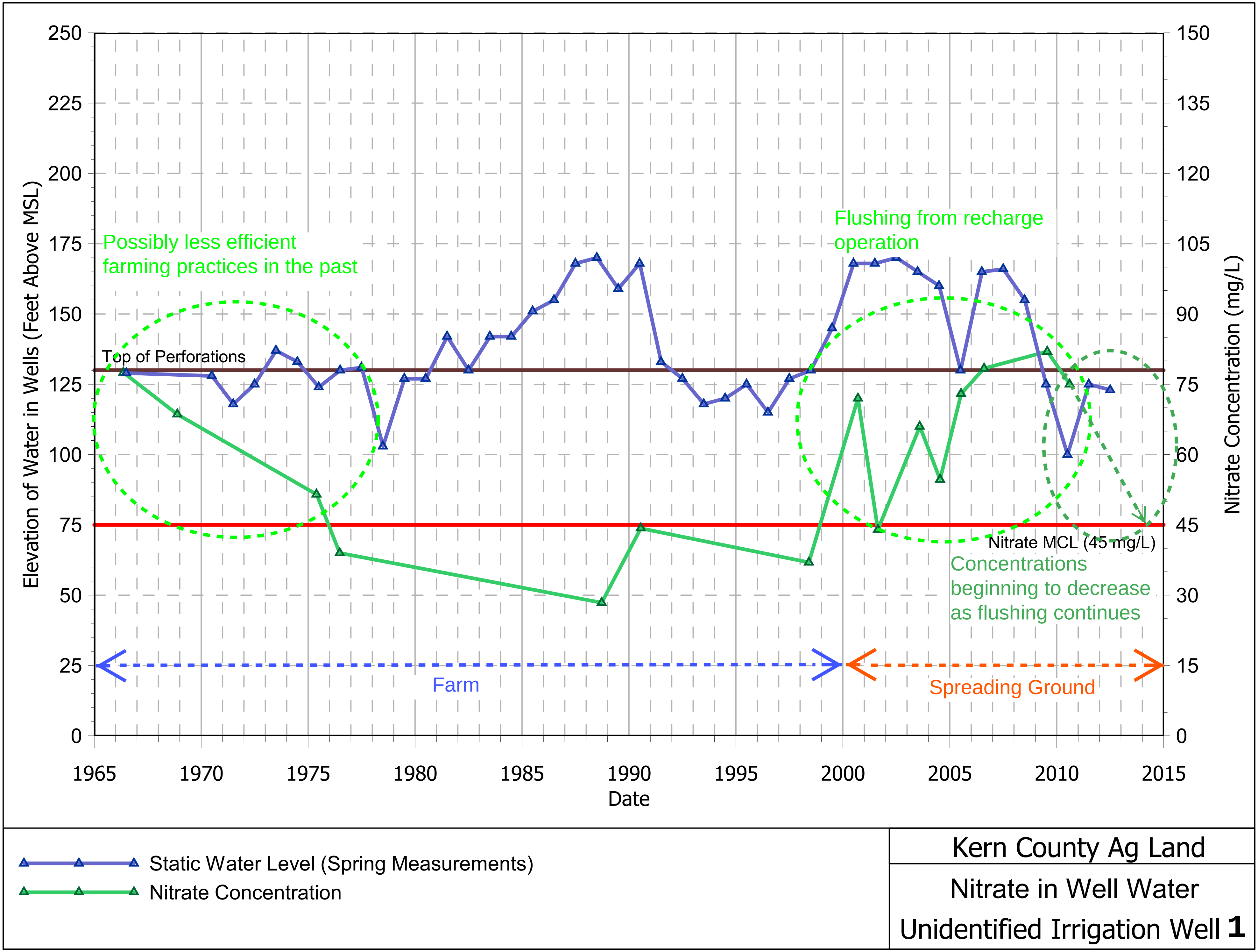


Figure 11: Portion of KRWCA Area with First-Encountered Saturated Zone Water Deeper than a Specified Value

Figure 12

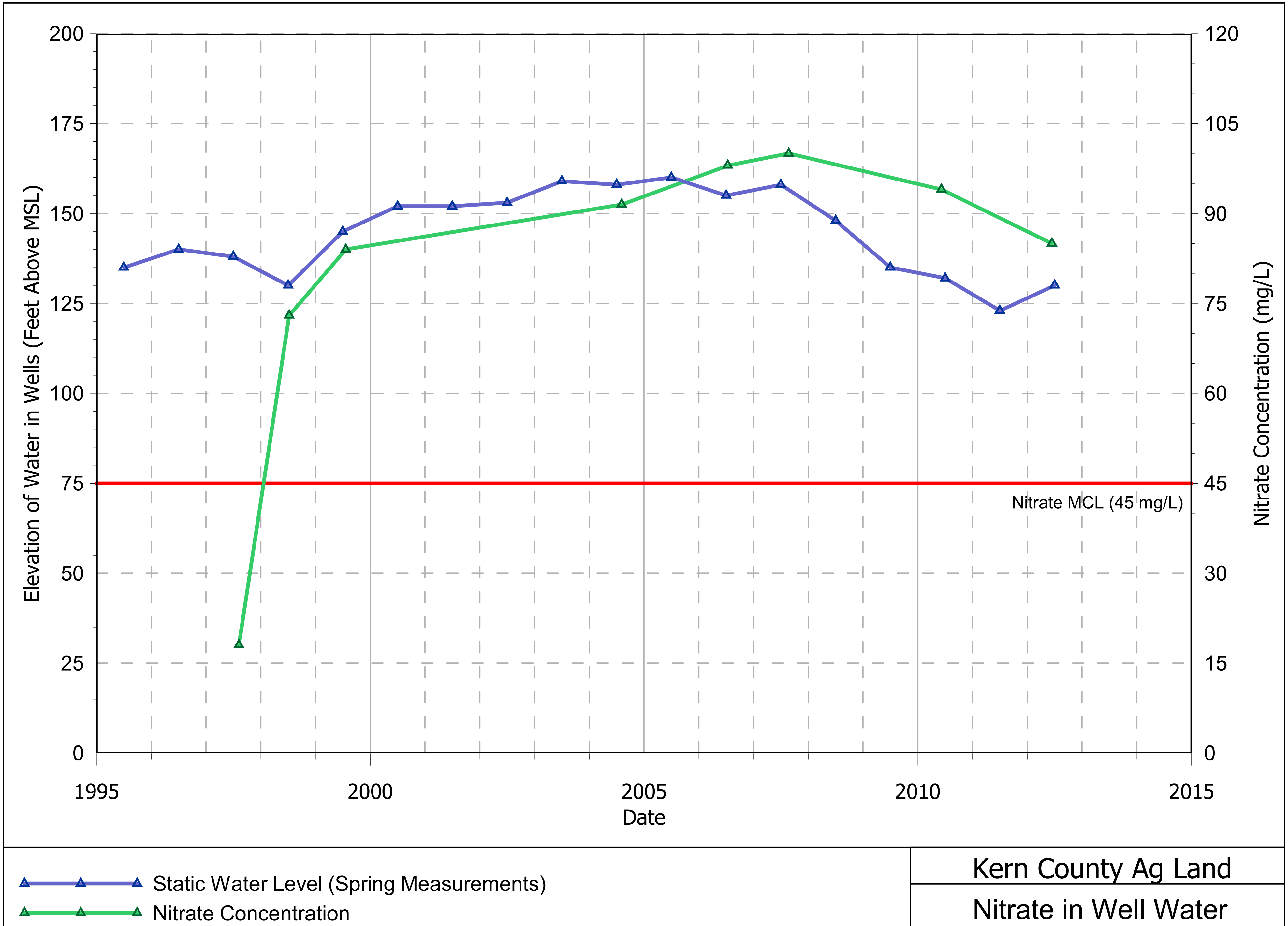


Kern County Ag Land

Nitrate in Well Water

Unidentified Irrigation Well 1

Figure 13

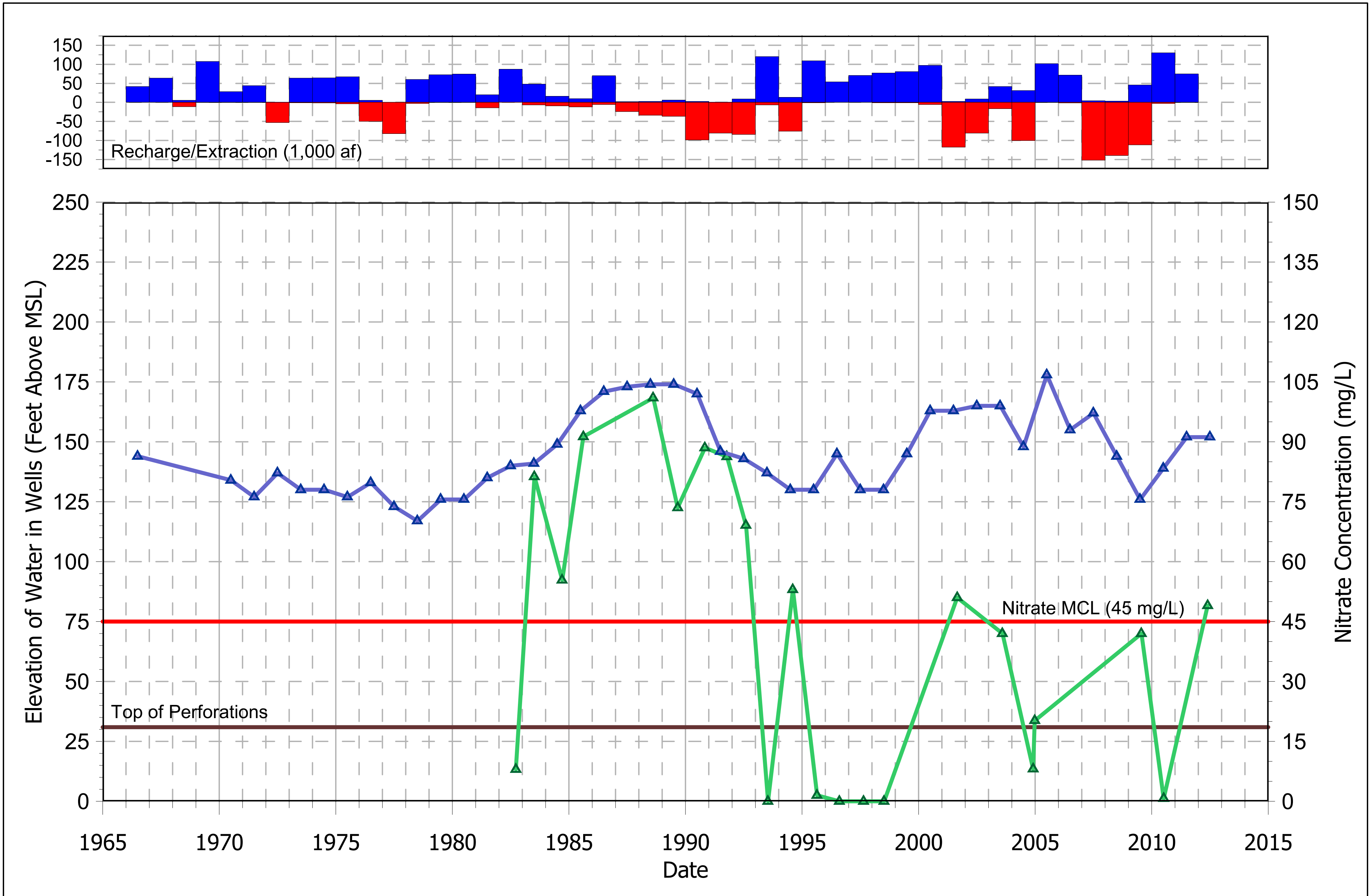


Kern County Ag Land

Nitrate in Well Water

Unidentified Irrigation Well 2

Figure 14



Kern County Ag Land

Nitrate in Well Water

Unidentified Irrigation Well 3

APPENDIX A

CURRICULUM VITAE FOR ROBERT M. GAILEY

Robert M. Gailey, P.G., C.HG.

Principal Hydrogeologist

Summary

Mr. Gailey has 28 years of experience on a wide range of projects in the field of hydrogeology. In the process of conducting projects throughout much of the United States, he has conducted site investigations ranging from preliminary site assessments to remedial investigations, negotiated with regulatory agencies for closure of contaminated sites as well as operation of municipal supply wells, provided critical review of technical documents, prepared written and verbal arguments for litigation and cost allocation, evaluated strategies for capture of groundwater solute plumes, designed and implemented remedial actions, assessed the effectiveness of ongoing groundwater remediation programs, mapped aquifers and assessed conditions for water supply development, performed water supply well siting evaluations, assessed water supply well conditions and performance, evaluated potential effects of well-field operations on water rights for adjacent parcels, and evaluated potential impacts on groundwater supplies related to groundwater contamination and proposed land development. This work has been conducted in accordance with local and state requirements, and federal requirements (CERCLA, RCRA, and SDWA) as administered by both state and federal agencies. Many of the hydrogeologic evaluations have been performed at scales that range up to basin-wide analysis.

For remediation and wastewater projects, Mr. Gailey has worked on both active and inactive industrial and commercial facilities where both organic constituents (petroleum, semi-volatile organic compounds [SVOCs], and volatile organic compounds [VOCs]) and inorganic constituents (heavy metals, nitrate, perchlorate, total dissolved solids [TDS], and tritium) have been present. The types of industries involved include agriculture (dairy and crop), airline, banking, barrel processing, chemical, defense, dry cleaning, electronics, food processing, flare manufacturing, insurance, machining, mining, petroleum (retail, storage, and refining), real estate, steel, trucking, waste disposal, and wood treatment. In addition, he has performed review and analysis for law firms and government agencies (Army Corps of Engineers [ACE], Department of Energy [DOE], Environmental Protection Agency [EPA], and Washington Department of Ecology). This work has involved hydrogeologic evaluation, modeling, statistical and other data analysis, and database management. The purposes of this work have included characterizing site conditions, predicting exposure point concentrations, developing remedial designs, evaluating ongoing remedial effectiveness, and performing comparative data analyses to meet various project needs.

For water supply projects, Mr. Gailey has worked on both municipal and rural facilities. The industries served include private and municipal water supply, agriculture, food processing, hospital, hotel, and mining. This work has involved hydrogeologic evaluation, well siting and performance evaluation (step discharge, pumping and wire-to-water tests), flow and concentration profiling (under pumping and static conditions using both spinner logs and the U.S. Geological Survey [USGS] dye tracer approach) water quality impact assessment (arsenic, bacteria, nitrate, pesticides, TDS, uranium and VOCs), feasibility testing for well modification, modeling, database management, economic and optimization analysis, and preparing construction and equipment specifications. The purposes of this work have been included developing and rehabilitating municipal and other water supplies, enhancing well field operations, and managing groundwater resources.

Project Experience

- Provides technical analysis related to hydrogeologic aspects of projects. Issues for analysis include hydraulic analysis for water supply and construction projects, water supply assessment, the distribution and migration of constituents of concern in groundwater, benefits of naturally occurring biodegradation, remediation system performance, and environmental impact assessment under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).
- Provides testimony, technical counsel, and support for regulatory negotiations and litigation involving 1) groundwater/soil cleanup and cost allocation related to serial and adjacent tenancy of commercial, industrial, and retail parcels and 2) conflicts over water resources. Has prepared expert reports and material for interrogatories and declarations, participated in the meet-and-confer process and settlement discussion, developed case strategy under the client-attorney confidentiality umbrella, briefed expert witnesses on technical aspects of cases, and provided deposition testimony.

Water Supply Assessment and Service

- Serving as Technical Lead evaluating the source of PCE in a municipal water supply well located in the Central Valley of California. Vertical flow and concentration profiling (USGS dye tracer approach) under ambient (non-pumping) conditions has been performed and profiling under dynamic (pumping) conditions is planned. The goal of the project is to modify the well and improve water quality at the wellhead.

Project Experience – *Water Supply Assessment and Service (cont.)*

- Serving as Technical Lead for ongoing supply well water quality evaluations at various locations throughout California. At issue is whether pumping operations and the well screens can be modified to reduce constituent concentrations (i.e., arsenic, manganese, nitrate, TDS, uranium and VOCs) to below drinking water standards. Vertical flow and concentration profile data are often collected from the wells using miniaturized tools so that the pumps do not have to be removed (USGS dye tracer approach). Data collection plans are developed to, among other things, account for uncertainty in pump intake depths, maximize information value and minimize the impact of any data collection uncertainties. For projects where evaluation results indicate that modifications may improve water quality, feasibility testing is performed and, as appropriate, recommendations for final modification of operations and facilities are provided. Management, or support as appropriate, of fieldwork is provided throughout the projects.

- Serving as Technical Lead performing analysis and construction tasks related to rehabilitating and modifying a water supply well for a disadvantaged community located in the Central Valley of California. The goal of the project is to reduce nitrate concentrations at the wellhead. Project work includes preparing technical specifications as well as conducting construction inspection, vertical flow and concentration profiling (USGS dye tracer approach), feasibility testing data analysis.

- Providing technical support to a public utility district regarding data collection and analysis for establishing baseline hydrologic conditions in a small groundwater basin located on the Central Coast of California. The work is being performed to support interest in developing the water resource. Project work has included installing water level and barometric transducers, training district staff regarding transducer maintenance and data retrieval, and data analysis related to evaluating safe yield for the basin

- Serving as Technical Lead to provide technical specifications and construction inspection support for the rehabilitation of four municipal water supply wells located in the Central Valley of California. The work is being performed subsequent to an initial evaluation of ten wells (specific capacity testing, progressive-volume water quality sampling, and video inspection without removing the vertical turbine pumps). The wells have not been rehabilitated within the past 40 to 60 years, and the removal of significant amounts of calcium carbonate scaling is necessary to increase the specific capacities of the wells. Space and wastewater discharge limitations are particular challenges being addressed to successfully complete the project. Particular attention has been given to balancing the benefits of improving hydraulic performance of the wells against the potential costs of damaging the aged wells. Thus far, spinner log and specific capacity testing conducted before and after the rehabilitation work have quantified performance increases in specific capacity of as much as 30 percent.

- Serving as Technical Lead to provide technical specifications and construction inspection support for the rehabilitation of four municipal water supply wells and pumps located in the Central Valley of California. The wells have not been rehabilitated within the past 20 years, and the removal of calcium carbonate and iron oxide scaling as well as bacterial mass is necessary to increase the specific capacities of the wells. Because the municipality relies heavily on the groundwater portion of its water supply, the project is being phased so that the construction activity does not impede the municipality's ability to meet demand. Thus far, spinner log, specific capacity and wire to water testing conducted before and after the rehabilitation work have quantified performance increases in specific capacity of 16 percent and plant efficiency of 32 percent.

Project Experience – *Water Supply Assessment and Service (cont.)*

- Serving as Technical Lead for evaluating potential hydraulic manipulation evaluation of a municipal water supply well located in the Central Valley of California. The focus of the work is to reduce nitrate concentration at the wellhead by changing how the well draws from strata that contain varying concentrations of nitrate. Vertical flow and concentration profiling data from the well (USGS dye tracer approach) were considered in order to identify a design strategy that would allow the well to be brought back on-line without the use of expensive wellhead treatment. The design strategy entailed well screen modification. Field testing of the design concept entailed step-discharge testing, sequential discharge sampling and packer testing in order to evaluate the potential improvement to water quality and decrease in production capacity associated with the chosen well screen modification design. The testing results proved that well modification will be sufficient to address the water quality issue and no treatment system will be required. Current project activities involve finalizing the well modification.
- Provided technical consultation related to bringing a new municipal water supply well online in the Central Valley of California. At issue were bacterial concentrations (total coliform and heterotrophic place counts). Extended purging, chlorination and cycle testing resulted in approval from the Department of Public Health for bringing the well online.
- Served as Technical Lead to perform an analysis for a county water management agency in northeastern California that determined the applicability of alternative monitoring approaches for compliance with the California Statewide Groundwater Elevation Monitoring (CASGEM) program. Six basins were evaluated and a report consistent with California Water Code requirements was prepared within five weeks to meet a client deadline. The report, first in the state to be accepted by the California Department of Water Resources (DWR), was finalized with only minor revisions after review by the DWR.
- Provided technical review of a draft Environmental Impact Statement prepared in accordance with NEPA for a proposed shale gas hydraulic fracturing project to be performed in a western state. At issue were a variety of concerns related to impacts upon water quantity and quality.
- Served as Technical Lead for an expedited review of well and pumping system conditions for four municipal supply wells located in the Central Valley of California. Issues of interest were 1) reduced production rates over time and 2) potential improvements in water quality through well modification in order to avoid the use of treatment systems. Miniaturized equipment was used to video log the wells in order to perform an initial assessment of well and pumping system condition. The pumps in all four wells were further evaluated by performing wire-to-water testing. Three of the wells were further evaluated by performing flow and concentration profiling (USGS dye tracer approach). The constituents of potential concern were arsenic, uranium, manganese and TDS. The findings were that 1) reduced production rates had resulted from both pump wear and well screen fouling and 2) well modification likely would not significantly improve water quality. The field work and reporting was completed in just under four weeks to meet this client's schedule requirements.
- Provided consultation related to increasing the water supply for a medical facility in northern California. The initial task was to review water development efforts in a limited-access area that had been unsuccessful and to recommend additional efforts in the same area. After reviewing the available information and performing field reconnaissance of the subject area, an alternative course of action was identified. The alternative approach to water development was based upon making a connection, previously missed by others, between pieces of information related to the groundwater availability and pumping system capacity. Once limited pumping capacity was identified as the primary issue, additional work in the remote access area was avoided and a significant water supply was readily developed.
- Served as Technical Lead for evaluating potential hydraulic manipulation of a municipal water supply well located in southern California east of Los Angeles. The focus of the work was to reduce arsenic concentrations at the wellhead by changing how the well draws from strata that contain varying concentrations of arsenic. Vertical flow and concentration profiling data (USGS dye tracer approach) from the well were considered along with other water supply system information in order to identify a design strategy that would allow the well to be brought back on-line without the use of expensive wellhead treatment. The design strategy included a combination of well screen modification and blending of the well discharge with that from two other wells. Field testing of the design concept entailed step-discharge testing, sequential discharge sampling and packer testing in order to evaluate the potential improvement to water quality and decrease in production capacity associated with the chosen well screen modification design. In this case, it was established that the site hydrogeology did not support successful well modification.

Project Experience – *Water Supply Assessment and Service (cont.)*

- Served as Technical Lead for evaluating the potential to hydraulically manipulate a municipal water supply well located in the Central Valley of California. The constituent of concern was arsenic. Vertical flow and concentration profiling data (USGS dye tracer approach) were collected. No additional work related to well modification was performed since it was determined that the distribution of arsenic concentrations in strata located along the well screen was not conducive to well modification.

- Served as Technical Lead for a groundwater supply management analysis for a city in the Central Valley of California. The purpose of the project was to evaluate current production operations and suggest operational guidelines and facility modifications to both maintain required production and protect water quality from a variety of constituents (nitrate, uranium and VOCs).

- Served as Technical Lead for developing an irrigation supply well for an athletic park in a coastal area of northern California. Issues considered included well siting, design and yield, and potential water quality impacts from a nearby municipal wastewater treatment facility. An opinion on the potential affects on the groundwater system with respect to production potential and water quality was also prepared for use in a CEQA analysis.

- Served as Technical Lead for a water supply well source area contamination assessment in the Central Valley of California. The sources and migration pathways related to nitrate and other potential contaminants were evaluated through 1) property and well records review, 2) focused well sampling and 3) isotopic analysis to evaluate the age of water pumped from different screened intervals (USGS dye tracer approach) in the municipal well and fingerprint the source of contamination. The purposes of the assessment were to provide information for 1) designing a wellhead treatment system, 2) addressing groundwater cleanup needs and 3) negotiating with the responsible party (RP) and the Central Valley Regional Water Quality Control Board (RWQCB).

- Served as Technical Lead for a hydrogeologic evaluation of water supply development potential in a basin located near the Central Coast of California. Factors considered included geologic formation and structure of water-bearing strata, groundwater flow patterns, existing well yields, water quality distribution patterns and trends, and hydrogeologic conditions specific to the parcel considered for development. Because the basin was not in a state of overdraft, recommendations were made for site-specific investigation of the parcel.

- Served as Technical Lead for a water quality impact analysis in support of regulatory negotiations regarding plans for increased groundwater pumping by a growing community in the Central Valley of California. At issue was whether additional deep pumping would degrade water quality by causing shallow nitrate contamination to migrate downward in significant quantities. The available data were reviewed and historic conditions under which downward migration of nitrate had occurred were identified. This information suggested that the increased pumping would not cause water quality degradation. Technical negotiations with the State Water Board were conducted and a limited amount of additional hydrogeologic data was collected. The collected data corroborated the original findings and the plans for increased pumping were approved.

- Provided technical review for a hydrogeologic impact assessment of dewatering related to expansion of gravel mining operations in the Central Valley of California. The review entailed comparing the results of two different groundwater modeling studies, explaining differences in results of the two studies, and evaluating these differences within the context of potential impacts to the local groundwater system.

- Served as Senior Hydrogeologist for the preparation of a State loan application/workplan to conduct a feasibility study for supplementing a municipal groundwater-based drinking water supply in the Central Valley of California. The workplan included tasks related to modeling groundwater recharge and wellfield operations, and groundwater management planning under the Groundwater Management Act.

- Served as Senior Hydrogeologist and Project Manager on a water well rehabilitation and maintenance project for a water purveyor in northern California. The initial focus of the project was to develop and implement a course of action to rehabilitate under-performing wells. The second focus of the project was to develop and implement a long-term plan for preserving efficiency and extending the lives of satisfactorily-performing wells by considering the economic life expectancy of each well and specifying data collection requirements for tracking performance. This information was managed using database and economic analysis software.

Project Experience – *Water Supply Assessment and Service (cont.)*

- Served as Senior Hydrogeologist Project Manager for the rehabilitation of a municipal water supply well in northern California. Services included developing specifications for both chemical/mechanical rehabilitation of the well screen and installation of a new pumping system that was compatible with an existing variable-frequency drive.
- Served as Project Manager and Senior Hydrogeologist for a new well and reservoir siting study conducted for a municipality in northern California. The goal of the project was to identify viable sites for the new facilities from the list of surplus city-owned lands. Issues considered included aquifer characteristics, proximity to groundwater contamination, proximity to existing facilities, potential for well interference, site suitability for aboveground facilities, aesthetics, and other criteria.
- Served as Project Manager on the design of pumping and transmission facilities for two new municipal water supply wells on the Central Coast of California. Services included developing equipment and construction specifications, and providing construction and system startup inspection. Timely completion of the project allowed the client to apply for project cost reimbursement from Federal funds.
- Provided consultation regarding the rehabilitation needs of a municipal water supply well located in the Central Valley of California. Services provided included consulting with the client on issues that arose during field implementation of the rehabilitation measures.
- Served as Senior Hydrogeologist for an electronics manufacturing facility siting assessment in western Mexico. Issues related to the quality and reliability of the water supply for the proposed site were considered as part of the assessment.
- Served as Senior Hydrogeologist for assessing conditions for developing a groundwater supply for a fruit processing facility located in the northern Central Valley of California. The local groundwater quality was poor, and a well was designed to maintain efficiency and integrity under anticipated use scenarios. Requirements for the well installation and related water treatment system construction were specified in accordance with the California Department of Health Services Office of Drinking Water.
- Developed and installed groundwater and surface water level measurement instruments for a watershed monitoring project in southwestern Mexico. The work was part of a larger malaria control research project.
- Evaluated potential impacts on groundwater supplies related to a proposed land development project on the Central Coast of California. Available hydrogeologic data were reviewed within the context of plans for groundwater withdrawal related to the development. Potential reductions in water availability were identified, and recommendations were made to further assess the degree of impact.
- Performed data collection and interpretation for groundwater resource evaluations in eastern South Dakota. Glacially derived aquifers were delineated and characterized in support of agricultural water supply development.

Wastewater

- Serving as Technical Lead related to renegotiation of WDRs for a cheese plant in southern California east of San Diego. The project is driven by changes in the wastewater stream. Tasks performed include 1) characterization of the wastewater quantity and quality, 2) preparation of a Report of Waste Discharge and a Nutrient/Salt Management Plan, and 3) contribution of various types of information and insights to support infrastructure modifications at the facility. Negotiation with the Colorado River Basin RWQCB on the WDR modification is in-process.
- Serving as Technical Expert reviewing and commenting on draft language for a General Order and WDRs regarding the Irrigated Lands Regulatory Program that has been prepared by the Central Valley RWQCB.
- Served as Project Manager for an environmental site assessment conducted on a 150-acre mixed-use/agricultural parcel located in the Central Valley of California. The purpose of the assessment was to facilitate acquisition of the parcel for expansion of wastewater land application operations at a food processing facility. Accordingly, the list of details for the assessment was expanded to address the intended use of the parcel.

Project Experience – *Wastewater (cont.)*

- Served as Technical Lead for planning and analysis related to technical and regulatory aspects of performing surface and groundwater drainage in a coastal area of northern California. Issues considered include potential rates of drainage, surface water quality, septic discharges and permissible ocean discharges.
- Served as Technical Lead related to renegotiation of WDRs for a dairy in southern California east of San Diego. The project was driven by changes in both the wastewater stream and the lands to which the water would be discharged. Tasks performed include 1) completion of a water use audit that resulted in a 40% reduction in wastewater production, 2) preparation of a Nutrient Management Plan and an Engineered Wastewater Management Plan that were accepted by the RWQCB in initial form, 3) contribution of various types of information and insights that supported infrastructure modifications at the facility, and 4) expedited negotiation with the RWQCB on the WDR modification.

Groundwater Modeling and Optimization Analysis

- Served as Technical Lead for a prospective performance evaluation of a new wastewater storage pond liner technology proposed at a dairy in the Central Valley of California. Information on site conditions and planned pond design were used to construct a groundwater flow and transport model. A range of estimated seepage rates through the liner were simulated with the model in order to evaluate potential impacts to shallow groundwater quality. The evaluation was used to finalize construction requirements and permitting details for the new wastewater pond.
- Served as Technical Lead for a probabilistic cost analysis regarding the remediation of a commercial property in the Central Valley of California that was impacted by chlorinated volatile organic compounds. Site conditions were somewhat uncertainty because only preliminary characterization of soil, soil gas and groundwater had been performed. The set of tasks required to perform the cleanup were identified and cost ranges were estimated based upon the existing uncertainties. A Monte Carlo analysis was performed to evaluate the range in total project cost and the probabilities of occurrence for costs within the range. The results provided a cost-benefit basis for the potential purchaser of the property to make decisions regarding site management.
- Served as Technical Lead for sea water intrusion and groundwater/surface water interaction modeling studies. The work considered past and potential future effects of groundwater extraction for irrigation upon flow and water quality in a river and estuary on the Central Coast of California. Technical aspects of this work were assessing buried channel geometry and hydraulic properties from the wide range of available data, and evaluating the simultaneous effects of groundwater pumping and spring tide occurrence. Detailed transient models that included several river reaches and hourly tidal variations were created based upon previously available information and data collected for this project. The work was used to support negotiations with the California Department of Fish and Game and, ultimately, hearings at the State Water Resources Control Board.
- Served as Technical Lead for flow and transport modeling conducted to evaluate the source of nitrate contamination to a municipal water supply well located in the Central Valley of California. The model was calibrated using the results of 1) a 30-day pumping test and 2) flow and concentration profiling performed on the impacted municipal supply well. Important aspects of the modeling were 1) simulating the contaminant plume response to different historical pumping periods and 2) including the effects of a nearby improperly constructed water supply well that acted as a vertical conduit.
- Served as Technical Lead for hydrogeologic analysis and development of software for the prediction of groundwater quality impacts resulting from operations at a northern California facility. The software used historic and projected facility operations to predict sourcing and migration of tritium in groundwater. A flow and transport code was developed to simulate advection, dispersion, decay and other processes particular to the site that are not included in standard modeling packages (in-place constituent mass creation and rate-limited mass transfer at multiple spatial scales). Once calibrated, the model was used to evaluate the impacts of various future operations scenarios within the context of making facilities management and regulatory negotiation decisions.

Project Experience – *Groundwater Modeling and Optimization Analysis (cont.)*

- Served as Technical Advisor for modeling performed in support of a feasibility study regarding groundwater cleanup in the Central Valley of California. Flow and transport modeling were performed to evaluate contaminant plume movement under different remedial pumping scenarios. Of particular importance in this work were the effects of many water supply wells located near the plume and flows between vertically adjacent water-bearing zones.
- Served as Technical Lead for a study that developed conjunctive use strategies and wellfield operational rules related to meeting future municipal water supply requirements of a growing community in the Central Valley of California. The project entailed developing a groundwater flow model that included 1) the operations of wellfields run by two adjacent communities and 2) groundwater-surface water interactions. Once calibrated, the model was linked to optimization tools in order to cost effectively evaluate a range of operational scenarios. At issue was how to meet projected higher demands without mobilizing contaminants (naturally occurring total dissolved solids and two plumes containing VOCs and pesticides) that would result in increased future treatment costs. Results of the study included wellfield operations guidelines, suggested maximum extraction schedules, and proposed coordination of wellfield operations by the two adjacent communities. The model was extended in time and recalibrated four years later. Future plans are to use the model as part of water supply planning for city expansion.
- Served as Technical Lead on a groundwater management study performed to support remedial design for a landfill site in Arizona. Remedial designs necessary to accommodate Groundwater flows resulting from present and future water supply management practices were evaluated with a groundwater model developed for the project. The goal of the work was to develop designs that were both economically viable and able to contain the leachate plume as water supply pumping and basin recharge practices changed.
- Served as Senior Hydrogeologist for a feasibility study and remedial action at an industrial site in the Central Valley of California. The project was reviewed by the California Department of Toxic Substances Control (DTSC) and entailed hydrogeologic analysis and groundwater modeling to mitigate impacts to a water supply wellfield by VOCs. Evaluating and implementing wellhead treatment as the remedial approach entailed accounting for both seasonal variations in wellfield pumping demand and economic constraints on performance of the project. Use of automated/optimization techniques for assessment of design options streamlined the modeling process and reduced project expenditures. The work also included developing a cost-effective monitoring program for the remedial action.
- Served as Senior Hydrogeologist for a remedial action at a decommissioned research facility located in northern California. The project was reviewed by the EPA, DTSC, and the Central Valley RWQCB. It included hydrogeologic analysis and modeling to mitigate impacts to groundwater and nearby irrigation supply wells by VOCs, and litigation support. This work supported preparation of an Engineering Evaluation/Cost Analysis and an Interim Remedial Action, and favorable settlement of the litigation matter. The work also included an assessment of rehabilitation needs for injection wells used in the remedial action.
- Served as Technical Lead for an assessment of potential VOC, SVOC and metals concentrations in groundwater at an industrial facility located in northern California. The project, reviewed by the EPA, DTSC, and National Oceanic and Atmospheric Administration, entailed modeling groundwater transport of constituents of potential concern and mixing of the constituents with surface waters. The concentration predictions were used to support performance of ecological and human health risk assessments.
- Served as Technical Lead on a groundwater supply management study for a mining operation located in the western United States. The focus of the project was exploring options for both meeting water production requirements and capturing impacted water while accounting for restrictions related to water rights and well/transmission line capacity limits. Use of automated/optimization techniques for assessing options streamlined the process and allowed a more detailed study to be conducted with a limited budget.
- Served as Technical Lead for an evaluation of groundwater drainage rates and volumes resulting from a planned tunnel construction project in the Sierra Nevada of California. A spreadsheet model was constructed to simulate transient drainage from fractured host rock surrounding the planned tunnel construction. Best- and worst-case estimates of the drainage rates and volumes were prepared to support plans for removal of suspended solids from the water prior to discharge.

Project Experience – *Groundwater Modeling and Optimization Analysis (cont.)*

- Provided consultation regarding the feasibility of modeling groundwater flow and solute transport in an alluvial valley located in the western United States. Flow in the valley has been increasingly influenced by water supply pumping. Key elements for conducting the assessment were development of a complete conceptual model of how groundwater flow patterns have changed over time, and identifying a viable approach for model calibration.
- Served as Senior Hydrogeologist to develop a remedial approach for an industrial site in Nevada impacted by chlorinated VOCs. Groundwater modeling was used as a planning tool for phased implementation of a pumping system to address remediation requirements for the 7,000-foot-long plume. The plume was present throughout the saturated alluvium in a small valley, and viable remedial pumping designs are highly sensitive to available drawdowns and potential dewatering. Use of automated/optimization techniques for model calibration and design development streamlined the modeling process and reduced project expenditures.
- Supported development of technical strategy and provided senior review for groundwater modeling performed for remedial investigation/feasibility study and litigation tasks related to a site in Oregon impacted by chlorinated VOCs. Hydrogeologic analysis involved accounting for the effects of nearby water supply well pumping on VOC transport in the vicinity of the site. Automated/optimization techniques were developed and demonstrated to streamline the modeling process.
- Evaluated an optimization model for cost-effective disposal of dredging wastes for potential application to San Francisco Bay. The evaluation was performed for the ACE. Methods were developed for applying the model to problems that included constraints imposed by environmental regulations. A result of the evaluation was the determination that increased permitting fees might not change disposal patterns within the Bay.
- Analyzed transient hydraulic head data collected during soil boring to estimate the hydraulic conductivity and potential solute migration rates for a petroleum site in Oregon. The analysis entailed developing a mathematical model for assessing slug test data in a three-dimensional flow field. Performance of the analysis reduced project costs by providing migration rate information without installation of monitoring wells.
- Conducted a modeling study for the DOE to determine the effect of spatially variable solute adsorption on groundwater solute concentration predictions. This included use of statistical techniques to increase the reliability of the transport predictions. These techniques have recently been used on other projects to defend conclusions that are based upon model predictions.
- Developed pump-and-treat designs for capturing organic and heavy metal compounds at an impacted groundwater site in Canada. The design involved development of a site-specific model of groundwater flow and solute transport for prediction of exposure point concentrations and application of optimization techniques for developing designs. The designs involved minimum capital and recurring remediation costs. Reliability of concentration predictions upon which the designs were based was demonstrated through application of statistical techniques.

Modeling, statistical analysis, and database management tasks performed by Mr. Gailey on many of the above-referenced projects have entailed use of software including Groundwater Vistas, MODFLOW, MODPATH, MT3D, SEAWAT, RT3D, MOC, Bioscreen, Bioplume II/III, SUTRA, PEST, LINDO, STARPAC, GEOEAS, NPSOL, AQMAN, Visual MODFLOW, GMS, ModelCad and GIS/Key.

Groundwater Remediation

- Provided technical support on subsurface characterization, modeling and reporting for a solvent contamination site in southern California. Much of the work focused on addressing technical challenges posed by the hydrogeologic setting (structurally deformed, fractured sedimentary rock). The project included significant scientific contributions in the areas of field characterization and groundwater flow modeling.

Project Experience – *Groundwater Remediation (cont.)*

- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activities (groundwater and soil vapor extraction) and monitoring progress toward cleanup for a multiparty, subregional plume of chlorinated VOCs. Reporting and interaction with the San Francisco Bay RWQCB involved completing semi-annual Self Monitoring Reports. Recent activity also included conducting a Five-Year Remedial Effectiveness Evaluation. Documenting and emphasizing the effects of impediments to pump-and-treat and naturally occurring biodegradation were important aspects of this project with respect to limiting future remedial requirements.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activity (groundwater extraction) and monitoring progress toward cleanup for a plume of chlorinated VOCs. Reporting and interaction with the North Coast RWQCB involved completing semi-annual Self Monitoring Reports. Other project work also included reassessment of the hydrogeology and the approach to groundwater extraction with the goal of increasing project efficiency.
- Served as Principal Hydrogeologist for evaluating the results of shutting down a groundwater extraction system at an industrial site located in northern California. The San Francisco RWQCB approved remedial system shutdown on a temporary basis because (1) on-going pump-and-treat efforts had resulted in only limited progress toward attaining remedial goals and (2) there was evidence that naturally occurring biodegradation may have prevented plume migration. The project entailed evaluating the groundwater data (elevations as well as VOC and inorganic water chemistry) for pre- and post-shutdown periods. A convincing case for VOC degradation was made based on spatial data trends. A case for plume stabilization was also been made based on temporal data trends. Accounting for the effects of concentration rebound after pumping and plume migration from the source area was an important consideration for future site monitoring in order to assess whether the plume front was stable.
- Served as Principal Hydrogeologist for proposing monitored remedial system shutdown at an industrial site in northern California. The proposal to the North Coast RWQCB included a workplan for collecting the necessary groundwater data to demonstrate the effects of naturally occurring biodegradation of VOCs in groundwater.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed enhancing remedial activities (groundwater and soil vapor extraction) for a plume of chlorinated VOCs. Reporting and interaction with the DTSC involved conducting expedited conceptual and engineering design for expansion of a remedial system. Plans were also been developed for collecting data to document the potential effects of naturally occurring biodegradation in order to limit future remedial requirements. This work was conducted within the context of negotiating a Prospective Purchaser Agreement for an adjacent parcel that was impacted by the plume.
- Served as Principal Hydrogeologist for ongoing remedial action at an industrial site located in northern California. The project entailed conducting remedial activity (groundwater extraction) and monitoring progress toward cleanup for a specific site within a multiparty, subregional plume of chlorinated VOCs. Reporting and interaction with the EPA involved semi-annual Self Monitoring Reports. Recent activity also included reevaluating measures for maintaining a site-specific capture zone given that remedial activities were also occurring on adjacent sites.
- Served as Lead Hydrogeologist for remedial action design related to petroleum-impacted groundwater near residential water supply wells in central California. The constituents of concern included MTBE, and the Central Valley RWQCB conducted a detailed review of the Remedial Action Plan. The potential effects of residential well pumping were factored into the remedial pumping design so that containment of the constituents of concern was achieved and the water supplies were protected.
- Served as Senior Hydrogeologist for a fate and transport analysis related to petroleum-impacted groundwater near residential water supply wells in Alaska. The effects of naturally occurring biodegradation were incorporated into the analysis and supported the conclusion that risk to the water supplies was low.
- Served as Senior Hydrogeologist for a remedial investigation and action at an industrial facility in central California. The project was reviewed by the Central Valley RWQCB. It included hydrogeologic analysis, historical review, and negotiation to define remedial action requirements and allocate responsibility among responsible parties.

Project Experience – *Groundwater Remediation (cont.)*

- Served as Project Manager and Senior Hydrogeologist for a subsurface investigation of an air cargo facility at the San Francisco International Airport. The project was reviewed by the RWQCB and parties involved in cost allocation for cleanup of petroleum-impacted groundwater and soil. Evaluation of subsurface impacts and recommendation of future actions was conducted within the context of maintaining current business activities at the site and deferring any intrusive remedial activities until an appropriate time in the future.

- Served as Senior Hydrogeologist for a landfill closure in Mexico City, Mexico. Tasks performed included acquiring data on potential leachate production rates and recommending design parameters for a leachate collection system. Collection of the leachate was required to facilitate the next step of the closure, extraction of accumulated landfill gas.

- Served as Senior Hydrogeologist for a five-year review and remedial effectiveness evaluation of a groundwater cleanup operation in northern California. The project entailed evaluation of remedial performance data for six groundwater extraction systems installed in alluvial sediments and was reviewed by the San Francisco RWQCB. Key points considered during the evaluation were hydraulic containment of the chlorinated VOC groundwater plume, cumulative removal of groundwater and VOCs, VOC removal efficiency, offsite sources of VOCs, and the potential for attaining cleanup goals set by the RWQCB. Presentation of the project findings positioned the client well for negotiation on further remedial actions.

- Provided technical/economic analysis and technical review for remedial investigations/ feasibility studies involving three industrial sites owned by a single client in southern California. The work was performed under the review of the DTSC. Project findings were used to develop estimates of cleanup cost and facilitate completion of real estate transactions for the benzene-impacted properties. Detailed evidence of naturally occurring biodegradation was developed and used to limit the extent of cleanup measures that were considered.

- Served as Senior Hydrogeologist for a remedial investigation conducted at a commercial site in northern California. The investigation was performed under review of the San Francisco Bay RWQCB. Communication with the RWQCB on technical aspects of the investigation prior to commencing work positioned the client well for negotiations on further investigative requirements. The option for cost recovery was developed by maintaining consistency with the National Contingency Plan during the remedial investigation and interim remedial action, and by presenting arguments for the presence of off-site sources of chlorinated VOCs. Potential off-site source areas were identified, and arguments for requiring subsurface investigation by neighboring parties were supported through an analysis of site hydrogeology and migration potential. The arguments were presented and defended to the RWQCB. The ultimate goal of this effort is to identify other parties also responsible for the cleanup so that costs may be shared.

- Served as Project Manager and Senior Hydrogeologist for a soil and groundwater remedial investigation/feasibility study and an ecological river assessment conducted at a decommissioned wood treatment facility in Michigan. Creosote was present at the facility as a dense nonaqueous phase liquid. Negotiations with state regulatory agencies were key to successfully limiting the scopes of the investigations. Early data review allowed expeditious performance of the site characterization and development of a risk assessment strategy that both met regulatory requirements and was protective of client cleanup liability. The quality of the site characterization work contributed to the cooperative relationship between the client and regulatory agency, which reduced the potential for natural resource damage claims by the state.

- Performed remedial investigations and developed site closure arguments for petroleum sites in California, Florida, Massachusetts, and Rhode Island. The work in California was performed under the review of the Kern County Department of Environmental Health. Site closure arguments were accepted in all four states.

- Performed an emergency investigation, and designed, installed, and maintained a petroleum recovery system in response to a high-volume spill of diesel fuel into the subsurface at a commercial site in Massachusetts. Implementation of interim petroleum recovery measures minimized petroleum migration away from the source area. During the first year of recovery system operation, 25,000 gallons of fuel were recovered. System enhancements were then made to maintain recovery rates. Project costs were defrayed by reuse of the recovered fuel.

Project Experience – *Groundwater Remediation (cont.)*

- Designed, installed and maintained numerous petroleum and groundwater recovery systems in several states. This work also included evaluation of overall remedial effectiveness and the benefits of using groundwater infiltration systems to enhance petroleum recovery. Work in California was performed under review of the Central Valley RWQCB.
- Performed site assessments for real estate transactions involving retail petroleum, commercial, and industrial sites throughout California and Massachusetts. The assessment findings were used to facilitate completion of the transactions.

Litigation Support

- Recent cases in which Mr. Gailey has been declared as an expert:
  - RF Land Inc. v. City of Ripon (California) 2010
  - Raymond Coldani v. Jack Hamm and Patricia Hamm (Federal 2009)
  - NCH Corporation v. Hartford Accident and Indemnity Company, et al. (New Jersey)
    Deposition testimony in 2007
  - Union Bank of California v. Rheem Corp. (California), 2006
  - Pinal Creek Group v. Newmont Mining Corp., et al. (Federal – Arizona)
    Deposition testimony in 2003 and 2006
- Serving as a Technical Consultant regarding responsibility for VOC contamination of a municipal water supply well. The case is being heard in the California courts.
- Served as an expert witness regarding financial responsibility for nitrate contamination of a municipal supply well from an industrial facility in northern California. Contributions included planning both data collection from the impacted well and inspection of the industrial facility, as well as presenting findings during mediation. The case, filed in the California state court system, ultimately settled.

Project Experience – *Litigation Support (cont.)*

- Served as an expert witness regarding responsibility for nitrate contamination of groundwater in the vicinity of a dairy in northern California. Work on the case, filed under the Clean Water Act in the California state court system, involved field investigation and analysis, mediation support and presentations, and preparing a technical declaration in support of a motion for recovery of attorney/expert fees and costs. The case was ultimately rescinded.
- Served as an expert witness regarding cost recovery and future apportionment among RPs for cleanup of a large acid mine drainage site in Arizona. The case involved several RPs active over almost a century and located throughout a mining complex, had been filed under CERCLA, and was heard in the federal court system. Expert analysis included a comprehensive consideration of the site hydrogeology and historic mining activities, and flow calculations (water budgets and mass balance assessments on surface water and groundwater flows, and three-dimensional groundwater flow modeling) to assess the relative contributions to the acid plume by various RPs. Video taped deposition testimony was given twice.
- Served as an expert witness regarding insurance coverage claims related to cleanup of a Superfund site. The case was filed under CERCLA and heard in the New Jersey state court system. Analysis and opinion development focused on hydrogeologic and regulatory factors that would influence the ultimate cost of the cleanup. Methods for incorporating uncertainty into the cost estimates was also addressed. Deposition testimony was given. Issues related to the above-referenced opinions were subsequently dropped from the case.
- Served as an expert witness regarding cost recovery for a former electronics manufacturing facility. The case was filed under CERCLA and heard in the California state court system. Analysis and opinion development focused on hydrogeologic factors that controlled both the duration of release to groundwater and the extent of subsequent off-site migration. The case settled before any testimony was given.

Project Experience – *Litigation Support (cont.)*

- Served as a consultant regarding a CERCLA claim for damages related to a release of contamination into a San Francisco Bay Area aquifer that serves a large population of individual well owners (residential and agricultural). The case, filed by a class of plaintiffs, involves releases from a single industrial parcel where multiple RPs operated over time and was heard in the federal court system. Consultation has included document review, quantitative analysis related to the extent of contamination and potential cleanup timeframe, mediation brief preparation, development of computer animation visual aids for mediation discussions, and presentation at mediation.
- Provided consultation for mediation of cleanup cost allocation for petroleum-impacted groundwater and soil at the San Francisco International Airport. The project involved research and strategy development focused on supporting negotiations with some twenty responsible parties.
- Provided consultation for legal defense against a claim concerning financial responsibility for contamination of residential and agricultural water supplies and soil. The case involved two adjacent parcels in northern California, was filed under CERCLA, and heard in the federal court system. Data analysis and discussions with attorneys focused on the plausibility of claims made by the plaintiff with respect to source area locations, site hydrogeology and migration potential of the constituents, and differences in signature assemblages of constituents present at each of the two sites. The case settled before any testimony was given.
- Provided consultation for legal defense against a claim concerning financial responsibility for petroleum and heavy metals present in soil and groundwater. The case involved two adjacent industrial parcels in northern California, was filed under CERCLA and heard in the federal court system. Data analysis and development of arguments focused on the plausibility of claims made by the plaintiff with respect to source area locations, site hydrogeology and migration potential of the constituents, and differences in signature assemblages of constituents present at each of the two sites. The arguments prepared supported successful opposition to motions made by the plaintiff for widespread inspection of the defendant's property, settlement discussions, and the defendant's motion for summary judgment. Prior to a settlement being reached, Mr. Gailey participated in settlement discussions and preparing the expert witness for trial.
- Provided consultation for legal defense against a claim concerning financial responsibility for petroleum contamination at two adjacent retail/industrial parcels in northern California. Data analysis and development of arguments focused upon the adequacy of previously implemented remedial actions for which the plaintiff sought compensation. The technical merits of written arguments developed for the defense resulted in the plaintiff's claim being rescinded prior to the case being heard in court.
- Served as an expert witness for a defendant regarding a cost recovery claim concerning petroleum and chlorinated VOCs present in soil and groundwater. The case was filed under CERCLA and heard in the federal court system. It involved a single property in northern California, an initial owner-operator (the plaintiff), and a subsequent series of occupants (the codefendants). Data analysis and development of written arguments focused on both changes in the chemical composition of materials used for automotive fueling and repair between the 1940s and the 1980s, and the appropriate allocation of cost for site cleanup among the involved parties. Estimation of total cost for the cleanup was also performed. 1,2-Dichloroethane (DCA) was identified as a signature compound for releases to the environment that occurred before the codefendants occupied the site. Data collected by the plaintiff demonstrated that DCA was present across the property and supported arguments that the plaintiff was also responsible for the cleanup. The case settled before any testimony was given.
- Provided consultation in support of a class action suit against the state of California concerning a levee failure. Three-dimensional transient groundwater flow and soil mechanical processes were modeled to show that departure from guidelines for levee maintenance could have caused the failure. Mr. Gailey defended the modeling work in deposition. This work supported testimony of the expert witness.

Insurance Analysis Support

- Conducted a comprehensive assessment and estimation of future remediation costs in support of insurance premium pricing for a cost cap policy on two sites. Annual costs over the life of the policy were developed for three possible scenarios (high, medium, and low costs) based on detailed review and consideration of project characteristics. These characteristics included technical (engineering and science), regulatory and logistical issues. The results were presented and discussed during negotiations between the insurance company and insurance brokers over premium price.

Project Experience – *Insurance Analysis Support (cont.)*

- Conducted several assessments of remediation projects in support of insurance claims analyses. The overall approach and effectiveness of remedial actions were evaluated. In addition, costs incurred were identified and categorized with respect to policy coverage and exclusion categories. General projections of future costs and timelines were also prepared.

Education

MBA, University of California, Berkeley, 2003.
MS, Applied Hydrogeology, Stanford University , 1991.
BS, Geology/Biology, Brown University, 1985.

Professional Certifications and Registrations

Professional Geologist, California No. 5338
Certified Hydrogeologist, California No. 259
40-Hour OSHA HAZWOPER Safety Training
8-Hour OSHA HAZWOPER Refresher/Respirator Fit Test
8-Hour OSHA Site Supervisor Certification
First Aid/CPR Training

Continued Education

Isotope Methods for Groundwater Investigation, Groundwater Resources Association of California, 2007
Endangered Species Acts: Meeting the Challenges, Association of California Water Agencies, 1999
Groundwater Use and Management, University of California at Berkeley Extension, 1998
Drinking Water Regulation, University of California at Berkeley Extension, 1998
Water Supply and Fish in the Sacramento-San Joaquin Delta, University of California at Berkeley Extension, 1997
Managing Groundwater into the 21st Century, Association of California Water Agencies, 1997
Watershed Management and Source Water Protection: The First Barrier, American Water Works Association, 1997
Aquifer Storage and Recovery, American Water Works Association, 1997
Graduate Study in Environmental Engineering, Stanford University, 1990
Surveying, Wentworth Institute of Technology, 1986

Professional Memberships and Activities

Association of Ground Water Scientists and Engineers
Groundwater Resources Association of California
Technical reviewer for various journals

Publications

Gailey, R.M. 2000. Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA Site. Proceedings of the International Symposium On Integrated Water Resources Management, International Association of Hydrological Sciences.

Gailey, R.M. 1999. Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA site. Proceedings of the 26th Annual Conference on Water Resources Planning and Management, American Society of Civil Engineers. (Published on compact disc.)

Gailey, R.M. and M. Eisen. 1997. An Optimization-based Evaluation for Groundwater Plume Containment and Water Supply Management at a California EPA Site. p. 138. In: proceedings of XXVIIth IAHR Congress, Water for a Changing Global Community, Theme C: Groundwater An Endangered Resource.

Brogan, S.D. and R.M. Gailey. 1995. A method for estimating field-scale mass transfer rate parameters and assessing aquifer clean-up times. Ground Water 33 (6) 997-1009.

Gailey, R.M. and S.M. Gorelick. 1993. Optimal, reliable plume capture schemes: application to The Gloucester Landfill groundwater contamination problem. Ground Water 31 (1) 107-114.

Gailey, R.M., A.S. Crowe, and S.M. Gorelick. 1991. Coupled process parameter estimation and prediction uncertainty using hydraulic head and concentration data. Advances in Water Resources 14 (5) 301-314.

Publications (cont.)

Gailey, R.M. and D.E. Jones. 1987. The use of sediment permeability variations in the performance of petroleum recovery from glacial sediments. p. 515. In: Proc. of the Focus on Eastern Regional Groundwater Issues, National Water Well Association.

Presentations

A Case for Alternative Groundwater Monitoring under CASGEM in Northeastern California. Session Speaker, Groundwater Resources Association of California, 21st Annual Meeting and Conference, California Groundwater: Data, Planning and Opportunities, October 4 and 5, 2012, Rohnert Park, California.

Water Supply Well Rehabilitation Methods: Alternatives and Successes. Invited Speaker, Groundwater Resources Association of California Managing Wells in California and Protecting Groundwater Resources Symposium, August 22 and 29, 2012, Sacramento, California.

Factors Affecting Nitrate Concentrations in Water Supply Wells. 28th Biennial Groundwater Conference and 20th Annual Meeting of the Groundwater Resources Association of California, California's Water's Future Goes Underground, October 5-6, 2011, Sacramento, California.

Identifying the Sources of Nitrate to a Deep Municipal Water Supply Well Using Stable Isotopes of Nitrate, Groundwater Age Dating and Depth-Specific Sampling. Copresenter with Brad Esser, Groundwater Resources Association of California Environmental Forensics Symposium, April 12, 2011, Irvine, California.

Reducing Arsenic Concentrations from a Municipal Supply Well through Well Screen Modification. Invited Speaker, Arsenic Symposium: Treatment Alternatives and Case Studies, December 8-10, 2009, Bakersfield, Barstow and Ontario, California.

Simulating Flow and Transport Uncertainty Associated with Water Supply Well Modification Based upon Well Profiling and Pumping Test Data. Coauthor with Grace Su, 2010 National Groundwater Association Groundwater Summit, April 12-14, 2010, Denver, Colorado.

Reducing Arsenic Concentrations from a Municipal Supply Well through Well Screen Modification. Invited Speaker, Arsenic Symposium: Treatment Alternatives and Case Studies, December 8-10, 2009, Bakersfield, Barstow and Ontario, California.

Considering the Consumption of Energy and Other Resources during Pumping at the Well and Wellfield Scales. Invited Speaker, 27th Biennial Groundwater Conference and 18th Annual Meeting of the Groundwater Resources Association of California, Water Crisis and Uncertainty: Shaping Groundwater's Future, October 6-7, 2009, Sacramento, California.

Planning Combined Municipal Use of Groundwater and Surface Water: Technical and General Results from a Case Study. Session Speaker, Groundwater Protection Council Annual Forum 2009, Water/Energy Sustainability Symposium – Water and Energy Policy in the 21st Century, September 13-16, 2009, Salt Lake City, Utah.

Optimal Conjunctive Use of Surface Water and Groundwater Resources: A Tale of Two Cities. Session Speaker and Symposium Co-Chair, Applications of Optimization Techniques to Groundwater, a Groundwater Resources Association of California Symposium, October 16, 2008, Sacramento, California.

Details of Optimization and Applications to Groundwater Projects. Course Instructor and Co-Chair, a Groundwater Resources Association of California Short Course, October 15, 2008, Sacramento, California.

Application of a Simulation-Optimization Approach for Water Supply Wellfield Management and Plume Containment. Session Speaker, Groundwater Resources Association of California, 13th Annual Meeting and Conference, Managing Aquifers for Sustainability – Protection, Restoration, Replenishment, and Water Reuse, September 23-24, 2004, Rohnert Park, California.

Application of Mixed-Integer Linear Programming Techniques for Water Supply Wellfield Management and Plume Containment at a California EPA site. Session Speaker, International Association of Hydrological Sciences, International Symposium On Integrated Water Resources Management, April 9-12, 2000, Davis, California.

Application of Mixed-Integer Linear Programming Techniques for Water Supply Well Fixed Management and Plume Containment at a California EPA site. Session Moderator and Speaker, American Society of Civil Engineers Water Resources Planning and Management Division Annual Conference, June 6-9, 1999, Tempe, Arizona.

Presentations (cont.)

Wellfield Optimization: A Case Study. Session speaker, American Water Works Association, California-Nevada Section, Fall Conference, October 6-9, 1998, Reno, Nevada.

A Linear Programming Application for Water Resource Management at a Mining Operation. Session speaker, 25th Annual Conference on Water Resources Planning and Management, American Society of Civil Engineers, June 7-10, 1998, Chicago, Illinois.

Water Disposal Concerns with a Well Rehabilitation Project. Invited Speaker, American Water Works Association, California-Nevada Section, Water Well Monitoring and Rehabilitation Seminar, May 20-21, 1998, Stockton, California.

Quantifying Rate-Limited Mass Transfer Effects in the Field: Challenges Faced by Environmental Science Practitioners. Session speaker, American Geophysical Union Fall Meeting, December 8-12, 1997, San Francisco, California.

An optimization-based evaluation for groundwater plume containment and water supply management at a California EPA site. Session speaker, American Water Resources Association Annual Conference and Symposium on Conjunctive Use of Water Resources: Aquifer Storage and Recovery, October 19-23, 1997, Long Beach, California.

An optimization-based evaluation for groundwater plume containment and water supply management at a California EPA site. Session speaker, XXVII in IAHR Congress, Water For A Changing Global Community, August 10-15, 1997, San Francisco, California.

A method for estimating field-scale mass transfer rate parameters and predicting aquifer clean-up times. Session speaker, 1994 Groundwater Modeling Conference, August 10-12, 1994, Fort Collins, Colorado.

Design of optimal, reliable groundwater capture schemes. Session speaker, solving Ground Water Problems with Models, February 11-13, 1992, Dallas, Texas.

Design of optimal, reliable groundwater capture schemes. Lecturer, National Research and Development Conference on the Control of Hazardous Materials, February 4-6, 1992, San Francisco, California.

Design of optimal, reliable plume capture schemes: application to the Gloucester Landfill. Invited speaker, American Geophysical Union Fall Meeting, December 9-13, 1991, San Francisco, California.

The use of sediment permeability variations in the performance of petroleum recovery from glacial sediments. Session speaker, Focus on Eastern Regional Groundwater Issues, July 14-16, 1987, Burlington, Vermont.

Presentations on aspects of quantitative hydrogeology at the U.S. Geological Survey, Lawrence Berkeley National Laboratory, California Department of Water Resources, and universities (California State University at Sacramento, Harvard, Stanford, and the University of Illinois).

APPENDIX B

CALCULATIONS ON UNSATURATED ZONE TRANSIT TIME AND WATER QUALITY IMPACTS TO FIRST-ENCOUNTERED GROUNDWATER

APPENDIX B

CALCULATIONS ON UNSATURATED ZONE TRANSIT TIME AND WATER QUALITY IMPACTS TO FIRST ENCOUNTERED GROUNDWATER

Unsaturated zone transit time calculations were performed for representative locations within the KRWCA area. This work was accomplished in collaboration with a soil and agricultural scientist hired by the KRWCA (Joel Kimmelshue). From a larger evaluation conducted by Mr. Kimmelshue, entitled Kern River Watershed Coalition Authority Agricultural Return Flow and Nitrogen Transport Estimates and Comparisons, three locations were selected for evaluation (Figure B1). The salient details of each location are presented below.

- Location 1
  - Crop: citrus
  - Irrigation method: drip/micro
  - Soil: medium-grained
  - Return flow: 2.3 inches per year
  - Nitrogen lost below root zone: 15 pounds per acre per year
  - Unsaturated zone stratigraphy: loam in shallow subsurface transitioning to clay at depth
  - Depth to first-encountered groundwater: 500 feet
- Location 2
  - Crop: almonds
  - Irrigation method: drip/micro (90%) & flood (10%)
  - Soil: coarse-grained
  - Return flow: 5.0 inches per year
  - Nitrogen lost below root zone: 15 pounds per acre per year
  - Unsaturated zone stratigraphy: interlayered sand and clay
  - Depth to first-encountered groundwater: 330 feet
- Location 3
  - Crop: cotton/wheat
  - Irrigation method: furrow/border
  - Soil: coarse-grained
  - Return flow: 16.4 inches per year
  - Nitrogen lost below root zone: 55 pounds per acre per year
  - Unsaturated zone stratigraphy: interlayered sand and clay
  - Depth to first-encountered groundwater: 150 feet

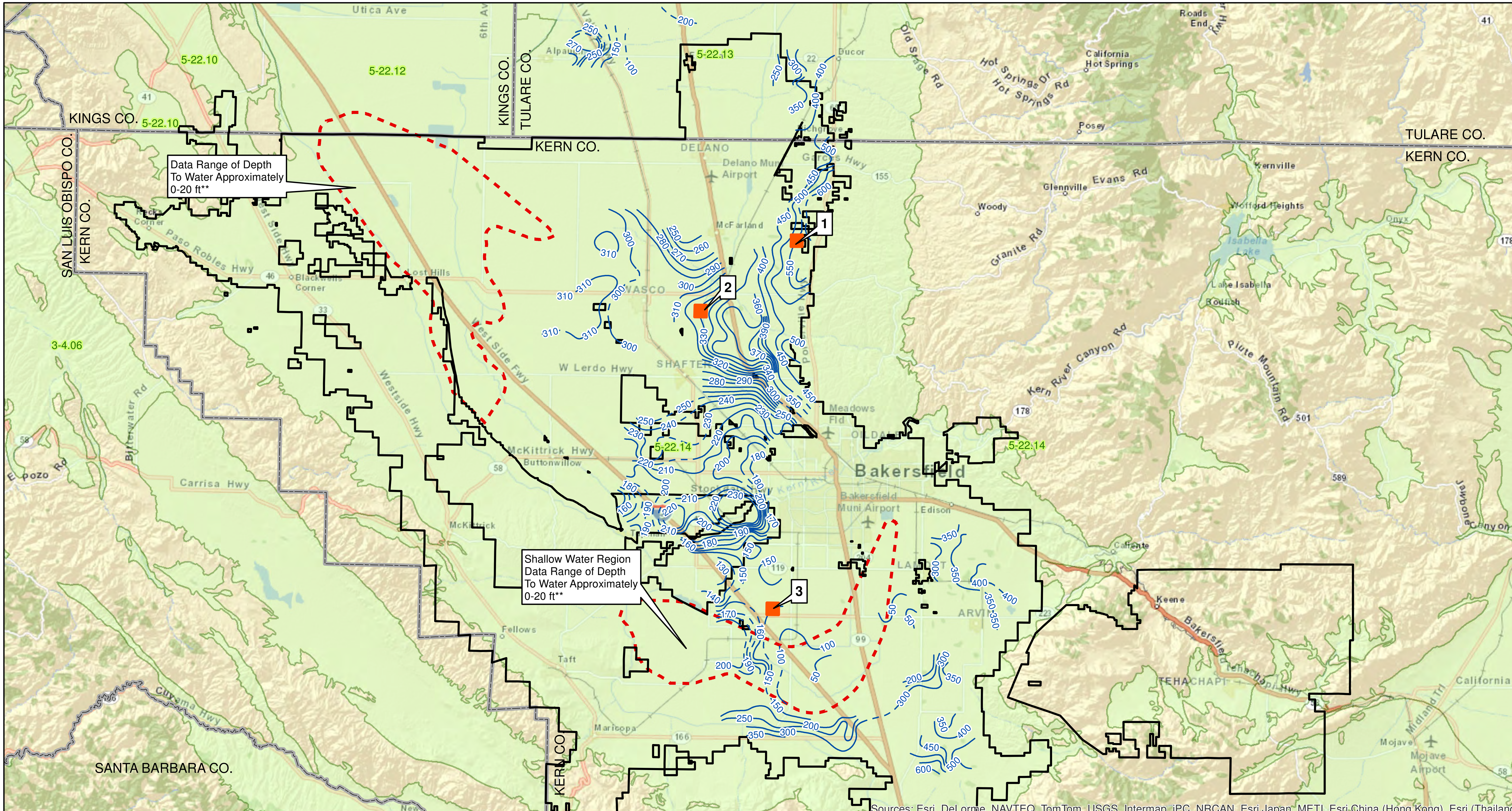
Unsaturated flow and nitrogen transport was simulated using the Hydrus 1D software. Estimates of monthly return flows and annual nitrogen losses below the root zone were obtained from Mr. Kimmelshue and used to specify upper boundary conditions for the flow and transport simulations (variable flux for flow and constant concentration for transport). Depth to first encountered groundwater was obtained from Department of Water Resources data (Figure 2a) and used to develop lower boundary conditions for the flow and transport simulations (constant head for flow and zero gradient for transport). Stratigraphy was included for each of the three locations based upon information from well completion reports obtained from KRWCA members, and physical properties were assigned based upon database values provided through the Hydrus 1D software. Initial conditions for flow were developed by running the flow model once before the flow and transport simulation was performed[15]. It was assumed that 1) all nitrogen occurred as nitrate, 2) no attenuation occurred by denitrification, diffusion or other processes and 3) no acceleration or deceleration occurred by anion exclusion, physical interaction with the sediments or other processes. This approach appears to be similar to that taken as part of the UC Davis nitrate study (Boyle et al., 2012); however, the two approaches differ in one important aspect. The present work included stratigraphic variability based upon field information instead of assuming a homogeneous soil column. This information adds a site-specific element to the results.

Transit times were calculated for transport from the bottom of the root zone to the bottom of the unsaturated zone. First arrival was considered as the simulated elapsed time when the nitrate concentration reached 1 mg/l at the bottom of the unsaturated zone[16]. Arrival of the 9 mg/l nitrate concentration, considered to be background (Boyle et al., 2012), was also considered. The results indicated a range in transport times[17]. For Location 1 where the depth to groundwater was greatest (Figure B1), arrival times were the greatest ranging from approximately 600 to 700 years (Figure B2). For Location 2 where the depth to groundwater was intermediate (Figure B1), arrival times were intermediate ranging from approximately 45 to 55 years (Figure B3). For Location 3 where the depth to groundwater was least (Figure B1), arrival times were the least ranging from approximately 10 to 15 years (Figure B4).

[15] The durations of the initial flow simulations were long enough to include the elapsed times for the transport simulations.

[16] Transport as nitrogen was simulated and the predicted nitrogen concentrations were then converted to nitrate concentrations.

[17] Transport mass balance errors were less than 0.5 percent.



0 5 10 Miles

Locations of Bulk Unsaturated Flow Estimates

DWR Groundwater Basin/Subbasin (ID Label)

County

KRWCA Boundary

Shallow Water Region - Approximate**

Depth To Water - Unconfined Aquifer***

High Degree of Confidence

Inferred

Data References:

**Areas digitized from CA DWR "Present and Potential Drainage Problem Areas" survey map, 2010
http://www.water.ca.gov/pubs/drainage/2010_shallow_groundwater_map__san_joaquin_valley/sgw10.pdf

***Isopleth lines from CA DWR "Lines of Equal Depth to Water in Wells, Unconfined Aquifer, San Joaquin Valley, Spring 2010"
http://www.water.ca.gov/groundwater/data_and_monitoring/south_central_region/images/groundwater/sjv2010spr_unc_depth.pdf

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Kern County Irrigated Lands Program
Kern Sub-Watershed

Locations For Unsaturated Flow Estimation

FIGURE B1

4/5/2013: V:\Clients\Kern River Watershed Coalition Authority-3484\348412V1-ILRP 2012\GIS\Map\DataProcessingForRobGailey\ReportFigs\figureB1.mxd

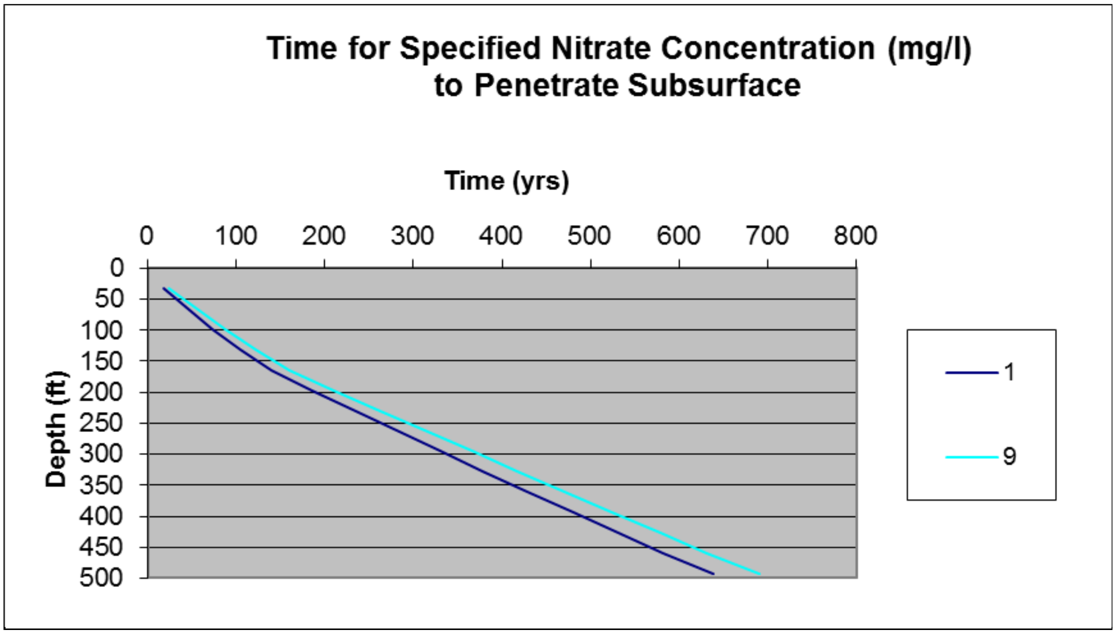

Figure B2: Nitrate Arrival Times for Location 1

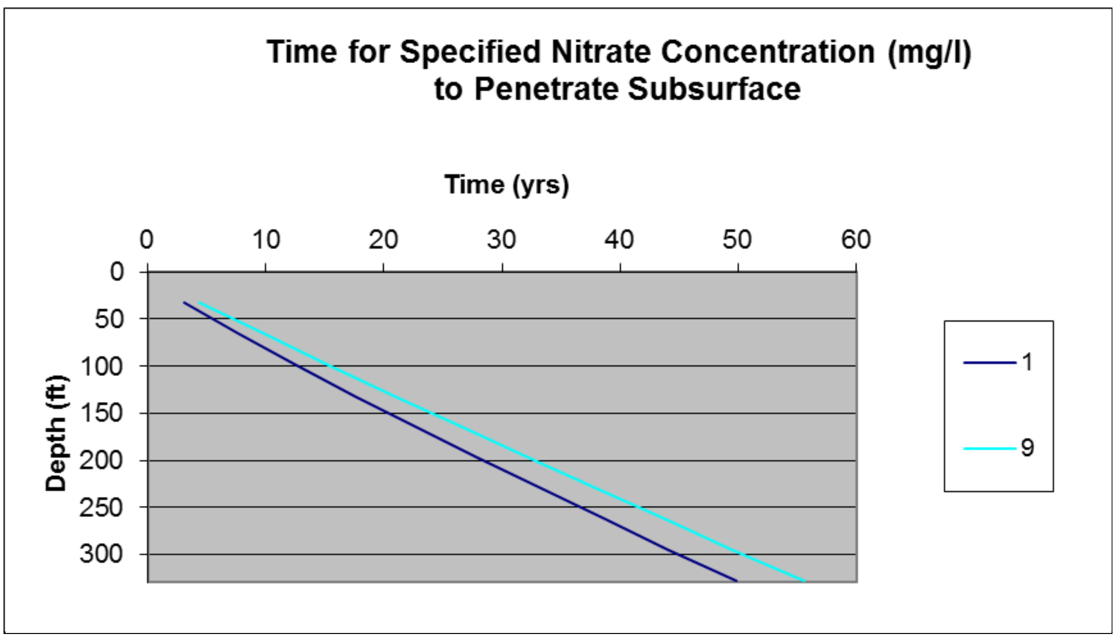

Figure B3: Nitrate Arrival Times for Location 2

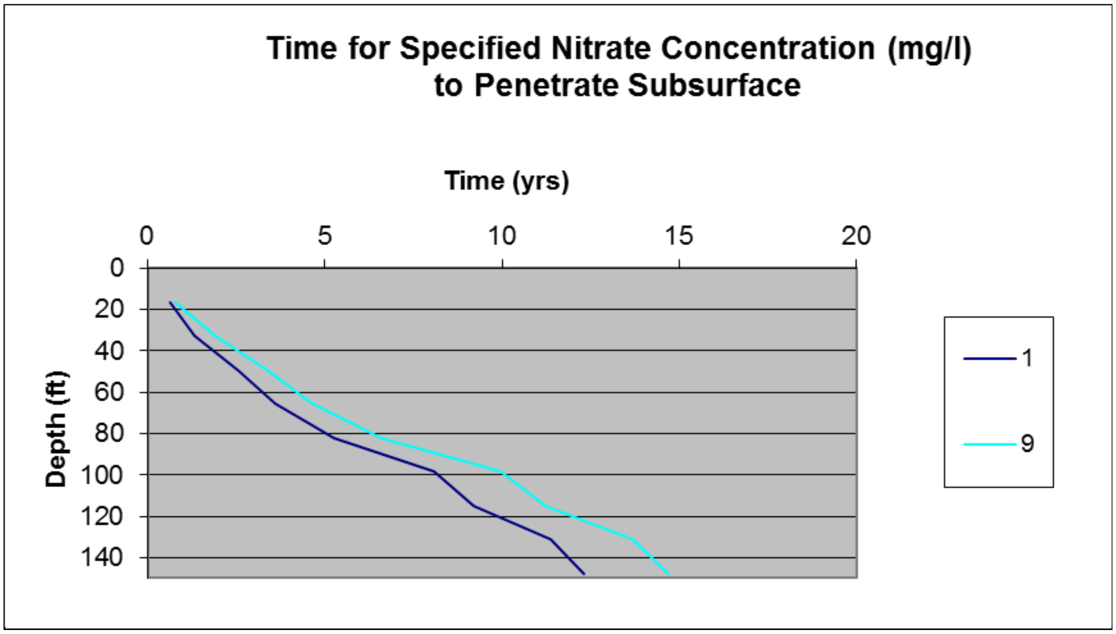

Figure B4: Nitrate Arrival Times for Location 3

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Kern River Watershed Coalition Authority
Assessment of Potential for Nitrate Migration in Kern Sub-Basin
Documentation Submittal for Preliminary Review Only

TO:

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April 11, 2013

Executive Summary

Background

The California Regional Water Quality Control Board – Central Valley Region (CVRWQCB) has issued Tentative Order R5-2013-XXXX titled, Waste Discharge Requirements General Order for growers within the Tulare Lake Basin Area that are members of a Third Party Group, dated March 15, 2013,"Tentative Order". This technical memorandum has been developed in support of the comments submitted by the Kern River Watershed Coalition Authority (KRWCA).

The purpose of this technical memorandum is two-fold: (1) to document on-going technical work that addresses the unique nature of the Kern Sub-Basin area, and (2) to provide an explanation of an alternative and modified methodology (using a Nitrate Hazard Index, or "NHI") to rank, track, and manage the potential for nitrate leaching to groundwater.

Approach

The overall approach of the work performed for the KRWCA was to:

- Develop and explain representative leaching conditions using a Soil Moisture Root Zone Balance (SMB) and understand the inherent variability associated with those estimates with specific conditions related to the Kern Sub-Basin area.

- Develop a unique Nitrate Hazard Index (NHI) as a comprehensive tool to use in assessing large landscape areas on a field by field basis in order to estimate relative potential nitrate contributions to groundwater based on surface agricultural activities and conditions unique to the Kern Sub-Basin area.

Results and Conclusions

The results and conclusions listed below, while part of an on-going investigation, are consistent with the conclusions from various researchers and approaches. NewFields used specific information applicable to the Kern Sub-Basin area.

- Currently, the Tentative Order suggests that agriculture in the Kern sub-basin is to be regulated similarly across all cropping systems in large areas regardless of irrigation method, N management, soil type, crop type, location, etc. The results of this preliminary evaluation indicate that within the Kern Sub-Basin there are significant differences between crop types and resultant potential contributions of N to groundwater resources which will require more flexible and perhaps crop- or area-specific considerations in order to develop effective regulations.

- For a variety of reasons (e.g. water availability, water cost, soil type, crop mix, market conditions, effective rainfall, etc.) the relative water use and nitrogen use in the Kern Sub-Basin is generally more efficient as compared to other areas of the Southern San Joaquin Valley and the remainder of the Central Valley as a whole. This is also supported by research conducted by others (Pettygrove, et al, 2012) (Boyle, et al, 2011) as contracted by the State Water Quality Control Board.

- Regardless of the methodology employed, estimating nitrate leaching, even under specified conditions, is a highly complex task with many variables. Therefore, the results of any N leaching estimating method should be interpreted as precisely that – estimates only – and are subject to modification with new information.

- The most significant effort related to broad land-based estimates of nitrate leaching potential to date focused on assessing nitrate contamination in groundwater from agricultural sources in California and resulted in the UC Nitrate Hazard Index. This effort intentionally avoided any attempt to place absolute values on total amounts of nitrate leached, due to the known variability (Wu et al, 1995). This work was developed and reviewed by some of the foremost experts in this multi-disciplinary subject, and should serve as an indication of the caution with which estimates of nitrate leaching must be interpreted and how variable they can be.

- A preliminary NHI was developed for the Kern Sub-Basin (specific to its conditions) and compared to previous years. In relative comparisons, the potential for nitrate leaching has decreased significantly over the past 20 years and in many areas is negligible due to the rapid conversion to highly-efficient irrigated perennial crops from historic surface irrigated row and field crops. The NHI approach allows for comprehensive assessment for the potential of nitrate leaching on large landscapes at the field level.

- From a hydraulic perspective, for purposes of our investigations, the Kern Sub Basin area was successfully separated into 6 regions that offered like soil, crop, water supply and overall production system similarities and a spatial dataset was developed from recent crop mapping (Kern Co., 2011) as the basis for analysis.

- This spatial dataset coupled with detailed literature resources and local expert knowledge specific to the Kern Sub-Basin was used in creation of inputs used for the analysis performed.

- Major crop type systems were evaluated from both a hydraulic (agronomic water balance focusing on return flows to groundwater) and nutrient use efficiency standpoint.

- In general, results confirm that perennial crops on high efficiency irrigation systems (common to the Kern sub basin) result in limited return flows to groundwater.

- Largest return flows occur under corn/wheat, sudan/wheat or other forage crop rotations that are commonly associated with feeding operations for dairies. The majority of these systems are currently regulated under the Dairy General Order (2007-035).

- Other row crops such as cotton/wheat and carrot/potato rotations result in moderate return flow estimates mostly because of the types of irrigation methods and management employed.

- The variation in nitrate leaching estimates for diverse cropping scenarios is significant, as irrigation method and soil combinations result in a wide range of nitrate leaching estimates. This finding is substantiated by numerous authors, whose work contributes to the scientific literature on N dynamics in cropping scenarios (Viers et al., 2012), and reinforces the point that nitrate leaching from various cropping systems cannot be considered or treated as similar systems.

- As a result of this preliminary evaluation, it is evident that a continued significant contributor to nitrate concentrations in groundwater is forage cropping systems predominantly used for dairy feed sources. The conclusion is supported by work performed by UC Davis (Pettygrove, et al., 2012). Much of this forage crop production is currently regulated under the existing Dairy General Order 2007-035 (the “Dairy Order”).

- As a result of our preliminary NHI evaluation, drip/micro irrigated perennials have a low risk due to limited return flow and effective precipitation. These results also agree with work performed by UC Davis (Pettygrove, et al., 2012) that also show that the nitrate risks to groundwater in the Kern Sub-Basin is significantly less than other areas to the North.

- Development and utilization of a modified, Kern Sub Basin-specific NHI as a comprehensive tool to use in assessing large landscape areas on a field by field basis is a preferred methodology in estimating relative potential nitrate contributions to groundwater based on surface agricultural activities and conditions. The NHI should be employed within the proposed Waste Discharge Requirements Tentative Order for members of a third-party group within the Tulare Lake Basin, at least for the Kern Sub-Basin, as a means of simplifying and prioritizing the regulatory scheme.

General Introduction

The subject of this review is the proposed California Regional Water Quality Control Board – Central Valley Region (CVRWQCB) Order R5-2013-XXXX titled, Waste Discharge Requirements Tentative Order.

NewFields Agricultural & Environmental Resources has been retained by Young Wooldridge, LLP, on behalf of the Kern River Watershed Coalition Authority, to assist in development of scientific-based, comments and suggestions to the Tentative Order. Some focus areas will include:

- irrigation and drainage management
- nutrient use efficiencies
- soil/nutrient dynamics
- crop production
- root zone moisture management
- other related scientific approaches

Our project team has focused efforts on estimated hydraulic and nitrogen components of the varied agricultural systems within the Kern Sub-Basin of the Southern San Joaquin Water Quality Coalition (SSJWQC). A comparison to other directly applicable published work will also be provided.

More specifically, the technical tasks that have been completed include:

- Review of the Tentative Order and Other Appropriate Literature
- Development of Spatial Data Resources
- Development of Representative Scenarios and Soil Moisture Budgets
- Development of a Preliminary NHI for the entire Kern Sub-Basin

In addition to these tasks, an attempt to compare existing agronomic conditions to past trends has been developed both from a water use efficiency and nitrogen (N) use efficiency standpoint.

Finally, the results of this work were compared to agronomic-focused research in the same area conducted by other researchers (e.g. Pettygrove, et al., 2012 and Boyle, et al, 2011). These researchers and others have developed components of an overall study performed by UC Davis (Harter, et. al. 2012) and support the work performed here.

Development of Spatial Data Resources

Introduction

The first step in assessing a region of this size is to partition “like” or more “manageable” areas that may be similar in soil type, crop type, irrigation supply and management, climate, etc. The information below provides the detailed documentation as to the methods used to separate the Kern sub-basin into six regional components for the purpose of our investigations.

Methods

Determination of Regions

The following descriptions outline the features that were used to determine the boundaries between each region. Names of KRWCA agencies (water districts, irrigation districts and water storage districts) are also included to ensure all KRWCA agencies are accounted for in a region or multiple regions. Final results indicate six distinct areas with similar characteristics (Figure 1).

Clay Rim Region

This region was created in response to two dominant zones of fine-textured clay present within the valley. The region encompasses all of the Buena Vista WSD and Henry Miller WD, portions of the Wheeler Ridge-Maricopa WSD (from the districts northern border to Copus Rd), southwest portions of the Kern Delta WD (from I-5 west and Herring Rd south), the northwestern portion of the Semitropic WSD (from Gun Club Rd. west and CA-46 north) and the northeastern corner of the Lost Hills WD (East of I-5).

Foothills Region

The Foothills region contains portions of the Southern San Joaquin MUD (east of the Famoso-Porterville Hwy), a portion of the Delano-Earlimart ID, Kern-Tulare WD, the Olcese WD, the Cawelo WD and a portion of the Arvin-Edison WSD. The eastern boundary of the region follows the Kern-Tulare WD and the Cawelo WD boundaries. The western boundary was determined based on the distribution of crop types due to the limited difference between soil mapping units found. A noticeable shift in crop types occurs immediately to the east of the city of Delano and the Famoso-Porterville Hwy/Richgrove Dr. from Vestal south to Famoso. This shift along Famoso-Porterville Hwy/Richgrove Dr from predominantly annuals, almonds, and grapes to the west and predominantly citrus to the east necessitates deviating from coalition agency boundaries to define the western edge of the Foothill region. The eastern and western boundaries head south along Poso Creek until it reaches the eastern border of Cawelo WD. The inclusion of a northern portion of the Arvin-Edison WSD is due to the density of citrus in this area. The northern boundary is formed by the Kern-Tulare WD northern border south of the city of Ducor near Vestal.

Kern Fan Region

The Kern Fan region contains the Rosedale-Rio Bravo WSD and the Kern Delta WD. The boundary was determined using differences in soil texture from the USGS SSURGO soil database and WSD boundaries. The orientation of soil map units (directionality of sediment deposition based on historic water flow characteristics) and the horizontal stratification associated with alluvial fans (coarse textured soils near the mouth of the stream and finer textured soils as distance increases away from the mouth of the stream) clearly shows the extent of the Kern River Fan. The southern boundary is formed along the Clay Rim region and a small section of the Arvin-Edison WSD The northern boundary is found along the Rosedale-Rio Bravo WSD northern border. The eastern edge is found along the Kern Delta WD and Arvin-Edison WSD boundary and extends north along CA-99 to Oildale. The western boundary is found running south from the Clay Rim region at Buttonwillow to the California Aqueduct at the Tule Elk State Reserve and south along the Aqueduct to Ironback Rd.

Westside Region

The Westside region contains the Belridge WSD, Dudley Ridge WD, Lost Hills WD and Berrenda Mesa WD. The boundary extends west to the edge of the Kern Sub-Basin, down to the bottom of Belridge WSD. The Eastern boundary follows the Clay Rim region which closely coincides with the Semitropic WSD and Buena Vista WSD western boundaries. More specifically, the eastern boundary mirrors that of the Clay Rim region to the bottom of Belridge WSD. The northern boundary extends to the northern most portion of the Dudley Ridge WD. The southern boundary of the region is shared by the southern boundary of the Belridge WSD and terminates near Lokern Rd by Missouri Triangle. The southern end of this region neighbors land that is not cropped and was therefore excluded. The interface between all of these coalition agency boundaries also corresponds closely with differences in soil texture distribution with the north end of this region being more heterogeneous in the textures found and the neighboring region (Northern region) being more homogeneous.

Northern Region

The North region contains portions of the Semitropic WSD (with the exception of the northwest corner from approx. CA-46, north and Gun Club Rd, west), the Southern San Joaquin MUD (west of Famoso-Porterville Hwy), Shafter-Wasco ID and the majority of the North Kern WSD (omitting the portion of the North Kern WSD that follows the Kern River). The western boundary respects the border established by the Clay Rim region. The eastern boundary follows the Famoso-Porterville Hwy to near the city of Famoso where it then follows Poso Creek and meets the Cawelo WD. The southern boundary lies along the northern border of the Rosedale-Rio Bravo WSD which happens to follow differences in soil texture found between the Northern region and Kern Fan region. The northern boundary is shared with the northern boundary of the Delano-Earlimart ID. The distinguishing characteristics that merit including this area as a separate region are the widespread presence of almonds and the divergent soil textures when compared to neighboring WSD's and regions.

Wheeler Ridge/Arvin-Edison Region

The Wheeler Ridge/Arvin–Edison region contains both of these water districts. The boundary follows the Arvin-Edison WSD and Wheeler Ridge-Maricopa WSD borders. Slight modifications to the boundary were made based on differences in soil texture and crop distribution when compared to surrounding areas, specifically coarser textured soils and citrus establishment. As a result, a portion of the northeastern section of Arvin-Edison WSD has been included in the Foothills WSD. Additionally, the dominant crop type in the area differed from other zones and overall crop diversity was increased in this region versus others. Furthermore, because of differences in soil texture and crop type in the northern part of the Wheeler Ridge-Maricopa WSD, the section from Copus Rd north to the district boundary is included in the Clay Rim region.

Approximately 935,000 acres were irrigated within the Kern Sub-Basin in 2011 (Table 1).

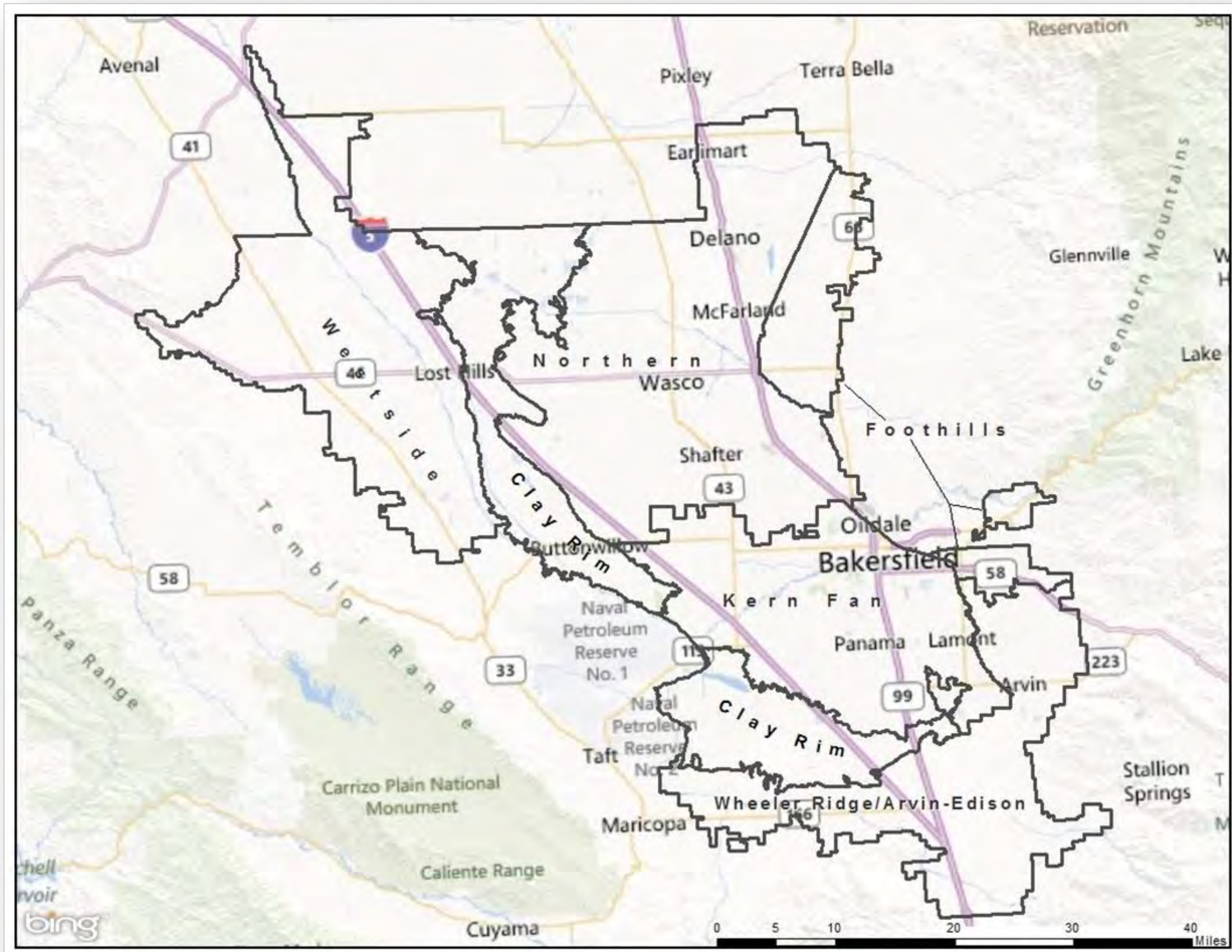


Figure 1. Six distinct regions based on differences in soil type, crop types and management

Table 1. Acreage summary for each region (includes irrigated lands only)

Region (AOI) Name	Acres
Clay Rim	114,809
Foothills	68,861
Kern Fan	106,032
Northern	321,360
Westside	152,013
Wheeler Ridge/Arvin-Edison	172,290
Total	935,365

Determination of Soil Type

The complexity and diversity of soil type over approximately 935,000 irrigated acres in the Kern sub-basin is substantial. The main driving force behind determining soil type was for the purpose of accounting for soil water holding capacities and relationships to crop types and modifications in irrigation management practices. The national SURRGO spatial soils database was initially used to partition the multitude of map unit classifications into three main categories (fine, medium and coarse) based on dominant surface texture within the expected rooting zone of the crops (Figure 2). It should be noted that soil types may also be categorized by drainage classification. Fine textured soils included mostly clays and any sandy clays and silty clays as defined by USDA textural classifications. Coarse textured soils included sands, loamy sands and coarse sandy loams. For the purposes of this evaluation, all other sandy loams (e.g. medium and fine sandy loams) were grouped with the medium classification due to similar water holding capacities and other hydraulic characteristics. Soil type and drainage classification was ultimately used as a variable in the calculation of both SMB and NHI.

Determination of Crop Type

Crop type was determined predominantly through the use of the Kern County crop distribution spatial data resources (Figure 3) for 2011 (Kern County, 2011). This annual data resource is detailed by crop type and even within various crop rotations within a single field. It offers a recent summary of existing crop distribution in an area of the state that is rapidly changing from lower water use efficiency annual row crops to higher water use efficiency perennial crops. In this regard, there is plentiful and timely data and as compared to other counties. Kern County has excellent crop distribution spatial data as do many of the water service entities within the county. In some areas, however, annual and forage crops still persist. This is especially true in areas within the Clay Rim and locations associated with dairy operations. The following figures represent all crop distribution within the Kern sub basin (Figure 3) as well as individual major crop types (Figures 4-11).

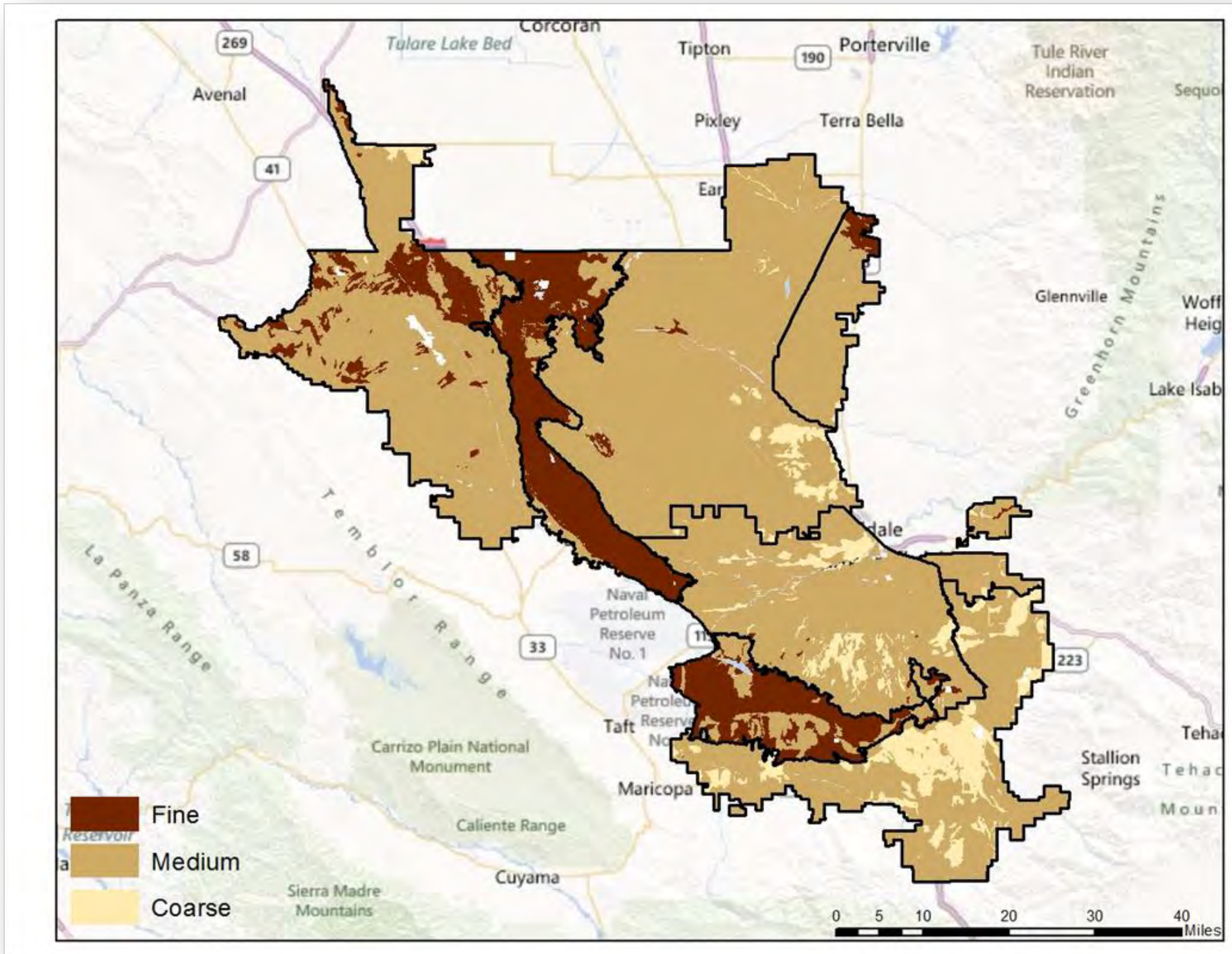


Figure 2. Generalized soil texture groupings derived from USDA SURRGO spatial soil data.

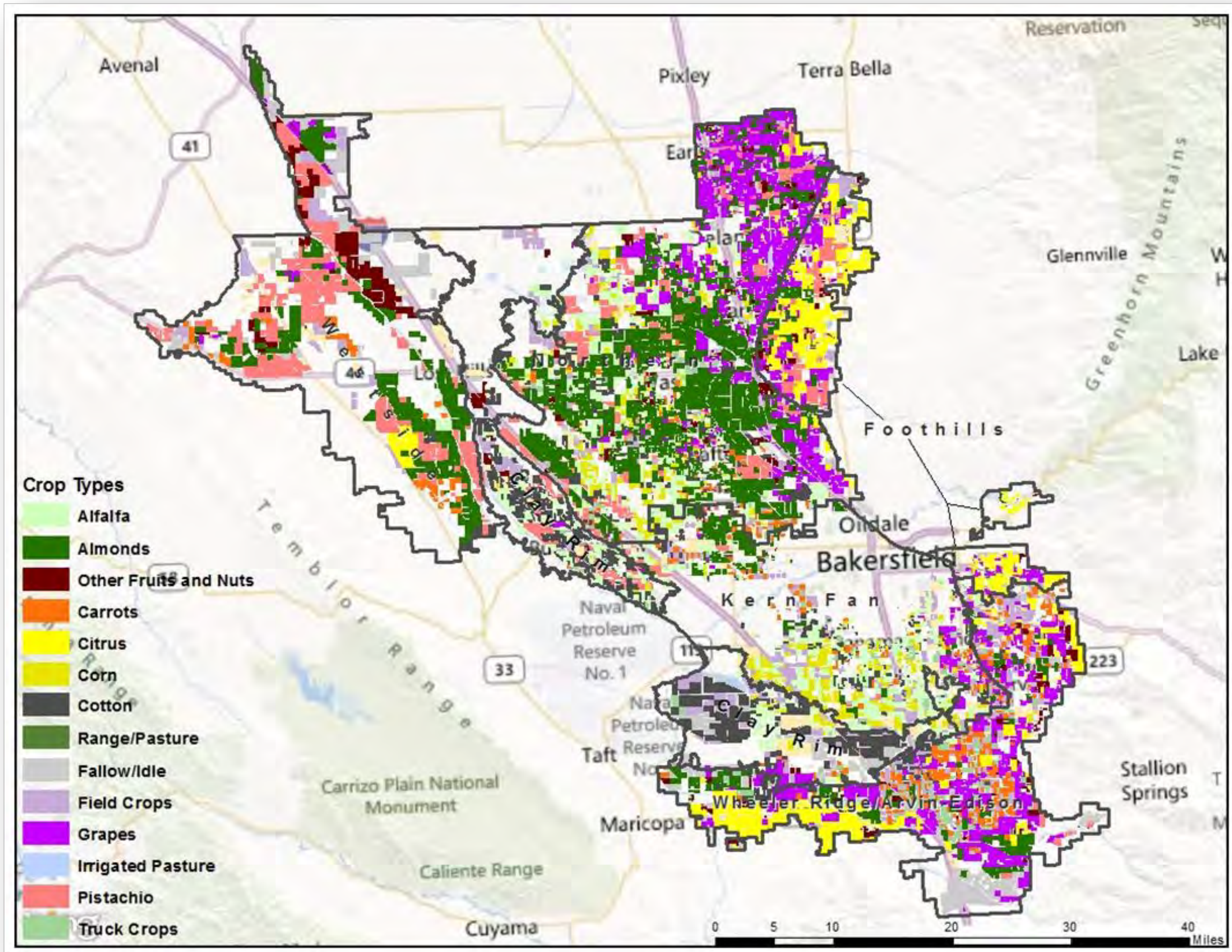


Figure 3. Comprehensive crop types and crop groupings in the KRWCA Sub-Basin.

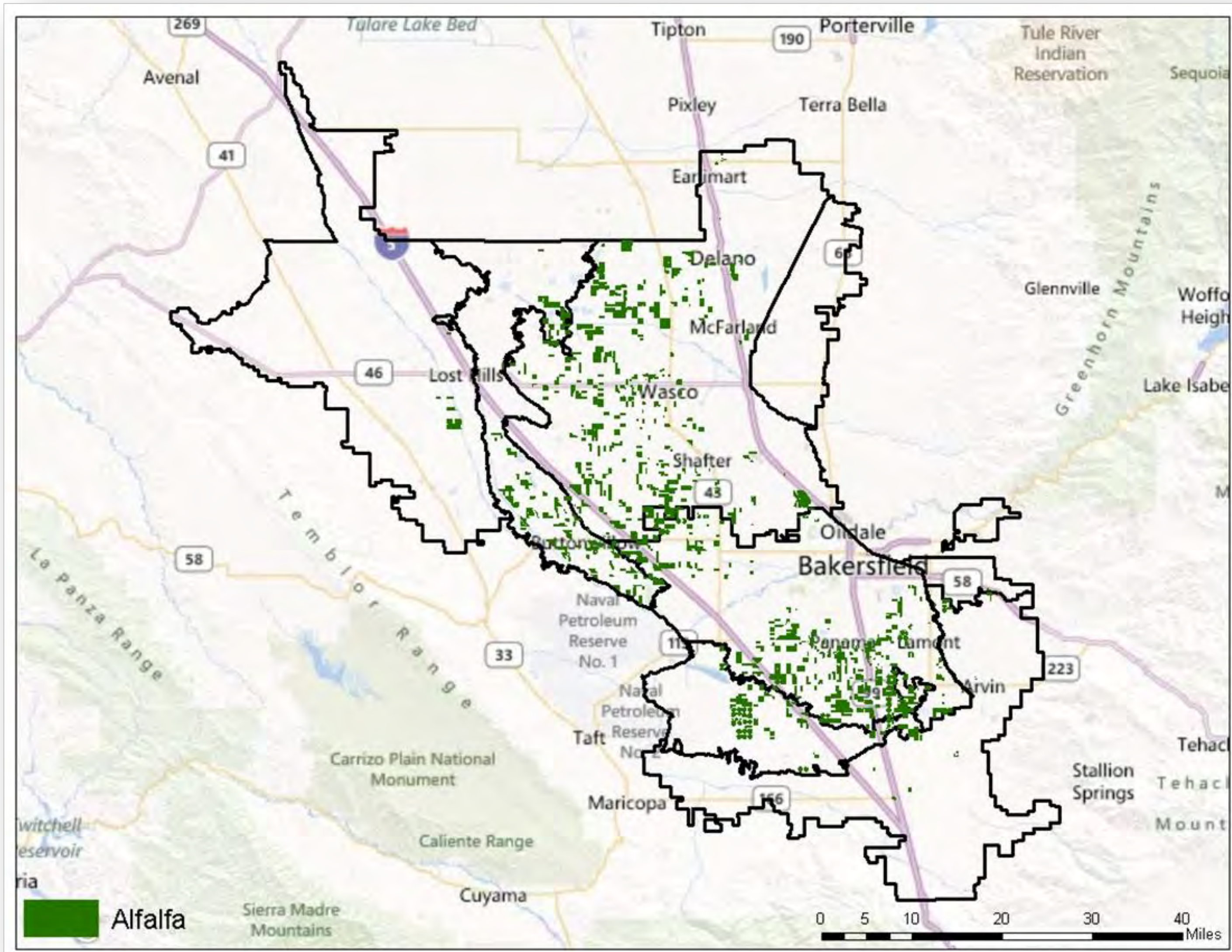


Figure 4. Alfalfa production within the KRWCA Sub-Basin.

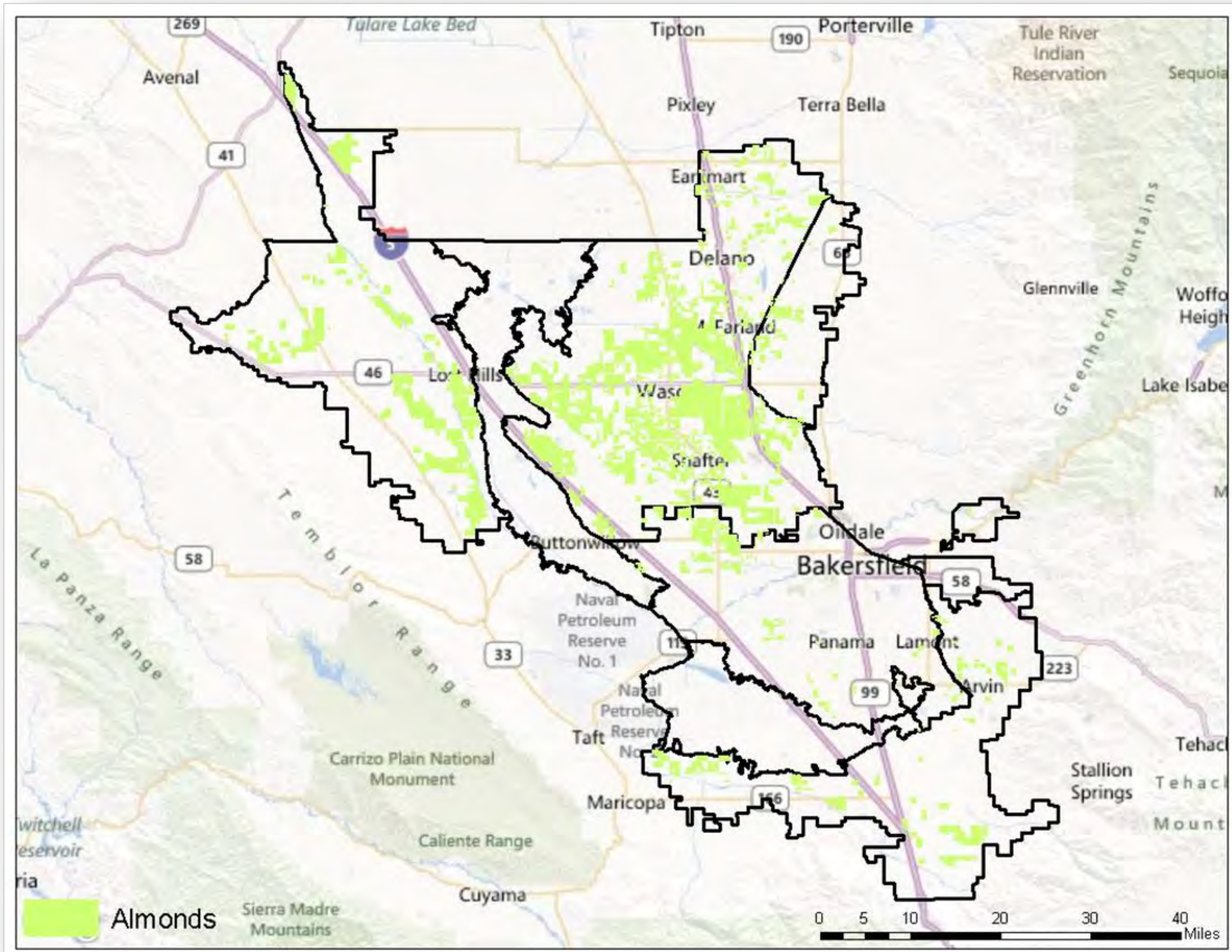


Figure 5. Almond production within the KRWCA Sub-Basin.

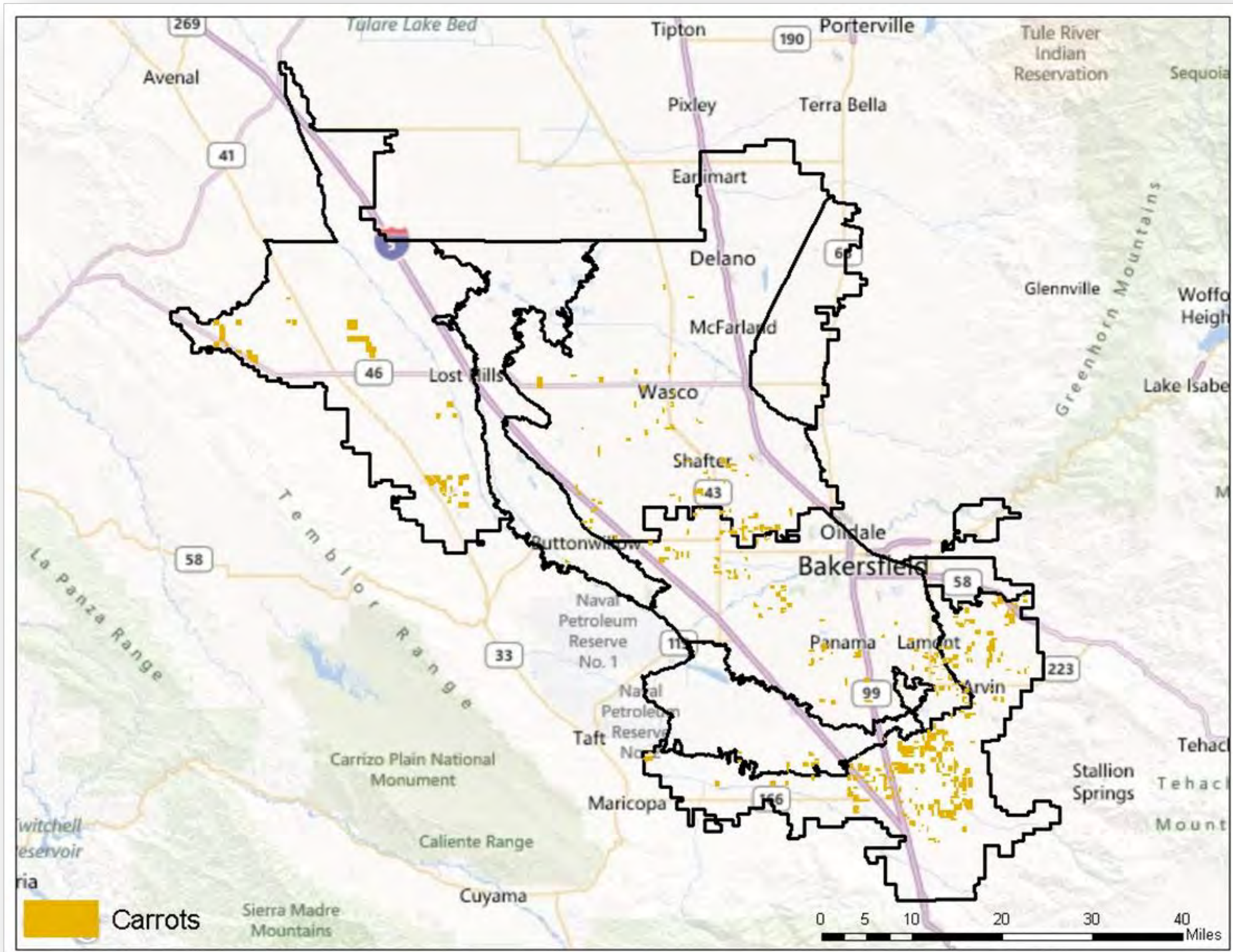


Figure 6. Carrot production within the KRWCA Sub-Basin.

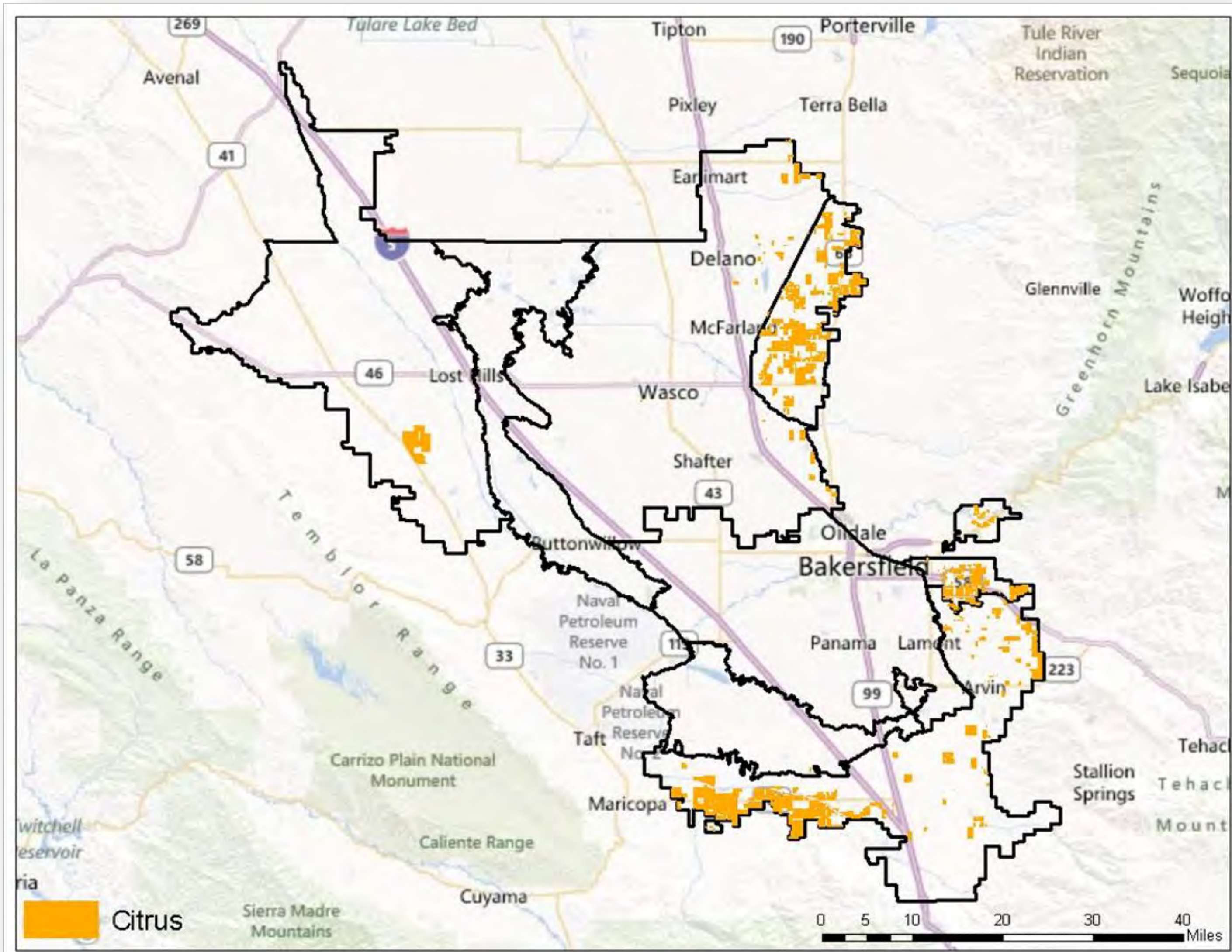


Figure 7. Citrus production within the KRWCA Sub-Basin.

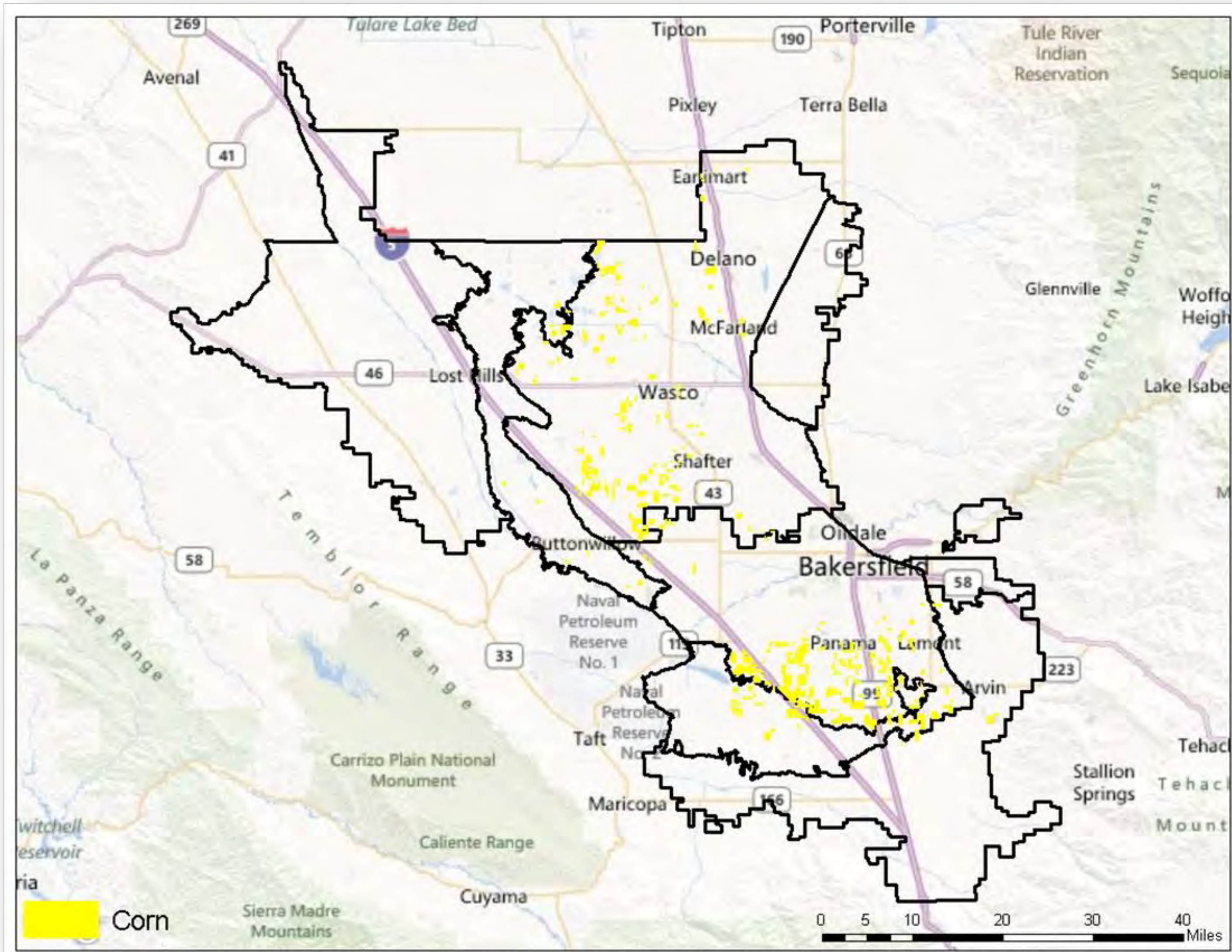


Figure 8. Corn production within the KRWCA Sub-Basin.

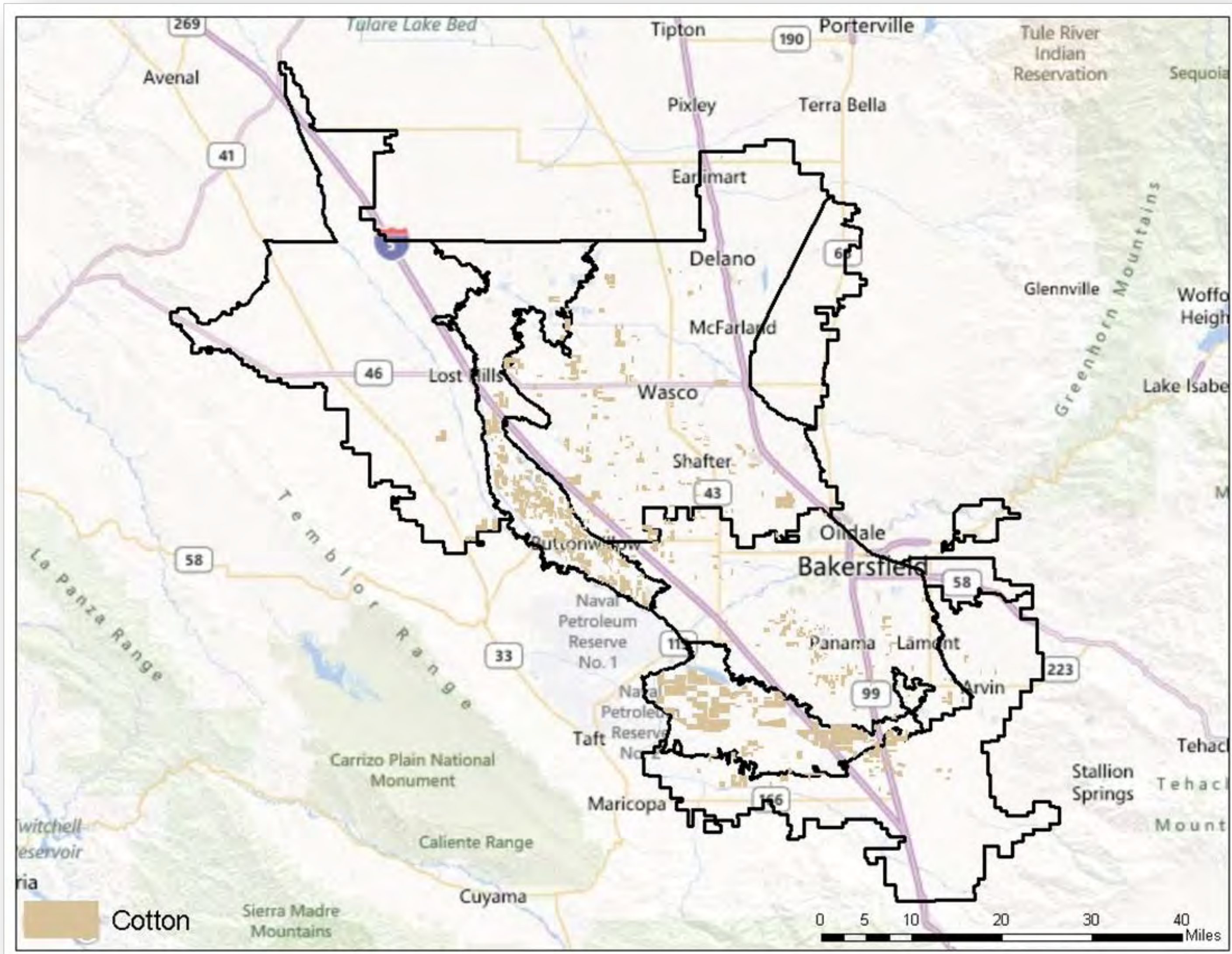


Figure 9. Cotton production within the KRWCA Sub-Basin.

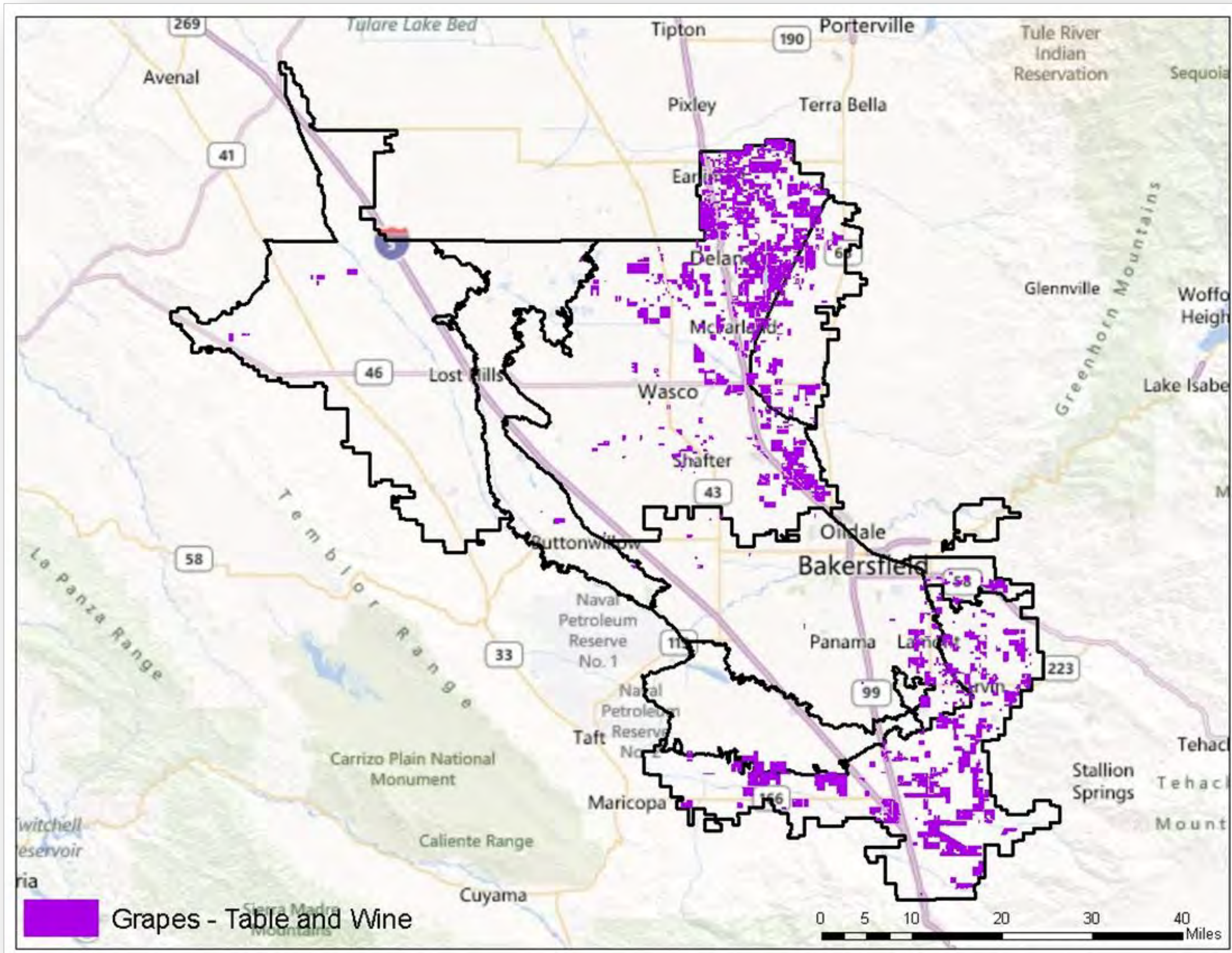


Figure 10. Grape production within the KRWCA Sub-Basin.

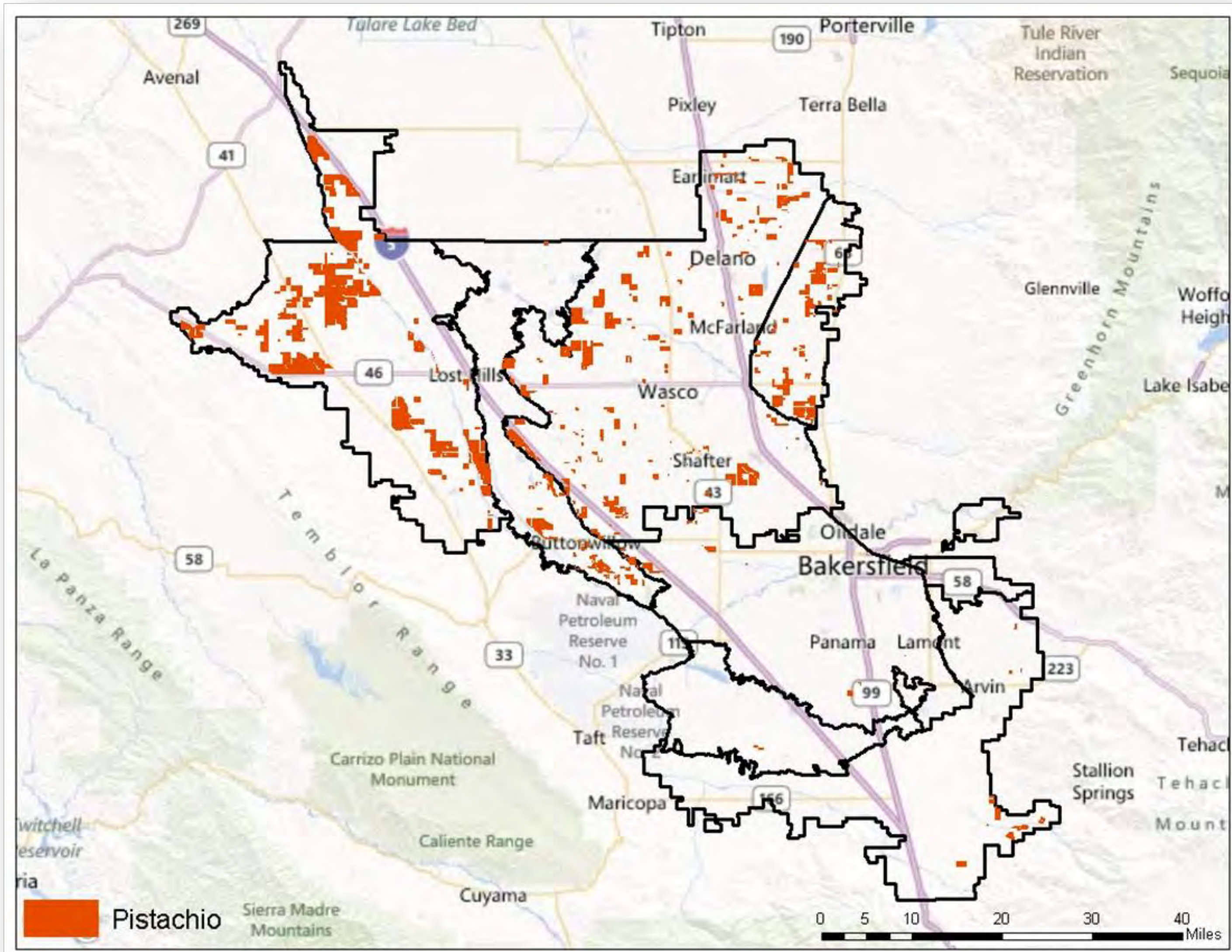


Figure 11. Pistachio production within the KRWCA Sub-Basin.

Historic Cropping Trends and Conversions

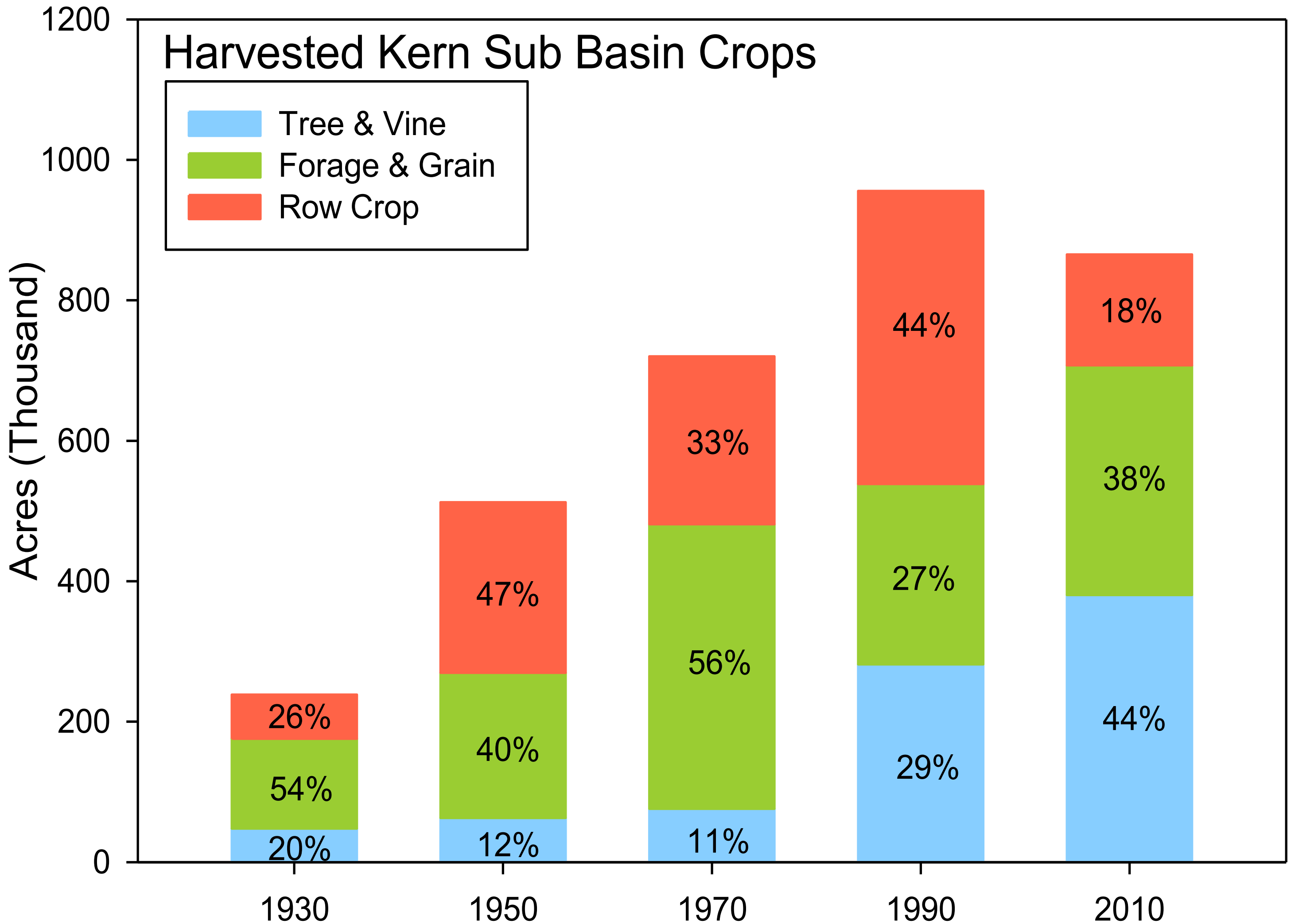
Historic crop trends for Kern Sub-Basin were summarized (Ag Commissioner Records) once every 20 years (1930-2010) to show the growth of agriculture in the county as well as the transition to permanent crops and also the recent (1990-2010) increase in forage crops associated with diaries (Figure 12). Cotton and to a lesser extent other row crops, have significantly been replaced by almonds and other permanent tree crops. This also has resulted in a corresponding shift in irrigation practices from gravity (mostly furrow) to pressurized (mostly drip/micro) systems. This has undoubtedly resulted in a significant reduction of return flows to groundwater and also associated nitrate contributions. The nitrate is allowed to remain in the deeper root zone for longer periods of time with a greater potential uptake by the crop. It is likely that Kern County is utilizing most of its irrigable land at this point. In fact, the total irrigated acreage actually dropped in 2010 as compared to 1990. Kern County does stretch into agricultural areas of the Antelope Valley; however this area is only sparsely irrigated as related to the remaining part of Kern County within the San Joaquin Valley.

Dairy production has also increased in Kern County over the past 20 years and, as a result so has a significant amount of forage crop production land (Figure 12). For the most part, the lands associated with dairy production are receiving manure as a nutrient source and are, therefore regulated by the CVRWQCB through the Dairy Order. There is, however, forage producing ground that is not regulated under the Dairy Order due the fact that it does not receive manure but does serve as a feed source.

Permanent Crop Irrigation Efficiencies

Irrigation efficiencies in the Kern Sub-Basin are, overall, some of the highest in the entire Central Valley. Various resources were used to show the increase in drip/micro irrigation systems in permanent crops (Figure 13). Overall, permanent crops are increasing significantly in the Sub-Basin and in nearly all cases are developed with highly efficient drip and/or micro spray irrigation systems.

This corresponding increase in highly efficient irrigation systems on permanent crops (e.g. grapes) is somewhat similar in other counties (Figure 14), however not to the degree as it has developed in Kern County. This is likely due to the scarcity and expense of water as well as a more dynamic and recent change to permanent crops in Kern County.



Source: Kern County Agricultural Commissioner Crop Reports – Does not include fallow land,1st leaf orchards and is Kern County only

Figure 12. Kern Sub-Basin harvested crop groupings.

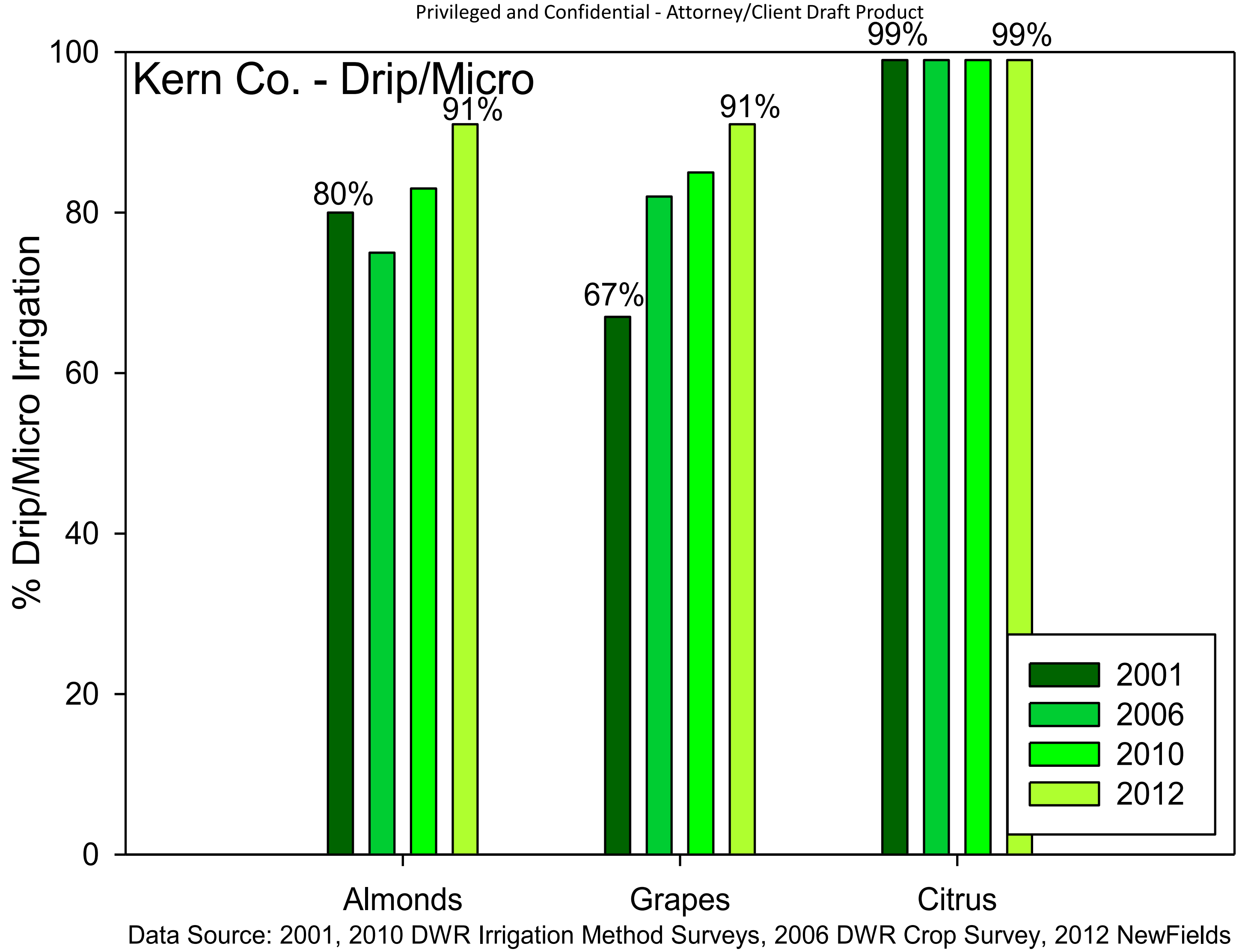


Figure 13. Increase in drip/micro irrigation systems on various permanent crops in Kern

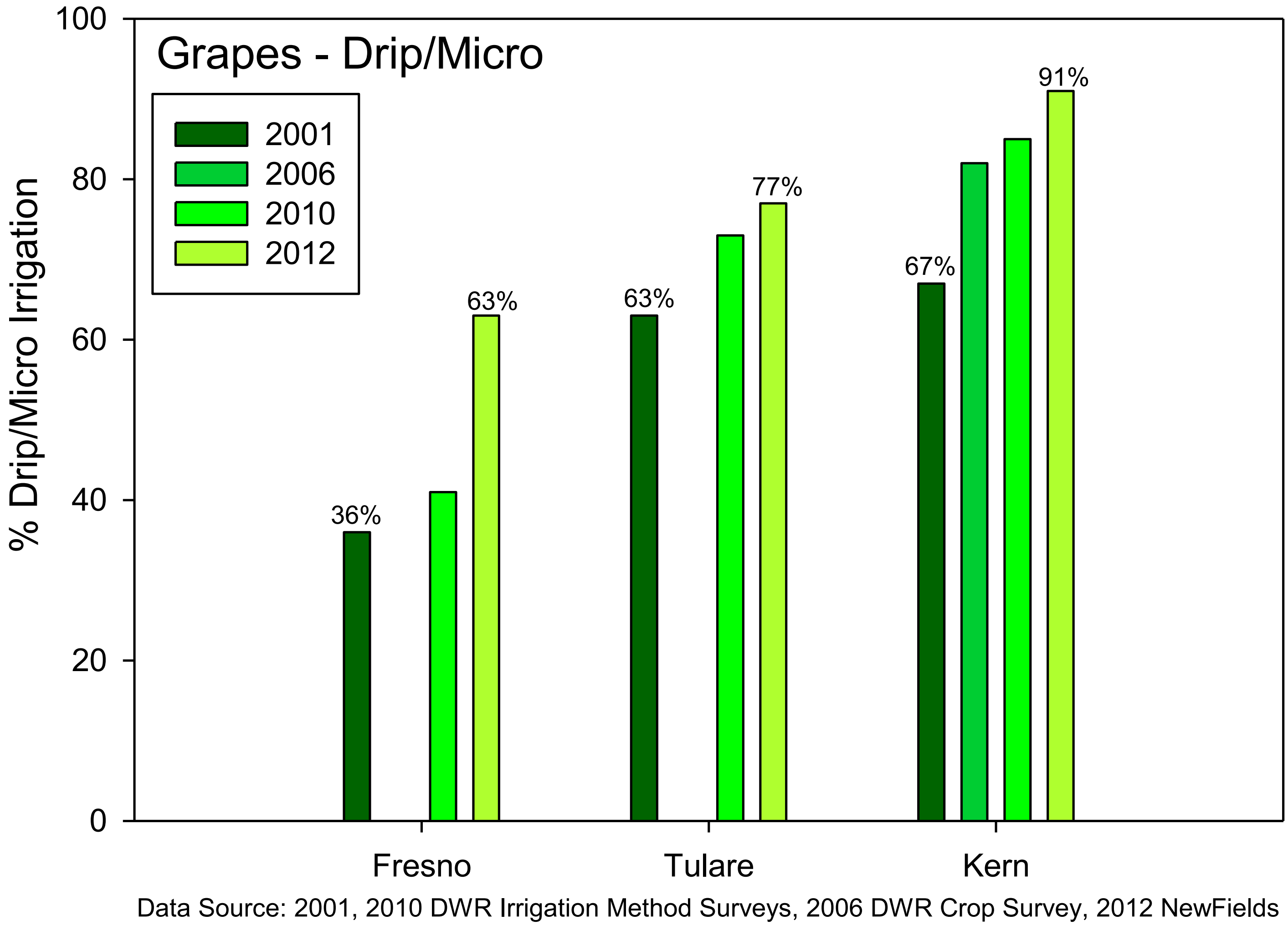


Figure 14. Example (in grapes) of shift to higher efficiency irrigation systems in Fresno, Tulare and Kern Counties County.

General Concepts of Nitrogen Fertilizer Recovery and Losses

Introduction

It is imperative to note that estimating nitrate leaching, even under specified conditions, is a highly complex task. Therefore, the results of any N leaching estimating method should be interpreted as precisely that – estimates only – and are subject to modification with new information.

The significance of the nitrate leaching estimates for diverse cropping scenarios is simply that they are different; crop, irrigation method and soil factors in combination with one another result in a wide range of nitrate leaching estimates. This finding is substantiated by numerous authors whose work contributes to the scientific literature on N dynamics in cropping scenarios (Viers, 2012), and implies that nitrate leaching from various cropping systems cannot be considered or treated as similar systems.

The most significant effort to date focused on assessing nitrate contamination in groundwater from agricultural sources in California resulted in the UC Nitrate Hazard Index (NHI). This effort intentionally avoided any attempt to place absolute values on total amounts of nitrate leached, for the reasons stated above (Wu et al., 2005). This work was developed and reviewed by experts in this multi-disciplinary subject, and should serve as an indication of the caution with which estimates of nitrate leaching must be interpreted. This approach was subsequently modified and used to identify agricultural areas in the Tulare Lake Basin and Salinas Valley that are vulnerable to nitrate contamination in groundwater (Dzurella et al., 2012).

A general description of nitrogen fertilizer recovery and losses from the literature and applied to the Kern Sub-Basin is provided (Appendix A) as background. The appendix was developed from reviewing scientific literature from peer-reviewed journals, extension publications, personal communications and privately-developed publications. No simulation models or statistical methods were used. The purpose of this information is to show the variability in the literature and impactful parameters that can significantly influence potential nitrate leaching.

Root Zone Soil Moisture Balance (SMB) Approach

Introduction and Purpose

Soil moisture conditions and nitrate leaching in agricultural systems can vary significantly throughout a year and are impacted primarily by irrigation practices and not necessarily rainfall in the Kern Sub-Basin area. This is because effective rainfall (1-3 inches) in this area is essentially insignificant as compared to the magnitude of irrigation water applied to meet crop and environmental demands (28-60 inches - depending on crop type, soil conditions and management practices).

A root zone soil moisture balance (SMB) calculator was used to model and predict potential leaching of available nitrate below the root zone. This was assumed to be nitrate that ultimately would be transported to the first encountered groundwater. It was assumed that any nitrate leached below the specified root zone of the crop was not recoverable by the crop and therefore transportable to groundwater.

The advantages of using a SMB approach include:

- a field- or smaller region-specific tool, commonly used to quantify hydraulic leaching below the root zone
- defensible and quantifiable results that can be used as input parameters for groundwater modeling purposes
- inclusion of various input parameters designed to optimize the results for a specific field, scenario, or a smaller area

The disadvantages of using the SMB approach for the Kern Sub-Basin include:

- relatively inaccurate representation of larger areas, thus why only representative scenarios can be developed
- difficultly in spatial application
- unwieldy number of iterations/options due to numerous and detailed input parameters
- complicated numerical applications and summary of results
- variable results over larger areas of land

The purpose of this effort was predominantly for:

- Development of representative scenarios (return flows) as input parameters for modeling work conducted by Rob Gailey/SGI Consultants.
- A better understanding of the unique nature of agricultural practices in the Kern Sub-Basin.
- A better understanding of the diversity of potential results for Basin-wide agricultural practices.

Approach

Twenty one scenarios were developed that represented major cropping systems across all six regions within the Kern sub basin. Ground truthing efforts were conducted throughout this area that documented irrigation practices on approximately 20% of all irrigated fields. This information was obtained spatially and overlain on the regional areas. When an irrigation practice on a certain crop type was documented greater than 90% of the time, that irrigation method was assigned to that crop type within a specified region. Where irrigation methods varied within crop type, a mix of methods was assumed. This resulted in correspondingly lower irrigation application efficiencies as well. Otherwise irrigation application efficiencies were used based on various sources including local knowledge (Sanden, personal communication, 2012) (Paramount Farms, 2012) and irrigation district reporting (Arvin Edison Water Use Report, 2012)

Representative scenarios were developed for common crop systems and soil types and represent the majority of cropping systems in the Kern Sub-Basin. For example, much of the Clay Rim area is cropped with cotton and to a much lesser relative extent, almonds. Therefore a "cotton on fine textured soils" scenario was developed for this area as was an "almond on medium textured soils" for other areas. A variety of other representative scenarios including other SMB inputs are summarized (Table 2). These scenarios were developed in conjunction with Blake Sanden, UC Cooperative Extension, Kern County and deemed as representative for the area.

It should be noted that certain set assumptions were developed for the 21 scenarios developed and modeled. Due to the variation in cropping systems, soil types, irrigation practice and management, rooting depths, etc., results for total return flow and to a lesser extent total applied water, should be considered as estimates only and specifically for the input parameters of each scenario only. It is entirely possible to find a combination of input parameters somewhere over the nearly 1,000,000 acres of irrigated land in the Kern Sub-Basin that result in less or more return flows or applied water. Again, this work was performed for the purpose of providing reasonable estimates as input parameters for the groundwater modeling work that are representative of the present-day Kern Sub-Basin, based on the best available data.

Results and Conclusions

In general, results indicate that perennial crops on high efficiency irrigation systems (common to the Kern Sub-Basin), result in limited return flows to groundwater. The largest return flows occur under corn/wheat, sudan/wheat or alfalfa crop rotations that are commonly associated with feeding operations for dairies. The majority of these systems are regulated under the dairy order. Other row crops such as cotton/wheat and carrot/potato rotations result in moderate return flow estimates mostly because of the types of irrigation methods and management employed.

Table 2. Scenario summary for common crop types, regions, soil types and irrigation methods. Summary table also includes assumed irrigation efficiencies, effective rooting depths and resultant return flows and applied water.

Scenario	Region	Crop	Soil	Irrigation Method	Irrigation Efficiency (%)	Rooting Depth (Effective) (ft)	Total Return Flow (in)	Total Applied Water (in)
1	Foothills	Citrus	Medium	Drip/Micro	95%	4	2.3	45.6
2	Foothills	Grape	Medium	Drip/Micro	95%	4	1.9	31.9
3	Kern Fan	Alfalfa	Coarse	Border	85%	6	9.8	61.7
4	Kern Fan	Corn/Wheat	Coarse	Furrow/Border	75%	3	14.8	57.7
5	Kern Fan	Cotton	Coarse	Furrow/Border	80%	3	10.2	40.0
6	Northern	Almonds	Coarse	Drip/Micro (90%) & Flood (10%)	90%	7	5.0	46.2
7	Northern	Grape	Coarse	Drip/Micro (75%) & Flood (25%)	80%	5	7.9	38.1
8	Westside	Almonds	Medium	Drip/Micro	95%	6	2.4	46.6
9	Westside	Pistachio	Medium	Drip/Micro	95%	6	2.7	45.8
10	Westside	Pistachio	Coarse	Drip/Micro	90%	7	5.3	48.3
11	Wheeler Ridge/A-E	Grape	Medium	Drip/Micro	95%	4	2.0	34.1
12	Wheeler Ridge/A-E	Citrus	Medium	Drip/Micro	95%	4	2.9	48.3
13	Wheeler Ridge/A-E	Grape	Coarse	Drip/Micro	90%	5	3.9	36.0
14	Wheeler Ridge/A-E	Carrots/Potato	Coarse	Sprinkler	85%	2	8.2	51.7
15	Clay Rim	Cotton	Fine	Furrow	90%	3	5.2	34.4
16	Clay Rim	Cotton/Wheat	Fine	Furrow/Border	85%	3	8.7	55.2
17	Clay Rim	Alfalfa	Fine	Border	85%	5	9.6	60.3
18	Foothills	Pistachio	Medium	Drip/Micro	95%	6	2.8	42.1
19	Northern	Alfalfa	Medium	Border	85%	6	8.6	60.4
20	Westside	Almonds	Coarse	Drip/Micro	95%	7	2.8	46.6
21	Clay Rim	Pistachio	Fine	Drip/Micro	95%	5	2.6	41.2

Note: Irrigation efficiencies and rooting depths reviewed by Blake Sanden, UCCE Cooperative Extension, Kern County. Other input provided by Boswell and Paramount Farms, etc.

Nitrate Hazard Index (NHI) Approach

Introduction and Purpose

An NHI was developed by UC Davis and other researchers as a qualitative method to assess the potential for nitrate leaching to groundwater based on at least three initial variables (e.g. crop type, soil type and irrigation method). The NHI was developed for the southern San Joaquin Valley and the Salinas Valley.

The advantages of using a NHI approach include:

- Offers the ability to span and create a relative assessment over large areas of land with a spatial resource
- Easily shows change over time as a result in crop or irrigation method changes
- Easily modified, flexible, and understandable
- Based on a field by field assessment, therefore can be aggregated to a larger area
- Results in strategic and justified locations for monitoring and therefore cost savings
- Approved as an acceptable method for quantifying the potential for nitrate leaching by the State Water Resources Control Board

The potential disadvantages of using the NHI approach include:

- A qualitative assessment, however is based on quantitative/proven research and local knowledge
- Requires some grouping of input data (e.g. soil type) at times depending on the size of the area and data resources available
- Requires up-to-date crop mapping (readily available for Kern County on an annual basis, however less frequently available elsewhere)

An excellent discussion of the justification, use, strengths, limitations and results of the NHI for the Southern San Joaquin Valley (including the Kern Sub-Basin) can be found at the following reference below. The reader is particularly encouraged to review section 2.2.3 (pages 12-17) – Leaching Vulnerability Assessment.

http://groundwaternitrate.ucdavis.edu/files/139103.pdf

or at:

Dzurella, K.N., Medellin-Azuara, J., Jensen, V.B., King, A.M., De La Mora, N., Fryjoff-Hung, A., Rosenstock, T.S., Harter, T., Howitt, R., Hollander, A.D., Darby, J., Jessoe, K., Lund, J.R., & Pettygrove, G.S. 2012. Nitrogen Source Reduction to Protect Groundwater Quality. Technical Report 3 in: Addressing Nitrate in California's Drinking Water with a Focus on Tulare Lake Basin and Salinas Valley Groundwater. Report for the State Water Resources Control Board Report to the Legislature. Center for Watershed Sciences, University of California, Davis.

The purpose of this effort was predominantly to develop a preliminary Kern Sub-Basin specific NHI that would demonstrate the changes over approximately 20 years as well as show the flexibility by addition of Nitrogen Use Efficiency (NUE) estimates.

Approach

The approach for the NHI assessment for the Kern Sub-Basin was similar to that performed by researchers at UC Davis (Dzurella, et al., 2012). The approach was modified for the unique attributes of the Kern Sub-Basin area. One of the major differences is that previous researchers used DWR crop mapping from 2006, while 2011 crop mapping from Kern County was used for our analysis. Also, irrigation practices specific to the Kern Sub-Basin were considered for this analysis including representative distribution of current irrigation methods.

An NHI was developed based on DWR crop mapping and associated irrigation practice for 1990 and Kern County crop mapping for 2011. Soil type remained constant for all analyses.

An additional NHI was developed for 2011 results only and attempted to incorporate three very broad NUE estimates of 25%, 50% and 75%. The purpose in conducting this analysis was to show the flexibility and additionality of the NHI approach, however is not intended to represent actual field conditions.

Results and Conclusions

A comparison of 1990 and 2012 NHI results (Figures 15 and 16) specifically for the Kern Sub-Basin indicate significant reduction in nitrate risk to groundwater. It is intuitive that this reduction has developed from the conversion of annual field and row crops (irrigated with less efficient surface methods) to permanent tree and vine crops (predominantly (>90%) irrigated with drip and micro-irrigation systems).

The results of this analysis also allow for field-specific location of areas where best use of monitoring and management practices can have the most impactful result. The "high vulnerability" areas can be shown at the field level, rather than at a regional level and better represent existing conditions. Identification of specific circumstances that warrant more than just a "high" and "low" vulnerability designation are possible using a modified NHI approach.

A second NHI analysis was conducted to show the flexibility and additionality of the NHI, by incorporating three sub basin-wide NUE estimates of 25, 50 and 75 percent (Figures 17, 18, and 19). Although this is neither realistic nor appropriate in this area due to the variation in crop type and management practices, it does provide an excellent demonstration of incorporation of additional variables to further refine the power of the NHI analysis. As would be expected, NHI is reduced with increasing NUE. The key result of this additional variable, however, is that results can be shown annually on a field by field basis.

Although we have not conducted specific analyses for areas beyond the Kern Sub-Basin related to this work, based on the information presented (Pettygrove, 2012), it is clear that the nitrate risk to groundwater is significantly less and, in many areas negligible for the Kern Sub-Basin as compared to other areas to the north.

It should be noted that additional variables can likely be included in a modified NHI calculation, thus strengthening its predictive capabilities. Some of these additional variables may include, but are not limited to:

- Nitrogen use efficiency
- Effective precipitation
- Depth to groundwater
- Variations in stratigraphy and soil type
- Specific best management practices

Overall the NHI approach is a powerful, flexible, and defensible tool that can be used for assessing large landscapes over time and documenting relative nitrate leaching hazards. It is preferable to the approach proposed in the Tentative Order because it specifically considers that contaminant of concern (N), and does not use other contaminants (pesticides) as an unsuitable proxy for N movement, and accounts for agricultural management, which is not a factor in the vulnerability assessment provided in the Tentative Order.

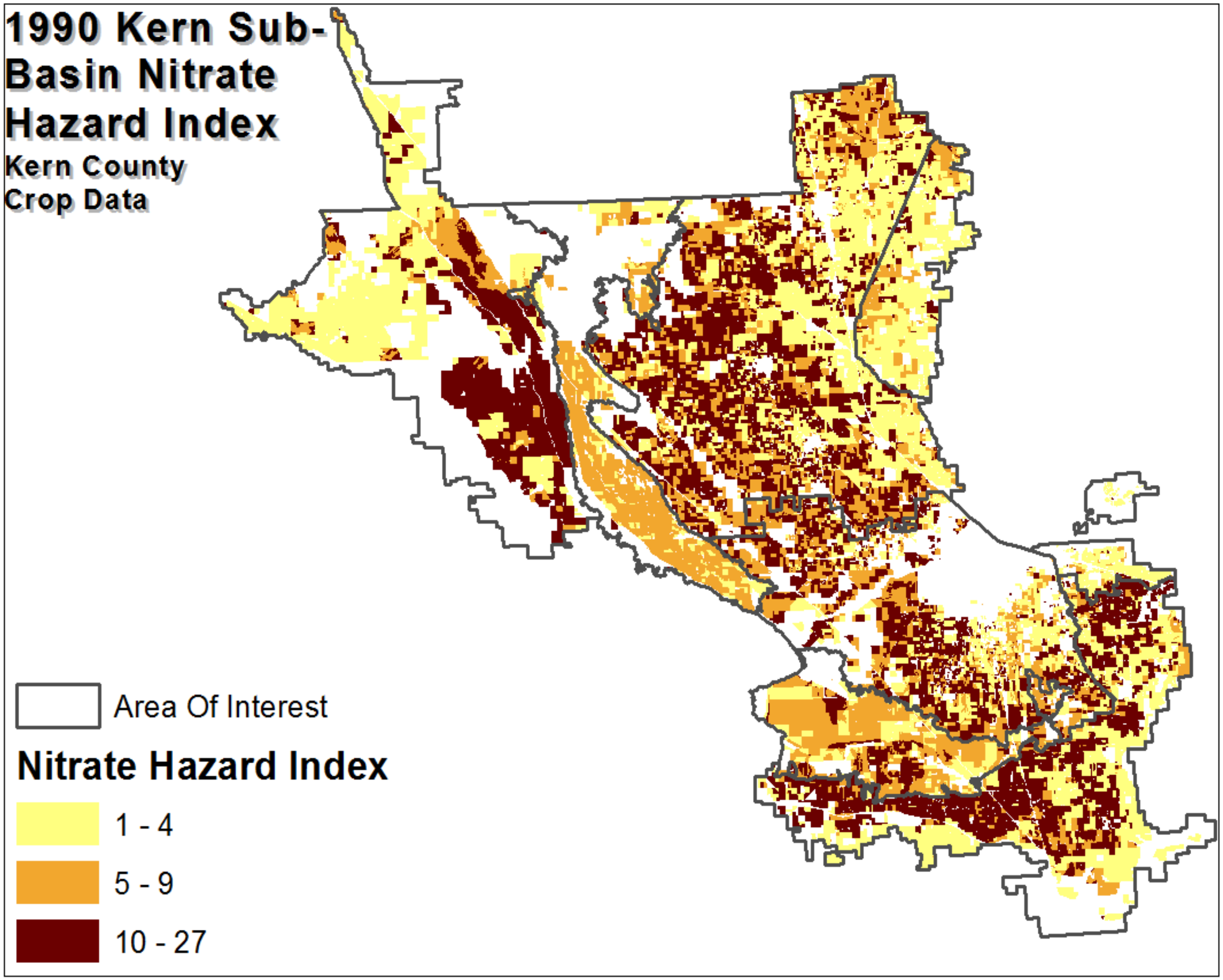


Figure 15. Kern Sub-Basin preliminary Nitrate Hazard Index – 1990

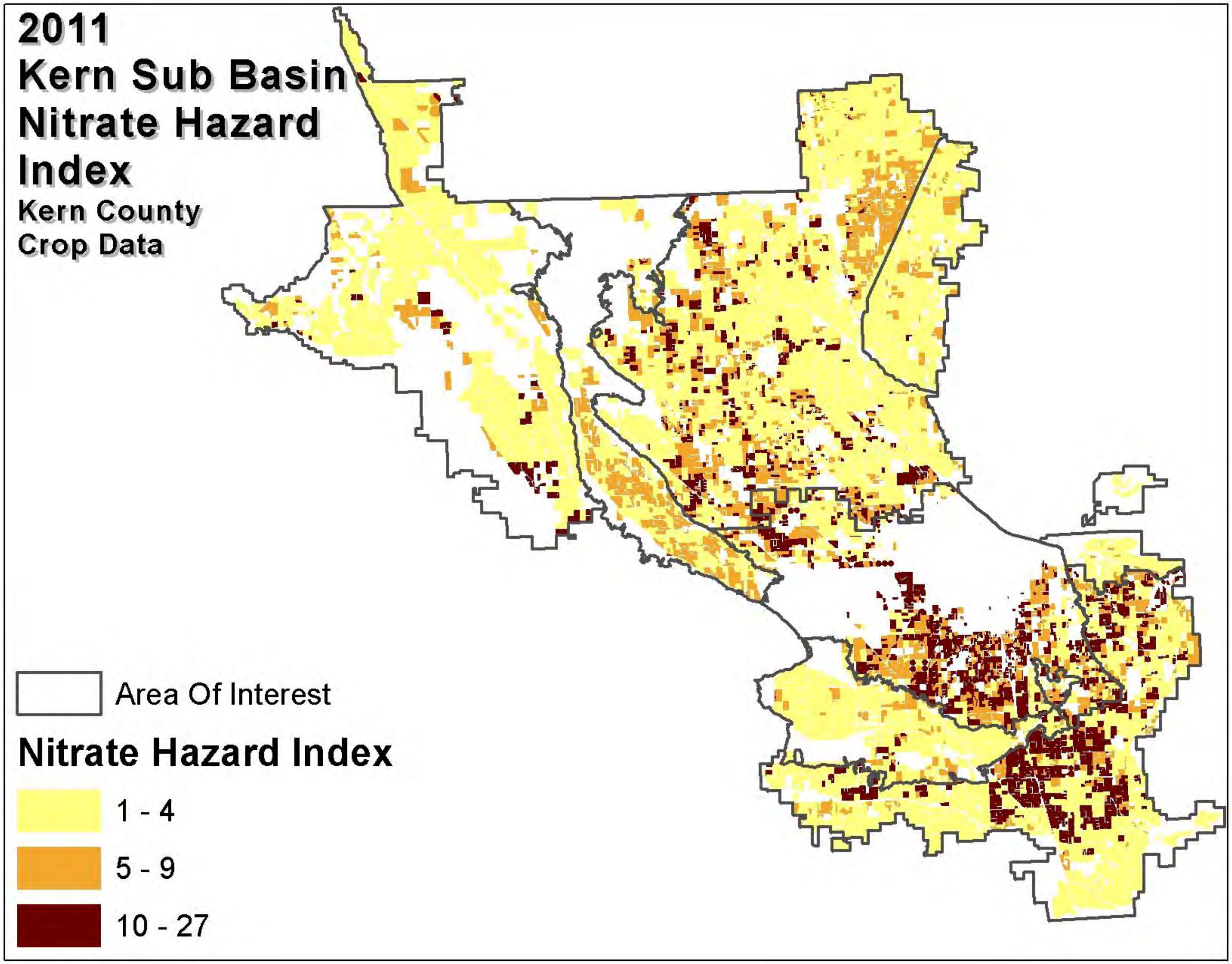


Figure 16. Kern Sub-Basin preliminary Nitrate Hazard Index - 2011

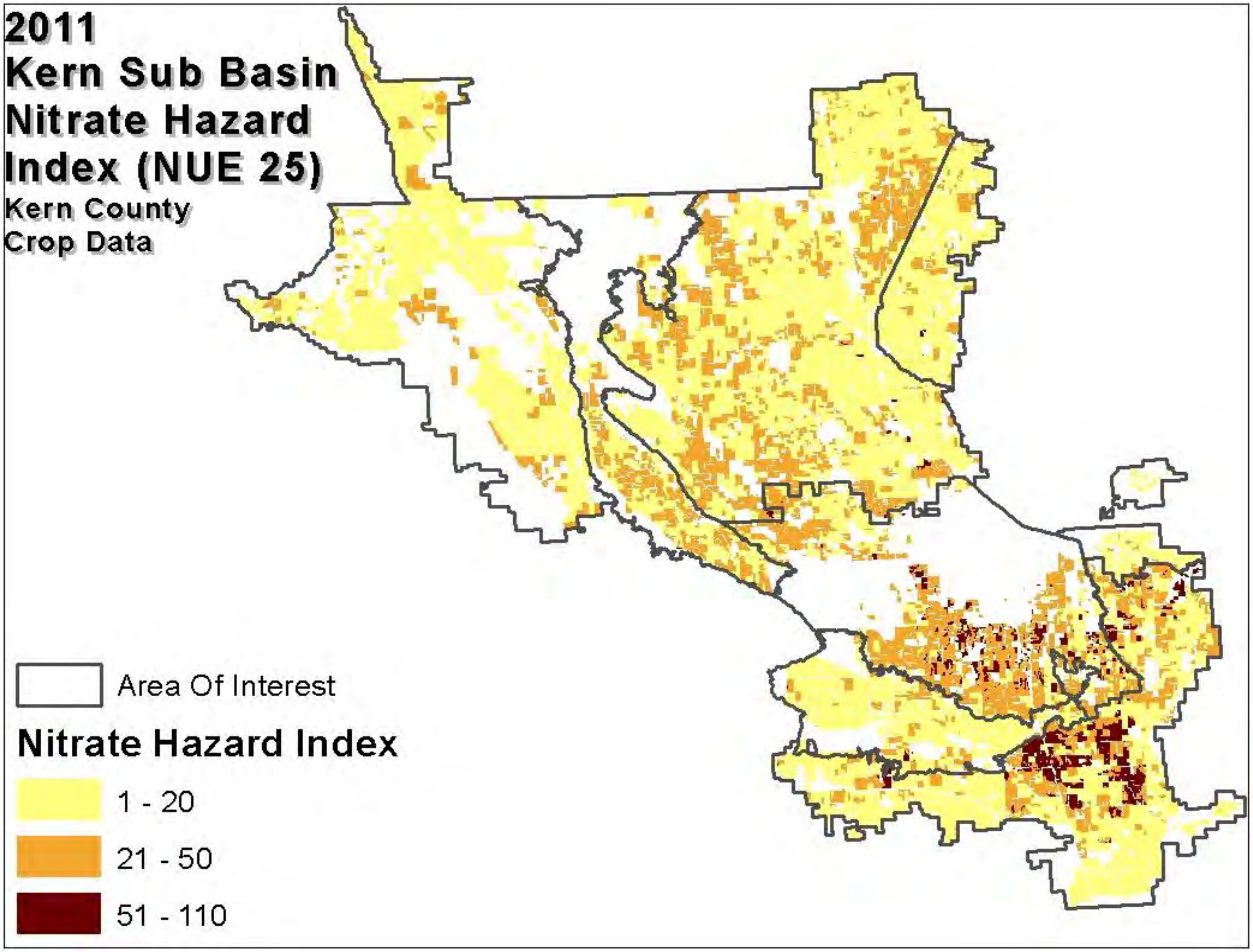


Figure 17. Kern Sub-Basin preliminary Nitrate Hazard Index, including 25% NUE estimate – 2011

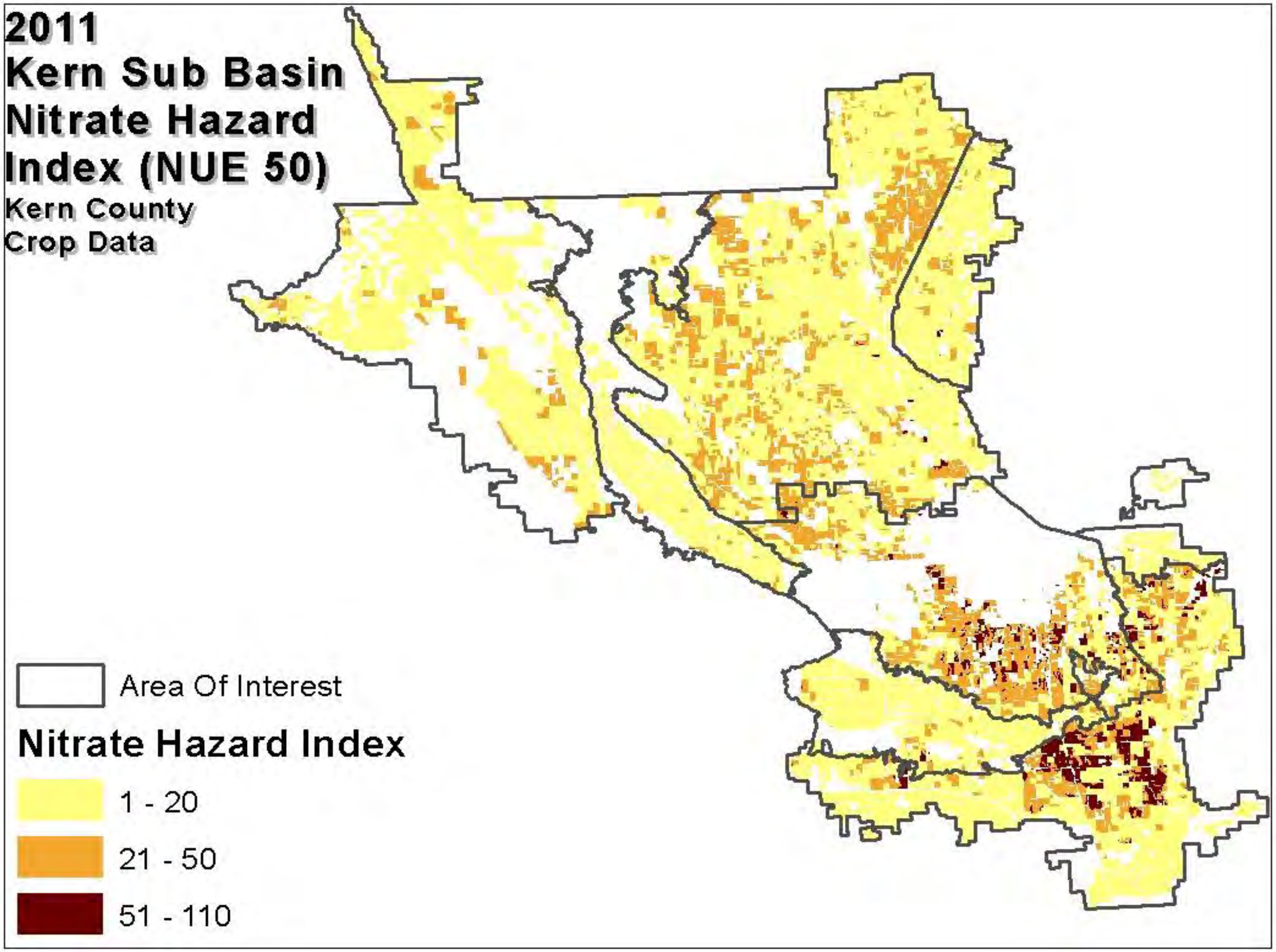


Figure 18. Kern Sub-Basin preliminary Nitrate Hazard Index, including 50% NUE estimate - 2011

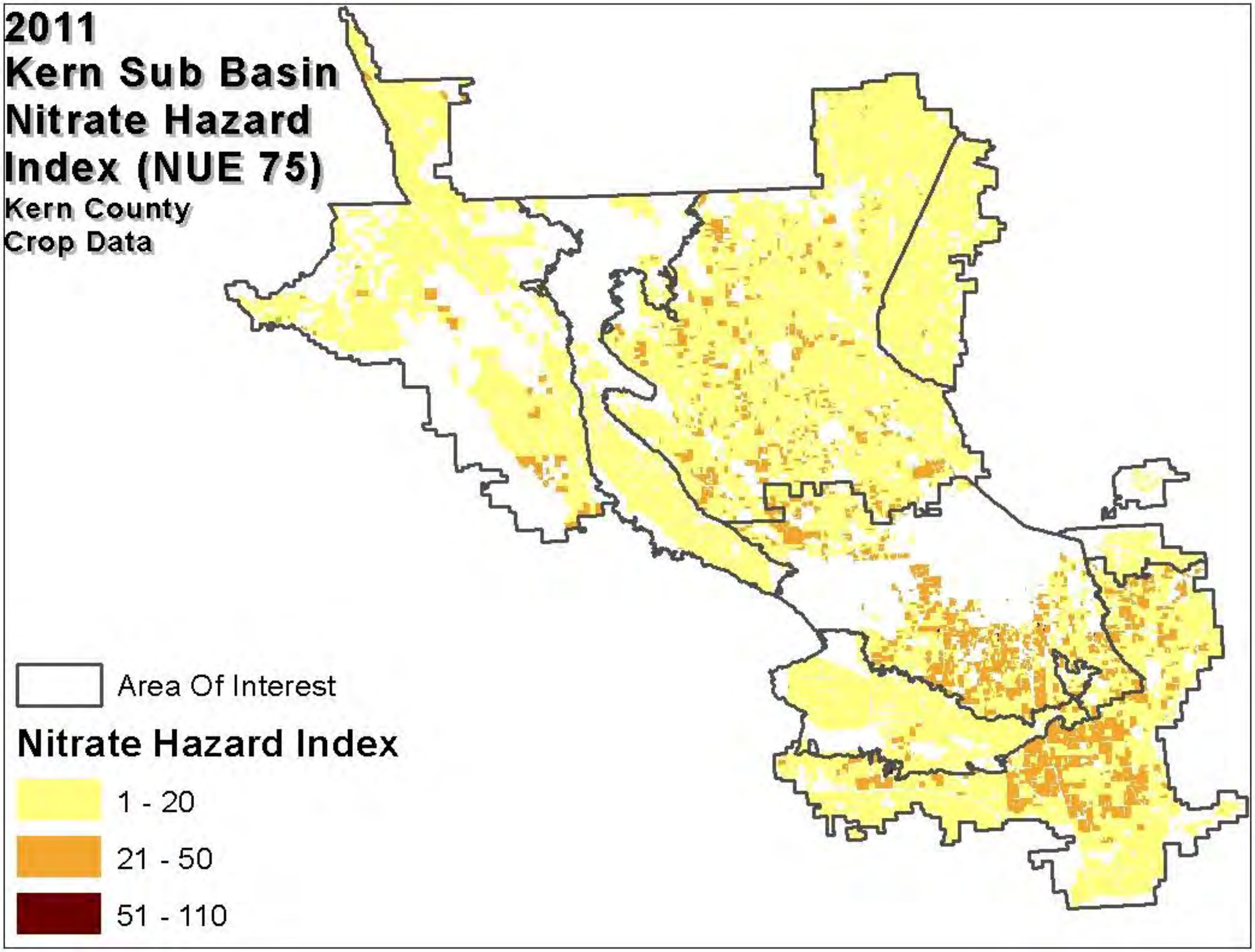


Figure 19. Kern Sub-Basin preliminary Nitrate Hazard Index, including 75% NUE estimate - 2011

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Appendix A. General Concepts of Nitrogen Recovery and Losses

Introduction

No biological system is 100% efficient. A general rule of thumb is that N fertilizer uptake efficiency is 50 percent, on average, for agricultural crops (Meyer, 2008). However, typical fertilizer N uptake efficiencies of major agronomic crops range from less than 30 to greater than 70% because of several factors. First, it is not possible for a plant to deplete the entire inorganic N from the soil solution. As the nitrate and ammonium concentrations decrease in solution, the rate of N uptake also decreases, in a relationship similar to substrate-enzyme reactions (Jackson et al., 1986).

Minimal N concentrations in the soil are required to drive the N influx into crop roots. In addition, some N losses (volatilization or leaching) from the root zone are inevitable during the season. As a result, not all of the N supplied will be available for plant uptake. Finally, and perhaps most importantly that to achieve maximum or near maximum yields, N must be supplied at high levels. According to Mitscherlich's Law, as N supply increases, there is a decrease in the incremental yield increase per unit of N input. As a result, N use efficiency invariably decreases at high levels of N input that are required to achieve maximum yield. On the other hand, if minimal N is supplied so that the soil N is depleted to near zero to minimize nitrate leaching potential, there is an insufficient concentration of soil N to drive maximal rates of N uptake, and crop yield will be limited. For this reason, the presence of residual soil N at the end of a growing season is inevitable in intensively managed cropping systems that are achieving near maximum or maximum economic yields (Hermanson, et al., (undated)).

Nitrogen Uptake and N Fertilizer Recovery

In general, the amount of N accumulated by a crop is affected by:

- the amount and location of N supplied by the soil or added as fertilizer
- the genetic potential of the species or cultivar to absorb N, which is influenced by genetic factors such as tolerance to biotic and abiotic stresses, rooting pattern and physiological N uptake efficiency
- the growth or yield potential under a set of environmental conditions and soil properties
- the ability to retain N in the root zone during the period of crop N uptake.

Nitrogen fertilizer recovery estimates for different fertilizer management and cropping systems are summarized in Table 1 and show varied and wide differences depending on crop type and timing of application.

Table 1. General guidelines for estimating N fertilizer recovery fraction when using N rates for maximum or near maximum yield [1] (Bock and Hergert, 1991).

Relative Efficiency of N-Application Timing	Perennial Grasses	Upland Cereal Grains	Shallow-rooted Crops	Flooded Crops
Low [2]	0.55	0.45	0.35	0.25
Medium [3]	0.70	0.60	0.50	0.40
High [4]	0.80	0.70	0.60	0.50

[1] N fertilizer recovery fraction values assume medium to high nitrate loss potential as determined by soil type and moisture regime and no or negligible NH3 volatilization losses.
[2] One N application (without nitrification inhibitor) well in advance of the growing season. When nitrate loss potential is low due to soil type or moisture regime, use nitrogen use efficiency values for medium to high efficiency of N application timing.
[3] One N application near beginning of growing season.
[4] Multiple N applications with first application near beginning of growing season; use of nitrification inhibitor may substitute for splitting N applications.

NITROGEN LOSSES

It should be clearly noted that N losses are extremely variable and are influence by a myriad of factors, some of which can be controlled or managed and some of which cannot. Estimating N use efficiencies (NUE) requires an understanding of field by field variables that impact N losses. Therefore, utilizing NUE across large landscapes to ultimately determine nitrate available for plant uptake or leaching is marginal at best. Rather, these approaches are more accurate at the field-scale level where a more detailed understanding of soil type, crop type, management practices, climatic conditions, soil chemistry, etc. can be determined.

The amount of N lost from an agricultural soil-plant system is also affected by many factors, all specific to different types of loss. These losses include volatilization, denitrification, and leaching.

Volatilization

Volatilization can occur whenever free ammonia is present near the surface of the soil. The ammonia concentrations in the soil solution will increase by applying ammonia-based fertilizers or decomposable organic materials to neutral or alkaline soils. The amounts of ammonia volatilized are small when N materials are incorporated into the soil, and ammonia losses are also low (≤15% of applied N) when ammonia-based fertilizers are applied in the surface of acidic or neutral soils.

Ammonia volatilization is a complex process involving chemical and biological reactions within the soil, and physical transport of N out of the soil. The method of N application, N source, soil pH, soil cation exchange capacity (CEC), and weather conditions influence ammonia emissions from applied N. Conditions favoring volatilization are surface applications, N sources containing urea, soil pH above 7, low CEC soils, and weather conditions favoring drying. Precise estimates of ammonia emissions are only possible with direct local measurements. Depending on application conditions, general ranges would be 2 to 50% emissions for soil pH > 7 and 0 to 25% emissions for soil pH < 7. If the N source is mixed into an acid soil, the emissions are usually greatly reduced (0 to 4% lost) (Meisinger and Randall, 1991).

Ammonia volatilization is a major pathway of N loss from livestock slurries following their application to land. Approximations of ammonia emissions from volatilized dairy manure are listed in Table 2 and shows the extreme variability as associated with ammonia volatilization under manure applied conditions. Research conducted on synthetic fertilizers show similar results.

Table 2. Approximate ammonia emissions of land-applied manure. These values are rough estimates of the percent of applied N lost; actual values depend on weather conditions after application, type of manure, ammonia content, etc. (Meisinger and Randall, 1991).

Manure Application Method	Type of Manure	Short-term Fate		Long-term Fate	
		N (%)			
		Lost	Retained	Lost	Retained
Broadcast, no incorporation	Solid	15-30	70-85	25-45	55-75
	Liquid	10-25	75-90	20-40	60-80
Broadcast, immediate incorporation	Solid	1-5	95-99	1-5	95-98
	Liquid	1-5	95-99	1-5	95-98
Knifed	Liquid	0-2	98-100	0-2	98-100
Sprinkler irrigated	Liquid	15-35	65-85	20-40	60-80

Denitrification

Compared to volatilization, denitrification emissions in agricultural systems are generally lower, however can be significant in some high water table/reduced soil environments. Emissions of N_2O were found to be lower than 5 to 7 % of the applied N, even at high application rates of 680 kg N/ha/year (Ryden and Lund, 1980). Similarly, Mosier et al. (1986) reported that, on well drained clay-loam soil sown with corn in 1982, 2.5% of the 200 kg N/ha applied as $(NH_4)2SO_4$ was lost as N_2O or N_2. The following year, only a loss of 1% could be measured from the same soil sown with barley. Denitrification estimates for soils with different organic matter contents and drainage classes are provided in Table 3. Clearly, poorly drained soils with high water tables and substantial organic matter can experience significant losses due to denitrification.

Again, it is imperative to understand each unique soil/crop/management system in order to somewhat reasonably estimate potential losses of N due to denitrification. The Kern Sub-Basin has a variety of soil types, management practices, and conditions that result in varied losses due to denitrification.

Table 3. Approximate denitrification estimates for various soils. (Meisinger and Randall, 1991).

Soil Organic Matter Content (%)	Soil Drainage Classification				
	Excessively well-drained	Well drained	Moderately well-drained	Somewhat poorly-drained	Poorly drained
	Inorganic Fertilizer N Denitrified (%)				
<2	2-5	3-9	4-14	6-20	10-30
2-5	3-9	4-16	6-20	10-25	15-45
>5	4-12	6-20	10-25	15-35	25-55

Note: Adjust as follows: for no-tillage use one class wetter drainage; for manure N double all values; for tile-drained soils use one class better drainage; for paddy culture use values under poorly drained; for irrigation or humid climates use value at upper end of range; for arid or semi-arid non-irrigated sites use values at lower end of range; for soils with compacted very slowly permeable layer below plow depth, but above 4-ft depth, use one class wetter drainage.

Leaching

The amount of nitrogen lost with percolating water through the root zone depends on the nitrate concentration in the soil profile. This nitrate concentration is strongly influenced by N application rates, methods and management. Cropping systems are a major factor in regulating nitrate movement below the root zone and toward the water table. Rooting depth, N placement, water requirement, climatic conditions, irrigation efficiency, water-use rate, N-uptake rate, and time of water and N uptake are all factors involved in nitrate leaching that can be affected by choice of cropping system. For nitrate leaching to occur, appreciable concentrations of nitrates must be present in the root zone at the time that water is percolating through that root zone. It is known from experiments with mineral N fertilizers that different cropping systems can influence the rate of leaching of N. Generally, the leaching of N is lower on grassland than on tillage land and is lower for plants with a longer vegetation period than those with a shorter vegetation period. This would also be consistent with the Kern Sub-Basin and the predominant population of permanent crops.

Altman et al. (1995) reported NO_3-N losses from crops amounting to 24 to 55% of the N applied at economic optimum rates (typically providing for near maximum crop yields). In Pennsylvania, the apparent recovery of N fertilizer (ammonium nitrate) applied at the economic optimum N rate in 42 experiments averaged 55% (Fix and Piekielek, 1983). Thus, even when using optimum fertilization rates, a potential exists for fertilizer N to accumulate in the soil with subsequent risk of loss through leaching. This risk is reduced in the Kern Sub-Basin due to the predominance of permanent crops, excessively low effective rainfall, and highly efficient irrigation and N uses.

Perhaps the greatest uncertainty when measuring or predicting deep water percolation and associated nitrate leaching in soil deals with the heterogeneous pore distribution in the root zone and below where microbial N cycling can greatly alter N availability for leaching. Large pores created by shrinking and swelling of clays, decomposition of roots, and faunal activity can accelerate water movement (two to five times higher for soils without obvious macropores, and as much as twenty times for soils with cracks). This increased water movement will have different effects on nitrate leaching depending on N concentration of those areas of the soil "bypassed" by infiltrating water, the rate of water application, the N concentration of infiltrating water, and other factors. The net result, however, is generally one of increased N amounts being transported beyond the reach of crop roots. Aschmann et al. (1992) detected flushes of nitrate and other ions and attributed them to preferential flow through the profile. The methods of highly efficient irrigation in the Kern Sub-Basin (e.g. drip/micro) coupled with deep-rooted permanent crops reduce this risk significantly.

Randall and Iragavarapu (1995) also showed that the amount of N leaching is highly related to the amount of percolating water. They conducted a study on a poorly drained clay loam in Minnesota with continuous corn and N fertilization rates of 200 kg N/ha for several years (fertilizer N was applied as one dose in the spring before planting). They found that annual losses of NO_3-N in the tile water ranged from 1.4 to 139 kg/ha. In dry years, losses generally were equivalent to less than 3% of the fertilizer N applied, whereas in the wet years, losses ranged from 25 to 70% of that applied. Pang et al (1997), in an irrigation quantity and uniformity study, concluded that N leaching was very low when the N application was close to crop N uptake and slightly higher when the uniformity coefficient of the irrigation was 90%. When N application exceeded N uptake, N leaching increased dramatically for all uniformity levels.

Hart et al (1993), working with labeled-N in winter wheat, indicated that most of the labeled-N was presumably mineralized during the fall and winter when the losses are high and crop demand is low. They concluded that leaching of NO_3-N from cereals comes predominantly from mineralization of organic N, not from residual unused N. Olson (1982), after working in the fate of N applied in the fall using labeled-N and agronomic rates in winter wheat, found that from all the leaching produced during the winter time, only about 10% of it came from the fertilizer nitrogen.

Gaines and Gaines (1994) indicated that soil texture affects NO_3-N leaching. In coarser soils, NO_3-N will leach faster than from finer ones. The addition of peat in sandy soils helps in reducing the velocity of N leaching. Tindall et al (1995), in a laboratory analysis, indicated that leaching of NO_3-N was significant in both clay and sandy soils. They concluded that in clay soils leaching occurred less rapidly than in sandy soils.

Crop production, irrigation practices and environmental conditions in the Kern Sub-Basin offer very unique attributes that will result in a relatively low nitrate leaching potential. For example much of the irrigated ground in the Kern Sub-Basin is continuing to rapidly transition from annual, relatively shallow rooted crops generally irrigated with lower efficiency irrigation systems to permanent, deep rooted, highly efficient irrigated systems.

One of the most significant contributors to leaching of nitrate is concentrated and significant rainfall, especially that which is considered as “effective rainfall.” Effective rainfall is defined as the amount of rain that is stored in the soil profile and available for leaching. The average annual rainfall in Bakersfield, Fresno, Merced and Sacramento is 6.5, 11.1, 13.1, and 18.7 inches respectively (National Climate Data Center). Saying that, the actual effective precipitation is likely 1-3 inches in Bakersfield, 5-8 inches in Fresno, 6-9 inches in Merced, and as much as 10+ inches in Sacramento. This is due to the fact that most of the rainfall occurs in the winter. The main difference is that 1-3 inches of effective rainfall over a number of months may not result in any leaching below the root zone in moderate to deep rooted crops, whereas this is not the case in other areas of the state. With deep rooted crops, this limited effective rainfall available to leach nitrate is usually stored within the root zone.

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Education

Ph.D., Soil Science (Water Resources concentration), North Carolina State Univ., Raleigh, 1996
M.S., Soil Science (Ag Engineering concentration), North Carolina State Univ., Raleigh, 1992
B.S., Soil Science (Crop Sci. concentration), California Polytechnic State Univ., San Luis Obispo, 1990

Professional Registrations and Organizations

Certified Professional Soil Scientist (CPSS - #18204) – American Registry of Certified Professionals in Agronomy, Crops and Soils; American Society of Agronomy; Soil Science Society of America

Distinguishing Qualifications

Expert/Specialist in the following areas:

- Soil/water/plant relations in arid climates
- Soil and water salinity management for agriculture
- Water quality for irrigated agriculture
- Regulatory support and negotiation for agriculture
- Policy, regulatory, and environmental influences on agricultural production systems
- Irrigation and drainage management
- Land use assessments
- Expert witness testimony
- Production agricultural systems
- Water resources
- Soil nutrient interactions and environmental issues in soils
- Soil and water conservation
- Soil and land use evaluations for the implementation of irrigation systems and crop production
- Agricultural research
- Agricultural land application and reuse systems for various liquid and solid byproducts

Relevant Experience

Dr. Kimmelshue is a Principal Soil and Agricultural Scientist for NewFields Agricultural and Environmental Resources, LLC. Dr. Kimmelshue is also a founding Partner in the firm. He has experience in agricultural and water resources consulting in the western United States (especially California), and agricultural research and crop production throughout the United States. This experience stretches to various locations in Europe and the Middle East. Dr. Kimmelshue has performed technical leadership and/or managed more than 100 projects and tasks of nearly $9 million dollars over the past 16 years. These projects are directly related to the distinguishing qualifications listed above and listed in more detail as selected representative projects below.

Dr. Kimmelshue's consulting experience includes practical and applied solutions for development of water/soil management systems and agricultural systems, specifically with irrigated agriculture. This technical expertise also includes expert witness testimony, regulatory support and negotiation, water resources science and planning, land reclamation, soil/plant nutrient dynamics, irrigation and drainage in arid and humid climates, soil classification, crop production, land application of municipal and agricultural wastes, vegetative and nonvegetative erosion control, and revegetation/reclamation efforts.

Predominantly, the objective scientific work that Dr. Kimmelshue performs is driven by ever-changing policy, legislative and environmental pressures on production agricultural systems. Dr. Kimmelshue thoroughly understands these drivers and applies sound and objective scientific results to help his clients address these challenges.

Select Representative Projects – Domestic Work

(Complete work experience includes efforts in the states of: California, Arizona, Colorado, Florida, Georgia, Idaho, Iowa, Louisiana, Massachusetts, Montana, Nevada, New Mexico, North Carolina, Oregon, Texas, Utah, Washington, and Wisconsin.)

Representative projects include:

- **Technical Lead – San Joaquin River Restoration Program, Seepage Management Plan, Expert Review Panel Member; United States Bureau of Reclamation; Sacramento, CA.** Dr. Kimmelshue was retained as a salinity, agricultural production, and irrigation and drainage expert to review a completed current version of the Seepage Management Plan for seepage impacts to agriculture including acceptable water table depths, salinity management, yield decline, remotely sensed solutions and irrigation and drainage management considerations. This work will result in completion of a comprehensive management document offering a review of thresholds, solutions and mitigation opportunities as a result of future increased flows in the San Joaquin River.

- **Technical Lead and Project Manager – Kern River Watershed Coalition Authority, Sub Basin Review of Agricultural Irrigation and Drainage Practices and Crop Impacts; Bakersfield, CA.** Dr. Kimmelshue was retained by the KRWCA as an expert in providing sound technical agronomic information related to the unique irrigation and crop production practices of the Kern Sub Basin area within the Southern San Joaquin Valley Water Quality Coalition. This work involved understanding and interpreting changes in cropping patterns, irrigation methods, salinity management, fertilization practices and overall water and nitrogen use efficiency. A portion of this work included intensive ground truthing for development of remotely sensed crop mapping products. Those ground truthing data included permanent crop irrigation method documentation for use in irrigation method change over time.

- **Project Manager and Technical Lead–Blending of Saline Mine Water with Central Arizona Project (CAP) Water for Irrigation to Cotton, Alflafa, and Sod; Rio Tinto Mining Company – Resolution Copper; Superior and Queen Creek, Arizona.** Dr. Kimmelshue is leading an effort to create an acceptable blended water quality for irrigation to alfalfa, cotton and sod on approximately 5,500 acres of land within the New Magma Irrigation and Drainage District (NMID). This project involves direct working efforts with the USBR, the state of Arizona Lands Department, NMID, the University of Arizona Soil, Water and Environmental Science Department, and the Resolution Copper Company. Many of these multi-stakeholder meetings were for the purpose of obtaining permitting documents and satisfying the discharge requirements. The work involves real-time monitoring of treated mine water, CAP water, and the blended result. This monitoring network comprises in-canal Total Dissolved Solids (TDS), temperature, and pH probes. A web-based portal will be used for instantaneous water quality assessment and tracking. Also, a comprehensive soil, water, and tissue sampling program will take place at least quarterly during the 3 to 4 year project.

Crop growth stages and tracking will also be conducted. The dewatering of this mine is necessary to make copper ore available from the largest copper mine in North America.

- **Project Manager and Technical Lead–Santa Clara River Watershed Total Maximum Daily Load (TMDL) Collaborative Process; Agricultural Irrigation Thresholds for Chloride and Salinity; Los Angeles County Sanitation Districts; Fillmore, California.** This project included the development of a detailed literature review and evaluation for determination of the potential threshold of irrigation water quality constituents of concern, specifically chloride, on sensitive crops as a basis of a TMDL process in working with the California Regional Water Quality Control Board. This collaborative process included work with a multitude of stakeholders including the California Avocado Commission, the California Strawberry Commission, Nursery Crop Growers, Ventura County Farm Bureau, and Los Angeles County Sanitation Districts. A multitude of crops were evaluated for their individual tolerances to specific constituents of concern. Only the most susceptible crops were further evaluated and included avocados, strawberries, and nursery stock. This work involved detailed assessment of water quality, irrigation practices, cultural practices and drainage management for the overall determination of acceptable irrigation water quality. The work also included comprehensive public notification efforts with stakeholder groups, public officials, researchers, and farm managers. The ultimate outcome of the work has been highly influential in establishing a chloride TMDL for irrigation of sensitive species in the Santa Clara River Basin.

- **Expert Witness and Technical Lead–Prepared Testimony for United States District Court – Eastern District of California; Judge Oliver W. Wanger; Tehama Colusa Canal Authority Water Deficit Evaluation; Willows and Fresno California.** Dr. Kimmelshue was retained to prepare a detailed evaluation of the influence of regulated deficit irrigation on a variety of crops including almonds, grapes, walnuts, rice, olives, alfalfa, tomatoes and a variety of other permanent and annual field and row crops. The preparation of this testimony was conducted to determine the influence of a deficit of irrigation water at predetermined periods of the growth cycles of the crops mentioned above – predominantly focusing on perennial crops such as almonds. The results of this work indicate the extreme detrimental influence of insufficient irrigation during key growth stages of the crop.

- **Technical Lead–Soil Salinity Evaluation; Glenn Colusa Irrigation District (GCID); Willows, California.** This soil salinity evaluation took place over approximately 200,000 acres of within GCID and some neighboring Districts. Dr. Kimmelshue managed and worked with GCID staff to sample the entire District and adjacent areas for soil salinity within the root zone. Sampling and analysis results were compared with historical measurements by the U. S. Bureau of Reclamation (USBR). The trend of salinization was analyzed for its relationship to long-term irrigation management, including a regulatory drought during which irrigation was curtailed throughout the District.

- **Expert Witness and Technical Lead–Prepared Testimony for Santa Clara County Superior Court; Judge Jack Komar; Crop Water Demand and Estimation of Return Flows in Irrigated and Nonirrigated Areas; Southern California Water Company; Santa Maria, California.** This project involved expert witness testimony, both in deposition and in trial settings, based on an 8-month effort to assess crop water use for an historical 58-year period over a 164,000-acre basin. The work focused on pumped water and return flows to groundwater under irrigated and nonirrigated areas. Crop and native vegetation evapotranspiration and soil storage modeling was conducted. Water was assessed to ensure adequate quality for sensitive crop production. The expert witness testimony included 2 days of deposition and 2 additional days of trial testimony, including cross-examination. The work was conducted as a component of a groundwater basin assessment focusing on the potential for overdraft. This was a multi-stakeholder case, which included agricultural, urban and local, state, and federal agencies.

- **Expert Witness and Technical Lead–Perparing Testimony for Los Angeles County Superior Court; Judge Jack Komar; Crop Water Demand and Estimation of Return Flows in Irrigated and Nonirrigated Areas; Antelope Valley Groundwater Agreement Association; Lancaster, California.** This work centered around the quantification of a water right adjudication of the Antelope Valley. Dr. Kimmelshue represented the agricultural interests in the Valley and conducted a detailed and comprehensive assessment of crop water use, irrigation methods and efficiencies, return flows, and other parameters to ultimately assess a component of the safe yield of the groundwater basin based on agricultural pumping. This work was prepared for expert witness testimony in early 2011. Modeling was conducted to assess not only a variety of crop types in irrigated agricultural, but also irrigated urban areas.

- **Project Manager and Technical Lead–Cold Water Rice Yield Loss Determination; Western Canal Water District, Richvale Irrigation District, Biggs West Gridley Irrigation District; Cold Water Influences on Rice Yield; Nelson, Richvale, and Gridley, California.** This project centered on the development and implementation of Settlement Agreement technical protocols between the three Districts (approximately 100,000 acres) and the California Department of Water Resources. The implementation of this Agreement will result in payment by the State of California to the growers within the Districts for loss of rice yield due to cold water diversion from the State Water Project at Oroville Dam and the Thermalito afterbay. The determination of yield loss is being conducted using aerial, satellite and other remote sensing techniques. This approach is being correlated to field measured yield losses utilizing grower owned and operated, combine-equipped GPS yield monitors. Also, in-canal temperature measurements were taken at 125 locations throughout the Districts for a period of up to 90 days. A temperature interpolation map and equation has been developed and is a third method of estimating yield loss determination. These three methods are being correlated against each other for an ultimate yield loss estimate. This work involves consistent contact and interaction with Districts' managers and staff, representatives from the California Department of Water Resources in Sacramento and Red Bluff, cooperating growers, and sub-consultants.

- **Technical Lead; Water Resources Plan–Oakdale Irrigation District; Oakdale, California.** This effort involved detailed assessment of historic land use and projections for future trends based on agricultural market conditions and urban and environmental pressures. This project also involved the development of a comprehensive water resources planning model. Main inputs to this dynamic model were crop water use estimates, water storage and conveyance, deep percolation, losses, recycled water use, and overall long-term water management options for both agricultural and urban uses.

- **Project Manager and Technical Lead–Historic and Present Crop Evaluation and Water Use Estimate; Brownstein, Hyatt, Farber, Schreck – Water Law Firm – representing a Confidential Client; Bakersfield, California.** This project involved the historic and present quantification of water use at a confidential site near Bakersfield. Historic remote sensing imagery was acquired to determine the irrigated area changes over time as well as the cropping pattern shifts from the early 1950s to present day. Water use estimates were determined for the current cropping patterns as well as diverted water quantities. A comprehensive site evaluation was performed with the client and area grower/owner to determine soil type, water conveyance, irrigation methods and management, storage, crop types, etc. This work was used to facilitate a potential substantial land purchase and water rights quantification.

- **Project Manager and Technical Lead–Irrigation Water Reuse – Water Demand Estimates and Water Quality Suitability; City of Hollister and San Benito County Water District; Hollister, California.** This project involved the quantification of water needs assessment from both a quantity and quality perspective for irrigation with treated wastewater. Dr. Kimmelshue led multiple public education sessions related to the water quality and worked closely with both the City and Water District to ensure acceptance by the farming community. Water quality and quantity estimates were determined and were coupled with appropriate crop types and practices. A key portion of this work involved an update of the Recycled Water Master Plan for approval by the Regional Water Quality Control Board and other entities.

- **Project Manager and Technical Lead–Coalbed Methane Produced Water Discharge and Irrigation Suitability; Petroglyph Operating Company; La Veta, Colorado.** Dr. Kimmelshue evaluated the suitability of highly concentrated sodium-rich water from a coalbed methane operation for discharge and irrigation to corn and alfalfa near Walsenburg, Colorado. This work involved evaluating soil and water amendments to compensate for the high sodium concentrations. This challenging project involved public presentations at local community forums as well as ongoing collaboration with Colorado State University and the Colorado Cooperative Extension Service.

- **Project Manager and Technical Lead–Pilot Study and Full-scale Reuse Program; ChevronTexaco; Richmond, California.** This water quality effort included agricultural reuse of approximately 11 million gallons of processing rinse water from a former nitrogen fertilizer manufacturing facility. The processing rinse water was registered with the State of California Department of Food and Agriculture as an agricultural mineral and labeled as Nitro One. Nitro One contains approximately 4 percent total nitrogen. A pilot study was conducted on a cooperating farmer's land that evaluated the effects of different application rates, injection protocols, and handling techniques on corn production. A public relations campaign was conducted to educate the area farmers about the benefits of using Nitro One and the management considerations of the product.

- **Technical Lead–Nutrient Management for the City of Los Angeles Biosolids Land Application Farm; City of Los Angeles Bureau of Sanitation; Bakersfield, California**. Over the past 8 years, Dr. Kimmelshue has been the lead technical consultant for the City of Los Angeles biosolids land application program at Green Acres Farms. This project involved a multitude of nutrient management programs and land application recommendations including irrigation, crop and overall farm management (including a Comprehensive Farm Management Plan) for the 5,000-acre site. The farm receives and beneficially reuses Class A biosolids from multiple municipal treatment plants in the Los Angeles Basin. Recent work involved the refinement of soil and plant tissue monitoring plans, a phased soil amendment schedule, crop fair market value assessment, and customized biosolids database and agronomic loading rate calculation tool Cybersolids™ for use at Green Acres Farm.

- **Technical Lead and Task Manager–Blackfeet Indian Reservation Water Right Adjudication; Bureau of Indian Affairs/Department of Justice; Browning, Montana.** Technical expert since 1997 leading efforts related to the establishment of a water rights claim for the Blackfeet Indian Tribe. These efforts have and continue to include determination of practicably irrigable acres, detailed land classification for the determination of arable and irrigable lands, present and historic irrigation delineations, water demand estimates of both agricultural and urban uses, drainage evaluations for the purpose of avoiding salinization of lands, and overall task management for nearly $1.7M of labor, subconsultants, and expenses.

- **Technical Lead–Feasibility Study to Determine the Chemical and Hydraulic Effects of Irrigating 420,000 Gallons per Day of Saline Wastewater to an 80-acre Orchard and 75 Acres of Landscaping; IBM; San Jose, California.** This evaluation included a detailed cost estimate of modifying the existing irrigation system and management plan to accept the reuse irrigation water. It also included a comprehensive water quality evaluation that reviewed different blending ratios to ensure adequate water quality according to plant species receiving this irrigation water.

- **Technical Lead and Manager–Clark County Water Reclamation District Biosolids Management Study: Market Assessment; Las Vegas, Nevada.** This effort included a diverse evaluation of potential end-use for Exceptional Quality (EQ) biosolids (in pelletized and bulk form) in the Las Vegas area for the Clark County Water Reclamation District. A key end-use included land application to alfalfa in an arid environment. The end result included recommendations for loading, crop rotations, soil sampling and analysis, tissue sampling and analysis, and potential economic return.

- **Technical Lead–Land Application of Former Fertilizer Processing Solids; ChevronTexaco; Fort Madison, Iowa.** This $1.2 million project included the land application of fertilizer pond wastewater (1.5 million gallons) and solids (16,000 cubic yards) to approximately 2,200 acres of suitable farmland in Lee County, Iowa. Roles and responsibilities included management of site suitability analysis, pilot testing with Iowa State University, request for subcontractor proposal development, contract negotiations, and regulatory requirements.

- **Project Manager and Technical Lead–Detailed Nitrogen Balance Model as a Component to a Required Plan of Study (POS); Anheuser-Busch; Jacksonville, Florida.** This POS evaluated the nitrogen dynamics resulting from multiple-year application of brewery processing waters to more than 300 acres of sod grass through center-pivot irrigation systems. Products included the development of a detailed nitrogen balance historic and predictive model for improvement of site irrigation management. An assessment report and findings were presented to the Florida Department of Environmental Protection and approved for permit extension.

- **Technical Lead–Detailed Engineering Report and Wastewater Discharge Permit Application for the Washington State Department of Ecology; ALCOA and Northwest Alloys, Inc.; Chewelah, Washington.** This report and permit were necessary for continued land application of approximately 2.0 million gallons annually of saline rinse waters to alfalfa and grass hay crops. This project involved protection of shallow groundwater that is already high in total dissolved solids (TDS). Also oversaw the monitoring and analysis of soil, crop, and groundwater testing within the land application field.

- **Technical Lead–Central Utah Water Resources and Land Classification Project; Central Utah Water Conservancy District; Roosevelt, Utah.** Successfully mapped nearly 10,000 acres of lands slated for supplemental irrigation and drainage improvements. Responsibilities included quality control for soil sampling and data interpretation. Co-authored a report to the USBR for final project approval and certification by the United States Congress.

- **Technical Lead–Detailed Site Investigation of Infiltration Rates and Soil Characteristics; Victor Valley Wastewater Reclamation Authority; Victorville, California.** Lead consultant for site investigation for the Victor Valley Water Authority for development of rapid infiltration basins. This work involved the delineation of various soil mapping units, repeated infiltration testing, soil laboratory data interpretation, overall data analysis, and report recommendation development. Infiltration testing work was performed at the edges of the Mojave Desert to evaluate infiltration rates and provide soil profile descriptions for a variety of soils for Victor Valley Wastewater Reclamation Authority. Testing included evaluation of over 300 acres of relatively coarse-textured desert landscape overlain by finer-textured eolian (wind-blown) deposits at various depths. A network of soil profile descriptions and mobile cone-penetrometer testing was performed to locate reasonable areas for siting of infiltration basins for recharge of treated wastewater. Basins were sited according to previously determined distances from the Mojave River to allow adequate treatment capabilities through the soil matrix. The rapid infiltration ponds were constructed successfully, are currently operational, and are satisfying the design rate estimates for infiltration of treated wastewater.

- **Technical Lead and Project Manager–Investigation of Sites for Infiltration Basins; Pajaro Valley Water Management Agency; Watsonville, California.** This project involved the evaluation of the infiltration rates through testing of a variety of soils for irrigation water infiltration, storage, and reuse. This infiltration testing was conducted to provide groundwater recharge of surface water supplies to a predominantly agricultural area that was experiencing groundwater overdraft and potential seawater intrusion. Two locations were selected for testing of native materials for siting the basins. The first location was in the dune lands of the valley directly adjacent to the Pacific Ocean. The second location was sited inland, close to the Pajaro River in fine-textured soils derived from alluvial sources. This second location was to be modified from an existing stormwater capture basin. Results of this investigation led to the construction and operation of the dune-land infiltration basin network and provided some protection from seawater intrusion into the valley. This basin is operated seasonally and aids in the overall water management plan of the Pajaro Valley.

- **Project Manager–Design and Construction of a Constructed Wetlands System for Lake County Sanitation District; Lakeport, California.** Role was to provide design and construction management services during an $110,000 development of a constructed wetland system. The project was designed to improve and enhance wildlife habitat, beneficially reuse secondary treated wastewater, provide for public access and education, and secondarily to improve water quality.

- **Technical Lead–Detailed Engineering Report and Wastewater Discharge Permit Application for the Washington State Department of Ecology; ALCOA and Northwest Alloys, Inc.; Chewelah, Washington.** This report and permit were necessary for continued land application of approximately 2.0 million gallons annually of saline shallow groundwater that is high in total dissolved solids. Also oversaw the monitoring and analysis of soil, crop, and groundwater testing within the land application field.

- **Project Manager and Technical Lead–Caltrans Statewide Vegetative Erosion Control Review; Sacramento, California.** This $390,000 project involved all aspects of project management from proposal development; presentation and interview for project; development of scope of work and budget; implementation of unique project evaluation tools; management of 11-person team, statewide field efforts; subcontractor selection and contracting; scientific publication development; and development and presentation of final report.

- **Project Manager and Technical Lead–Caltrans Nonvegetative Alternative Soil Stabilizers; Bishop, California.** This $300,000 project resulted in the focus of nonvegetative erosion control technologies for soil stabilization. The project management roles of this follow-on work effort involved proposal development; presentation and interview for project; development of scope of work and budget; evaluation of multiple nonvegetative/vegetative erosion control technologies; management of eight-person team; subcontractor selection and management; and report development.

- **Technical Lead–State of California Erosion Control and Cover Establishment Guidelines; California Integrated Waste Management Board; Sacramento, California.** The end product was a practical, and easy-to-use specification to revegetate disposal areas. The specification was tailored to separate the state into individual climatic regions for better species selections and survivability. This specification is being utilized throughout the state for revegetation of illegal dumps sites after clean up.

- **Technical Lead–Selection and Incorporation of Plant Species in a Remediation Effort; Beale Air Force Base; Sacramento, California.** This project involved using a variety of plant and tree species within a slurry wall design for containment and natural degradation of a shallow contamination plume. This work also involved the rerouting of a seasonal stream and revegetation and irrigation of the stream channel.

- **Technical Lead–Riverbend Landfill Leachate Management Study; McMinville, Oregon.** Developed and implemented a client-useable water balance so that the landfill could accurately monitor land application progress and nutrient loadings. Performed detailed water balance modeling and co-authored the initial Leachate Management Plan and three subsequent monitoring reports. These detailed reports were approved by the Oregon Department of Environmental Quality.

Select Representative Projects – International Work

(Complete work experience includes efforts in the countries of: Turkey, Malaysia, Germany, Egypt Israel, Jordan, and The West Bank) Representative projects listed here include:

- **Project Manager and Technical Lead–Development of a Reuse Feasibility Assessment for Irrigation of Conventionally Treated Wastewater; Adana, Turkey**. This project was stimulated by the need to conserve on-base water supplies at the Incirlik Air Base. The feasibility study evaluated the needs associated with the conversion of some on-base irrigation water sources from potable water to treated wastewater. This $100,000 project limited the reliance on off-base water supplies through irrigation with treated wastewater and other conservation practices associated with landscape and crop irrigation. The use efficiency was maximized in this project because storage was limited. A nutrient and hydraulic management plan was constructed for this work to ensure that no over-application of treated wastewater takes place.

- **Project Manager and Technical Lead–Development of Evaluation Strategy for Agricultural Reuse at 19 Wastewater Treatment Plant Sites throughout the Country of Jordan; Amman, Jordan.** These efforts included a technical strategy development for agricultural reuse for the currently operating 19 wastewater treatment plants in Jordan. This involved an evaluation of influencing factors such as soils, climate, crop production in the area, market conditions, cultural acceptance, wastewater quality, and crop recommendations. The technical report was used to preliminarily prioritize agricultural reuse development for specific areas.

- **Technical Lead–Development of a Feasibility Assessment for Agricultural Reuse of Treated Wastewater for the Hebron Wastewater Treatment Plant Improvements Project; Hebron, West Bank.** This project involved initial development and site location options for reuse of treated wastewater from the anticipated wastewater treatment plant serving Hebron and surrounding communities. Four main sites were evaluated according to land suitability; climatic regimes; proximity to markets; available land area; wadi discharge, potential storage areas and sizing; and impacts to the surrounding environment. Preliminary hydraulic and nutrient balance modeling was conducted for each site and for projected increases in treated wastewater production. This included development of water and nutrient balances for agricultural reuse with local cropping patterns.

- **Technical Lead–Development of a Master Planning Document for the Hebron Wastewater Treatment Plant Improvements Project; Hebron, West Bank.** This project involved a detailed hydraulic and nutrient loading modeling effort for the agricultural reuse component initially proposed in a previous Feasibility Assessment effort. This work was a component of an overall wastewater master planning effort and was driven by environmental and economic concerns of the region.

- **Technical Lead–Development of a Feasibility Study for the Mafraq Wastewater Treatment Plant Improvements Project; Mafraq, Jordan.** This project involved development of water and nutrient balances for beneficial agricultural reuse of treated wastewater based on various scenarios of different cropping patterns, storage sizing, and wadi discharge for forecasted wastewater flows to 2025. Managing climatic influences and the seasonality of application were optimized to maximize the land base available for application.

Previous Experience

Before co-founding NewFields Agricultural and Environmental Resources, LLC, Dr. Kimmelshue spent over 11 years with CH2MHILL. During that time, Dr. Kimmelshue was the firm-wide leader for

Agricultural Services Technology, which represented nearly 70 people throughout the firm. Dr. Kimmelshue was also the Business Development Lead for all water resources related projects for a 7-state southwestern region. Prior to that, Dr. Kimmelshue worked as a research associate at North Carolina State University and managed portions of an irrigated agricultural farm in northern California, producing a variety of tree, field, and row crops.

Professional Responsibilities and Accomplishments

State Committee Member – California Department of Food and Agriculture – Specialty Crop Block Grant Advisory Committee – A 3-year appointment for review and selection of proposals for up to $16M in United States Department of Agriculture funding annually. Sacramento, CA

Fellow – California Agricultural Leadership Program – Class 37 – a 2-year, intensive leadership development program designed for the advancement of current and future leaders in California agriculture. Sacramento, CA

National Committee Member – American Society of Agronomy Career Placement and Professional Development, Minneapolis, MN

Participant – California Water Education Foundation Tours – Sacramento Valley and Central Valley Tours.

Board Chair and Member – Advisory Board for California Polytechnic State University Earth and Soil Sciences Department, San Luis Obispo, CA

Board Member – Advisory Board for California State University Geosciences Department, Chico, CA

Board Member – Shasta Land Trust, Redding, CA

Selected Publications

Kimmelshue, J.E. 2010. A Case Study of Reuse and Conservation of Water during Resource Management: Resolution Copper Mining. Chapter in: Sustainable Land Development and Restoration – Decision Consequence Analysis. Brown, Hall, Snook and Garvin. Elsevier, Inc.

Heilmann, M., B. Inman, J. Kimmelshue, B. Schmid, J. Dickey, R. Coles, and R. Harasick. 2006. Classification of the Owens Dry Lake Playa Surface Using Satellite Imagery and Unique Surface Characterization Methods. 2006. World Congress of Soil Science: Frontiers in Soil Science, Philadelphia, PA, July 2006.

Kimmelshue, J.E. and G. Eldridge. 2006. Agricultural Reuse – A Component of Total Water Management. National Water Resources Association. Park City, UT, July 2006.

Kimmelshue, J.E., K. Freas, and S. Sulaiman. 2006. VOYAGE – A Total Water Management Modeling Tool. AsiaWater 2006. Kuala Lumpur, Malaysia. March 2006.

Griffes, D., D. Meerbach, J. Kimmelshue and P Rude. 2003. Reuse of Treated Wastewater and its Impact on the Environment: Research Priorities. Proceedings of: The First Conference for Scientific Research at Jordan Universities. Amman, Jordan.

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Kimmelshue, J.E. and D. Kruse. 2003. Feasibility and Water Savings of Treated Wastewater Reuse for Irrigation of Golf Course and Landscaped Areas at Incirlik Air Base. 5th Biennial European Command Joint Environmental Conference. Sonthofen, Germany.

Sloan, A.J., M.L. Scharff, M. Hart, L. Karren. J.E. Kimmelshue, and B. Hallock. 2002. Development of the Highway Erosion Assessment Tool (HEAT) for evaluation of roadside slopes in California. Proceedings of the International Erosion Control Association Conference, Orlando, FL, February 25-March 1, 2002.

Kimmelshue, J.E., M. Dellinger, R. Langis, and J. Bays. 2000. Basin 2000/Lyons Creek wildlife habitat and treatment wetlands design and construction. WEFTEC 2000 Annual Meetings, Oct 16-19, 2000. Anaheim, CA.

Kimmelshue, J.E., J. Maier, and C. Peck. 2001. Land Application of 25 Years of Phosphorus Fertilizer Residues. WEFTEC 2001 Technical Proceedings.

Kimmelshue, J.E., R. Langis, M. Dellinger and J. Bays. 2000. *Wildlife Habitat and Treatment Wetlands Design and Construction.* Treatment Wetlands for Water Quality Improvement - Quebec 2000 Conference Proceedings (Selected Papers). CH2M HILL, Waterloo.

Kimmelshue, J.E., M. Dellinger, R. Langis, and J. Bays. 2000. Basin 2000/Lyons Creek wildlife habitat and treatment wetlands design and construction. WEFTEC 2000 Technical Proceedings.

Kimmelshue, J.E., R.O. Evans, and J.W. Gilliam. 1996. Extraction and instrumentation of round soil monoliths for monitoring evapotranspiration and solute movement. Evapotranspiration and Irrigation Scheduling in Proceedings of International Conference of American Society of Agricultural Engineers.

Kimmelshue, J.E., J.W. Gilliam, and R.O. Evans. 1996. The influence of drainage management and nitrogen additions on nitrate leaching. Soil Science Society of North Carolina Proceedings.

Kimmelshue, J.E., J.W. Gilliam, and R.O. Evans. 1996. Agronomy Abstracts. Influence controlled drainage on nitrate leaching. American Society of Agronomy 88th Annual Meetings. Nov. 2, 1996. Indianapolis, IN.

Kimmelshue, J.E. 1996. *TheIinfluence of Drainage Management and Nitrogen Fertility Practices on Nitrate Leaching.* Ph.D. dissertation. North Carolina State University. Raleigh, NC.

Kimmelshue, J.E., J.W. Gilliam, and R.J. Volk. 1995. Water management effects on mineralization of soil organic matter and corn residue. *Soil Science Society of America Journal*. 59:1156-1162.

Kimmelshue, J.E., R.O. Evans, and J.W. Gilliam. 1995. Extraction and use of large intact soil cores and a field site in drainage management studies. Soil Science Society of North Carolina Proceedings. 38:83-87.

Kimmelshue, J.E. and J.W. Gilliam. 1993. Controlling the mineralization of organic nitrogen in lower coastal plain soils. Soil Science Society of North Carolina Proceedings. 36:29-34.

Kimmelshue, J.E. and J.W. Gilliam. 1992. Agronomy Abstracts. Nitrogen mineralization of 15N labeled corn residue as influenced by water management. American Society of Agronomy 84th Annual Meetings. Nov. 5, 1992. Minneapolis, MN.

Kimmelshue, J.E. 1992. *Nitrogen Mineralization of 15N Labeled Corn Residue as Influenced by Water Management.* M.S. Thesis. North Carolina State University. Raleigh, NC.

Kimmelshue, J.E. 1990. *Sulfur Additions to an Alkaline Soil in the Northern Sacramento Valley of California and Influence on Almond Production*. Unpublished bachelor's thesis. California Polytechnic State University. San Luis Obispo, CA.

NEWFIELDS

Stephanie K. Tillman, M.S., CPSS, CPAg

Project Soil and Agricultural Scientist - NewFields Agricultural & Environmental Resources, LLC

Education

M.S., Soil Science, University of Saskatchewan, 2001

B.S., Agriculture (Environmental Science), University of Saskatchewan, 1998

B. Music Performance – Brandon University, 1993

Professional Registrations

Certified Professional Soil Scientist (CPSS) – American Registry of Certified Professionals in Agronomy, Crops and Soils

Certified Professional Agronomist (CPAg) – American Registry of Certified Professionals in Agronomy, Crops and Soils

Distinguishing Qualifications

Expert/Specialist in the following areas:

- Implementing and monitoring regulatory compliance programs for land application of industrial wastewater
- Evaluating soil and plant systems and water quality for beneficial agricultural reuse
- Developing grower marketing programs
- Characterizing soil profiles
- Mapping rangeland and developing rangeland management plans
- Modeling agricultural water and nutrient use
- Researching salinity-related problems in agriculture
- Reclaiming sodic/saline soils
- Evaluating industrial co-products for beneficial agricultural use

Relevant Experience

Ms. Tillman has worked in the consulting and agri-business industries for 12 years. She has worked with clients to understand and comply with regulations related to beneficial agricultural use and land treatment of industrial wastewater. Water quality issues also figure prominently in project work that involves estimating water use in various plant and soil systems. These systems often include salinity issues that must be managed for the benefit of clients, crops, and soils. Ms. Tillman has extensive experience working with growers on various projects such as rangeland management plans, product development, and irrigation projects. Ms. Tillman has worked on projects throughout California and in other Western States.

Representative Project Experience

- **Soil and Agricultural Scientist – Modeling Carbon Flux of Almond Pruning Practices; Almond Board of California; Modesto, CA.** Conducted literature review of carbon and nitrogen dynamics of almond management practices. Conducted survey of university extension agents, industry experts, and growers and compiled information for greenhouse gas model. Collaborated with remote sensing and GIS specialists to conduct almond crop mapping in California.

- **Soil and Agricultural Scientist – Reclaiming Sodic Soil; Petroglyph Energy; Walsenburg, CO.** Collaborated to develop soil reclamation treatment and monitoring program for dairy farm. Soil had become sodic from irrigation with coal bed methane discharge. Worked with landowner, client, and state industry commission to determine and coordinate field operations.
- **Soil and Agricultural Scientist – Water and Soil Quality Monitoring and Crop Water Use Estimating; Resolution Copper Mining; Superior, AZ.** Assisted in determining and developing monitoring protocol for irrigation district using blended, treated mine discharge water. Developed estimates for water quantity and quality appropriate for applicable crops.
- **Soil and Agricultural Scientist – Researching and Coordinating Rice Yield Monitoring; Western Canal Water District, Oroville, CA.** Developed protocol for monitoring rice yield with GPS-equipped harvesters. Coordinated communication between water districts, landowners, and technical experts for data analysis. Assisted with various technical aspects of applying remote sensing technology to yield determination on large scale.
- **Soil and Agricultural Scientist – Determining Carbon Credits; Barksdale Airforce Base, Barksdale, Louisiana.** Assisted with technical aspects of using remote sensing and management information for modeling greenhouse gas flux from large area of land. Researched economic and technical mechanisms used in the carbon trading industry.
- **Project Manager–Waste Discharge Requirements Permitting; Wilbur Packing Company; Yuba City, California.** Managed monitoring program to ensure regulatory compliance. Colusa Industrial Properties owns and operates a fruit packing facility and several orchards. Project management responsibilities included scope, budget, and schedule development and tracking; client service, project team management, and coordinating technical document submittals to the Regional Water Quality Control Board on behalf of the client.
- **Project Manager–Land Treatment System Monitoring; Colusa Industrial Properties; Colusa, California.** Managed a monitoring program to ensure regulatory compliance. Colusa Industrial Properties owns and operates a land treatment system for disposal of industrial wastewater. Project management responsibilities included scope, budget, and schedule development and tracking; field soil sampling; writing technical and annual summary reports; tracking hydraulic and nutrient loading on the site; and coordinating project staff and document submittals to the Regional Water Quality Control Board on behalf of the client.
- **Task Manager/Soil Scientist/Agricultural Specialist–Upper Santa Clara River Chloride TMDL Collaborative Process; County Sanitation Districts of Los Angeles County**. Conducted extensive literature review and evaluation on chloride and salt tolerance of salt sensitive crops. Developed scoring system to rank literature on quality, applicability, and scope relevance to study area. Developed extended study alternatives including sand tank studies, field studies, and outdoor containers for avocado, strawberry, and nursery crops.
- **Assistant Project Manager–Rangeland and Riparian Managements Plans; Deer Creek Watershed Conservancy; Cottonwood, California**. Conducted all mapping (GPS), landowner interviews, stocking rate assessments, and developed management practice implementation plans and monitoring plans for 20,000 acres on five ranches in Deer Creek Watershed. Mapping and planning included management units, fences, invasive weeds, water developments, and cultural and historical resources.
- **Soil Scientist–Facility Runoff Control Plans; Colorado Department of Transportation (CDOT).** Conducted site visits and assisted in writing Facility Runoff Control Plans for CDOT maintenance yards in and around Denver. Assisted in developing Best Management Practices to reduce erosion and pollutants in stormwater discharges.
- **Soil Scientist–Cottonwood Creek Watershed Management Strategy and Plan; Cottonwood Creek Watershed Group; California.** Conducted public meetings on strategic resource areas

including groundwater and surface water quality, erosion and flooding, aquatic habitat, rangeland and timber, and terrestrial and riparian habitat. Worked collaboratively with Technical Review Team and stakeholders to develop strategic areas including fuel reduction and vegetation management, inventory and mapping, outreach and education, management plan development, and monitoring and modeling.

- **Soil Scientist–Santa Maria Basin Return Flow Modeling Under Agricultural Lands, Santa Barbara County, California.** Modified existing water balance in order to model return flow under irrigated crops, non-irrigated agricultural lands, and native vegetation. Researched and developed key model inputs such as rooting zones and consumptive water use for native vegetation and irrigated and non-irrigated crops.
- **Task Manager–Soil Sampling and Analysis; Owens Lake Dust Mitigation Program; Los Angeles Department of Water and Power (LADWP).** Coordinating soil sampling and analysis in conjunction with court-ordered dust mitigation program. Owens Dry Lake is the nation's largest single source of dust emissions. LADWP must mitigate the emissions with dust control measures that include shallow flooding and establishing managed vegetation. Compliance must be accomplished under extremely saline conditions. Tasks included developing sampling plans, performing soil sampling and interpreting data for soil reclamation, and developing soil profile descriptions.
- **Regulatory Compliance–Jacksonville Brewery Land Application Site; Anheuser-Busch; Jacksonville, Florida.** Responsible for assisting Anheuser-Busch with regulatory compliance activities associated with land application of process water. This site is regulated by the Florida Department of Environmental Protection (DEP) for nitrate contamination in groundwater. Involvement included developing a nitrogen balance tool by summarizing and manipulating historical and present-day data to identify alternatives for compliance with DEP regulations.
- **Soil Scientist/Agricultural Specialist–Agricultural Reuse Pilot Study and Marketing Program; Chevron-Richmond; Richmond, California.** Chevron Environmental Management Company requires a means to dispose of its industrial process water. Responsibilities included designing and conducting a pilot field study to evaluate agricultural reuse and developing a marketing program with local state agency staff and academic community experts for growers to use Chevron’s industrial process water as fertilizer.
- **Soil Scientist–Stormwater Monitoring, Multiple Statewide Projects, California Department of Transportation.** Contributor to various Caltrans erosion control and stormwater management projects, including the Caltrans Statewide Vegetative Erosion Control Review and Caltrans Non-Vegetative Alternative Soil Stabilizers project. Tasks included stormwater sampling, non-vegetative erosion control methods study plan documentation, and assisting in the design of stormwater collection methods.

Previous Experience

Prior to her employment at NewFields, Ms. Tillman worked as a soil and agricultural scientist at CH2M HILL for 6 years. Preceding her work in consulting, Ms. Tillman worked in the agri-sales, development and research industry across three Canadian provinces for Simplot Canada and Rhone-Poulenc. International experience includes volunteering at a project in Mali, West Africa, which encouraged agricultural and economic diversification by teaching local farmers about cotton production.

TENTATIVE WASTE DISCHARGE REQUIREMENTS GENERAL ORDER FOR GROWERS WITHIN THE TULARE LAKE BASIN AREA THAT ARE MEMBERS OF A THIRD-PARTY GROUP

4/15/2013

ESTIMATED COST OF COMPLIANCE TECHNICAL REPORT – KERN COALITION

Prepared For:

Kern River Watershed Coalition Authority
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Prepared By:
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130 N. Garden Street
Visalia, CA 93291

Principal Authors - Provost & Pritchard Consulting Group

The principal authors of this Report have hands on experience with farming and irrigation practices in the Southern San Joaquin Valley. They were also the principal engineers to help develop the implementation cost estimates for the Dairy General Order working with agronomists, the dairy industry organizations, and the Rancho Cordova Water Board Staff.

Donald Ikemiya, P.E. – Mr. Ikemiya is a Vice President at Provost & Pritchard with 28 years of engineering experience. He is a California registered Civil Engineer and Agricultural Engineer. He formerly was the Area Engineer for the USDA Natural Resources Conservation Service covering most of the southern Central Valley. He grew up on a farm and currently manages the financial aspects of the now leased family farm, located within the Tulare Lake Basin Area.

E. John Schaap, M.S., P.E. - Mr. Schaap is a Vice President at Provost & Pritchard with 17 years of engineering experience. He is a California registered Civil Engineer and Agricultural Engineer. He formerly managed his own engineering firm and worked for a major Central Valley agricultural producer. He grew up on a dairy in Texas, New Mexico, and Kern County, California.

The cost estimate presented in this Report was developed with significant detail by designating direct hourly costs and expenses to each of the required tasks in the March 2013 Tulare Lake Basin Area Tentative General Order.

An initial version of the cost spreadsheets and per acre costs were presented to the Water Board staff in Fresno on January 29, 2013.

REGISTERED PROFESSIONAL ENGINEER
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Donald Ikemiya
Signed 4/15/13

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ESTIMATED COST OF COMPLIANCE

TECHNICAL REPORT

KERN RIVER WATERSHED COALITION AUTHORITY

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Attachments

1

OBJECTIVES, APPROACH & ASSUMPTIONS

A. OBJECTIVES

The objectives of this Estimated Cost of Compliance Technical Report (Report/Study) include the following:

1. Provide a detailed assessment of the Kern River Watershed Coalition Authority's (KRWCA) Third Party and Member costs to comply with the March 2013 Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area (Order).
2. Provide a comparative analysis of the $1.90 per acre incremental cost estimate above the current surface water only program, provided under Finding No. 39 in the Order, to the costs determined in this Study. We are unaware of what detailed assumptions the Water Board staff used or specifically how the $1.90/acre was determined, and are unaware if these assumptions were made public.
3. This Report is to provide concise explanations, coupled with detailed technical background.

B. APPROACH

1. The Kern Coalition is a sub-watershed of the Tulare Lake Basin area. This Report assesses the cost impacts of the Order within the Kern Coalition area and its Members. The Kern Coalition irrigated area is approximately 1,040,000 acres in size with an estimate of 902 Members ultimately joining the Kern Coalition.
2. The primary approach is to designate specific hours, an hourly rate, consultant expenses, and administrative expenses, on a requirement-by-requirement basis as written in the Order. The Report is written to correlate with the Order's Sections.
3. The surface water quality requirements are currently being addressed by the Kern Coalition and therefore the Third-Party and Member costs to comply with the surface water quality sections of the Order were not included in this Report.
4. The costs associated with implementing management practices that might be indirectly triggered or required, were largely not included in the Report costs. Only direct compliance practices (i.e. nitrogen management plans) were estimated. Although these costs will be significant for some individual members, a large majority of Kern Coalition Members have already implemented pressurized irrigation systems, tailwater recovery systems, and other practices that have improved irrigation water distribution uniformity.

C. ASSUMPTIONS

1. It is acknowledged that many of the specific requirements referenced and assumptions made in this Report are based on the information available at the time the Reporat was written. Future refinements of the costs are expected.
2. The Tentative Order's requirements are not well defined in numerous areas, thus assumptions were made in order to assign costs.
3. Numerical assumptions used in this Report are listed in Table 1 – 1 Kern Coalition Cost Analysis Assumptions.
4. Each Table in this report utilized data summarized from the corresponding detailed spreadsheet in the Appendix.

Table 1 – 1. Kern Coalition Cost Analysis Assumptions

Description	Tulare Lake Basin Area Tentative Order	Kern Coalition	Units
Total Irrigated Lands Area	2,890,000[1/]	1,040,000	Acres
Acres to be Under the Order	850,000[1/ 4/]	1,040,000	Acres
Growers with Irrigated Lands	10,700[1/]	902[3/]	Growers
Potential Members	7,200[1/]	902[3/]	Members
Current Members	--	350	Members
Members Needing to Enroll	--	552	Members
Small Farming Operation (<60 acres) Members	6,206[1/]	182[3/]	Small Farm Members
Small Farming Operation (<60 acres) Acres	133,000[1/]	4500[3/]	Small Farm Acres
Member Hourly Rate	$120[2/]	$120	Per Hour
Coalition Staff Hourly Rate	--	$120	Per Hour
Consultant Staff Hourly Rate	$120[2/]	--	Per Hour
Member Water Board Fee	$0.56	$0.56	Per Acre

1/ March 2013 Tentative Order - Findings No. 12

2/ July 2010 Draft Economic Analysis Technical Memorandum ICF International – Page 2-22

3/ Kern County Agricultural Commissioner Data

4/ This appears to be an error. The acres should match irrigated acres of 2,890,000.

2

WASTE DISCHARGE REQUIREMENTS THIRD-PARTY GROUP COSTS (SECTIONS IV.C & VIII)

A. SECTION IV.C PROVISIONS & REQUIREMENTS – THIRD PARTY

The costs associated with the Third-Party requirements to comply with the WDRs Section IV.C are described in this section. **Table 2 – 1 "Third Party Section IV.C Costs"** summarizes the estimated Kern Coalition costs.

Table 2 – 1 Third-Party Section IV.C Costs

Report Heading	WDR Section	Description	Third-Party One Time Costs			Third-Party Annual Costs		
			Total Hours	Expenses	One Time Upfront Costs[1/]	Total Hours	Expenses	Annual Costs
1.	IV.C.1	Organizational Documentation	72	$7,000	$15640	--	--	--
2.	IV.C.2	Prepare Annual Summaries	--	--	--	144	$4,000	$21,280
3.	IV.C.3	Response to Notice of Violation (NOV)	--	--	--	108	$22,600	$35,560
4.	IV.C.4	Develop, implement, track and evaluate effectiveness of GQMP	200	$100,000	$124,000	100	$40,000	$52,000
5.	IV.C.5	Submittals	--	--	--	100	$5,000	$17,000
6.	IV.C.6	Quality Assurance/Quality Control	--	--	--	100	$1,000	$13,000
7.	IV.C.7	Receipt of Notice of Applicability (NOA)	260	$7,000	$38,200	--	--	--
8.	IV.C.8	Conduct Education and Outreach activities			--	500	$24,000	$84,000
9.	IV.C.9	Annual Membership Participation Report			--	500	$11,000	$71,000
10.	IV.C.10	Ensure Requirements are Met			--	80	$2,000	$11,600
11.	IV.C.11	Fees			--	210	$10,000	$35,200
Third-Party Subtotal			**532**	**$114,000**	**$177,840**	**1,842**	**$119,600**	**$340,640**

1/ One time costs can occur anytime within the first five years of implementation.

1. Organizational Documentation (IV.C.1)

One time upfront costs for:

- Hiring staff to manage the operations.
- Identify responsible persons for program fulfillment.
- Setting up an organizational system and office.
- Update website for Third-Party functionality, create database for contact emails, addresses, transmittals of hardcopies and recordkeeping for Members.
- Annual costs are built into the other ongoing tasks.

2. Prepare Annual Summaries (IV.C.2)

Annual costs for:

- Utilizing accounting staff.
- Fee notices, collection of fees, and receipts.
- Prepare annual summaries of expenditures and revenue.
- Summaries mailed or made readily available to Members.
- First year fee notices and collections are higher in year one, but were annualized over 5 years.

3. Response to Notice of Violation (IV.C.3)

Annual costs for responses to a Notice of Violation (NOV):

- Assume one NOV per year, with approximately 20 Members impacted.
- Notify affected Members within 30 days of receiving NOV.
- Provide confirmation to Water Board of each notification.
- Prepare an annual summary of NOVs for submission to the RWQCB.
- Retain and manage consultants to help respond to and resolve NOV items.
- The cost for a consultant is allocated to expenses.

4. Develop & Implement Plans to Track & Evaluate (IV.C.4)

One time upfront costs for:

- The Third-Party is to develop and implement plans to track and evaluate the effectiveness of water quality management practices, pursuant to the Groundwater Quality Management Plan (GQMP).
- Requirements are identified in WDRs IV.C.4, VIII.I and portions of MRP-1.

Annual costs for:

- Annual updates to the GQMP due in May of each year,.

5. Submittals (IV.C.5)

Annual costs:

Most submittal requirement costs are embedded in the costs for each report. However, additional administrative costs are required to track, schedule, meet the deadlines, and file on an annual basis.

6. Quality Assurance Quality Control (QAQC) (IV.C.6)

Annual costs:
Annual costs are required to provide a fresh look at water quality monitoring and assessments in conformance with QA/QC.

7. Receipt of Notice of Applicability (NOA) (IV.C.7)

Upfront costs:

- Up-front costs to inform Members and future Members (within 30 days) of approval of the NOA, and to provide Members information on the Order's requirements.
- Request and track return receipt of a notice of confirmation form to be completed by each Member.

8. Conduct Education and Outreach Activities (IV.C.8)

Annual costs:

a) Educate Members of program requirements:
   - Water quality problems.
   - Exceedances of water quality objectives.
   - Degradation of water quality.

b) Maintain attendance lists for outreach events.

c) Provide Members with information on:
   - Water quality practices.
   - Environmental impacts of water quality practices.

d) Provide annual summary of education and outreach activities to Board, including:
   - Copies of educational and management practice information provided.
   - Report the total number of Members attended.
   - Describe the process used to provide information to non-attendees.

9. Annual Membership Participation Report (IV.C.9)

Annual costs:

a) Work with RWQCB to ensure all Members are addressing exceedances or degradation.

b) As part of the Membership List submittal, identify growers who have failed to:
   - Implement improved water quality management practices as specified (GQMP).
   - Respond to an information request associated with the GQMP or this Order.
   - Participate in Third-Party studies where the Third-Party is the lead.
   - Provide confirmation in an outreach event.
   - Submit required fees to the Third-Party.

10. Requirements by Subsidiary Groups (IV.C.10)

Annual costs:

- Ensure activities performed by subsidiary groups meet requirements.
- Assume 5 days of work per subsidiary group and up to 16 groups.

11. Fees (IV.C.11)

Annual costs:

- Collect RWQCB fees from Members and submit to Board.
- Collect fees from Members for reimbursement of Third-Party activities.
- Maintain records and/or reports for 5 years.

B. SECTION VIII REQUIRED REPORTS AND NOTICES – THIRD PARTY

The costs associated with the Third-Party requirements to comply with the WDRs Section VIII are described below. **Table 2 – 2 "Third-Party Section VIII Costs"** summarizes the Kern Coalition costs.

Table 2 – 2 Third-Party Section VIII Costs

Report Heading	WDR Section	Description	Third-Party One Time Costs			Third-Party Annual Costs		
			Total Hours	Expenses	One Time Upfront Costs	Total Hours	Expenses	Annual Costs
1.	VIII.A	Third-Party Application	40	$2,000	$6,800	--	--	--
2.	VIII.B	Membership (Participant) List	720	$3,100	$89,500	90	$600	$11,400
3.	VIII.C	Templates	0	0	$0	40	$2,200	$7,000
4.	VIII.D	Groundwater Quality Assessment Report and Evaluation/Monitoring Workplans	Included in Attachment B MRP					
5.	VIII.F	Sediment Discharge and Erosion Assessment Report	200	$70,000	$94,000	--	--	--
6.	VIII.H	Monitoring Report (Attachment B – V.C)	--	--	--	800	$5,000	$101,000
7.	VIII.I	Comprehensive Groundwater Quality Management Plans (GQMP)	Included in MRP-1					
8.	VIII.J	Technical Reports-Where monitoring in not effective, provide technical reports	--	--	--	350	$2,000	$44,000
9.	VIII.K	Notice of Termination	--	--	--	--	--	--
10.	VIII.L	Total Maximum Daily Load (TMDL) Requirements	300	$5,000	$41,000	--	--	--
		Third-Party Subtotal	**1,260**	**$80,000**	**$231,300**	**1,280**	**$9,800**	**$163,400**

1. Third-Party Application (VIII.A)

Upfront costs:

- Submit request to Board within 30 days of Order effective date.

- Follow up actions.
- Formation costs in IV.C.1

2. Membership (Participant) List (VIII.B)

Upfront costs of and annual costs :

a) Submit list of Members to Board:
  - Within 180 days of reviewing NOA.
  - Annually by July 31 of each year.

b) List shall contain, at minimum:
  - All parcel numbers covered under the membership.
  - County of each parcel.
  - Section, Township, and Range associated with each parcel.
  - Number of irrigated acres for each parcel
  - Member names, mailing addresses, and contact name and phone number (can use Third-Party) with annual updates.
  - Name of farm operator for each parcel if different from the Member.
  - Identification of the crops grown and acreage of each crop.
  - Identification of each parcel that is a part of the Small Farming Operation, if applicable.

3. Templates (VIII.C)

The Kern Coalition costs were estimated with the assumption that the Eastern San Joaquin Coalition templates (yet to be approved) would be utilized. Costs for development of the templates have already been incurred, as part of the group option, and are not included in this estimate.

Upfront costs submitted to the RWQCB but and annual costs of $7,000:

a) Farm Evaluation Template:
  - Group Option to Water Board within 90 days of NOA.
  - Identification of on-farm management practices implemented to achieve the Order's farm management performance standards.
  - Specifically track which management practices recommended in management plans have been implemented on the farm.
  - Identification if movement of soil occurs during storm events and/or during irrigation drainage events (sediment and erosion risk areas) and a description of where this occurs.
  - Identification if water leaves the property and is conveyed downstream and a description of where this occurs.
  - Location of in-service wells and abandoned wells.
  - Identification if well-head and backflow protection practices have been implemented.

b) Nitrogen Management Plan Template:
   - Costs for member compliance with the templates are captured in section C, Member Requirements below.
   - Nitrogen Management Plan Summary Report.

c) Sediment and Erosion Control Plan Template:

4. Groundwater Quality Assessment Report and Evaluation/Monitoring Workplans (VIII.D)

Costs for this section are included in the MRP Attachment B of the Order and Section 3 of this Report.

5. Sediment Discharge and Erosion Assessment Report (VIII.F)

Upfront costs:

- Submit one year after receiving NOA (Attachment B, VI).
- Notify impacted Members to prepare plan.

6. Monitoring Report (VIII.H)

Annual costs:

- MRP Attachment B, V.C.
- Submit monitoring reports to State Board GeoTracker database by 1 May annually.

7. Comprehensive Groundwater Quality Management Plan (GQMP) (VIII.I)

a) The costs for this item are estimated under Section 4 of the report, Management Plan Requirements.:

8. Technical Reports (VIII.J)

Annual costs:

- Where monitoring is not effective, provide technical reports.
- One report per year.

9. Notice of Termination (VIII.K)

- Negligible costs are estimated to be associated with this item.

10. Total Maximum Daily Load (TMDL) Requirements (VIII.L)

Upfront costs:

- Implement approved TMDLs in the Basin Plan, as applicable.

C. SECTION VII REQUIRED REPORTS & NOTICES – MEMBER

The costs associated with Member requirements to comply with the WDRs Section VII are described in this section. **Table 2 – 3 "Member Section VII Costs"** summarizes the Kern Coalition Costs.

Table 2 – 3 Member Section VII Costs

Report Heading	WDR Section	Descriptions	Member One Time Costs			Member Annual Costs		
			Total Hours	Expenses	One Time Upfront Costs	Total Hours	Expenses	Annual Costs
1.	VII.A	Notice of Confirmation (NOC) / Notice of Intent (NOI) / Membership Application	3,548	$123,900	$549,660			$0
2.	VII.B	Farm Evaluation	5,548	$22,933	$688,633	920	$0	$110,354
3.	VII.C	Sediment and Erosion Control Plan	800	$110,000	$117,500	50	$0	$6,000
4.	VII.D	Nitrogen Management Plan (NMP)				90,920	$2,637,246	$13,547,646
5.	VII.E	Mitigation Monitoring – Certain Members required to implement mitigation measures in Attachment C	400	$300,000	$348,000	40	$10,000	$14,800
6.	VII.F	Notice of Termination				50	$200	$6,200
7.	XI	Annual Fees Paid by Member					$582,500	$582,500
Member Subtotal			**9,558**	**$556,833**	**$1,703,793**	**91,980**	**$3,329,946**	**$14,267,500**

1. Notice of Confirmation (NOC) / NOTICE OF INTENT (NOI) / MEMBERSHIP APPLICATION (VII.A)

a) Member enrolled under Order R5-2006-00XX Southern San Joaquin Water Quality Coalition; 350 estimated Kern Members.
   - Within 150 days of NOA by Executive Officer.
   - Third-Party will provide NOC form from Member within 30 days of receiving NOA.

b) All other Growers:
- Growers not in Coalition, estimated 500 Members need to join.
- Complete Third-Party membership application.
- One-time fee of $200.
- Provide certification, written notice was provided of enrollment to non-Member parties.
- Third-Party will confirm membership.

c) 151 days after the Executive Officer's issuance of NOA to the Third-Party, Growers no yet members must:
- Estimate 52 Growers will miss the deadline.
- Complete NOI application to the Board.
- NOI processing fee.
- Membership application to Third-Party.
- Alternatively, a Grower may submit to the Board a RWD or NOI as an individual discharger. These costs not accounted in the cost estimate.

2. Farm Evaluation (VII.B) Upfront

The costs for the Farm Evaluation were estimated based on the template provided to the RWQCB on April 11, 2013 by the East San Joaquin Water Quality Coalition, under the group option. If the template or other Farm Evaluation guidelines are ultimately revised, our cost estimate will need corresponding adjustment.

a) Approximately $19,400 in third party up-front cost were estimated for five grower outreach events to explain and provide clarification in filling out the forms.
- Member time was included in the estimate for attending the outreach meetings.
- A small amount of member time was allotted for gathering parcel information, doing research on management practices in preparation for the meeting.
- Filling out part B for combinations of management practices by crop per farm.
- Drawing a map of the farm for onsite inspection purposes.

b) Assumptions for small vs large farms in low vs. high vulnerability are detailed in **Table 2 - 4 Farm Size and Vulnerabiity Areas** below.
- Slightly more time and expense was estimated for filling out the farm evaluation for large farms than for small. (3 combinations of crops/management practices to detail in part B vs. 1 for small farms).
- The time to fill out the farm evaluation on a recurring basis (annually in high vulnerability and every 5 years in low vulnerability) was estimated to be significantly less, once growers were familiar with it.

The following summarizes the major results of the Farm Evaluation cost estimate:

c) Members in Low Vulnerability Areas:
- Small Farming Operations cost to fill out the form of $595 per member.

- Farming Operations greater than 60 acres: $775 per member.
- Costs to fill out evaluations every five years were annualized. Costs to fill out the form on a recurring basis was estimated at $162 per member.

d) Members in High Vulnerability Areas:
- Costs for large growers were used for all growers in high vulnerability.
- For more details, refer to the **WDR Member Requirements Attachment.**

3. Sediment and Erosion Control Plan (VII.C)

The costs for the Sediment and Erosion Control Plan were estimated based on the template provided to the RWQCB on April 11, 2013 by the East San Joaquin Water Quality Coalition, under the group option. If the template or other guidelines are ultimately revised, our cost estimate will need corresponding adjustment.

a) Fifty (50) farms were assumed to be subject to the requirement for a Sediment and Erosion Control Plan in the Kern sub-watershed.
- Since the details of a self certification program are unknown at this point, and since a significant (and valuable) investment of time on the part of the grower would also be required for self certification, certification by a professional engineer was assumed.
- We assumed a flat cost of approximately $2200 to certify a plan based on the template.
- The plan assumes a small amount of grower time to work with the certifying party.
- The total cost estimated for each plan was $2,338.
- The estimated costs to implement management practices that would possibly be specified by the plans were not included.

4. Nitrogen Management Plan (NMP) (VII.D)

The costs for the nitrogen management plan were estimated based on the NMP template provided to the RWQCB on April 11, 2013 by the East San Joaquin Water Quality Coalition, under the group option.

a) Given the definition of high vulnerability stated in the Tentative Order, it is assumed that the entire Westside and all areas with poor quality perched water and underlying high nitrates will be high vulnerability.

b) It was assumed that only about 30% of the farms would be in the low vulnerability area, with corresponding lower regulatory requirements.

c) According to Kern Ag Commissioner data, there are approximately 902 farms in Kern, and approximately 182 of those farms have less than 60 acres.

d) **Table 2 - 4 Farm Size and Vulnerability Assumptions** summarizes the distribution of farm sizes assumed for the nutrient management cost analysis.

Table 2 – 4 Farm Size and Vulnerability Assumptions

	Small	Farms > 60 ac	Total
Low vulnerability	60	216	**276**
High vulnerability	122	504	**626**
TOTAL	**182**	**720**	**902**

e) There are approximately 1,040,000 irrigated acres in the Kern sub-watershed. Small farms comprise approximately 4500 acres, which averages out to approximately 25 acres per farm. Our analysis assumed that the remaining farms averaged 1,438 acres per farm, so that the sum total of acres would match the sub-watershed total.

f) Since the details of a self certification program are unknown at this point, and since a significant (and valuable) investment of time on the part of the grower would also be required for self certification, certification by a Certified Crop Advisor (**CCA**) was assumed. From our experience with the dairy order, we assumed a minimum flat cost of $1,200 plus $100 per field. Field size was assumed to be 25 acres on small farms and 80 acres on large farms. An irrigation well was assumed to exist on every small farm. On large farms, every well was assumed to serve 240 acres. Thus, large farms were assumed to have 6 wells.

g) Lab analysis cost assumptions are summarized in **Table 2 – 5 Lab Analysis Cost and Frequency Assumptions**.

Table 2 – 5 Lab Analysis Cost and Frequency Assumptions

Analysis	Cost per sample	Sample frequency
Soil	$20	One per field per year
Irrigation water	$60	One per well per year
Manure/compost	$33	One per field per year

h) Approximately six hours of time was assumed to be required per field, per year, for nutrient and yield recordkeeping. Other small amounts of grower time per field were assumed to be necessary for the following:
- Review of yield history and preparation for nutrient planning at the beginning of the season;
- Mid season review of yield potential and adjustments in nutrient planning;

- Ratio calculation;
- Reporting (in high vulnerability only).

i) Some expense is estimated for accomplishing grower outreach meetings in various parts of the sub-watershed, to help orient growers to the new requirements and to provide helpful information and guidance. This shows up as an up-front third party cost.

The following summarizes the major aspects of the results of the NMP cost analysis:

j) High Vulnerability Groundwater Area costs to prepare, certify, and implement an NMP:
   - Small Farming Operations: $2,433 total cost per farm, or about $97.30 per acre.
   - Farming Operations > 60 ac: $19,314 total cost per farm, or about $13.40 per acre.

k) Low Vulnerability Groundwater Area costs to prepare and implement an NMP:
   - Small Farming Operations: $1,823 total cost per farm, or about $72.90 per acre.
   - Farming Operations > 60 ac: $15,774 total cost per farm, or about $11 per acre.

5. CEQA Mitigation Monitoring (Attachment C) (VII.E)

a) Submit mitigation monitoring by an estimated 10 members per year for upfront and annual costs.
   - Implementation of CEQA mitigation measures (cultural resources, veg & wildlife, fisheries, ag resources, GHG emissions
   - Measures implemented
   - Potential environmental impact measures addressed
   - Location of measures (parcel number, county)
   - Steps taken to monitor success of measure

6. Notice of Termination (VII.F)

Estimate 5 terminations per year, mostly due to change in ownership or consolidation of farms.

7. Annual Fees Paid by Member (XI)

Tier 1 Water Board Fees at $100 per group plus $0.56 per acre.

3

MONITORING AND REPORTING PROGRAM ATTACHMENT B OF GENERAL ORDER

A. MONITORING AND REPORTING PROGRAM, SECTION IV

The costs associated with the Third-Party requirements to comply with the Monitoring and Reporting Program (MRP) in Attachment B, Section IV are described in this section. **Table 3 – 1 "Attachment B – MRP Section IV Low Estimate"** summarizes the Kern Coalition estimated costs.

Table 3 – 1 Attachment B – MRP Section IV Low Estimate

Report Heading	MRP Section	Description	Third Party-Upfront			Third Party-Annual		
			Total Hours	Expenses	One Time Upfront Costs	Total Hours	Expenses	Annual Costs
1.	IV.A	Groundwater Quality Assessment Report (GAR)	450	$250,500	$304,500			
2.	IV.B	Management Practice Evaluation Program (MPEP)	6,900	$260,000	$171,429			
3.	IV.C	Groundwater Quality Trend Monitoring IV.C	500	$5,000	$60,000	2,300	$12,000	$265,000
4.	IV.D	Management Practices Evaluation Workplan IV.D	880	$7,000	$171,429			
5.	IV.E	Trend Monitoring Workplan-following MRP IV.E	1,900	$16,000	$225,000			
		Section IV Subtotal	**12,680**	**$313,000**	**$932,358**	**2,300**	**$12,000**	**$265,000**

Table 3 – 2 Attachment B – MRP Section IV High Estimate

Report Heading	MRP Section	Description	Third Party-Upfront			Third Party-Annual		
			Total Hours	Expenses	One Time Upfront Costs	Total Hours	Expenses	Annual Costs
1.	IV.A	Groundwater Quality Assessment Report (GAR)	2,500	$25,000	$300,000			
2.	IV.B	Management Practice Evaluation Program (MPEP)	6,900	$260,000	$1,500,000			
3.	IV.C	Groundwater Quality Trend Monitoring IV.C	500	$5,000	$60,000	2,300	$12,000	$265,000
4.	IV.D	Management Practices Evaluation Workplan IV.D	880	$7,000	$1,500,000			
5.	IV.E	Trend Monitoring Workplan-following MRP IV.E	1,900	$16,000	$225,000			
		Section IV Subtotal	**12,680**	**$313,000**	**$3,585,000**	**2,300**	**$12,000**	**$265,000**

1. Groundwater Quality Assessment Report (GAR) (IV.A)

The proposed GAR outline must be submitted within 3 months after receiving the notice of applicability (**NOA**). The completed GAR must be submitted within 1 year after receiving the NOA. The following data and analysis are required:

a) GAR Components from existing federal/state/county/local databases and documents:
   - Detailed land use information.
   - Depth to groundwater map.
   - Groundwater recharge information.
   - Soil survey information.
   - Shallow groundwater constituent concentrations (potential COCs).
   - Existing groundwater data collection and analysis efforts.
   - Discuss geological and hydrogeologic information.

b) GAR data review and analysis:
   - Determine high vulnerability areas based on potential impacts from irrigated agricultural activities.
   - Determine merit of incorporating existing data collection efforts to achieve objectives.
   - Prepare ranking of high vulnerability area for prioritization of workplan activities.
   - Utilize GIS mapping applications, graphics, tables to convey data, analysis, and results.

c) Groundwater vulnerability designations:

- Designate high/low vulnerability areas.
- Modify designations every 5 years after GAR approval.

d) Prioritization of high vulnerability groundwater areas:
- Identify exceedances of water quality objectives.
- Proximity of high vulnerability area to areas contributing to recharge to urban and rural communities.
- Identify existing irrigated agriculture field or operational practices.
- Consider largest commodity types comprising up to at least 80% of irrigated agricultural acreage.
- Consider legacy or ambient conditions of groundwater.
- Identify groundwater basins currently or proposed to be under review by CV-SALTS.
- Identify constituents of concern (e.g. relative toxicity, mobility).

Based on other prior detailed estimates of GAR cost that we have performed, we estimate the GAR cost for the sub-watershed to be approximately $304,500. This estimate is in reasonable agreement with the reported initial contracted price of the East San Joaquin GAR.

2. Management Practice Evaluation Program (MPEP) (IV.B)

The goal of the MPEP is to determine effects, if any, that irrigated agricultural practices have on groundwater quality. The following are requirements of the MPEP that are detailed in the Monitoring and Reporting Program of the Tentative Order.

a) Objectives of MPEP:
- Identify existing site and/or commodity specific practices protective of groundwater quality.
- Determine if newly implemented management practices are improving or may improve groundwater quality.
- Develop an estimate of the effected Members' discharges of COCs using a mass balance model.
- Utilize results of evaluated management practices to determine if management practices need to be improved.

b) Implementation on a watershed or regional commodity basis with other Third-Party groups. Prepare and submit a master schedule of the rank or priority for investigation of high-vulnerability areas.

c) Reports of the MPEP – reports shall evaluate the data and make a determination whether groundwater is being impacted by activities at farms.

d) Management Practices Evaluation Report (MPER):
- No later than 6 years after implementation of each phase.
- Identify management practices that are protective of groundwater quality.
- Identify management practices that are appropriate for site conditions on farms.

- Include maps showing types of management practices that should be implemented in certain areas.
- MPEP to include adequate technical justification for identifying protective management practices.
- Propose and implement new/alternative management practices if existing are not protective.
- GQMPs are to be updated to be consistent with the findings of the MPER.

The costs of the MPEP are variable at this point. There are two major options as noted above: perform the MPEP as a group, or just within the Kern area. Costs estimates can be refined once a decision is made on approach and once an MPEP workplan has been approved by the RWQCB. The following is our best estimate of the total cost of all activities associated with the MPEP options. Please refer to the following related areas of this report and the cost estimate spreadsheet:

- Management Practices Evaluation Workplan (item 4 below), and;
- Monitoring Well Installation, Sampling Plan, And Completion Report (section 5 of this report. This estimates major monitoring well costs for a Kern only approach.)

e) The Kern only option for executing the MPEP will be extremely expensive in Kern due to the significant depth to groundwater. Results will also be slow to reach monitoring wells, which may require monitoring over a longer period before conclusions can be made, probably incurring more cost. Nevertheless, growers in Kern may not choose to rely on conclusions that are derived in areas with much shallower groundwater. There is an argument for Kern doing its own MPEP, as Rob Gailey noted that 85% of the Kern area has groundwater deeper than what has been covered by existing studies. Areas with shallower groundwater may not have geology that is as protective, and may not benefit from natural attenuation or denitrification that Kern may benefit from due to its deeper groundwater.

f) Clay Rodgers noted at the 8/21/12 Tulare workshop that the Representative Monitoring Program (now MPEP), will be expensive. The name has changed, and there will potentially be less reliance on first encountered groundwater monitoring and more reliance on vadose zone monitoring (potentially using lysimeters) and modeling; however, staff has expressed that monitoring well data will be necessary to validate conclusions. Mr. Rodgers approached the question of cost using the Dairy Representative Monitoring Program (RMP) as an example. Mr. Rodgers indicated that the Dairy RMP had spent $2 million in two years and that it had a revenue stream of approximately $1.25 million dollars per year to support it.

g) As Mr. Rodgers noted, Central Valley irrigated agriculture, is much larger in scope than the dairy industry consisting of 33,000 farms on 7.5 million acres, with in excess of 250 crops. Mr. Rodgers emphasized that the management practices would likely be a bigger driver in determining the amount of work necessary for evaluating irrigated ag than the number of crops. Mr. Rodgers noted that there are fewer dairies with a smaller number of crops, but they have production areas in addition to cropland. Mr. Rodgers theorized that in the best case would be that the MPEP would be the same size as the dairy RMP, or a little larger. He theorized that the worst case the MPEP would be five times larger. This would result in a cost range of $1.5 to $7 million per year, or $0.20 to $1/acre a year. Using a cooperative approach, he estimated that costs would be on the low end. He noted that the disadvantages of representative monitoring include that after having agreed to representative monitoring, if results indicate that a grower needs to improve their management practices, they will be obligated to follow through and cannot at the end refuse to make prescribed improvements. Thus, growers must carefully consider their commitment to a monitoring program that proposes to monitor elsewhere, and make sure that all necessary variables are taken into account, to provide accurate results. This will be an important item for Kern's consideration, as it will be very expensive to monitor in Kern.

h) Looking at the draft Farm Evaluation template submitted on 4/11/13, the management practices can be characterized in the following way:
- Pesticide practices: 15 practices noted.
- Irrigation practices: 9 noted, which could fall into two broad categories of pressurized vs. surface irrigation systems.
- Nitrogen management practices: 11 noted. These could be further classified as application methods vs. management tools.
    - At the simplest level, the application methods could be contrasted as fertigation vs. alternative delivery methods (foliar, split applications, variable rate/GPS).
    - Management tools can be classified as technical (lab testing) vs. simple advising (published guidelines, etc.)
    - Thus under management, there seems to be a minimum of 4 combinations to evaluate.

i) If we consider only irrigation and nutrient practices and combinations therein, we could have a minimum of 2 irrigation x 4 nitrogen practices = 8 combinations of practices. It would easily be conceivable to have up to 16 combinations or more that should be incorporated, if we were to add pesticide practices as a variable, or further resolution on irrigation or nitrogen practices.

j) Mr. Rodgers noted that there are in excess of 250 crops grown in the Central Valley. At the simplest level these can probably be aggregated into three groups: field crops, vegetable crops, and fruit & nut crops. Knowing that there are many unique aspects about various crops, this may not be appropriate. It's very possible that there could be 25 or more crop groups that should be analyzed.

k) Regarding site conditions, at the simplest level, there should probably be three variables: coarse or sandy soils, medium texture soils, and fine (clayey) soils. Looking at the soil triangle, there could easily be 9 or more variables for site condition. Depth to water and other variables could also be introduced here, adding more variables.

l) Thus, looking at the possible combinations for a MPEP effort, we could have the following:
   - Minimum: 3 crops groups x 8 management practices x 3 site conditions = 72 monitoring sites.
   - Middle scenario: 14 crops groups x 12 management practices x 6 site conditions = 1008 monitoring sites.
   - Possible maximum: 25 crops groups x 16 management practices x 9 site conditions = 3600 monitoring sites.

m) If a Kern-only MPEP were to be undertaken, it would have less diversity than the whole Central Valley. It may be possible to aggregate Kern into 6 crop groups x 8 management practices x 3 site conditions. There has been a relatively uniform adoption of advanced practices in Kern, which may lend to analyzing something closer to the minimum number of management practice factors. Regarding site conditions, 3 factors may be appropriate, as noted in Dr. Kimmelshue's work, and characterization of the sub-watershed into 3 major texture categories.

n) Given the above possibilities for combinations that may need to be analyzed, and using cost assumptions such as those noted in Section 5 regarding MWISP costs, we estimated the potential up-front and annual costs that may be incurred for MPEP programs at the various intensity levels. Assumptions used in the model included the following:
   - Higher MPEP workplan costs for aggregation into fewer crop groups.

- Higher MPEP analysis and reporting work necessary to derive conclusion when crops were aggregated into fewer, larger groups.
- 3 wells per monitoring site (as opposed to the 5 or 6 that were used in the Dairy RMP). This is in recognition of the changes made with the name change from RMP to MPEP, with the intent to reduce the number of wells and rely on alternative methods instead. While alternatives to groundwater monitoring can have considerable cost, we did not account for their cost in this analysis.
- $4000 monitoring well cost for group option work, assuming that wells will be constructed in places with shallower groundwater.
- Kern share calculated by taking 1/7th of up-front and annual group option costs.

o) Once a model was built, other scenarios were devised that would roughly match the dairy RMP cost and something that was close to Mr. Rodgers anticipated worst case scenario of 5 times the dairy RMP cost.

Calculations for a Kern-only MPEP were undertaken with similar assumptions, but using a $17,000 well cost instead, to account for the deeper groundwater.

The data for all of these scenarios is summarized in **Table 3 - 3**. In addition, the percent of growers monitored is noted. As a reference, the dairy RMP proposes to ultimately monitor 65 out of 1250 dairies, a rate of approximately 5%

.

Table 3 – 3 MPER Cost Grid

Description	Crop groups	Management Practices	Site Conditions	Sites	% of growers monitored	Wells per site	Workplan cost per crop group	Analysis cost per crop group	Well drilling cost, ea	One time costs	Annual costs, $	Annual costs, $/ac	Annual, % of dairy RMP cost	Comments
Kern Only	6	8	3	144	16%	3	$250,000	$250,000	$17,000	$11,864,64	$5,932,800	$5.70	456%	There will doubtless be some duplication of effort with a Kern only MPEP. Is there a possibility for a hybrid option? Group option for certain crops, Kern only for other crops?
Group option														
Description	**Crop groups**	**Management Practices**	**Site Conditions**	**Sites**	**% of growers monitored**	**Wells per site**	**Workplan cost per crop group**	**Analysis cost per crop group**	**Well drilling cost, ea**	**Kern share of one-time costs**	**Kern share of annual costs, $**	**Annual costs, $/ac**	**Group annual cost, % of dairy RMP cost**	**Comments**
Match dairy RMP cost	3	4	3	36	0.1%	3	$300,000	$300,000	$4,000	$373,166	$211,886	$0.21	114%	Doubtful that we could cover the whole valley on this few combinations.
Minimum combinations	3	8	3	72	0.2%	3	$300,000	$300,000	$4,000	$489,189	$423,771	$0.42	228%	Risk being regulated on data that doesn't fit. This may not be enough combinations.
5x Dairy RMP	4	8	5	160	0.5%	3	$300,000	$300,000	$4,000	$858,514	$941,714	$0.94	507%	This was Clay Rodgers' worst case scenario. This may not be enough combinations to avoid bad conclusions.
Middle scenario for combinations	14	12	6	1008	3.1%	3	$150,000	$150,000	$4,000	$3,848,64(	$5,932,800	$5.93	3195%	Cost goes up exponentially with increase in combinations. Dairy RMP monitored 65 dairies out of 1250 represented = 5%. This is closest scenario to the same ratio.
Possible max combinations	25	16	9	3600	10.9%	3	$100,000	$100,000	$4,000	$12,316,57	$21,188,571	$21.19	11409%	This is still a modest number of crop groups and management practices considering the Valley's diversity. Costs are astronomical.

MPEP Conclusions:

Based on inspection of table XX, we think that the MPEP cost will exceed close to the worst case scenario noted by Mr. Rodgers, approximately five times the cost of the dairy RMP. This is just above the minimum scenario, with 4 crop groups, 8 management practices, and 5 site conditions, resulting in 160 monitoring sites. While all of the coalitions want to minimize the cost of the MPEP and other compliance obligations, irrigated agriculture cannot afford to be regulated based on bad data. If derived conclusions are wrong, it will be much more costly to change management practices wrongly. Given the fact that the executive officer has all of the power in approving the MPEP workplan, and given how adding factors can increase the work and cost almost exponentially, it will be very important to secure some sort of maximum expenditure for the MPEP, perhaps at the worst case scenario level of five times the dairy RMP (or about $1/acre/year), noted by the Assistant Executive Officer. Since irrigated agriculture can't afford to be regulated by bad data, additional time may be necessary to accomplish the MPEP, if the cost of work to be done on an annual basis needs to be limited.

As noted by the Kern-only MPEP scenario, if the Kern sub-watershed decides that it will not be able to abide by conclusions derived in shallower groundwater areas, the costs could be much higher. In addition, monitoring would have to be undertaken for a much longer period of time in order to get results. Monitoring for the Kern-only option, if undertaken at the intensity estimated, could cost close to $6/acre/year. Until other assurances can be made, this contingency could also cover the possibility of the number of combinations to be analyzed in the group option getting closer to the level of the middle scenario (14 crop groups x 12 management practices x 6 site conditions = 1008 monitoring sites.) If undertaken on behalf of the whole Central Valley, this represents monitoring on approximately 3.1% of the grower farms, a ratio that is closest to the ratio exhibited in the dairy RMP. Our cost estimate summary thus reflects a range of costs, due to the uncertainty surrounding the cost of the MPEP.

3. Groundwater Quality Trend Monitoring (IV.C)

a) Objectives:

- Determine baseline groundwater quality relevant to irrigated agriculture.
- Develop long-term groundwater quality info that can be used to evaluate regional effects of irrigated agriculture.

b) Implementation:
   a) Develop a groundwater monitoring network over high & low vulnerability areas.
   b) Employ existing shallow wells but <u>not</u> necessarily wells in the upper zone of the first encountered groundwater.
   c) Submit proposed Trend Groundwater Monitoring Workplan (MRP IV.E)

c) Reporting:
   a) Maps, tabulation of data, time of concentration charts, submitted electronically to GeoTracker.
   b) Evaluate data for trends as proposed in MRP IV.E.

4. Management Practices Evaluation Workplan (IV.D)

a) Submit workplan within 2 years after GAR approval.
b) Workplan approach:
   a) Groundwater monitoring – must be first encountered groundwater.
   b) Modeling of groundwater data.
   c) Vadose zone sampling.
   d) Other scientifically sound and technically justifiable methods for meeting objectives of the MPEP.
c) Groundwater quality monitoring – constituent selection (when groundwater monitoring is proposed):
   a) Constituents to be assessed.
   b) Frequency of data collection for each constituent.
d) Workplan implementation and analysis – explain how data at evaluated farms will be used to assess groundwater impacts on farms not evaluated.
e) Master work plan prioritization:
   a) If high vulnerability areas are ranked in GAR, prepare a workplan timeline, priority, for areas and/or commodity.
   b) Submittal dates for addendums proposing the details of each area's investigation.
f) Installation of monitoring wells:
   c) Upon approval of a workplan, prepare and submit a Monitoring Well Installation & Sampling Plan (MWISP) as described in MRP-2.

5. Trend Monitoring Workplan – MRP IV.C (IV.E)

a) Submit workplan within 1 year after GAR approval.
b) Workplan approach:
   a) Discussion of rationale for number of proposed monitoring wells and locations.
   b) Consider variety of agricultural commodities produced.
   c) Consider conditions discussed/identified in GAR related to vulnerability prioritization.
   d) Areas identified as recharge to urban and rural communities
c) Well details for wells included in Trend Monitoring:
   a) GPS coordinates, physical address of property, and CA State well number.
   b) Well depth, top and bottom perforation depths.
   c) Copy of the well drillers log, if available.
   d) Depth to standing water (static), if available.
   e) Well seal information (type of material, length of seal).
d) Proposed sampling schedule:
   a) Annual sampling.
e) Workplan implementation and analysis:
   a) Proposed method(s) to be used to evaluate tends in the groundwater monitoring data over time.

B. MONITORING AND REPORTING PROGRAM, SECTION V

The costs associated with the Third-Party requirements to comply with the Monitoring and Reporting Program (**MRP**) in Attachment B – Section V are described in this section. **Table 3 – 2 "Attachment B – MRP Section V"** summarizes the Kern Coalition costs.

Table 3 – 2 Attachment B – MRP Section V

Report Heading	MRP Section	Description	Third Party-Upfront			Third Party-Annual		
			Total Hours	Expenses	One Time Upfront Costs	Total Hours	Expenses	Annual Costs
1.	V.A	Quarterly Submittal of Monitoring Results	$0					
2.	V.B	Annual Groundwater Monitoring Results-Annually by May 1	$0			44	$16,000	$21,280
3.	V.C	Monitoring Reports-Annually by May 1			$0	410	$80,000	$129,000
4.	V.D	Surface Water Exceedance Reports	$0					
5.	VII	Water Quality Triggers for Development of Management Plans	$0					
6.	VIII	Quality Assurance Project Plan (QAPP)	$5000					
Section V Subtotal						**454**	**$96,000**	**$150,480**

1. Quarterly Submittals of Surface Water Monitoring Results (V.A)

This program is actively being implemented. Therefore, no future costs are estimated here.

2. Annual Groundwater Monitoring Report (GWMR) (V.B)

This program is actively being implemented. Therefore, no future costs are estimated here.

3. Monitoring Reports (V.C)

The costs shown in the table above estimate the costs of prepare and submission of annual monitoring reports.

4. Surface Water Exceedance Reports (V.D)

This program is actively being implemented. Therefore, no future costs are estimated here.

5. Water Quality Triggers for Development of Management Plans (VIII)

This program is actively being implemented. Therefore, no future costs are estimated here.

6. Quality Assurance Project Plan (QAPP) (XI)

The QAPP will be modified from the present version. Approximately $5000 in extra effort is anticipated to incorporate groundwater items.

4

MANAGEMENT PLAN REQUIREMENTS MRP-1 OF GENERAL ORDER

The costs associated with the Third-Party requirements to comply with the Groundwater Management Plan in MRP-1 are described in this section. **Table 4 – 1 "MRP-1 –Groundwater MRP"** summarizes the Kern Coalition costs.

Table 4 – 1 MRP-1 –Groundwater Management Plan Requirements

			Third Party				Member	
			Up-front		Annual		Annual	
Report Heading	MRP-1 Section	Descriptions	Hours	Cost	Hours	Cost	Hours	Cost
1	A	Introduction and Background Section	24	$2,880				
2	B	Physical Setting and Information	492	$59,040				
3	C	Management Plan Strategy	210	$25,200				
4	D	Monitoring Method	76	$9,120				
5	E	Data Evaluation	72	$8,640				
6	F	Records and Reporting-Management Plan Progress Report			285	$34,200		
7	G	Source Identification Study Requirements	96	$11,520				
8		Implementation Estimate	250	$30,000	2000	$240,000	1800	$216,000
		MRP-1 Subtotal	1220	$146,400	2285	$274,200	1800	$216,000

There are many uncertainties regarding a groundwater management plan, including what constituents will need to be included, and the areal extent of the impacts. It is assumed that the major item to deal with will be nitrates, and that a Comprehensive Groundwater Management Plan will be issued with the GAR.

1. Introduction and Background Section (MRP-1.A)

Much of this work will be drawn from the GAR.

- Discussion of COCs, water quality objective(s), or trigger(s).
- Identification (narrative & map format) of boundaries to be covered by the management plan.
- Discussion how boundaries were delineated.

2. Physical Setting and Information (MRP-1.B)

a) Land use maps – partially satisfied in GAR:
   - Crop information by square-mile section (TRS) level.
   - Maps in electronic format using ArcGIS format.

b) Identification of potential irrigated agricultural sources of COCs:
   - If potential sources unknown, conduct source identification study (triggers MRP-1.G).
   - Or develop management plan for COCs (Triggers MRP-1.C).

c) List of designated beneficial uses for impacted water.

d) Baseline inventory of existing management practices with location to TRS level. Much of this will be drawn from the Farm Evaluations.

e) Available surface and/or groundwater quality data – partially satisfied in GAR:
   - Summary, discussion, and compilation of available data.
   - For COCs in the management plan.
   - Acceptable sources of quality data include, but not limited to SWAMP, GAMMA, USGS, DPH, DPR, DWR, local groundwater management plans, and GAR prepared by the Third-Party.

2.1 Groundwater – Additional Requirements (MRP-1.B)

a) Soil types and soil data as described by NRCS soil survey.

b) Description of geology and hydrogeology for the area:

c) Regional and area specific geology:
   - Groundwater basin and sub-basin in the area.
   - General water chemistry known.
   - Concentrations of major anions, cations, nutrients, TDS, pH, DO and hardness.
   - Provide Piper (tri-linear), Stiff, and/or Durov diagrams for the area.

d) Hydrogeology information:
   - Known water bearing zones.
   - Areas of shallow and/or perched groundwater.
   - Areas of discharge and recharge to basin.

e) Identify water bearing zones utilized for domestic, irrigation, and municipal water.

f) Aquifer characteristics know from existing information:
   - Depth to groundwater.
   - Groundwater flow and direction.

- Hydraulic gradient and conductivity.

g) Identification of irrigation water sources and general water chemistry.

3. Management Plan Strategy (MRP-1.C)

a) Description of approach and prioritization.
b) Goals and objectives:
   - Compliance with water quality objectives.
   - Education and outreach.
   - Identify, validate, and implement management practices.
c) Identify duties and responsibilities of individuals/groups:
   - Identification of key individuals.
   - Discussion of each individual's responsibilities.
   - Organizational chart with identified lines of authority.
d) Strategies to implement Management Plan tasks:
   - Identify entities/agencies contacted to obtain data and assistance.
   - Identify management practices used to control COC.
   - Identify outreach to participants. Outreach is anticipated to deal with NMP training and accounting for N in well water. Meetings, website, and district correspondence is anticipated to be employed.
   - Schedule and milestones for implementation of management practices and tasks.
   - Establish measurable performance goals. Ratios will be monitored and progress will be tracked.

4. Monitoring Methods (MRP-1.D)

a) General requirements:
   - Designed to measure effectiveness at achieving goals and objectives.
   - Capable of determining management practices made in response to plan are effective.
b) Groundwater – additional requirements:
   - May include commodity-based representative monitoring. We anticipate that we will rely on and tier off of MPEP efforts.
   - Conducted to determine effectiveness of management practices implemented.

5. Data Evaluation (MRP-1.E)

a) Methods utilized to perform data analysis.
b) Identify information necessary to quantify program effectiveness.
   - Tracking of management practice implementation.
   - Describe approach used to determine effectiveness of management practices.
   - Describe process for tracking implementation of management practices.
   - Description of how information is collected from growers.

- Type of information collected.
- How information will be verified and reported.

6. Records and Reporting – Management Plan Progress Report (MRP-1.F)

a) This report is annual once management plan is implemented.
b) Executive summary, location map(s), and front pages.
c) Table with exceedances from the management plan.
d) Status update on preparation of the new management plan.
e) Summary and assessment of data collected during reporting period.
f) Summary of grower outreach conducted.
g) Summary of implementation of management practices.
h) Results of evaluation of management practices.
i) Evaluation of progress in meeting performance goals and schedules.
j) Recommendations for changes.

7. Source Identification Study Requirements (MRP-1.G)

a) This is a triggered report; not always required/included.
b) Evaluation of types of practices, commodities, and locations that may be a source. For nitrate, the NHI could be useful for this.
c) Continued monitoring at site/area and increased monitoring, if appropriate. For nitrate, we will monitor ratios, primarily.
d) Assessment of potential pathways through which discharge can occur.
e) Schedule of conducting study
f) Field studies:
   - Evaluate feasibility of field studies as part of their source identification study proposal. We anticipate that we will rely heavily on MPEP work.
   - Identify a reasonable number and variety of field study sites that are representative.
g) Alternative source identification – if not performing a source ID study:
   - Demonstrate how method will produce data/information.
   - Determine contributions from irrigated agricultural sources.

8. Implementation

a) Registered pesticides. There are minimal Groundwater Protection Areas (GWPAs) in Kern. Some follow-up may be triggered, depending on what the data looks like.
b) Toxicity.
c) Contingency / as-required phase on high priority items (covers the first two years).
   - Quarterly progress reports.
   - Meetings with RWQCB staff.
   - Addressing issues that may arise.
d) Legacy pesticides and trace metals.
e) DO and pH.
f) Salinity and pathogens.

- Quarterly progress reports.
- Meetings with RWQCB staff.
- Addressing issues that may arise.

g) Nitrates – groundwater management plan items. This is assumed to require one person-year to monitor grower nitrogen ratios, research acceptable values, meet with growers, do outreach, interact with and support MPEP work, and provide support for growers and answer questions. We assumed that 600 growers would be in the high vulnerability area. Each grower or their representative would attend one outreach per year for their crop.

For more detail, see the corresponding cost estimation spreadsheet.

Our cost estimate does not include grower time or expense to implement practices. None of our costs include farm level management practices that may be indirectly triggered. (Direct compliance practices, such as the NMP were estimated).

5

MONITORING WELL INSTALLATION, SAMPLING PLAN AND COMPLETION REPORT MRP-2 OF GENERAL ORDER

The costs associated with the Third-Party requirements to comply with Monitoring Well Installation, Sampling Plan, and Completion Report in MRP-2 are described in this section. **Table 5 – 1 "MRP-2 – MWISP"** summarizes possible Kern Coalition costs. The costs associated with monitoring wells are closely linked with the Management Practice Evaluation Program (MPEP). Please refer back to section 3 for a discussion of the MPEP. The costs estimated here are for a Kern only MPEP option (not the group option).

Table 5 – 1 MRP-2 MWISP

Report Heading	MRP-2 Section	Description	Third Party (Upfront)		Third-Party (Annual Costs)	
			Hours	Phase Cost	Hours	Phase Cost
B.	II	Per Phase Monitoring Well Installation and Sampling Plan (MWISP)	6480	$777,600	0	0
C.	III	Monitoring Well Installation Completion Report (MWICR) and implementation, including well construction, monthly sampling and analysis, and quarterly reporting.	6192	$8,087,040	0	$5,932,800
		MRP-2 Subtotal	**4,224**	**$8,864,640**	**0**	**$5,932,800**

A. ASSUMPTIONS

- 6 crop groups, 8 management practices, and 3 site conditions will result in 144 combinations to monitor for first encountered groundwater quality as part of the MPEP. This is associated with the highest cost option for carrying out the MPEP. The MPEP can be done cooperatively with other coalition areas, representing the lower possible cost option. This was estimated separately in the MPEP section.
- A minimum of 3 wells are required to ascertain impacts up/down gradient of a potential source. Therefore, a total of 432 wells would be needed at an average depth to groundwater of 220 ft in Kern.

B. MONITORING WELL INSTALLATION AND SAMPLING PLANS (MWISP) (MRP-2.II)

The following information is required in an MWISP.

1. Stipulations

2. MWISP Required Elements:

a) General Information:
- Topographic map, site plan.
- Rationale for number of monitoring wells proposed.
- Local permitting information.
- Drilling details.
- Health and safety plan.

b) Proposed drilling details:
- Drilling techniques.
- Well/soil sample collection and logging method(s).

c) Proposed monitoring well design.
d) Proposed monitoring well development.
e) Proposed surveying.
f) Monitoring according to QAPP.

We estimated the cost of an MWISP at approximately $5400 per site. For 144 sites, the cost is $777,600.

C. MONITORING WELL INSTALLATION COMPLETION REPORT (MWICR) (MRP-2.III)

The following information is required in an MWICR.

1. General Information

a) Brief overview of field activities.
b) Site plan.
c) Period of field activities and milestone events.

2. Monitoring Well Construction

3. Monitoring Well Development

We estimated the cost of an MWICR at approximately $3480 per site. For 144 sites, the cost is $501,120.

4. Monitoring Well Survey

We estimated the cost of a monitoring well survey at approximately $1680 per site. For 144 sites, the cost is $241,920.

5. Implementation Costs

a) Well construction, project management and oversight. With depths in the Kern sub-watershed, a direct rotary rig will be needed in most places. We estimated approximately $17,000 per well with e-log, project management, and oversight. For 432 wells, the cost would be $7,344,000.
b) Sampling and analysis cost, assuming monthly sampling. We estimated $1000 per site for sampling and $1100/site for analysis, to include pesticides. Thus, the cost for 144 sites would be $302,400 per month or $3,628,800 per year.
c) Quarterly reporting of results to RWQCB. We estimated $4000 per site for reporting event. With 144 sites and quarterly reporting, the cost is estimated to be $2,304,000 per year.

More detail regarding the calculations can be found on the MRP-2 sheet from the attached spreadsheet.

6

CONCLUSIONS & SUMMARY

A. COST SUMMARY

a) This Report provides a vigorous and in-depth assessment of the Kern Coalition's Third Party and Member costs to comply with the March 2013 Tentative Order. Upon request, additional background and information can be provided to the Water Board.

b) The $1.90 per acre incremental cost estimate provided under Finding No. 39 in the Order and in Attachment A Information Sheet are summarized in **Table 6-1 Water Board Estimated Costs**.

Table 6-1

Water Board Estimated Costs.

	Tulare Lake Basin Area Order	Current Surface Water Program	Change from Groundwater Program
Administration	$1.19	$0.91	**$0.28**
Farm Plans	$0.29	$0.00	**$0.29**
Monitoring/Reporting/Tracking	$2.11	$0.79	**$1.31**
Management Practices	$15.87	$15.84	**$0.02**
Total	**$19.46**	**$17.54**	**$1.90**

c) The Management Practice Evaluation Program and Workplan are subject to significant variation in costs. As stated in Section 3 of this Report, a lower and higher cost was determined.

d) The upfront costs are expected to be a one-time cost that could be required in year one (1) or beyond year five (5). For comparative purposes, the upfront costs per acre were divided by five years to provide an annualized per acre cost. The actual year of upfront cost expenditures will vary.

e) For the lower cost scenario, the upfront cost of $3.65/acre divided by 5 years = $0.73/acre/year + the annual cost of $16.04/acre/year = $16.77/acre/year for the first five years. After five years the annual cost would be $16.04/acre/year.

f) For the higher cost scenario, the upfront cost of $14.23/acre divided by 5 years = $2.85/acre/year + the annual cost of $20.83/acre/year = $23.68/acre/year for the first five years. After five years the annual cost would be $20.83/acre/year.

g) **Table 6-2 Kern Coalition Lower Estimated Costs** and **Table 6-3 Kern Coalition Higher Estimated Costs** depict the summary totals of costs.

Table 6-2

Kern Coalition Lower Estimated Costs

Costs	Up-Front Costs		Annual Costs	
	Third-Party	Member	Third-Party	Member
Waste Discharge Requirements General Order				
Third-Party - Provisions	$177,840	--	$340,640	--
Third-Party - Required Reports & Notices	$247,200	--	$163,700	--
Member - Notice of Confirmation/Intent/Application	--	$549,660	--	$0
Member - Farm Evaluation	$19,400	$688,633	--	$110,354
Member - Sediment & Erosion Control Plan	$8,200	$117,500	--	$6,000
Member - Nitrogen Management Plan (NMP)	$19,400	--	--	$13,547,646
Member - CEQA Mitigation Monitoring (Attachment C)	--	$348,000	--	$14,800
Member - Notice of Termination	--	$0	--	$6,200
Member - Annual Fees	--	$0	--	$582,500
Attachment B - Monitoring & Reporting Program				
Groundwater Quality Assessment Report (GAR)**	$304,500	--	--	--
Management Practice Evaluation Program (MPEP)	$171,429	--	--	--
Groundwater Quality Trend Monitoring	$19,400	--	$288,000	$31,200
Management Practices Evaluation Workplan	$171,429	--	--	--
Trend Monitoring Workplan	$244,000	$48,000	--	--
Attachment B - Groundwater Monitoring Report (GWMR)	--	--	$150,480	--
MRP-1 Quality Management Plan Requirements Groundwater Quality Management Plan (GQMP)	$146,400	--	$274,200	$216,000
MRP-2 Monitoring Well Installation, Sampling Plan, and Completion Report	$515,657	--	$941,714	--
Total	**$2,044,854**	**$1,751,793**	**$2,158,734**	**$14,514,700**
Total	**$3,796,648**		**$16,673,435**	
Cost per Acre * **	**$1.97**	**$1.68**	**$2.08**	**$13.96**
Total Cost per Acre	**$3.65**		**$16.04**	

*** Assumes workplan portion, not the alternative*

**** Per acre cost is based on the total costs divided by the Kern Coalition irrigated acres*

Table 6-3

Kern Coalition Higher Estimated Costs

Costs	Up-Front Costs		Annual Costs	
	Third-Party	Member	Third-Party	Member
Waste Discharge Requirements General Order				
Third-Party - Provisions	$177,840	--	$340,640	--
Third-Party - Required Reports & Notices	$247,200	--	$163,700	--
Member - Notice of Confirmation/Intent/Application	--	$549,660	--	$0
Member - Farm Evaluation	$19,400	$688,633	--	$110,354
Member - Sediment & Erosion Control Plan	$8,200	$117,500	--	$6,000
Member - Nitrogen Management Plan (NMP)	$19,400	--	--	$13,547,646
Member - CEQA Mitigation Monitoring (Attachment C)	--	$348,000	--	$14,800
Member - Notice of Termination	--	$0	--	$6,200
Member - Annual Fees	--	$0	--	$582,500
Attachment B - Monitoring & Reporting Program				
Groundwater Quality Assessment Report (GAR)**	$304,500	--	--	--
Management Practice Evaluation Program (MPEP)	$1,500,000	--	--	--
Groundwater Quality Trend Monitoring	$19,400	--	$288,000	$31,200
Management Practices Evaluation Workplan	$1,500,000	--	--	--
Trend Monitoring Workplan	$244,000	$48,000	--	--
Attachment B - Groundwater Monitoring Report (GWMR)	--	--	$150,480	--
MRP-1 Quality Management Plan Requirements Groundwater Quality Management Plan (GQMP)	$146,400	--	$274,200	$216,000
MRP-2 Monitoring Well Installation, Sampling Plan, and Completion Report	$8,864,640	--	$5,932,800	--
Total	**$13,116,080**	**$1,751,793**	**$7,149,520**	**$14,514,700**
Total	**$14,802,773**		**$21,664,520**	
Cost per Acre ***	**$12.55**	**$1.68**	**$6.87**	**$13.96**
Total Cost per Acre	**$14.23**		**$20.83**	

*** Assumes workplan portion, not the alternative*

**** Per acre cost is based on the total costs divided by the Kern Coalition irrigated acres*

B. CONCLUSIONS

a) The Kern Coalition's upfront annualized costs plus the annual costs result in the following comparative values to the Tentative Order and summarized in **Table 6-4 Comparative Estimated Costs.**

Table 6-4

Comparative Estimated Costs

	Tulare Lake Basin Area Order Groundwater Program	Kern Coalition Lower Cost Scenario	Kern Coalition Higher Cost Scenario
	($/acre/year)	($/acre/year)	($/acre/year)
Total Cost - First 5 Years	**$1.90**	**$16.77**	**$23.68**
Total Cost – Year 6+	**$1.90**	**$16.04**	**$20.83**

b) The Tentative Order (at $1.90) is significantly lower than the results from this Report. The high cost scenario (at $23.68) is over 12 times higher than the $1.90.

c) The Water Board must take into consideration the detailed costs of this Report and work with the Kern Coalition to reduce the cost burdens of the March 2013 Tentative Order.

Kern Coalition ILRP - Lower Cost Estimate*

Assumptions:

Kern Third-Party Potential Members	902	members (estimate)
Kern Coalition Current Members	350	members (about 40%)
Members Needing to Enroll	552	members (about 60%)
Kern Coalition Irrigated Acres	1,040,000	acres
South San Joaquin Valley Irrigated Acres	2,640,000	acres
Member Hourly Rate	$120	per hr
Coalition Hourly Rate (Coalition Staff)	$120	per hr
Average Farm Acres	1,438	acres
Low vulnerability area (estimated)	300,000	acres
Member Water Board Fee	$0.56	per acre

**Based on Kern Coalition Acres and the March 2013 Tulare Lake Basin Area Tentative WDR's General Order (Groundwater only)*

Costs	Up-Front Costs		Annual Costs	
	Third-Party	Member	Third-Party	Member
Waste Discharge Requirements General Order				
Third-Party - Provisions	$177,840	--	$340,640	--
Third-Party - Required Reports & Notices	$247,200	--	$163,700	--
Member - Notice of Confirmation/Intent/Application	--	$549,660	--	$0
Member - Farm Evaluation	$19,400	$688,633	--	$110,354
Member - Sediment & Erosion Control Plan	$8,200	$117,500	--	$6,000
Member - Nitrogen Management Plan (NMP)	$19,400	--	--	$13,547,646
Member - CEQA Mitigation Monitoring (Attachment C)	--	$348,000	--	$14,800
Member - Notice of Termination	--	$0	--	$6,200
Member - Annual Fees	--	$0	--	$582,500
Attachment B - Monitoring & Reporting Program				
Groundwater Quality Assessment Report (GAR)**	$304,500	--	--	--
Management Practice Evaluation Program (MPEP)	$171,429	--	--	--
Groundwater Quality Trend Monitoring	$19,400	--	$288,000	$31,200
Management Practices Evaluation Workplan	$171,429	--	--	--
Trend Monitoring Workplan	$244,000	$48,000	--	--
Attachment B - Groundwater Monitoring Report (GWMR)	--	--	$150,480	--
MRP-1 Quality Management Plan Requirements Groundwater Quality Management Plan (GQMP)	$146,400	--	$274,200	$216,000
MRP-2 Monitoring Well Installation, Sampling Plan, and Completion Report	$515,657	--	$941,714	--
Total	**$2,044,854**	**$1,751,793**	**$2,158,734**	**$14,514,700**
Total	**$3,796,648**		**$16,673,435**	
Cost per Acre ***	**$1.97**	**$1.68**	**$2.08**	**$13.96**
Total Cost per Acre	**$3.65**		**$16.04**	

*** Assumes workplan portion, not the alternative*

**** Per acre cost is based on the total costs divided by the Kern Coalition irrigated acres*

Kern Coalition ILRP - Higher Cost Estimate*

Assumptions:

Kern Third-Party Potential Members	902	members (estimate)
Kern Coalition Current Members	350	members (about 40%)
Members Needing to Enroll	552	members (about 60%)
Kern Coalition Irrigated Acres	1,040,000	acres
South San Joaquin Valley Irrigated Acres	2,640,000	acres
Member Hourly Rate	$120	per hr
Coalition Hourly Rate (Coalition Staff)	$120	per hr
Average Farm Acres	1,438	acres
Low vulnerability area (estimated)	300,000	acres
Member Water Board Fee	$0.56	per acre

**Based on Kern Coalition Acres and the March 2013 Tulare Lake Basin Area Tentative WDR's General Order (Groundwater only)*

Costs	Up-Front Costs		Annual Costs	
	Third-Party	Member	Third-Party	Member
Waste Discharge Requirements General Order				
Third-Party - Provisions	$177,840	--	$340,640	--
Third-Party - Required Reports & Notices	$247,200	--	$163,700	--
Member - Notice of Confirmation/Intent/Application	--	$549,660	--	$0
Member - Farm Evaluation	$19,400	$688,633	--	$110,354
Member - Sediment & Erosion Control Plan	$8,200	$117,500	--	$6,000
Member - Nitrogen Management Plan (NMP)	$19,400	--	--	$13,547,646
Member - CEQA Mitigation Monitoring (Attachment C)	--	$348,000	--	$14,800
Member - Notice of Termination	--	$0	--	$6,200
Member - Annual Fees	--	$0	--	$582,500
Attachment B - Monitoring & Reporting Program				
Groundwater Quality Assessment Report (GAR)**	$304,500	--	--	--
Management Practice Evaluation Program (MPEP)	$1,500,000	--	--	--
Groundwater Quality Trend Monitoring	$19,400	--	$288,000	$31,200
Management Practices Evaluation Workplan	$1,500,000	--	--	--
Trend Monitoring Workplan	$244,000	$48,000	--	--
Attachment B - Groundwater Monitoring Report (GWMR)	--	--	$150,480	--
MRP-1 Quality Management Plan Requirements Groundwater Quality Management Plan (GQMP)	$146,400	--	$274,200	$216,000
MRP-2 Monitoring Well Installation, Sampling Plan, and Completion Report	$8,864,640	--	$5,932,800	--
Total	**$13,050,980**	**$1,751,793**	**$7,149,820**	**$14,514,700**
Total	**$14,802,773**		**$21,664,520**	
Cost per Acre ***	**$12.55**	**$1.68**	**$6.87**	**$13.96**
Total Cost per Acre	**$14.23**		**$20.83**	

*** Assumes workplan portion, not the alternative*

**** Per acre cost is based on the total costs divided by the Kern Coalition irrigated acres*

WDRs - Third-Party Provisions

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order

Hourly Costs $120

Third-Party Provisions - Costs		Third-Party - Upfront Costs			Third-Party - Annual Costs			
WDR Section IV.C (Provisions, Requirements for the Third-Party)		Hours	Expenses	Cost	Hours	Expenses	Cost	
IV.C.1.	**Organizational Documentation**							
	a. Documentation of organization or management structure	24	$1,000	$3,880	--	--	--	Water Board approval of new third party entity
	b. Identify responsible persons	8	$1,000	$1,960	--	--	--	Hires, identify individuals, ranks
	c. Documentation made readily available to members	40	$5,000	$9,800	--	--	--	Website updates, email, hardcopies for members
IV.C.2.	**Prepare Annual Summaries**							Accounting staff
	a. Expenditures of fees and revenue used to comply	--	--	--	120	$3,000	$17,400	Higher first year fee notices, collection, receipts, expenditures, but annualized over 5 years
	b. Summaries made readily available to members	--	--	--	24	$1,000	$3,880	Summary and mailer
IV.C.3.	**Response to Notice of Violation (NOV)**							Assuming 1 NOV per year
	a. Provide members information regarding reason(s) of violation	--	--	--	20	$500	$2,900	Assume 20 members in violation
	b. Provide notification to all Members in areas covered by the NOV	--	--	--	20	$1,000	$3,400	Within 30 days
	c. Provide confirmation to Water Board of each notification	--	--	--	8	$100	$1,060	
	d. Annual summary of all notices	--	--	--	20	$1,000	$3,400	Annual summary of notices
	e. Respond and resolve NOV	--	--	--	40	$20,000	$24,800	Hire consultant/engineer
IV.C.4.	**Develop, implement, track and evaluate effectiveness of:**							May 1 each year
	a. Groundwater Quality Management Plans (GQMP)	200	$100,000	$124,000	100	$40,000	$52,000	Annually for 5 years 45,000 acres of 436,000 acres May 1 each year
IV.C.5.	**Submittals**							
	a. Provide timely & complete submittal of any plans or reports required by this Order	--	--	--	100	$5,000	$17,000	
IV.C.6.	**Quality Assurance/Quality Control**							
	a. Conduct water quality monitoring & assessments in conformance with QA/QC	--	--	--	100	$1,000	$13,000	
IV.C.7.	**Receipt of Notice of Applicability (NOA)**							
	a. Inform members of NOA requirements within 30 days of receipt	60	$2,000	$9,200	--	--	--	
	b. Send a notice of confirmation form to each Member	200	$5,000	$29,000	--	--	--	
IV.C.8.	**Conduct Education and Outreach activities**							
	a. Inform Members of program requirements							2 classes/yr and Qrt newsletter @ 4 d/class and 3 d/ltr
	i. Program requirements							
	ii. Water quality problems	--	--	--	240	$10,000	$38,800	
	iii. Exceedances of water quality objectives							
	iv. Degradation of water quality							
	b. Maintain attendance lists for outreach events	--	--	--	40	$1,000	$5,800	
	c. Provide Members with information on							
	i. Water quality practices	--	--	--	160	$10,000	$29,200	
	ii. Environmental impacts of water quality practices							
	d. Provide annual summary of education and outreach activities to Board, including:							
	i. Copies of educational and management practice information provided							
	ii. Report the total number of Members attended	--	--	--	60	$3,000	$10,200	
	iii. Describe the process used to provide information to non-attendees							
IV.C.9.	**Annual Membership Participation Report**							
	a. Work with RWQCB to ensure all Members are addressing exceedances or degradation				250	$5,000	$35,000	
	b. As part of the Membership List submittal, identify growers who have failed to:							
	1 Implement improved water quality management practices as specified (GQMP)							
	2 Respond to an information request associated with the GQMP or this Order							
	3 Participate in third-party studies where the third-party is the lead				250	$6,000	$36,000	
	4 Provide confirmation in an outreach event							
	5 Submit required fees to the Third-Party							
IV.C.10.	**Ensure activities performed by subsidiary groups meet requirements**				80	$2,000	$11,600	5 days per group
IV.C.11.	**Fees**							
	a. Transmit RWQCB fees from Members and submit to Board				105	$5,000	$17,600	40% enrolled in surface water Coalition, need to enroll 60%
	b. Collect fees from Members for reimbursement of Third-Party activities				105	$5,000	$17,600	21 Districts x 5 hours each
	Totals	**532**	**$114,000**	**$177,840**	**1,842**	**$119,600**	**$340,640**	

WDRs - Third-Party Requirements

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order

Hourly Costs $120

Third-Party Requirement Costs		Third-Party - One Time Cost			Third-Party - Annual Costs			
WDR Section VIII (Required Reports and Notices - Third-Party)		Hours	Expenses	Cost	Hours	Expenses	Cost	
VIII.A.	**Third-Party Application**							
	1 Submit request to Board within 30 days of Order effective date & follow-up actions	40	$2,000	$6,800				Formation costs in IV.C.1.
VIII.B.	**Membership (Participant) List**							
	1 Submit list of Members to Board							
	a. Within 180 days of receiving NOA	20	$100	$2,500				
	b. Annually by July 31 of each year				20	$100	$2,500	
	2 List shall contain, at minimum							
	a. All parcel numbers covered under the membership							
	b. County of each parcel							
	c. Section, Township, Range associated with each parcel							
	d. Number of irrigated acres for each parcel	700	$3,000	$87,000	70	$500	$8,900	Annual updates
	e. Members names, mailing address, and contact name and phone number (can use Third-Party conta							
	f. Name of farm operator for each parcel if different from the Member							Identification of the crops grown and acreage of each crop.
	g. Identification of each parcel that is a part of a Small Farming Operation, if applicable							• Location of the farm.
VIII.C.	**Templates**							
	1 Farm Evaluation Template							• Identification of on-farm management practices implemented to achieve the Order's farm management performance standards. Specifically track which management practices recommended in management plans have been implemented at the farm.
	a. Farm Evaluation Template - Group Option, to Water Board within 90-days of NOA	40	$500	$5,300	20	$250	$2,650	• Identification of whether or not there is movement of soil during storm events and/or during irrigation drainage events (sediment and erosion risk areas) and a description of where this occurs.
	b. Central Valley Water Board - Farm Evaluation Template			$0			$0	• Identification of whether or not water leaves the property and is conveyed downstream and a description of where this occurs.
	2 Nitrogen Management Plan Template							• Location of in-service wells and abandoned wells. Identification of whether wellhead protection and backflow prevention practices have been implemented.
	a. Nitrogen Management Plan Template - Group Option	40	$500	$5,300	20	$250	$2,650	
	b. Central Valley Water Board - Nitrogen Management Plan Template			$0			$0	
	c. Nitrogen Management Plan Summary Report	20	$250	$2,650	10	$100	$1,300	
	3 Sediment and Erosion Control Plan Template							
	a. Sediment and Erosion Control Plan Template - Group Option	20	$250	$2,650	5	$100	$700	
	b. Central Valley Water Board - Sediment and Erosion Control Plan Template			$0			$0	
VIII.D.	**Groundwater Quality Assessment Report and Evaluation/Monitoring Workplans**							
	1 Groundwater Quality Assessment Report (GAR), submitted 1 year after NOA (Attachment B, IV.A.)			$0			$0	Cost is included in MRP, Attachment B Sheet
	2 Management Practice Evaluation Program (MPEP) Workplan (Attachment B, IV.B.)							
	a. Management Practices Evaluation Program - Group Option			$0				Cost is included in MRP, Attachment B Sheet
	b. Third Party Only - Management Practices Evaluation Program							
	1 Objectives, Implementation, Report,							
	2 Implementation			$0				Cost is included in MRP, Attachment B Sheet
	3 Report							
	4 Management Practices Evaluation Report - 6 years after implementation of MPEP							
	3 Groundwater Quality Trend Monitoring Workplan - submit 1 year after approval of GAR (IV.E.)			$0				Cost is included in MRP, Attachment B Sheet
VIII.F.	**Sediment Discharge and Erosion Assessment Report**							
	1 Submit 1 year after receiving NOA (Attachment B, VI), notify impacted Members to prepare Plan	200	$70,000	$94,000				
VIII.H.	**Monitoring Report (Attachment B, V.C. by 1 May every year)**							
	1 Submit monitoring reports to State Board GeoTracker database, due May 1st of each year 2014			$0	800	$5,000	$101,000	Annually
VIII.I.	**Groundwater Quality Management Plans (GQMP)**							
	1 Newly triggered **GQMP**						$0	
	a. Submit to Board within 60 days						$0	
	b. Submit to CV-SALTS Chair if addresses salt or nitrate	Included in MRP-1					$0	
	c. Implement outreach or monitoring before approval						$0	
	2 Ensure compliance and continued implementation of management plans until completed			$0			$0	
	3 Comprehensive Groundwater Quality Management (CGQM) Plan			$0			$0	Assuming comprehensive option
	a. Third-Party may submit CGQM plan instead of GQMP			$0			$0	Submitted with GAR
	b. CGQM must be updated at same time as Management Plan Progress Report			$0			$0	
VIII.J.	**Technical Reports - Where monitoring is not effective, provide technical reports**			$0	350	$2,000	$44,000	1 report per year
VIII.K.	**Notice of Termination**			$0			$0	Not applicable or expected.
VIII.L.	**Total Maximum Daily Load (TMDL) Requirements**							
	1 Approved TMDLs in the Basin Plan as applicable shall be implemented	300	$5,000	$41,000				
	Totals	**1,380**	**$81,600**	**$247,200**	**1,295**	**$8,300**	**$163,700**	

WDRs - Member Requirements

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order

No. of Members	Small (<60 ac)		Other (60+ ac)		Total
	Low Vul	High Vul	Low Vul	High Vul	
Farm Evaluation	60	122	216	504	902
Nitrogen MP	60	122	216	504	902
Sediment & Erosion	10		40		50
Mitigation Monitoring	10				10

Member Hourly Costs: $120

Member Requirement Costs WDR Section VII (Required Reports and Notices - Member)	Upfront Cost Member: No. of Members	Hours/ Member	Total Hours	Expenses	Cost	Annual Cost Member: No. of Members	Hours/ Member	Total Hours	Expenses	Cost	
VII.A. Notice of Confirmation (NOC) / Notice of Intent (NOI) / Membership Application											
1 NOC submitted to Third-Party within 120 days of Third-Party NOA by the Executive Officer (EO)											
a. If enrolled under Order R5-2006-00xx Southern San Joaquin Water Quality Coalition											Members in the 2006 Coalition (350 estimated)
b. Third-Party will provide NOC form to Member within 30 days of receiving NOA	350	2	700	$9,000	$93,000						
c. Provide certification written notice was provided of enrollment to other parties											
2 All other growers must become Members within 120 days of Third-Party NOA by EO											
a. Complete Third-Party membership application	500	4	2,000	$102,000	$342,000						Growers who were not in the Coalition (estimate 500 will join within 120 days).
b. Provide certification, written notice was provided of enrollment to non-Member parties	500	0.5	250	$500	$30,500						
c. Third-Party will confirm membership	500	0.0	0	$0	$0						
3 121 days after the EO's issuance of the NOA to the Third-Party, Growers not yet members must											
a. Completed NOI application to Board	52	6	312	$11,000	$48,440						Growers who miss the 120 day deadline (estimate 52)
b. NOI processing fee	52	1.5	78	$600	$9,960						
c. Membership application to Third-Party	52	4	208	$800	$25,760						
4 Alternatively, a Grower may submit to the Board											
a. Report of Waste Discharge (RWD)	0	0	0	$0	$0						Costs for individual RWD (estimate $0)
b. NOI for coverage under applicable general waste discharge req for individuals	0	0	0	$0	$0						
VII.B. Farm Evaluation											
1 Members in Low Vulnerability Areas											
a. With Small Farming Operations (<60 ac) by 1 March 2017, update every 5 years	60	4.75	285	$1,526	$35,726	60	0.27	16	$0	$1,944	4.75 hrs per member plus 45 miles trip to meeting, recurring .27 hrs/yr annualize
b. Farming Operations not qualifying as Small by 1 March 2015, update every 5 years	216	6.25	1,350	$5,492	$167,492	216	0.27	58	$0	$6,998	6.25 hrs per member plus 45 miles trip to meeting, recurring .27 hrs/yr annualize
2 All Members in High Vulnerability Areas (Surface/Groundwater) by 1 March 2014											
a. Farm Evaluations and submit to Third-Party and update annually 1 March	626	6.25	3,913	$15,916	$485,416	626	1.35	845	$0	$101,412	6.25 hrs per member plus 45 miles trip to meeting, recurring 1.35 hrs/yr w/ no m
VII.C. Sediment and Erosion Control Plan											
Required Members in areas potential to cause erosion & discharge sediment to surface waters											
a. With Small Farming Operations (<60 ac) within one year of SDEAR	20	1.25	25	$44,000	$47,000	20	1.0	20	$0	$2,400	Assume 1.25 hrs per member and $2160 consultant, 1 hr annually to review
b. Farming Operations not qualifying as Small within 180 days of SDEAR	30	1.25	38	$66,000	$70,500	30	1	30	$0	$3,600	Assume 1.25 hrs per member and $2160 consultant, 1 hr annually to review
											Does not include costs to fix identified problems
VII.D. Nitrogen Management Plan (NMP)											
1 All Members within a High Vulnerability Groundwater Area must prepare, certify, and implement an NMP											
a. With Small Farming Operations (<60 ac) by 1 March 2016, update annually thereafter						122	8.5	1,037	$172,386	$296,826	Estimate 122 members, 8.5 hrs + consultant $1,300 + testing $113, annual
b. Farming Operations not qualifying as Small by 1 March 2014, update annually thereafter						504	125.0	63,000	$2,174,256	$9,734,256	Estimate 504 members, 125 hrs + consultant $3,000 + testing $1,314, annual
2 Members in Low Vulnerability Groundwater Areas											
a. Small farming operations						60	14.3	855	$6,780	$109,380	Estimate 60 members, 14.25 hrs + consultant $0 + testing $113, annual
b Farming Operations not qualifying as small						216	120.5	26,028	$283,824	$3,407,184	Estimate 216 members, 120.5 hrs + consultant $0 + testing $1314, annual
VII.E. Mitigation Monitoring - Certain Members required to implement mitigation measures in Attachment C											
1 Submit mitigation monitoring by March 1 of each year to Third-Party	10	40	400	$300,000	$348,000	10	4	40	$10,000	$14,800	Estimate 10 members Year 1 (40 hrs+consultant $30,000), Annually (4 hrs + co
2 Shall include information on:											
a. Implementation of CEQA mitigation measures (cultural resources, veg & wildlife, fisheries, ag resources, GHG emissions											
b. Measures implemented											
c. Potential environmental impact measures addressed											
d. Location of measures (parcel number, county)											
e. Steps taken to monitor success of measure											
VII.F. Notice of Termination						5	10	50	$200	$6,200	Estimate 5 terminations/year, mostly due to change in ownership
XI. Annual Fees - Paid by Member									$582,500	$582,500	Tier I - Water Board Fee $100 per group + $0.56/acre
Totals			9,558	$556,833	$1,703,793			91,980	$3,229,946	$14,267,500	

One time $200 fee

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Attachment B - MRP - Monitoring & Reporting Program Section IV

These costs are totaled in WDR VIII.D. Hourly Costs $120

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order

Groundwater Quality Assessment Report (GAR) MRP, Attachment B (Monitoring and Reporting Program) Section IV			Third-Party - Upfront		
			Hours	Expenses	Cost
IV.A.		Groundwater Quality Assessment Report (GAR)			
	-	Submit proposed GAR outline within 3 months after receiving NOA	100	$1,000	$13,000
	-	Submit completed GAR within 1 year of receiving NOA	100	$49,000	$61,000
	2	GAR components obtained by review of existing federal/state/county/local databases and documents:			
	a	Detailed land use information			
	b	Depth to groundwater map			
	c	Groundwater recharge information			
	d	Soil survey information	50	$53,500	$59,500
	e	Shallow groundwater constituent concentrations (potential COCs)			
	f	Existing groundwater data collection and analysis efforts			
	g	Discuss geological and hydrogeologic information			
	3	GAR data review and analysis			
	a	Determine high vulnerability areas based on potential impacts from irrigated ag activities			
	b	Determine merit of incorporating existing data collection efforts to achieve objectives	50	$43,500	$49,500
	c	Prepare ranking of high vulnerability areas for prioritization of workplan activities			
	d	Utilize GIS mapping applications, graphics, tables to convey data, analysis and results			
	4	Groundwater vulnerability designations			
	a	Designate high/low vulnerability areas	50	$21,500	$27,500
	b	Modify designations every five years after approval of GAR			
	5	Prioritization of high vulnerability groundwater areas			
	a	Identify exceedances of water quality objectives			
	b	Proximity of high vulnerability area to areas contributing to recharge to urban and rural communities			
	c	Identify existing irrigated agriculture field or operational practices			
	d	Consider largest commodity types comprising up to at least 80% of irrigated ag acreage	100	$82,000	$94,000
	e	Consider legacy or ambient conditions of groundwater			
	f	Identify groundwater basins currently or proposed to be under review by CV-SALTS			
	g	Identify constituents of concern, e.g. relative toxicity, mobility			
		Subtotal	**450**	**$250,500**	**$304,500**

Management Practice Evaluation Program (MPEP) MRP, Attachment B (Monitoring and Reporting Program) Section IV			Third-Party - Upfront		
			Hours	Expenses	Cost
IV.B.		Management Practice Evaluation Program (MPEP)			
	-	Determine effects, if any, irrigated ag have on groundwater quality			
	-	MPEP is required in high vulnerability areas and must address CoCs described in the GAR			
	1	Objectives of the MPEP			
	a	Identify whether existing site and/or commodity specific practices are protective of GW quality	Use different approach		
	b	Determine if newly implemented management practices are improving or may improve GW quality			
	c	Develop an estimate of the effect Members' discharges of CoCs using a mass balance model	See MPEP high and low		
	d	Utilize results of evaluated to determine if management practices need to be improved			
	2	Implementation - on a watershed or regional commodity basis with other third party groups			
	a	Prepare and submit a master schedule of the rank or priority for investigation of high-v areas			
	3	Reports of the MPEP - Information to complete the MPEP schedule to meet deadline			
	4	Management Practices Evaluation Report (MPER)			
	-	No later than 6 years after implementation of each phase			
	a	Identify management practices that are protective of GW quality			
	b	Identify management practices that are appropriate for site conditions on farms			
	c	Include maps and types of management practices that should be implemented			
	d	MPER to include adequate technical justification for identifying protective management practices			
	e	Propose and implement new/alternative management practices if existing are not protective			
	f	GQMPs are to be updated to be consistent with the findings of the MPER			
		Subtotal	**0**	**$0**	**$0**

Groundwater Quality Trend Monitoring MRP, Attachment B (Monitoring and Reporting Program) Section IV			Third-Party - Upfront			Third-Party - Annual			
			Hours	Expenses	Cost	Hours	Expenses	Cost	
IV.C.		Groundwater Quality Trend Monitoring							
	1	Objectives							
	a	Determine baseline GW quality relevant to irrigated ag	120	$5,000	$19,400			$0	Board input to guide workplan.
	b	Develop long-term GW quality info that can be used to evaluate regional effects of irrigated ag							
	2	Implementation							
	a	Develop a groundwater monitoring network over high & low vulnerability areas							
	b	Employ existing shallow wells but <u>not</u> necessarily wells in the upper zone of 1st encountered GW			$0	2,000	$10,000	$250,000	Estimate 130 existing wells to be monitored
	c	Submit proposed Trend Groundwater Monitoring Workplan (MRP IV.E)							
	3	Reporting							
	a	Maps, tabulation of data, time of concentration charts, submitted electronically to GeoTracker			$0	300	$2,000	$38,000	
	b	Evaluate data for trends as proposed in MRP IV.E							
		Subtotal	**120**	**$5,000**	**$19,400**	**2,300**	**$12,000**	**$288,000**	

Management Practices Evaluation Workplan MRP, Attachment B (Monitoring and Reporting Program) Section IV			Third-Party - Upfront		
			Hours	Expenses	Cost
IV.D.		Management Practices Evaluation Workplan			
	-	Submit workplan within 2 years after GAR approval			
	1	Workplan approach			
	a	Groundwater monitoring - must be first encountered GW			
	b	Modeling			
	c	Vadose zone sampling			
	d	Other scientifically sound and technically justifiable methods for meeting objects of the MPEP			
	2	Groundwater quality monitoring - constituent selection (when GW monitoring is proposed)	Use different approach		
	a	Constituents to be assessed			
	b	Frequency of data collection for each constituent			
	3	Workplan implementation and analysis	See MPEP high and low		
	a	Explain how data at evaluated farms will be used to assess GW impacts on farms not evaluated			
	4	Master workplan - prioritization			
	a	If high vulnerability areas are ranked in GAR, prepare workplan timeline, priority, for areas/commodity			
	b	Submittal dates for addendums proposing the details of each area's investigation			
	5	Installation of monitoring wells			
	a	Upon approval of workplan, prepare and submit a Monitoring Well Installation & Sampling Plan (MWISP) as described in MRP-2			
		Subtotal	**0**	**$0**	**$0**

Trend Monitoring Workplan MRP, Attachment B (Monitoring and Reporting Program) Section IV			Third-Party - Upfront			
			Hours	Expenses	Cost	
IV.E.		Trend Monitoring Workplan - following MRP IV.C.				
	-	Submit workplan within 1 year after GAR approval				
	1	Workplan approach				1.00E+06 acres
	a	Discussion of rationale for number of proposed monitoring wells and locations				43.402778 townships
	b	Consider variety of ag commodities produced	500	$5,000	$65,000	4 wells per township
	c	Consider conditions discussed/identified in GAR related to vulnerability prioritization				174 wells total at above density
	d	Areas identified as recharge to urban and rural communities				
	2	Well details for wells included in trend monitoring				
	a	GPS coordinates				Estimate using data for 130 existing wells
	b	Physical address of property				
	c	CA State well number (if known)				
	d	Well depth	1200	$10,000	$154,000	
	e	Top and bottom perforation depths				
	f	A copy of the water well drillers log, if available				
	g	Depth of standing water (static), if available				
	h	Well seal information (type of material, length of seal)				
	3	Proposed sampling schedule				
	a	Annual sampling (MRP Table 3)	100	$500	$12,500	
	4	Workplan implementation and analysis				
	a	Proposed method(s) to be used to evaluate trends in the GW monitoring data over time	100	$500	$12,500	
		Subtotal	**1,900**	**$16,000**	**$244,000**	

	Hours	Expenses	Cost	Hours	Expenses	Cost
Total	**2,470**	**$271,500**	**$567,900**	**2,300**	**$12,000**	**$288,000**

Low MPEP estimate (Group option, worst case per Clay Rodgers)

Crop groups	4			Workplan per crop	$300,000		
Management Practices	8			Analysis per crop	$300,000	More aggregation, higher cost per crop (or converse)	
Site Conditions	5						
Sites	160	0.5%	of 33,000 growers				
Wells per site	3						
Dairy RMP cost	$ 1,300,000	per year					
				One time cost (front or back end)		**Annual cost**	
				Central Valley Coalitions	**Kern Share (1/7th)**	**Central Valley Coalitions**	**Kern Share (1/7th)**
MWISP	$ 5,400	per site		$ 864,000	$ 123,429		
MWICR	$ 3,480	per site		$ 556,800	$ 79,543		
Survey	$ 1,680	per site		$ 268,800	$ 38,400		
Wells	$ 4,000	per well		$ 1,920,000	$ 274,286		
Monthly sampling	$ 2,100	per site per instance				$ 4,032,000	$ 576,000
Quarterly reporting	$ 4,000	per site per report				$ 2,560,000	$ 365,714
Workplan				$1,200,000	$ 171,429		
Analysis / MPEPR				$1,200,000	$ 171,429		
				$ 6,009,600	$ 858,514	$ 6,592,000	$ 941,714
						$ 0.94	per acre
						507%	of dairy RMP cost
						5.1	times dairy RMP cost

High MPEP estimate (Kern only option)

Crop groups	6			Workplan per crop	$250,000		
Management Practices	8			Analysis per crop	$250,000	More aggregation, higher cost per crop (or converse)	
Site Conditions	3						
Sites	144	16.0%	of 902 growers				
Wells per site	3						
Dairy RMP cost	$ 1,300,000	per year					
				One time cost (front or back end)		**Annual cost**	
				Kern Coalition		**Kern Coalition**	
MWISP	$ 5,400	per site		$ 777,600			
MWICR	$ 3,480	per site		$ 501,120			
Survey	$ 1,680	per site		$ 241,920			
Wells	$ 17,000	per well		$ 7,344,000			
Monthly sampling	$ 2,100	per site per instance				$ 3,628,800	
Quarterly reporting	$ 4,000	per site per report				$ 2,304,000	
Workplan				$1,500,000			
Analysis / MPEPR				$1,500,000			
				$ 11,864,640		$ 5,932,800	
						$ 5.70	per acre
						456%	of dairy RMP cost
						4.6	times dairy RMP cost

Attachment B - MRP - Monitoring & Reporting Program Section V

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order Hourly Costs $120

Groundwater Monitoring Report (GWMR)			Third-Party - Upfront			Third-Party - Annual		
MRP, Attachment B (Monitoring and Reporting Program) Section V			Hours	Expenses	Cost	Hours	Expenses	Cost
V.B.		**Annual Groundwater Monitoring Results - Annually by May 1**						
	1	Submit prior year's GW monitoring results in Excel and/or export into GeoTracker			$0	40	$15,000	$19,800
	2	Explanation of why some data is missing			$0	4	$1,000	$1,480
V.C.		**Monitoring Report - Annually by May 1**						
	1	Signed transmittal letter			$0	4		$80,480
	2	Title page			$0	2		$240
	3	Table of contents			$0	4		$480
	4	Executive Summary			$0	16		$1,920
	5	Description of third-party geographical area			$0	16		$1,920
	6	Monitoring objectives and design			$0	16		$1,920
	7	Sampling site / monitoring well descriptions and rainfall records			$0	16		$1,920
	8	Location map(s) of sampling sites/monitoring wells, crops and land uses			$0	16		$1,920
	9	Tabulated results summary of analyses			$0	40		$4,800
	10	Discussion of data relative to water quality objectives and water quality management plan milestones			$0	40		$4,800
	11	Sampling and analytical methods used			$0	16	$80,000	$1,920
	12	Summary of Quality Assurance Evaluation results (from QAPP)			$0	24		$2,880
	13	Specification of the method(s) used to obtain estimated surface water flow estimation, at each monitoring site during each monitoring event			$0	16		$1,920
	14	Summary of water quality objectives exceedances			$0	24		$2,880
	15	Actions taken to address water quality exceedances			$0	24		$2,880
	16	Evaluation of monitoring data to identify spatial trends and patterns			$0	24		$2,880
	17	Summary of Nitrogen Management Plan information			$0	32		$3,840
	18	Summary of management practice information collected as part of Farm Evaluations			$0	24		$2,880
	19	Summary of Mitigation Monitoring			$0	16		$1,920
	20	Summary of education and outreach activities			$0	16		$1,920
	21	Conclusions and recommendations			$0	24		$2,880
VIII.		**Water Quality Triggers for Development of Management Plans**			$0	0	$0	$0
XI.		**Quality Assurance Project Plan (QAPP)**	0	$0	$0			$0
		Totals	**0**	**$0**	**$0**	**454**	**$96,000**	**$150,480**

MRP-1 - Groundwater Management Plan Requirements

Assumptions:
The average hourly rate is meant to cover district staff time and consultant time in addressing management plan issues. There are many inherent uncertainties, most significant of which are details on what wil actually be found to be in exceedance of water quality standards, and the areal extent of those exceedances.
This assumes that Kern will submit a Comprehensive GW Management Plan with our GAR.

Average Hourly Costs $120

MRP-1 Groundwater Management Plan Requirements	Groundwater Mgmt Plan								
	Third Party				Member				
	Up-front		Annual		Up-front		Annual		
Monitoring and Reporting Program R5-2013-XXXX	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Notes
A Introduction and Background Section									
1 Discussion of COCs, water quality objective(s) or trigger(s)	8	$960							Draw from GAR on a lot of this.
2 Identification (narrative & map format) of boundaries to be covered by the management plan	8	$960							
Can include all areas or separate management plans for each area where plans are req	0	$0							
3 Discussion how boundaries were delineated	8	$960							
B Physical Setting and Information									
1 General Requirements									
a. Land use maps - partially satisfied in GAR	20	$2,400							
i. Crop information by square-mile section (TRS) level	8	$960							
ii. Maps in electronic format using ArcGIS format	8	$960							
b. Identification of potential irrigated ag sources of COCs	20	$2,400							
i. If potential sources unknown, conduct source identification study - Triggers G	0	$0							See below under implementation
ii. **or** Develop management plan for COCs - Triggers C									
c. List of designated beneficial uses for impacted water	12	$1,440							
d. Baseline inventory of existing management practices	20	$2,400							Draw from Farm Evaluation.
i. Location of practices to TRS level	40	$4,800							
e. Available surface and/or groundwater quality data - partially satisfied in GAR									
i. Summary, discussion, and compilation of available data	20	$2,400							While groundwater is a bigger job, assume that much of this information is available from the GAR.
ii. For COCs in the management plan	20	$2,400							
iii. Acceptable sources of quality data:	0	$0							
CA State Water Board Groundwater Ambient Monitoring Assessment (GAMA) program	20	$2,400							
US Geological Survey (USGS)	20	$2,400							
CA Department of Public Health (DPH)	20	$2,400							
CA Department of Pesticide Regulation (DPR)	16	$1,920							
CA Department of Water Resources (DWR)	16	$1,920							
Local groundwater management programs	0	$0							
Groundwater Assessment Report (GAR) developed by Third-Party	40	$4,800							
3 Groundwater - Additional Requirements									
a. Soil types and soils data as described by NRCS soil survey	20	$2,400							
b. Description of geology and hydrogeology for area	20	$2,400							
i. Regional and area specific geology	8	$960							
ii. Groundwater basin and sub-basins in the area	16	$1,920							
1 General water chemistry known	16	$1,920							
2 Concentrations of major anions, cations, nutrients, TDS, pH, DO, and hardness	16	$1,920							
3 Provide Piper (tri-linear), Stiff, and/or Durov diagrams for the area	16	$1,920							
iii. Hydrogeology, including	8	$960							
1 Known water bearing zones	8	$960							
2 Areas of shallow and/or perched groundwater	8	$960							
3 Areas of discharge and recharge to basin	8	$960							
iv. Identify water bearing zones utilized for domestic, irrigation, and municipal water	8	$960							
v. Aquifer characteristics known from existing information	8	$960							
1 Depth to groundwater	8	$960							
2 Groundwater flow direction	8	$960							
3 Hydraulic gradient and conductivity	8	$960							
c. Identification of irrigation water sources and general water chemistry	8	$960							
C Management Plan Strategy - this is probably the norm but can be short-circuited by performing a source ID study (G)									
1 Description of approach and prioritization	4	$480							
2 Goals and Objectives	4	$480							
a. compliance with water quality objectives	2	$240							
b. Education and outreach	2	$240							
c. Identify, validate, and implement management practices	2	$240							
3 Identify duties and responsibilities of individuals/groups	8	$960							
a. Identification of key individuals	8	$960							
b. Discussion of each individual's responsibilities	8	$960							
c. Organizational chart with identified lines of authority	8	$960							
4 Strategies to implement Management Plan tasks	8	$960							
a. Identify entities/agencies contacted to obtain data and assistance	8	$960							
b. Identify management practices used to control COC that are	32	$3,840							
i. Technically feasible	8	$960							
ii. Economically feasible	8	$960							
iii. Proven to be effective at protecting water quality	8	$960							
iv. Complies with Sections III.A. and B. of the Order	8	$960							
v. Practices to be implemented by Members	16	$1,920							NMP, outreach on accounting for N in well water
vi. Estimation of effectiveness and know limitation of implemented measures	16	$1,920							
c. Identify outreach to participants	8	$960							
i. Strategy for informing growers of water quality problems	8	$960							
ii. Method for disseminating information on management practices	4	$480							Websites, district correspondence, etc.
iii. Description of how effectiveness of outreach to be evaluated	8	$960							Monitor ratios
d. Schedule and milestones for implementation of management practices and tasks	8	$960							
i. time estimated to identify new management practices	4	$480							
ii. Timetable for implementation of identified management practices	4	$480							
e. Establish measurable performance goals	8	$960							
D Monitoring Methods		$0							
1 General Requirements	8	$960							
a. Designed to measure effectiveness at achieving goals and objectives	4	$480							
b. Capable of determining management practice made in response to plan are effective	4	$480							
2 Surface Water - Additional Requirements									
a. Location(s) of monitoring site and schedule representative of COC discharges									
b. Monitoring data submitted electronically									
3 Groundwater - Additional Requirements									
a. May include commodity-based representative monitoring	40	$4,800							Rely on MPEP efforts
b. Conducted to determine effectiveness of management practices implemented	20	$2,400							
E Data Evaluation									
1 Methods utilized to perform data analysis	4	$480							
2 Identify information necessary to quantify program effectiveness	4	$480							
i. Tracking of management practice implementation	4	$480							
ii. Describe approach used to determining effectiveness of management practices	12	$1,440							
iii. Describe process for tracking implementation of management practices	12	$1,440							
iv. Description of how information is collected from growers	12	$1,440							
v. Type of information collected	8	$960							
vi. How information will be verified	8	$960							
vii. How information will be reported	8	$960							

	Groundwater Mgmt Plan								
	Third Party				Member				
MRP-1 Groundwater Management Plan Requirements	Up-front		Annual		Up-front		Annual		
Monitoring and Reporting Program R5-2013-XXXX	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost	Notes
F Records and Reporting - Management Plan Progress Report - this is annual once a Mgmt Plan is implemented.									
1 Front Pages			1	$120					
2 Executive Summary			20	$2,400					
3 Location map(s) and brief summary			14	$1,680					
4 Table with exceedances for the management plans			20	$2,400					
5 New management plans triggered since previous report			0	$0					Assume that we will use a comprehensive plan.
6 Status update on preparation of the new management plans			0	$0					
7 Summary and assessment of data collected during reporting period			40	$4,800					
8 Summary of grower outreach conducted			30	$3,600					
9 Summary of implementation of management practices			60	$7,200					
10 Results of evaluation of management practice effectiveness			60	$7,200					
11 Evaluation of progress in meeting performance goals and schedules			20	$2,400					
12 Recommendations for changes			20	$2,400					
G Source Identification Study Requirements - this is a triggered report - not always included									
1 Evaluation of types of practices, commodities, and locations that may be a source	32	$3,840							Use NHI for this.
2 Continued monitoring at site/area and increased monitoring, if appropriate	8	$960							Monitor mostly nitrogen ratios.
3 Assessment of potential pathways through waste discharge can occur	8	$960							
4 Schedule for conducting study	16	$1,920							
5 Field Studies									
a. Evaluate feasibility of field studies as part of their source identification study proposal	0	$0							Rely on MPEP work.
b. Identify a reasonable number and variety of field study sites that are representative	0	$0							
6 Alternative Source Identification - if not performing a source ID study									
a. Demonstrate how method will produce data/information	16	$1,920							Reference MPEP work.
b. Determine contributions from irrigated ag operations	16	$1,920							
Subtotal - Documentation of the plans	970	$ 116,400	285	$ 34,200	0	$ -	0	$ -	
IMPLEMENTATION ESTIMATE									
Registered pesticides									
Source ID	80	$9,600							We have minimal GWPA's in Kern. Might have some follow-up, depending on what data looks like.
Identification of potential management practices	40	$4,800							
Management practice implementation	50	$6,000							
Effectiveness evaluation	80	$9,600							
Toxicity									
Source ID									
Identification of potential management practices									
Management practice implementation									
Effectiveness evaluation									
Contingency / As-required phase on high priority items (covers first two years of implementation)								$0	
Legacy pesticides and trace metals									
Source ID									
Identification of potential management practices									
Management practice implementation									
Effectiveness evaluation									
DO and pH									
Source ID									
Identification of potential management practices									
Management practice implementation									
Effectiveness evaluation									
Salinity and pathogens									
Source ID									
Identification of potential management practices									
Management practice implementation									
Effectiveness evaluation									
Contingency / As-required phase on lower priority items (covers last three years of 5 year plan)								$0	
Nitrates - groundwater management plan items (KRWCA staff time)			2000	$240,000					Assumed to require one person-year to monitor grower nitrogen ratios, research acceptable values, meet with growers, do outreach, interact with and support MPEP work, and provide support for growers and answer questions. This is uncertain.
Nitrates - grower attendance at outreaches.							1800	$216,000	Assume 600 high vulnerability growers/personnel. Each grower would attend one outreach for their crop. 3 hours per outreach plus travel expenses. This doesn not include grower time to implement practices.
Subtotal - Implementation	250	$ 30,000	2000	$ 240,000	0	$ -	1800	$ 216,000	These costs do not include farm level management practices that may be required. For example, pressurized irrigation systems, etc.
GRAND TOTAL	**1,220**	**$ 146,400**	**2,285**	**$ 274,200**	**0**	**$ -**	**1,800**	**$ 216,000**	

MRP-2 - Monitoring Well Installation, Sampling Plan, and Completion Report

Crop groups	6
Management practices	8
Site conditions	3
Sites	144

Based on the March 2013 Tulare Lake Basin Area Tentative WDRs General Order

Hourly Costs $120

MRP-2 Monitoring Well Installation, Sampling Plan, and Completion Report	Third-Party (up-front costs)		Third-Party (annual costs)		
Monitoring and Reporting Program R5-2013-XXXX	Hours	Phase Cost	Hours	Phase Cost	Notes
II. Per Phase Monitoring Well Installation and Sampling Plan (MWISP)	6480	$777,600			This includes all of the below.
A Stipulations					Approximately $5,400 per site.
B MWISP Required Elements					
1 General Information					
a. Topographic map					
b. Site plan					
c. Rationale for number of monitoring wells proposed					
d. Local permitting information					
e. Drilling details					
f. Health & Safety plan					
2 Proposed Drilling Details					
a. Drilling techniques					
b. Well / soil sample collection and logging method(s)					
3 Proposed Monitoring Well Design					
4 Proposed Monitoring Well Development					
5 Proposed Surveying					
6 Monitoring according to QAPP					
III. Monitoring Well Installation Completion Report (MWICR)	4176	$501,120			Includes A-C below.
A General Information					Approximately $3,480/site
a. Brief overview of field activities					
b. Site Plan					
c. Period of field activities and milestone events					
B Monitoring Well Construction					
C Monitoring Well Development					
D Monitoring Well Survey	2016	$241,920			Approximately $1,680 per site
Implementation costs					
Well construction, project management and oversight		$7,344,000			Direct rotary, approximately $17k per well with e-log, project mgmt and oversight.
Sampling and analysis cost, assuming monthly sampling.				$3,628,800	$1000/site for sampling. $200/site for normal analysis. $900/site for pesticide analysis.
Quarterly reporting of results to RWQCB				$2,304,000	$4000/site for reporting event
Totals		**$8,864,640**		**$5,932,800**	

WHITE PAPER/TECHNICAL MEMORANDUM

Nitrate Hazard Index (NHI) Description

FROM: Joel Kimmelshue/NewFields Agricultural & Environmental Resources
Stephanie Tillman/NewFields Agricultural & Environmental Resources

TO: Ernest Conant/Young Wooldridge
Eric Averett/Kern River Watershed Coalition Authority
John Schaap/Provost & Pritchard

DATE: April 10, 2013

PROJECT: Kern River Watershed Coalition Authority Irrigated Lands Regulatory Program Support

INTRODUCTION

The California Regional Water Quality Control Board – Central Valley Region (CVRWQCB) has issued Order R5-2013-XXXX titled, Waste Discharge Requirements General Order for members of a third-party group within the Tulare Lake Basin, excluding the area of the Westlands Stormwater Coalition. This white paper/technical memorandum has been developed in support of the comments submitted by the Kern River Watershed Coalition Authority (KRWCA).

BACKGROUND

In 1994, the California State Water Resources Control Board (State Water Board) appointed a Nutrient Technical Advisory Committee (TAC) to assess water quality problems associated with agriculture and make suggestions for addressing such issues. A hazard indexing methodology was conceptualized in which growers could identify field nitrate leaching vulnerabilities based on the soil characteristics, the crop grown, and irrigation method used. An index or ranking method allows for a way to quickly and easily determine risk severity and identify the major factors contributing to this risk, without requiring a large, variable and expensive data set.

The UC Center for Water Resources proceeded with this work, developing the matrix-based (overlay and index method) Nitrate Groundwater Pollution Hazard Index (NHI) for irrigated agriculture (Wu et al. 2005). It was made available online to the public. This online tool borrowed and built upon the conceptual framework of the TAC, assigning soil series, crop types, and irrigation methods individual leaching risk values through consideration of multiple factors by expert collaboration. Index values proposed for soils, crops, and irrigation systems were then subjected to external review by experts.

The NHI was then used by Dzurella et al. (2012) to identify the nitrate leaching risk of individual fields in the Tulare Basin as well as other areas of the Central and Salinas valleys. During this effort, values assigned to irrigation methods were modified to allow for conditions specific to the regions that were not considered during the original, more general iteration of the NHI. These modifications were made because of knowledge of practices that were known to be common in the region, but did not neatly fall within the categories of nitrate-influencing factors identified during the development of the NHI. The NHI can and should be modified to allow for region-specific conditions and should leverage as much information as possible about pertinent agricultural practices, soil conditions and cropping patterns within specific regions. Without this "customized" approach to the NHI, the results of the NHI analysis do not truly reflect the nitrate risk of agricultural fields with specific attributes.

OVERVIEW

The concept that underpins the NHI approach recognizes three important points:

1. No individual factor on its own (soils, crop types, irrigation method, or other variable) can fully account for the potential magnitude of nitrate leaching
2. Nitrate contamination is exceedingly difficult and costly to quantify through field sampling and analysis and correlate with agricultural fields spatially
3. Nitrate leaching risk from agriculture occurs over a wide range of conditions and is best represented by a spectrum from low to high risk

The NHI is a tool for evaluating the potential for nitrate leaching to groundwater under agricultural fields. As such, it does not provide an absolute value of how much N will be leached under various conditions of soil, cropping and irrigation; rather, it is an index that provides a rank for each field situation within an overall range or spectrum.

The NHI is simply a ranking system for factors that influence N leaching. Each soil series, crop type and irrigation method in use is assigned a value that ranks its risk or potential contribution to N leaching. The rankings assigned to these factors are multiplied together and the result is the NHI composite value. Therefore, each combination of soil, crop type and irrigation method risk values results in a composite NHI value that has no value or meaning in itself, but is a relative value that indicates the potential for a field to leach N.

It should be noted that to date, soil type, crop type and irrigation method have been used as variables to establish a relative NHI. The NHI approach could be modified further to include other variables that may be especially important to a certain areas or cropping system. For example, other parameters that impact nitrate leaching include: effective rainfall, nitrogen use efficiency, depth to groundwater, etc.

WHY THE NHI IS A PREFERRED METHOD FOR EVALUATING RISK OF N LEACHING

The NHI is the preferred method for evaluating risk or vulnerability of groundwater contamination by nitrate for several reasons.

First, it was developed specifically for nitrate and does not use a proxy (such as pesticides) to represent its fate in the environment. The vulnerability assessment used in the Draft General Order, for example, uses Department of Pesticide Regulation data to identify potentially contaminated groundwater. It also considers depth to groundwater and soil type. This approach assumes that nitrate behaves similarly to pesticides as they encounter soil, soil water, microbes, and plant roots. Unlike pesticides, nitrate is part of the nitrogen cycle and may be transformed into forms of nitrogen other than nitrate that are not available for leaching, or used by plant roots and microbes depending on soil conditions. In addition, agricultural practices, such as irrigation methods, highly influence the amount of nitrate that is available for leaching. This approach, importantly, lacks two of the main factors that affect nitrate leaching risk – crop type and irrigation method. While these two factors may not have as significant effects on pesticide movement in soils, they most certainly impact nitrate leaching potential.

The NHI, on the other hand, captures the important factors that influence nitrate leaching – soils, crops, and irrigation methods. Other factors of importance that are not included in the original NHI format, such as depth to groundwater, nitrogen use efficiency and effective precipitation, could easily be appended to the NHI index. This flexibility of the NHI approach is advantageous and can be leveraged to produce even more accurate results than the original NHI would have produced.

Another reason why the NHI is a preferred method for evaluating nitrate leaching risk is because its results are accurate as validated in the Central Valley (Wu et al., 2005). When results of the NHI were compared to USGS groundwater data, they were found to be representative of the condition of groundwater and reflective of the nitrate leaching that had occurred under specific conditions. This shows that it is useful in practice as well as theory.

WHY THE NHI IS A PREFERRED REGULATORY TOOL

The NHI is the preferred tool to regulate agricultural practices that may contribute to nitrate contamination in groundwater for the following reasons:

The NHI is a modifiable tool that can be customized to specific regions and refined by other regulatory activities such as monitoring. Though the NHI was developed as a stand-alone tool, its use in conjunction with other approaches and methods would only make the regulatory process more accurate and more efficient. In fact, monitoring could not only be used to supplement NHI results, but could be used to validate them as well.

The NHI has low data needs, is quick and low-cost. Kern County, in particular, maintains an excellent, up-to-date spatial database of crops. The inputs to the NHI are not only available, therefore, but are assured to be current and accurate. No other approach in the scientific literature can produce results that are as representative with the amount of effort it takes to do an NHI.

The NHI can be used to analyze agricultural landscapes at different scales. While the proposed approach in the Draft General Order uses somewhat of a "fish net" approach, where one vulnerable area may cause a very large area to be deemed vulnerable because the resolution of the vulnerability assessment is relatively coarse, the NHI can be used on a field by field basis especially in Kern County where field-specific information is readily available.

The results of the NHI are applicable, useful and require little interpretation. In contrast with monitoring or even detailed planning, the NHI results clearly indicate where priority attention should be given to agricultural practices that influence nitrate leaching risk. Because the NHI must necessarily be done on an area that includes many units of analysis (because the resulting composite values are relative to some other value), no interpretation is required. Nitrate leaching risk is either lower than somewhere else or higher than somewhere else in the area of analysis. Regardless of the absolute amount of contamination that has occurred or could potentially occur, regulation should be focused on areas with higher risk while areas of lower risk should be lower priority. The simplicity of this approach affords efficiency and greater potential compliance.

The NHI is representative of current conditions, and those are the only conditions that can be changed. In contrast, evaluating nitrate risk using monitoring only reveals the practices and conditions of the past, and those are no longer under growers' control. Modeling, on the other hand, requires a large data set and is subject to the "garbage in garbage out" concept, meaning that the model results are only as good as the data that produce them.

Implementation of an NHI for KRWCA

The authors of the work in the Central Valley who used NHI to estimate nitrate leaching risk on individual fields conceded that their results suffered from inaccuracy caused by out-of-date crop data (Dzurella et al., 2012). They recognized that cropping patterns and irrigation methods change rapidly and are often not accurately represented by the DWR crop data they used in their analysis. Kern County has a unique advantage in that most of the work that needs to be done to produce an accurate NHI analysis has already been completed in the crop database. Furthermore, this allows for the NHI to be updated annually as long as the crop database is updated annually. This approach would refine the process of prioritizing regulation even more, so that low vulnerability areas are not unduly regulated.

An NHI with current crop data and a customized approach that leverages knowledge of local agricultural practices and conditions specific to Kern is a powerful tool for estimating potential nitrate leaching and prioritizing its regulation. For that matter, it is the simplest method for discriminating between like regions and sub-regions of the state as whole; especially unique areas similar to the Kern Sub-Basin.

A proposed development and implementation of an NHI in the Kern Sub-Basin would likely be to:

- Achieve consensus with CVRWQCB Staff and Board to implement an NHI for the Kern Sub-Basin
- Work together and in consultation with CVRWQCB staff and their designees/experts to agree upon the most impactful NHI variables (e.g. soil type, irrigation method, crop type, nitrogen use efficiencies, effective rainfall, depth to groundwater, etc) unique to the Kern Sub-Basin
- Work together and in consultation with CVRWQCB staff and their designees/experts to use all available and applicable science in defining the relative importance within each variable (e.g. accurately ranking irrigation methods such as: flood, furrow, sprinkler, drip/micro).
- Integrate the agreed-upon variables and rankings into the already existing spatial database of the Kern Sub-Basin.
- Work with the varied data-rich resources within the Kern Sub-Basin (e.g. Kern County, irrigation districts, local agricultural extension resources, climatic resources, university research resources, water storage districts, agribusinesses, individual growers) to additionally populate the spatial database.
- Identify data gaps and develop an on-going program for acquisition, creation, integration and improvement of remaining data resources.
- Utilize current technology (e.g. remote sensing) and additional local knowledge to expand and improve the NHI predictability.

- Use the NHI to strategically and economically locate and manage necessary monitoring and overall regulatory reporting and other requirements.
- Annually update the spatial database with existing resources and work with providers to enhance those data.

References

Dzurella, K.N., Medellin-Azuara, J., Jensen, V.B., King, A.M., De La Mora, N., Fryjoff-Hung, A., Rosenstock, T.S., Harter, T., Howitt, R., Hollander, A.D., Darby, J., Jessoe, K., Lund, J.R., & Pettygrove, G.S. 2012. Nitrogen Source Reduction to Protect Groundwater Quality. Technical Report 3 in: Addressing Nitrate in California's Drinking Water with a Focus on Tulare Lake Basin and Salinas Valley Groundwater. Report for the State Water Resources Control Board Report to the Legislature. Center for Watershed Sciences, University of California, Davis.

Wu, L., Letey, J., French, C., Wood, Y. & Birkle, D. (2005) Nitrate leaching hazard index developed for irrigated agriculture. Journal of soil and water conservation, 60, 90–95.

Letter 7

5K

SACRAMENTO
CVRWQCB

PM 12:52

Leland Bell Farms Inc.
1499 East Los Angeles Ave.
Shafter, CA. 93263
(661) 746-4455

April 8, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments on Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group

Dear Board members;

We are a small family farm from Shafter farming a total of 200 acres of almonds. I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

All of our acres are watered with Micro-jets, so we can give the trees exactly the amount of water they require and not waste water; which is exspensive to pump from a average groundwater depth of 280 feet. We also use all of our surface water when available.

The Micro-jets are also useful in feeding the tree nitrogen fertilizer just the amount it needs during the whole year. We can minimize groundwater contamination at the same time maximize efficiently nitrogen for the almond tree. This means greater yields and lower costs because nitrogen is very expensive.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that past farming practices did contribute to nitrate contamination of groundwater along with septic tanks and other sources including natural; but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead develop, in cooperation with the KRWCA, an alternative that makes sense for our area.

Sincerely;

David Bell

David Bell, President
Leland Bell Farms Inc.

APRIL 10, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

My name is Jeremy Blackwell. I work for a medium-sized farming operation based in the Central Valley, Pioneer Nursery. Our main focus is the production of Pistachios but do have other crops such as citrus and ornamental Palms. I am writing this letter on behalf of both Pioneer Nursery and myself because I hope to one day have my own farming operations.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

I will speak specifically about pistachios only because they are what I am most involved with, but I know that the same conclusions can be carried across all crops grown in Kern County. California is home to some of the best agricultural universities in the world and we make use of the research being done on a daily basis. I firmly believe that both my practices and those of all of my neighbors and colleagues should be considered part of what I call "normal-modern farming." This modern farming practice involves utilizing our resources in an extremely efficient matter that wasn't even conceivable thirty years ago. We have modern research that helps guide exactly how much water is needed and at what times, we have weather stations in the fields that stream real-time data to our iPads including soil moisture to ensure water is not wasted. We are a new generation of efficiency. There is not enough water to waste nor are there cheap enough forms of Nitrogen that we can afford to be wasteful.

We fund new research projects every year that bring us closer to a true understanding of the exact amounts and the exact timing of Nitrogen and other fertilizer applications. This is a new world and a new day. We have University of California tested fertilizer budgets that allow us to estimate crop load and properly take tissue analysis to get the specific doses we require. There are no more "gut-feelings" and hunches when it comes to water and fertilizer use. We track our fertilizer use, our tissue and soil samples and our crop yield every year and make adjustments for the following crop. In fact there are too many budgets. We have financial budgets as well as water budgets and fertilizer budgets. We are almost too knowledgeable. Farming is a business now. It has a corporate culture but retains the "down to earth" lifestyle that keeps many of us here doing what we do. We are good stewards of the land. We are forward thinking, generational-minded people. We want to raise the next generation to be able to carry on with the great traditions of California farming. So we must be good stewards, we must utilize our resources in the most efficient way to have long-term sustainability both for the land and for the profitability of the business.

Regulations will impact the economics of sustainability. We can do our part. We can make improvements. But we cannot go down a road of such restriction that we are unable to farm economically.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Jeremy Blackwell

Pioneer Nursery
5401 Business Park South, #214
Bakersfield, CA 93309

Letter 9

ARVIN-EDISON WATER STORAGE DISTRICT

20401 BEAR MOUNTAIN BOULEVARD
MAILING ADDRESS: P.O. BOX 175
ARVIN, CALIFORNIA 93203-0175

TELEPHONE (661) 854-5573
FAX (661) 854-5213

EMAIL arvined@aewsd.org

April 15, 2013

California Regional Water Quality Control Board, Central Valley 11020 Sun Center Drive, Suite 200 Rancho Cordova, CA 95670-6114	Karl E. Longley, Chair Jennifer Moffitt, Vice-Chair Jon Constantino, Board Member Sandra O. Meraz, Board Member Carmen Ramirez, Board Member Robert Schneider, Board Member Pamela Creedon, Executive Officer Clay Rodgers, Assistant Executive Officer Kenneth Landau, Assistant Executive Officer Clint Synder, Assistant Executive Officer Andrew Altevogt, Assistant Executive Officer Richard Loncarovich, Assistant Executive Officer

RE: Tulare Lake Basin Waste Discharge Requirements Tentative Order Comments

Dear Board Chair, Vice Chair, Members, Executive Officer and Assistant Executive Officers:

Arvin-Edison Water Storage District (District) hereby incorporates by reference the extensive comments submitted this date by the Kern River Watershed Coalition Authority (Coalition), among other things pointing out the board application to all groundwater within our Coalition boundary (mainly Kern County) of the subject Tentative Order (Order). The District provides the following additional comments, including incorporating the Coalition comments, and on behalf of this District and our landowners, which covers approximately 130,000 acres in southeastern Kern County. The District defers to the expertise of the Coalition in these matters as it applies to the Southern San Joaquin Valley generally, and wish to point out the "real world" factors as it relates to water quality in our area.

The District has been engaged in conjunctive use of surface and groundwater as well as groundwater banking projects since the mid '60s and since then has imported approximately 7.3 million acre-feet to the area for various purposes. As pointed out in the Coalition comments and particularly the engineering analysis, the best way to maintain and improve groundwater quality is to import water. In our case, the base supply is high quality Friant-Kern water which the District aggressively and actively defends. Maintenance of this and other high quality supplies will have a better effect and potentially improve groundwater quality than any of the means proposed by Regional Board staff, many of which proposals are draconian and unnecessary.

The District has an extensive on-going water quality program for both surface water and groundwater on a monthly and annual basis. District records includes a wide spread source dating back to 1966. Review of District records, with Order and associated monitoring requirements in mind, fail to exhibit any true findings and indicate that certain proposed Order requirements like "trend monitoring" will not provide a decisive conclusion and will obviously be ineffective and an unjustifiably expense on landowners.

It shall be noted, over several decades District landowners have transitioned cropping patterns to more permanent crops with high efficient irrigation systems that are designed to reduce deep percolation past the root zone. As you may know the depth to groundwater in Kern County is much deeper than coalition areas to the north. District area depth to groundwater is some of the deepest in Kern County given our geologic features (foothills of Tehachapi Mountains) and range from static levels of 300 to 550 feet below sea level.

As previously mentioned, the District has operated a conjunctive use program for its landowners with groundwater banking facilities (spreading ponds and extraction wells) since July 1966. The District began a groundwater banking program with the Metropolitan Water District of Southern California (MWD), one of the largest urban purveyors in the nation in December 1997. As a part of the banking program, it is a requirement that District return previously banked water (local groundwater) to MWD in the California Aqueduct. The District has an extensive water quality monitoring program and blending model to predict water quality that is introduced into the California Aqueduct. To this date, District groundwater quality has never been a concern to MWD or Department of Water Resources, especially in reference to nitrates.

The communities of Arvin, Lamont, Metter and East Bakersfield rely on the same groundwater supply and each community service district or urban purveyor in our area do not exhibit problems with nitrates.

The District believes the best strategy for the Regional Board to pursue to maintain and improve water quality would be to encourage its sister agencies, such as the State Board and Department of Fish and Wildlife, to take appropriate actions to maintain import of surface water to the San Joaquin Valley to insure those historical imports continue and, to among other things, maintain groundwater quality. Irrigating agricultural lands by importing surface water is beneficial to the groundwater basin. Therefore the erroneous link, made by Regional Board Staff, that irrigated agriculture and resultant activities are a potential waste discharge to groundwater is greatly simplified and a false assumption.

The District encourages you to work with the Coalition and follow the advice of its comments to implement meaningfully measures to help maintain water quality in our region.

Sincerely,

Steve C. Collup
Engineer-Manager

cc: Board of Directors
Jeevan Muhar, Staff Engineer
Kern River Watershed Coalition Authority
Ernest Conant, Esq.

SCC:JSM:sj\AEWSD\ILRP\ AE.Comments.to.CRWQCB.Tentative.Order.04.13.doc

Letter 10

California Citrus Mutual
California Cotton Growers and Ginners Associations
California Grape & Tree Fruit League
California Farm Bureau Federation
Nisei Farmers League
Western Agricultural Processors Association

April 15, 2013

Mr. David Sholes
Central Valley Regional Water Quality Control Board
1685 "E" Street
Fresno, CA 93706

submitted via email to: dsholes@waterboards.ca.gov

Re: Comments on Tentative Waste Discharge Requirements for the Tulare Lake Basin

Dear Mr. Sholes:

The agricultural organizations identified above appreciate the opportunity to review and comment on the tentative waste discharge requirements for the Tulare Lake Basin, excluding the area of the Westlands Stormwater Coalition.

I. Nitrogen Management Planning in High Vulnerability Areas

Management planning is one of the key aspects of all farming entities and is a necessity to remain economically viable in producing food and fiber in the Central Valley. The complexity and diversity of how this is done varies by locations, crops, farm size, and rotations. The tentative order states that members in high vulnerability areas must use the Nitrogen Management Plan Template provided by the Executive Officer. We understand the rationale for wanting standardized information, but would also like some flexibility for growers to be able to reduce redundant paperwork requirements. We request the language be changed to indicate that the member must use the approved NMP Summary Report template and that the calculations used to come up with the information in the Summary Report template be consistent with the EO approved template. Growers would then be required to provide documentation similarly to those who fill out the Nitrogen Management Plan Worksheet Template. We believe this should satisfy the Board's desire to get consistent information and reduce the paperwork burden for growers who are already implementing nitrogen management planning on their farms.

II. Nitrogen Management Planning in Low Vulnerability Areas

The documentation requirement for nitrogen management planning in Low Vulnerability areas was added at the late stages of the Eastern San Joaquin River WDR. We understand that flexibility is allowed in these low vulnerability areas for an "equivalent" to the Nitrogen Management Plan. While we remain supportive of the previous language recommending Nitrogen Management Plans in low vulnerability areas, we do need further discussion with the Executive Officer on how growers can comply with the order using alternative approaches to satisfy the BPTC requirement.

III. Designation of Vulnerability Areas

The current language in the tentative order gives the Third-Party the ability to propose high and low vulnerability areas with the final approval from the Executive Officer. We believe this approach is more workable than the previously suggested boundaries and associated process. A more focused approach will allow third-parties and growers to address the areas where farm nitrogen use has an affect on drinking water sources. Additional time and resources spent in areas where there is no usable drinking water is time and money which could have been allocated to a more beneficial use.

IV. Sign-up Period

We appreciate the Regional Board moving the sign-up period from 120 days to 150 days in the Tentative Order, but we still believe that our request of 180 days from the Notice of Applicability (NOA) was reasonable and adequate. Currently, two-thirds of the acreage in the Tulare Lake Basin is not subject to the ILRP due to the fact that they have no surface water discharge. In addition, small farming operations represent 58% of the estimated 10,700 growers in the region, but only account for 4.6% of the acreage. This will mean that more time will be needed to reach each and every grower. Ethnic and language barriers that are prevalent in the region will make the challenge that much greater. We are only requesting that the Coalition group have an additional 30 days for outreach and education of the adopted program, and not a delay in the other requirements of the order.

V. Township Reporting

We continue to support Nitrogen Management Plan Summary Reporting to the Regional Board at the township level. The township level allows coalition groups to properly compare crop data, evaluate nitrogen management trends, and manage in an efficient manner the enormous amounts of data being collected from its members. We do not support the comparison of data at the field level by the Regional Board with or without the member's parcels being identified. The Regional Board has the ability to audit the Coalition's data when deemed necessary or when a problem arises. Reporting data at the field level directly to the Regional Board is an inefficient use of resources and compromises the Third-Parties from proactively working with outliers. Field level comparisons in parcels which are not permanently planted on a year by year level are not effective, nor warranted. It was our initial understanding that information was being reporting by crop per township, which we believed was an adequate use of resources. The language as drafted in the ESJ order and in this Tentative Order more closely resembles individual parcel reporting and not spatially at the township level as was our understanding.

VIII. Cost Impacts

We remain concerned that costs associated with implementing this order will be substantially higher than the Regional Board's estimates. We encourage the Regional Board to continue to look at the costs associated with the program and look for ways to implement the order in more cost effective ways. We remain committed to working with the Board to find ways to reduce the burdens placed on growers through on-farm and Third-Party costs.

IX. Conclusion

On behalf of the above listed groups, we appreciate the opportunity to comment on the Tentative Waste Discharge Requirements for the Tulare Lake Basin and look forward to continuing to work closely with you to find practical solutions to improving water quality. If you have any questions, please contact Casey Creamer at (559) 252-0684 or casey@ccgga.org.

Sincerely,

California Citrus Mutual
California Cotton Growers and Ginners Associations
California Farm Bureau Federation
California Grape & Tree Fruit League
Nisei Farmers League
Western Agricultural Processors Association

cc: Joe Karkoski, CVRWQCB
Clay Rodgers, CVRWQCB
Pamela Creedon, CVRWQCB

KERN-TULARE Water District

BOARD OF DIRECTORS
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RECEIVED SACRAMENTO CVRWQCB 13 APR 15 PM 1:51

APRIL 12, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

Kern-Tulare Water District (the District) is located on the eastern side of the San Joaquin Valley in Kern and Tulare Counties. The District provides irrigation water to over 17,000 acres of high-value permanent crops. The current annual irrigation demand is approximately 53,000 acre-feet (AF), of which approximately 36,000 AF is provided from the District. The remaining approximately 17,000 AF is from groundwater pumped by Growers. At the present time, approximately 99 percent of irrigated lands are permanent crops.

We are writing to express our objection to the Tentative Order. The District is a participant of the Kern River Watershed Coalition Authority and we concur with their comments on the Tentative Order. We do not believe the Tentative Order is appropriate for our area, which we understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different.

The Growers in the District have permanent crops irrigated by drip systems and micro sprinklers. The average cost of water from the District is $197 per AF. Growers use highly efficient irrigation and fertilizer systems to avoid wasting money and energy.

Wells drilled in the District tap predominetly into the confined aquifers of the Santa Margarita formation and Olcese sand deposits. These deposits contain useable groundwater and are located beneath fine-grained deposits that limit the natural recharge from the land surface. In addition, the average depth to groundwater is 450 feet. Due to the confined nature of the aquifer, the depth to groundwater and the low volume irrigation practices, it is highly unlikely that water from the surface can reach the useable groundwater aquifer.

As the Kern River Watershed Coalition Authority attested to in its technical comments, the amount of time it takes to get from the District surface by way of agricultural means is extraordinarily long if at all given the geological setting. It is unreasonable to assume that activity on the surface can be correlated to the groundwater quality below the surface.

Furthermore, any change in activity on the surface will not provide meaningful results in the groundwater that can be quantified.

As it applies to the District's area, the District does not believe the Tentative Order is reasonable. Based on the District's experience, current farming practices do not have an adverse impact on groundwater quality. Past farming practices may have contribute to nitrate contamination of groundwater, in addition to other factors, however the District understands the focus of the proposed Tentative Order is current farming practices.

The District requests the Central Valley Regional Water Quality Control Board not to adopt the Tentative Order and instead develop in cooperation with representatives, an alternative that makes sense for the District's area.

Sincerely,

Steven C. Dalke, P.E.
General Manager

P.O. Box 81435
Bakersfield, CA 93380-1435
Administration
Telephone: 661-393-2696
Facsimile: 661-393-6884

33380 Cawelo Avenue
Bakersfield, CA 93308-9575
Water Orders and Operations
Telephone: 661-393-3361
www.northkernwsd.com

NORTH KERN WATER STORAGE DISTRICT

April 15, 2013

California Regional Water Quality
Control Board, Central Valley
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Karl E. Longley, Chair
Jon Constantino, Vice Chair
Jennifer Moffitt, Board Member
Katherine Hart, Board Member
Sandra O. Meraz, Board Member
Carmen Ramirez, Board Member
Robert Schneider, Board Member
Pamela Creedon, Executive Officer
Clay Rodgers, Assistant Executive Officer

RE: Tulare Lake Basin Waste Discharge Requirements General Order Comments

Dear Board Chair, Vice Chair, Members, Ms. Creedon and Mr. Rodgers:

North Kern Water Storage District (NKWSD or District) hereby incorporates by reference the extensive comments submitted this date by the Kern River Watershed Coalition Authority (Coalition), among other things pointing out the broad application to all groundwater within our Coalition boundary (mainly Kern County) of the subject Tentative Order (Order). The District provides the following additional comments, including incorporating the Coalition comments, and on behalf of this District and our landowners, which covers approximately 70,000 acres in northern Kern County. The District defers to the expertise of the Coalition in these matters as it applies to the Southern San Joaquin Valley generally, whereas this letter focuses on the "real world" factors relating to water quality in our area.

Since all of NKWSD overlies areas classified as "high vulnerability" by the Regional Board, the District and its landowners have a keen and vested interest in the regulatory structure described in the Order. NKWSD has been proactive in both participating in the Coalition and independently evaluating conditions within the District on a "field-by-field" basis. More specifically, several months ago the District entered into a contract to have Dr. Joel Kimmelshue of New Fields Agricultural & Environmental Resources apply the "Nitrate Hazard Index" (NHI) approach to the District based on up-to-date, field-by-field data available from the District. A copy of Dr. Kimmelshue's summary technical memorandum is attached to this letter and provided into the record. This memorandum indicates that, to highly substantial degree, it is unlikely that elevated nitrate levels underlying the District result from current overlying cultivation practices. This is true because District landowners have transitioned cropping patterns to more permanent crops with high efficient irrigation systems that are designed to reduce deep percolation past the root zone. Furthermore, the depth to groundwater in Kern County is much deeper than coalition areas to the north. District area depth to groundwater is some of the deepest in Kern County given our geologic features and range from static levels of 300 to 400 feet below ground surface. More specifically, the conclusion section from Dr. Kimmelshue's memorandum states:

> "There are a few areas within the NKWSD that have a higher nitrate leaching risk than other areas. For the vast majority of this area however, the risk of nitrate leaching within NKWSD is negligible due to the reasons previously mentioned. That being said, NKWSD is currently completely contained with an area classified as "high vulnerability" by the CVRWQCB. These two classifications are currently in complete opposition to one another.
>
> Current land use and management practices at the land surface were not taken into consideration when establishing the generalized and broad-reaching "high vulnerability" classification. This is a significant omission because the majority of the groundwater quality issues present today are relics of different cropping systems and land management strategies that were in place decades ago."

The fundamental disconnect between the Regional Board's "high vulnerability" regulatory approach and the actual on-the-ground risks for additional nitrate contamination is very troublesome. Rather than imposing burdensome regulation in areas of low risk, the Regional Board should implement measures that will directly address the real issue: existing "legacy" nitrates. These measures might include support for the continuation of importation of high quality surface water supplies (as discussed below) and proposals to recover and reuse groundwater nitrate to meet the nitrogen needs of current overlying plantings.

In addition to the low risk posed by current practices, the District has been engaged in conjunctive use of surface and groundwater as well as groundwater banking projects since the 1950s, and since that time has imported approximately 10 million acre-feet to the area for various purposes. As pointed out in the Coalition comments and particularly the engineering analysis, the best way to maintain and improve groundwater quality is to import water. In our case, the base supply is high quality Kern River water which the District aggressively and actively defends. Maintenance of this and other high quality supplies will have a better effect and potentially improve groundwater quality than any of the means proposed by Regional Board staff, many of which proposals are draconian and unnecessary.

The District has an on-going water quality monitoring program for both surface water and groundwater on annual basis when the District is pumping wells. District records include a source data back to 1977. Review of District records, with Order and associated monitoring requirements in mind, fail to exhibit any true findings and indicate that certain proposed Order requirements like "trend monitoring" will not provide a decisive conclusion and will obviously be ineffective and an unjustifiably expense on landowners.

The District encourages you to work with the Coalition and follow the advice of its comments to implement meaningfully measures to help maintain water quality in our region.

Sincerely,

Richard A. Diamond
General Manager

Attachment:

Technical Memorandum – Summary of Nitrate Hazard Index (NHI) Analysis for NKWSD (New Fields Agricultural & Environmental Resources)

TECHNICAL MEMORANDUM - DRAFT NewFields

Summary of Nitrate Hazard Index (NHI) Analysis for NKWSD

FROM: Joel Kimmelshue/NewFields Agricultural & Environmental Resources
Stephanie Tillman/NewFields Agricultural & Environmental Resources

TO: Dick Diamond/North Kern Water Storage District
Ernest Conant/Young Wooldridge

DATE: April 12, 2013

PROJECT: North Kern Water Storage District (NKWSD) Irrigated Lands Regulatory Program Support

INTRODUCTION

The Central Valley Regional Water Quality Control Board (CVRWQCB) has issued Order R5-2013-XXXX titled, Waste Discharge Requirements General Order for members of a third-party group within the Tulare Lake Basin, excluding the area of the Westlands Stormwater Coalition in an effort to reclaim and mitigate nitrate losses to groundwater and lessen groundwater quality degradation. As part of these efforts, the areas that have been deemed 'high vulnerability' (Figure 1) in terms of potential nitrate leaching were determined by considering hydrogeology (depth to groundwater and soil texture), monitoring well sampling results and California Department of Pesticide Regulation Groundwater Protection Areas. This area completely encompasses the North Kern Water Storage District boundaries (Figure 1). Current land use and management practices at the land surface were not taken into consideration. This is a significant omission because the majority of the groundwater quality issues present today are relics of different cropping systems and land management strategies that were in place decades ago.

SUMMARY

To most effectively use mitigation efforts, monitor strategically and reduce unnecessary costs to all parties involved, it is important to identify higher risk nitrate leaching areas from locations of lower risk. Accomplishing this requires an understanding of the crop, soil and management practices found on the surface. Current and accurate data resources need to be brought together to achieve this end result.

The North Kern Water Storage District is found in the Southern San Joaquin Valley, in Kern County, California. Because of the crops found in this area and the associated management practices, the land within the NKWSD is thought to be among some of the lowest vulnerability in terms of potential nitrate leaching to groundwater. The purpose of this work was to prove this hypothesis and take advantage of the plentiful NKWSD spatial data of crop type, irrigation method and other variables.

The majority of the crops found in this area are permanent crops with deep roots under efficient (predominantly drip and micro) irrigation systems. It is because of NKWSD and areas like it, that a

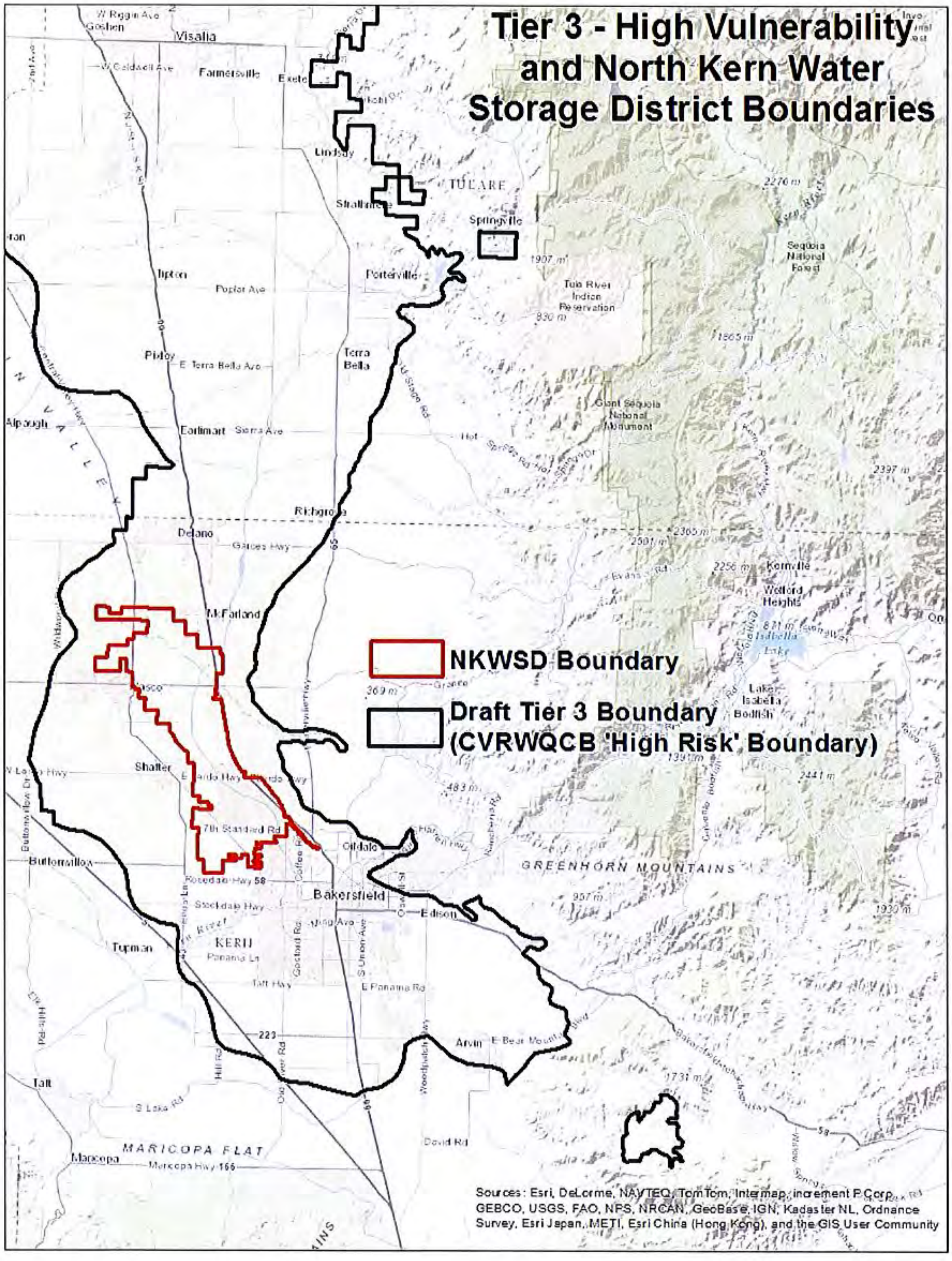

Figure 1. Central Valley Regional Water Quality Control Board tier 3 high vulnerability and North Kern Water Storage District boundaries.

Greater emphasis should be placed on the differentiation of risk areas, especially for regulatory and monitoring purposes.

In an effort to spatially support the assertion that the cropped land within the NKWSD is of lower nitrate leaching risk and not a higher risk as currently classified by the CVRWQCB, a tool called the Nitrogen Groundwater Pollution Hazard Index (NHI) was used to preliminarily evaluate the potential level of nitrate leaching risk of each field. NKWSD was used as a test case because similar to Kern County, it possesses annual cropping data by field. NKWSD also has the luxury of recording irrigation method by field as well. Development of a NKWSD-specific NHI through integration of these data resources provides a spectrum of nitrate leaching risk from the combination of soil, crop type and irrigation methods specific to NKWSD. Soils found within NKWSD were taken into consideration as were the 2012 cropping data and current irrigation methods. Soils, crops and irrigation systems that are potentially higher risk were assigned higher numerical values in relation to those that are of lower risk. These assigned values were then assessed for each field to determine the relative nitrate leaching risk, or NHI value.

It should be noted that this work is preliminary in nature and more refinement of actual values assigned to each variable impacting leaching may be conducted in the future. Those efforts were outside the scope this initial evaluation. Saying that, the values used adequately represent the magnitude of nitrate leaching risk for each parameter and result in a reasonable spectrum of risk. If the NHI is adopted as a method by the CVRWQCB, it is expected that a more detailed evaluation of input parameters specific to the Kern Sub-Basin will be conducted.

METHODOLOGY RATIONALE

The NHI method employed for the NKWSD is a modification of the NHI work developed by Wu et al. (2005) and expanded upon by Harter et al. (2012) at the University of California at Davis. The work performed by Harter et al. sought to definitively classify larger regions as 'high vulnerability' or 'low vulnerability' in terms of potential nitrate leaching risk. The approach taken by NewFields differed in the sense that the final outcome of the analysis was not intended to classify parcels in a binary fashion, but rather, show areas that were more vulnerable than others within a spectrum of risk for the region of interest. The end result was intended to be more granular than previous NHI work so it could be used as an example of a tool to better relate management and regulatory efforts and nitrate leaching risk.

The specific index values for each variable of the Wu et al. (2005) and Harter et al. (2012) analyses were not used for the NewFields analysis; rather a preliminary area-specific approach was taken where the dominant variables impacting potential nitrate leaching risk were taken into consideration. The specific index values assigned to each variable are relative compared to how much risk they present compared to their companion variables (e.g. coarse textured soils have higher index values compared to fine textured soils). Other factors such as depth to groundwater, effective precipitation and nitrogen use efficiency could be used to refine and potentially improve the analysis, but the NewFields analysis presented here focused solely on the crops, irrigation methods and soils of the NKWSD. The specific variables used in an NHI analysis can and should be modified based on the region of interest when each analysis is performed.

DATA RESOURCES

The data resources used for the NKWSD NHI analysis included the following:

- California Department of Water Resources (DWR) crop mapping from 1990 – These data are presented spatially for comparison purposes to present-day cropping systems (Figure 2).

- NKWSD crop mapping from 2012 – These data are presented for comparison to DWR 1990 crop coverages as well as used for crop type identification for NHI determination (Figure 3).

- NKWSD irrigation method mapping from 2012 – These data were used to spatially identify irrigation method for NHI determination (Figure 4).

- Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) for the NKWSD area – These data were used to spatially identify soil type for NHI determination for both drainage and textural classifications (Figures 5 and 6).

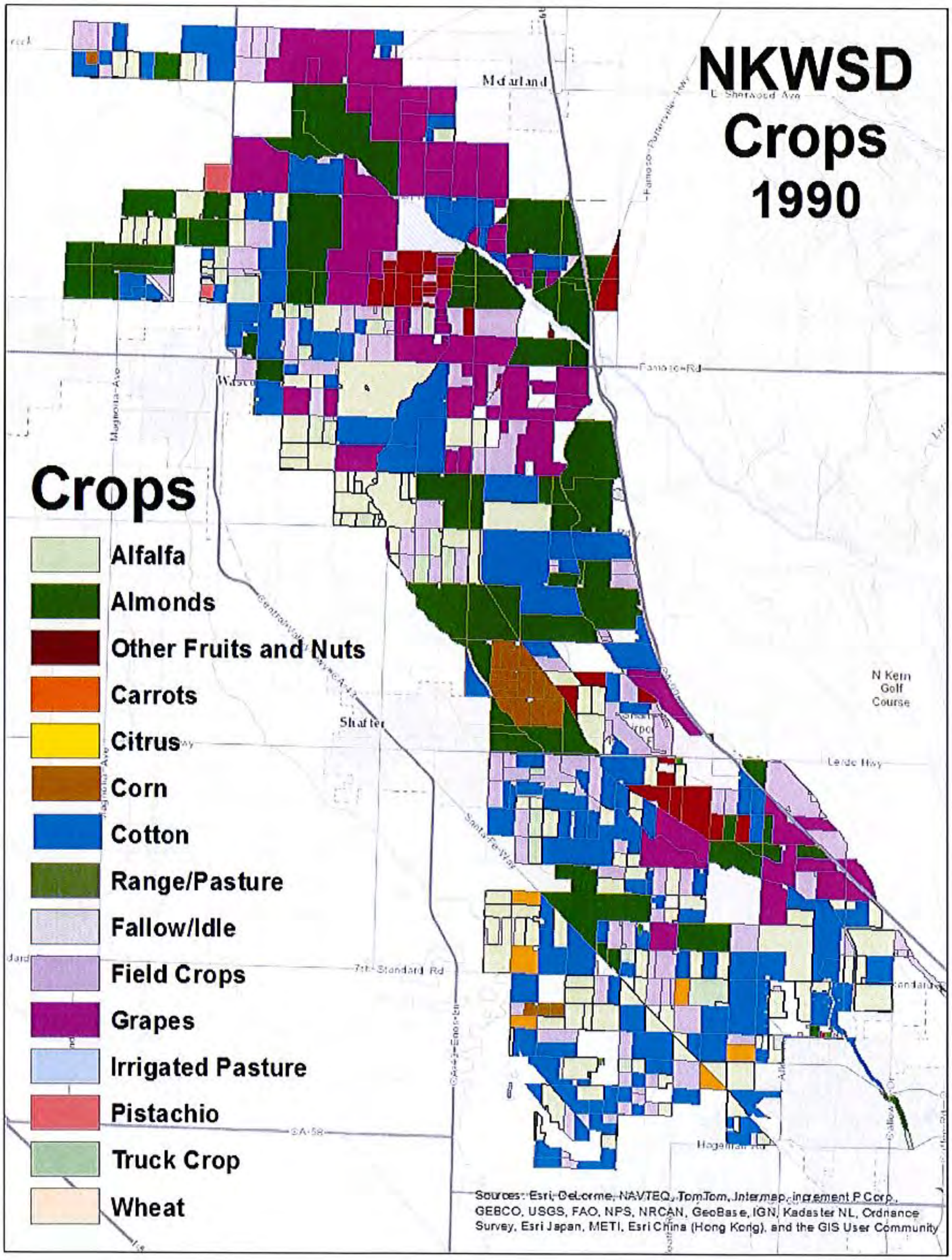

Figure 2. Crop distribution within NKWSD in 1990 (Source: DWR Crop Mapping)

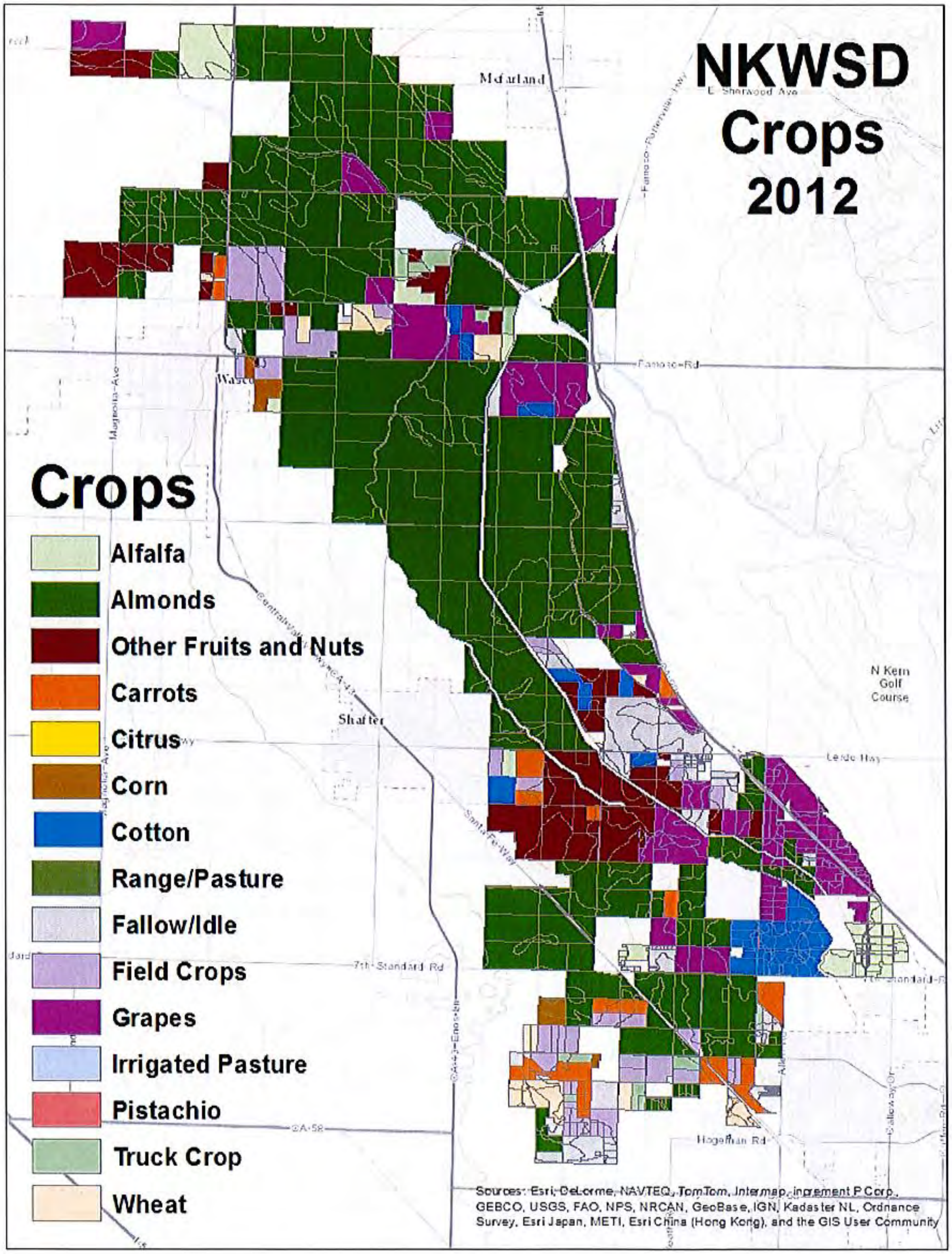

Figure 3. Crop distribution within NKWSD in 2012 (Source: NKWSD Mapping)

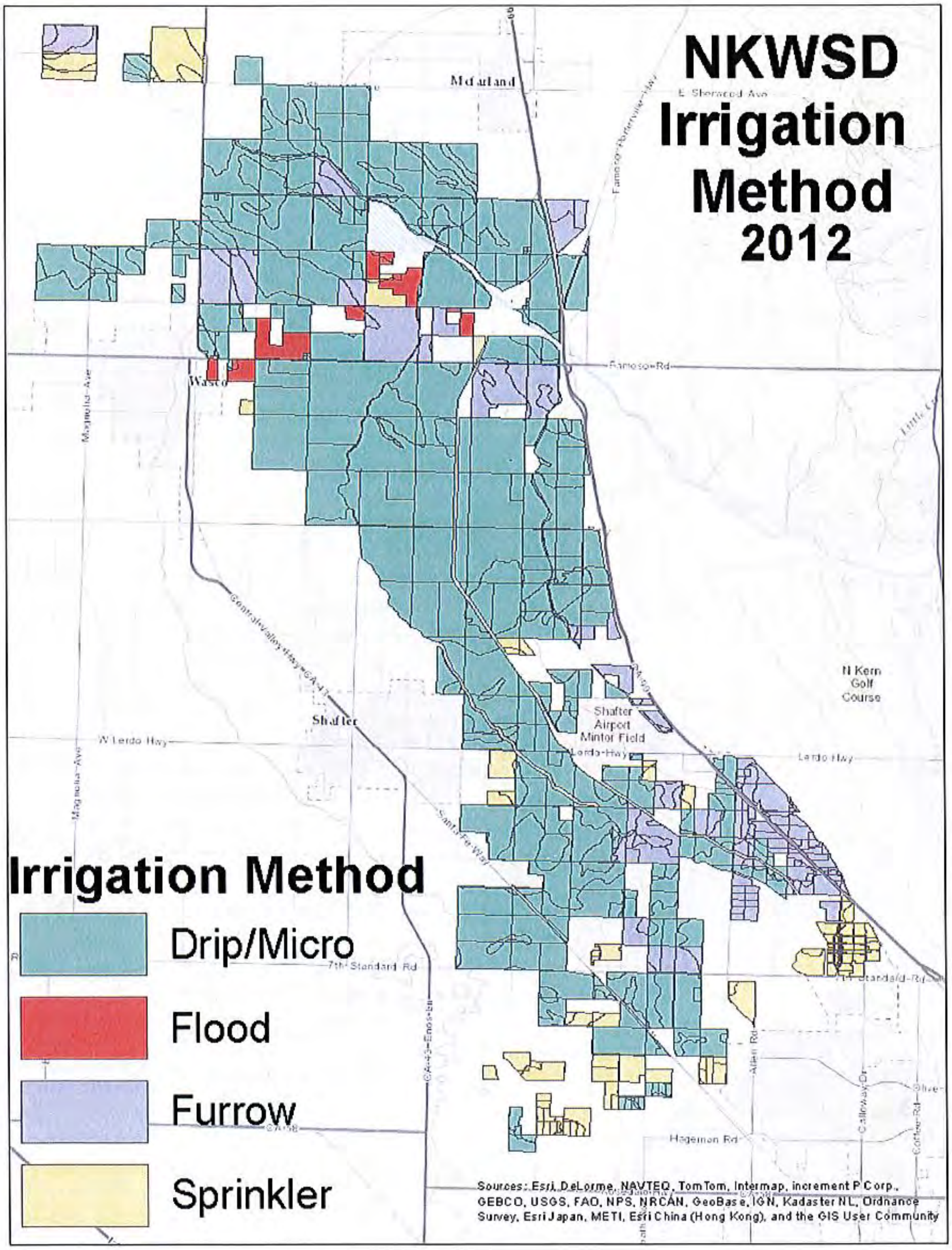

Figure 4. Distribution of irrigation methods within NKWSD (Source: NKWSD Mapping)

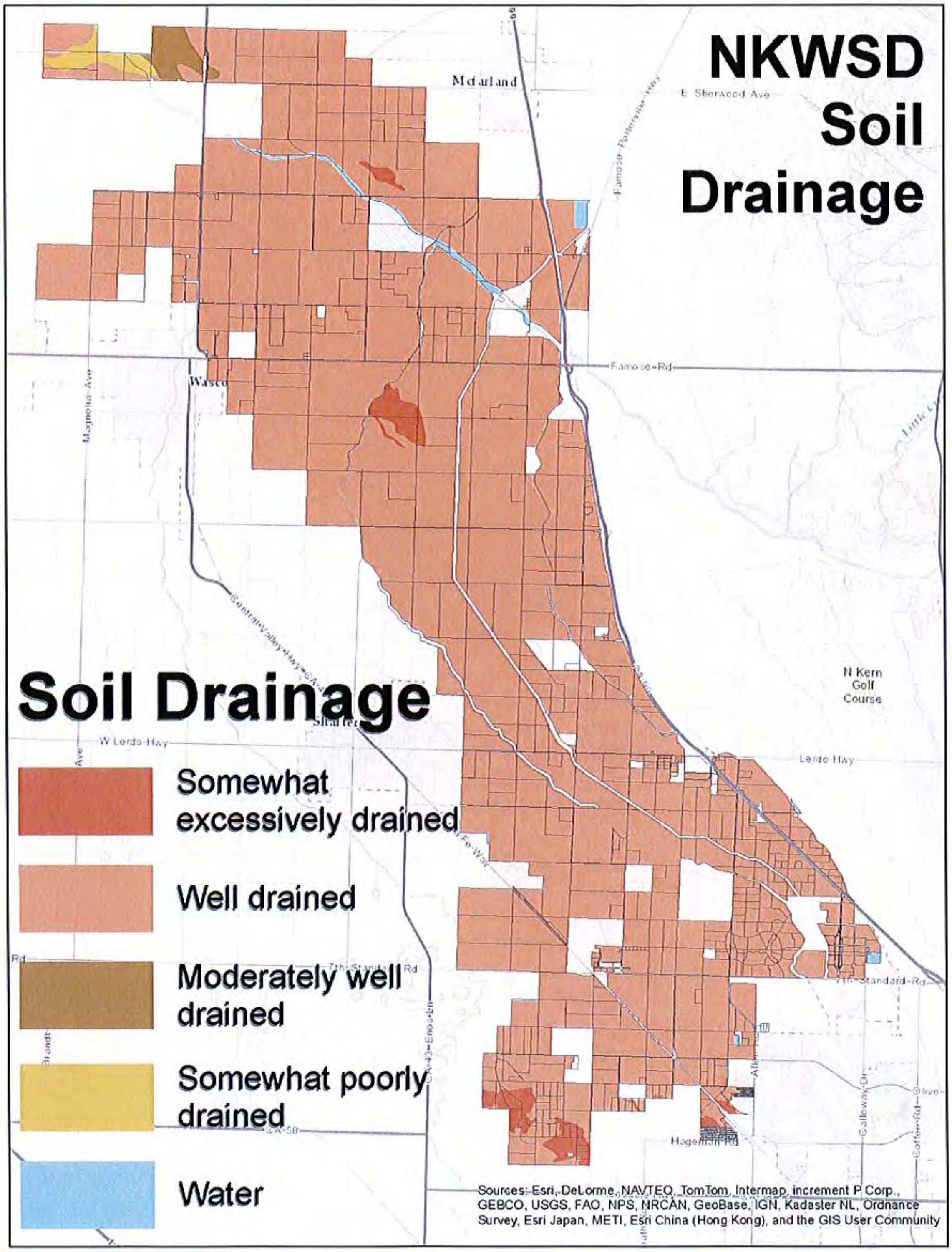

Figure 5. Drainage classes of the soils within NKWSD (Source: SSURGO)

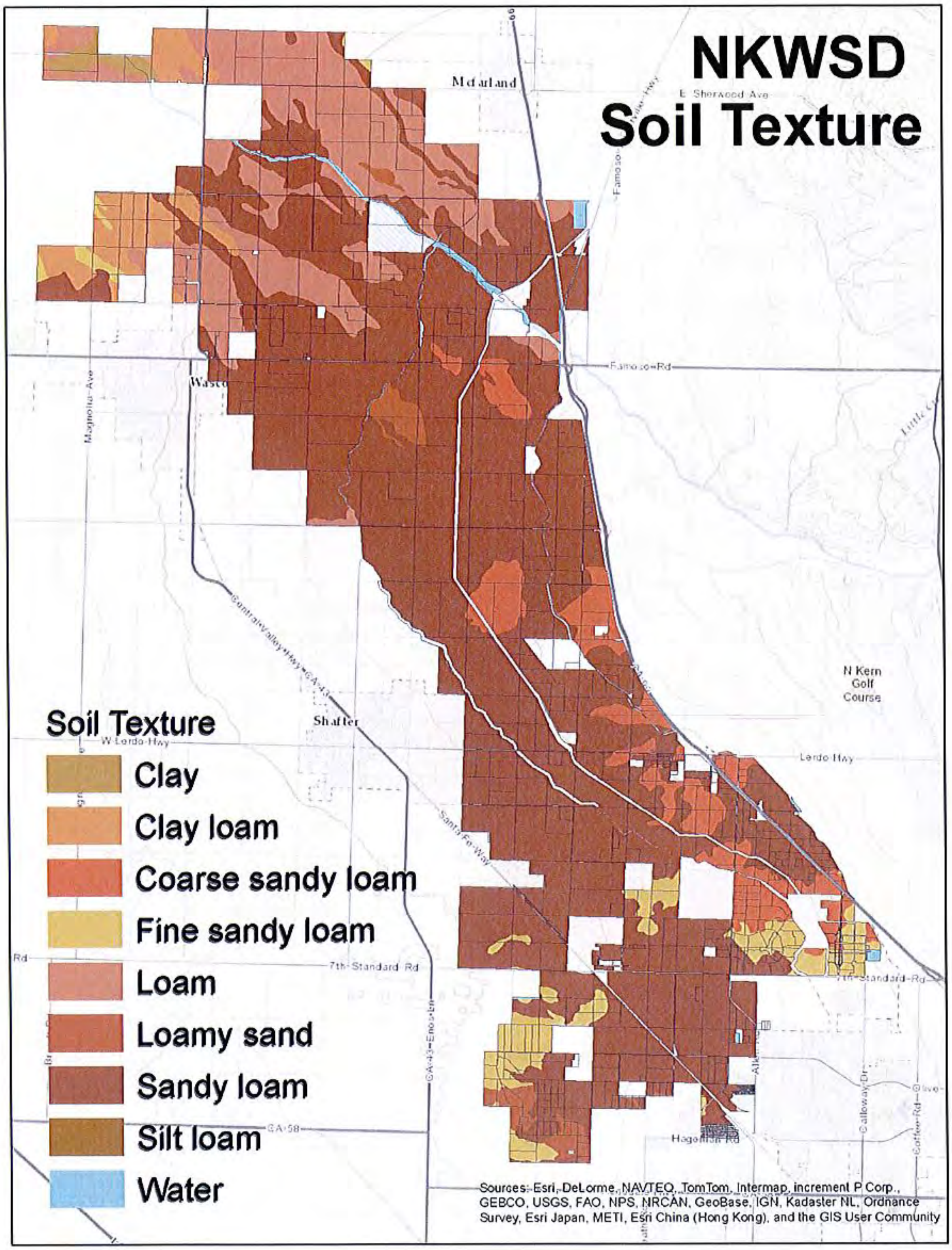

Figure 6. Soil texture of the soils within NKWSD (Source: SSURGO)

NHI Variables Development

Soils

Soil drainage class and soil texture (Figures 5 and 6) greatly influence the movement of water through the profile and potential transport of soluble materials to groundwater. In general, areas with coarser soils and/or soils that drain quickly pose a greater potential risk to nitrate leaching than those that are poorly drained. Therefore, in the NHI system, a higher rank is assigned to soils that possess more rapid drainage.

The seven drainage classes recognized by the USDA were simply numbered from one to seven; one being the lowest risk (very poorly drained) to seven being the highest risk (excessively drained) (Table 1). Using a series of geo-processing tools, the numerical value assigned to each drainage class was applied to the spatial soils layer provided by SSURGO. Each soil polygon within the SSURGO spatial soils layer then had a NHI assigned to it based on the drainage class of that soil polygon.

In addition to the drainage class of the soil, other soil properties of each soil mapping unit (Tables 1 and 2) may be considered as refinement of the soil input parameter in the future if deemed appropriate. For example, the use of the soil textural class could be used in addition to or in place of the drainage class.

Table 1. Variable ranking for soil drainage class

Drainage Class	Variable Ranking
Excessively drained	7
Somewhat excessively drained	6
Well drained	5
Moderately well drained	4
Somewhat poorly drained	3
Poorly drained	2
Very poorly drained	1

Table 2. Example additional variable for soil textural input.

Textural Classification	Textural Grouping	Variable Ranking
Coarse sandy loam	Coarse	3
Loamy coarse sand	Coarse	3
Loamy fine sand	Coarse	3
Loamy sand	Coarse	3
Sand	Coarse	3
Fine sandy loam	Medium	2
Loam	Medium	2
Sandy clay loam	Medium	2
Sandy loam	Medium	2
Silt loam	Medium	2
Silty clay	Fine	1
Silty clay loam	Fine	1
Clay loam	Fine	1

CROPS

Crop data by field for 2012 were provided by NKWSD. The crops were either grouped with other like crops (for example, peaches and plums) because of similar characteristics and/or because of small acreage (i.e. truck crops, such as peppers and other vegetables). Most crops were used as provided (e.g. almonds, citrus, cotton). The variable ranking for each crop type was established based on known rooting depths. Crops with greater rooting depths were assigned smaller variable rankings because of their increased potential to mine nitrate throughout a deeper soil profile. The shallower rooted crops received higher variable rankings according to respective rooting depths (Table 3). The rankings were then assigned to individual crops based on effective rooting depths.

While the only crop-specific factor considered in this analysis was the rooting depth of the particular crop, other factors such as nitrogen use efficiency, timing and duration of nitrogen uptake, total annual nitrogen applied, etc. could be used to further refine the NHI results.

Table 3. Variable Ranking for Rooting Depth

Rooting Depth Index (ft)	Variable Ranking
>4.5	1
3.0-4.5	2
1.6-2.9	3
0-1.5	4

Irrigation Method

The irrigation method (Figure 4) used in each parcel was included with the crop data supplied by NKWSD. Relative and common irrigation efficiencies for four methods (flood, furrow, sprinkler and drip/micro) were considered when assigning variable rankings for each method. Method of applied water (e.g. gravity or pressurized system) was also considered. Due to the greater risk of passing water through the root zone with gravity as compared to pressurized, more controlled systems, variable rankings were modified accordingly (Table 4). For example, greater weight was placed on flood and furrow irrigation and were given higher values respectively. It should be noted that this was performed to provide an example of how variable rankings can be modified according to known expertise, research results, local knowledge, unique conditions, etc. Ultimately, however the resultant NHI shows the relative differences by field as long as appropriate partitioning and ranking of the variables takes place. Actual ranking values are of lesser importance as compared to appropriate separation of the variable itself (e.g. type of irrigation method, range of rooting depth, etc.)

Table 4. Variable Ranking for Irrigation Method

Irrigation Method	Variable Ranking
Flood	5
Furrow	4
Sprinkler	2
Drip/Micro	1

NHI Determination

Once variable rankings were assigned to each of the partitioned variables (soil drainage class/soil texture group, crop type rooting depth, irrigation method for each crop), the three individual index values were combined and resulted in a single NHI value for each field. For the purposes in demonstrating changes in risk over time, an NHI was developed using soil texture as the soil parameter for both 1990 and 2012 (Figures 7 and 8). Significant differences exist between this 20+ year time frame which shows the improvement and lower risk to groundwater due to inherent changes in agriculture. Another NHI was developed utilizing soil drainage class (Figure 9). Very few differences exist between Figures 8 and 9 indicating that as long as the variables are partitioned reasonably, a clear spectrum of risk can be determined. A more important factor is consideration of the variables (e.g. crop type, soil type, irrigation method, etc.) to be included in the NHI initially. Note that the relative vulnerability of an individual field is similar when both NHI analyses are compared. The range of NHI results using soil drainage class is larger than the range of results using soil texture because the range of index values for drainage class is larger (1-7) than the range for soil texture (1-3). However, relative to the range of results produced by each analysis, the vulnerability of each field is similar.

Interpretation and Conclusions from the NKWSD NHI Analysis

Within the last 20+ years, the cropping patterns within NKWSD have largely shifted from generally shallower-rooted annual crops such as a variety of row and field crops (Figure 2) to more permanent, deeper-rooted crops such as almonds and grapes (Figure 3). Correspondingly, irrigation practices have shifted from less efficient, gravity supplied methods (e.g. flood and furrow) to more efficient and uniform pressurized systems (e.g. sprinkler and drip/micro). This shift in crop types and irrigation methods is not unique to the NKWSD, rather common across much of the Kern Sub-Basin. The benefit of this shift can be clearly shown when viewing the results of an NHI for historic conditions from 1990 (Figure 7) to current conditions as of 2012 (Figures 8 and 9).

There are a few areas within the NKWSD that have a higher nitrate leaching risk than other areas. For the vast majority of this area however, the risk of nitrate leaching within NKWSD is negligible due to the reasons previously mentioned. That being said, NKWSD is currently completely contained with an area classified as "high vulnerability" by the CVRWQCB. These two classifications are currently in complete opposition to one another.

Current land use and management practices at the land surface were not taken into consideration when establishing the generalized and broad-reaching "high vulnerability" classification. This is a significant omission because the majority of the groundwater quality issues present today are relics of different cropping systems and land management strategies that were in place decades ago.

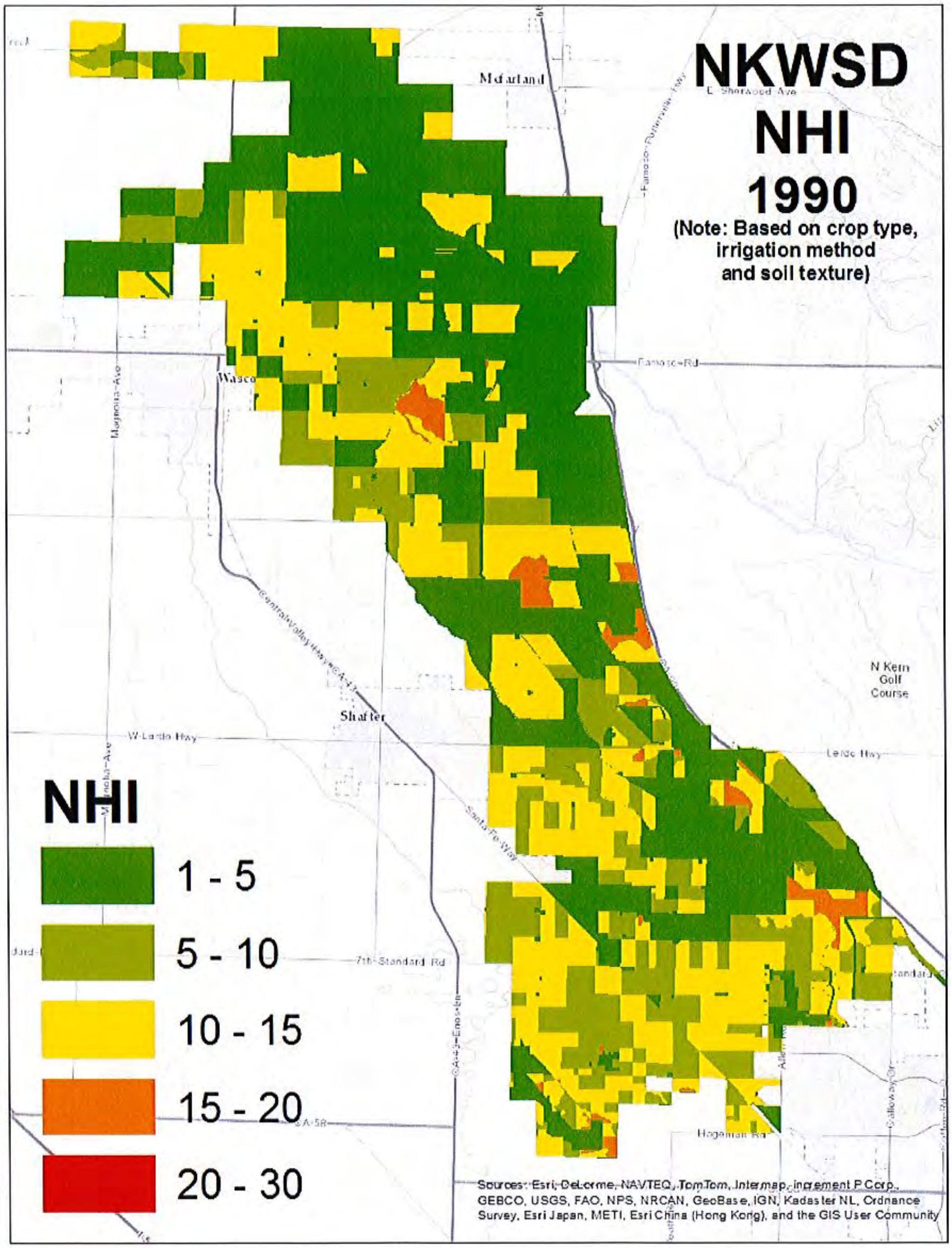

Figure 7. Nitrogen Hazard Index for NKWSD in 1990 using soil texture for the soil component

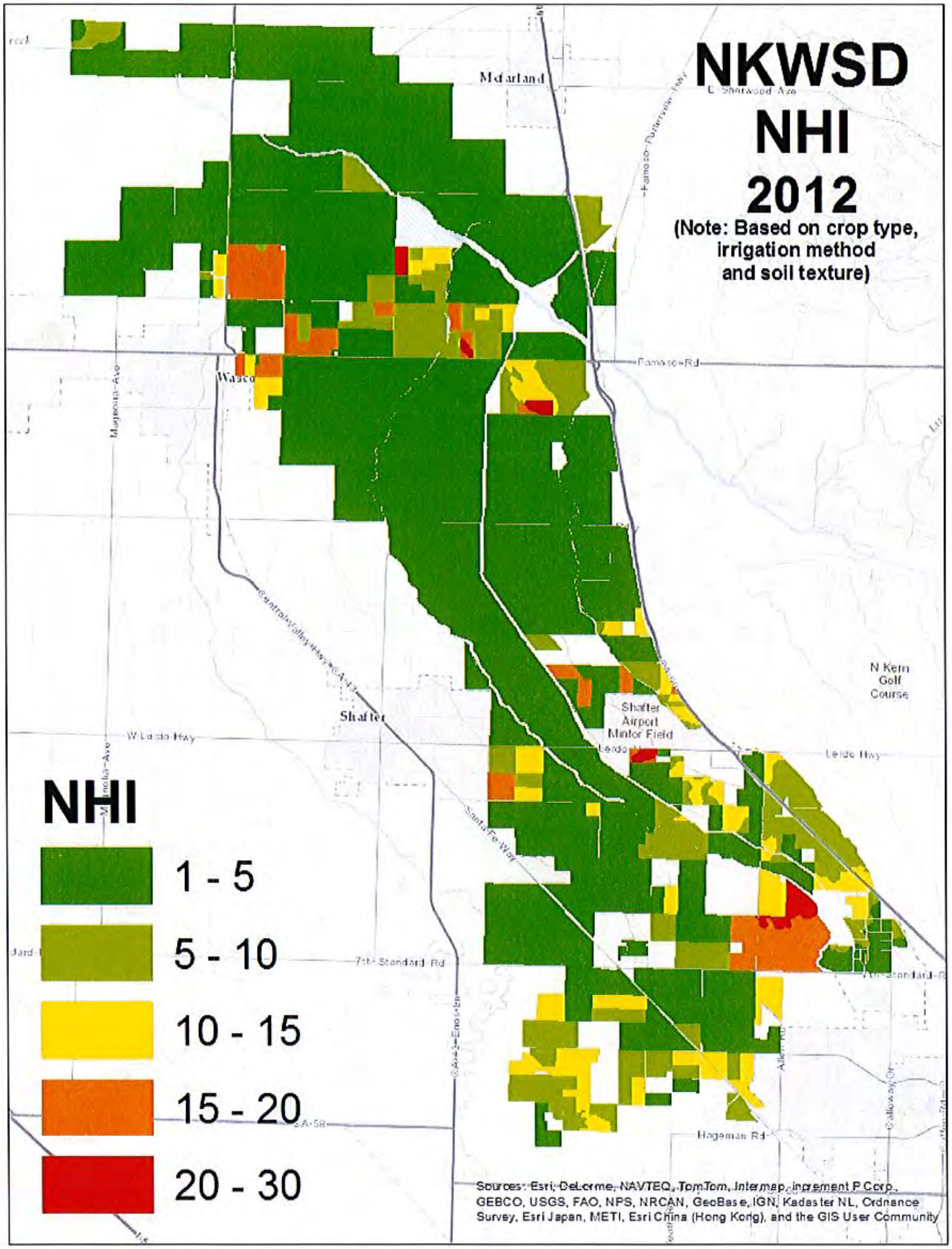

Figure 8. Nitrogen Hazard Index for NKWSD using soil texture for the soil component

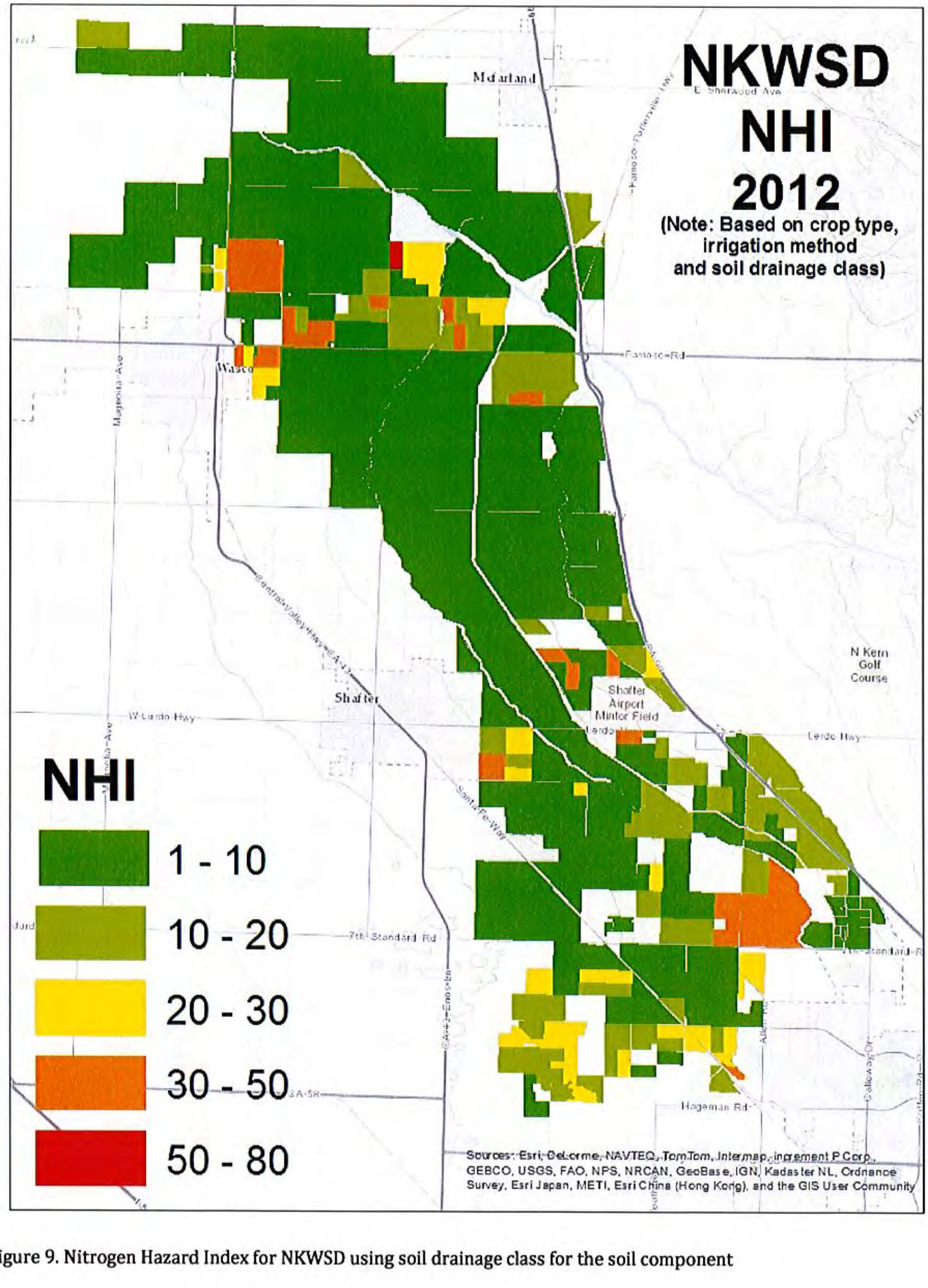

Figure 9. Nitrogen Hazard Index for NKWSD using soil drainage class for the soil component

REFERENCES

Harter, T., Pettygrove, S., Dzurella, K., Medellin-Azura, J., Jensen, V., King, A., De La Mora, N., Fryhoff-Hung, A., Rosenstock, T., Howitt, R., Hollander, A., Darby, J., Jessoe, K., Lund, J. 2012. Nitrogen Source Reduction to Protext Groundwater Quality. Technical Report 3. Center for Watershed Sciences. University of California at Davis.

Wu, L., Letey, J., French, C., Wood, Y. & Birkle, D. (2005) Nitrate leaching hazard index developed for irrigated agriculture. Journal of soil and water conservation, 60, 90–95.

Letter 13

BCS

13 APR ... PM 12:57

April 10, 2013

Central Valley Regional Water
Control Board
11020 Sun Center Drive, Suite 200
Rancho Cordova, Ca 95670-6114

RE: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

My father came to the United States in 1910, settling in Kern County in 1920. He started a 40-acre dairy farm with 35 cows. His land was located on lots 19 and 20 in Section 5, T31S, R28E in Bakersfield, California. I started farming in 1948. The lands I farm are lots 16, 17, 18, 31, and 32 in Section 5, T31S, R28E.

I do not have wells for irrigation, but I have surface water rights from the Kern River through Kern Delta Water District. I have never put down any commercial fertilizer on pre-irrigation for cotton, wheat or alfalfa for fear of leaching. When I did fertilize I only applied enough to grow the crop and the same approach was taken with the use of water. Due to very little percolation, I do not believe there was any contamination to impact the quality of the groundwater. I drilled a domestic well 63 years ago. The water level was 40 feet deep and today it is 100 feet deep. I am still drinking the same water without any detectable difference in the quality.

Therefore, I am writing to express my objection to the Tentative Order. Instead, I request that you work in cooperation with the representatives from the KRWCA to develop an alternative that makes sense for our area.

Sincerely,

Peter Ermigarat

Peter Ermigarat
1304 Curnow Road
Bakersfield, Ca 93307

Letter 14

EDISON HIGHWAY RANCH, LLC

P.O. Box 446
Arvin, CA 93203

Phone No. (661)854-5750
Fax No. (661)854-2203

13 APR 15 PM 1:43
SACRAMENTO
CVRWQCB

April 11, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re : Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15,2013)

Dear Board Members:

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

We are a permanent crop grower, mostly wine grapes. We use very little fertilizer, about 40 units of Nitrogen per acre yearly. We water in a very strict manner, using the vines to tell us when it is necessary. All of the water is 100% contained in the vineyard. Water is a expensive commodity and in our operation we are very serious about using it wisely and wisely only.

We also use soil and leaf tests to check on Nitrogen needs, sometimes if warranted we use no Nitrogen, probably an average use is 40 units of Nitrogen per year.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Ray Etcheverry
President, Agro Farming Corporation

Letter 15

AGRO FARMING CORPORATION

P.O. Box 446
Arvin, CA 93203

Phone No. (661)854-5750
Fax No. (661)854-2203

April 11, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

13 APR 15 AM 10: 20

SACRAMENTO
CVRWQCB

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15,2013)

Dear Board Members:

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We are a permanent crop grower, mostly wine grapes. We use very little fertilizer, about 40 units of Nitrogen per acre yearly. We water in a very strict manner, using the vines to tell us when it is necessary. All of the water is 100% contained in the vineyard. Water is a expensive commodity and in our operation we are very serious about using it wisely and wisely only.

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I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Ray Etcheverry
President, Agro Farming Corporation

Letter 16

NJL RANCH

P.O. Box 446
Arvin, CA 93203

Phone No. (661)854-5750
Fax No. (661)854-2203

April 11, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

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I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Ray Etcheverry
President, Agro Farming Corporation

Letter 17

SVS VITICULTURE, LLC

P.O. Box 446
Arvin, CA 93203

Phone No. (661)854-5750
Fax No. (661)854-2203

April 11, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re : Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15,2013)

Dear Board Members:

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I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Ray Etcheverry
President, Agro Farming Corporation

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

CLEAN WATER ACTION
CALIFORNIA

California Rural Legal Assistance Foundation

April 15, 2013

Karl Longley
Chair, Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670

Re: Tulare Lake Basin Tentative WDR Comments

Dear Mr. Longley,

As representatives of environmental and environmental justice communities located in the Central Valley and throughout California, our organizations have closely followed the development of the Tulare Lake Basin Region's General Waste Discharge Requirements for Irrigated Agricultural Discharges. We appreciate the efforts made by staff as well as the regulated community to create an effective regulatory program for agriculture. Our comments on the current draft continue to reflect the urgent need to address widespread groundwater contamination attributable to irrigated agriculture, and your responsibility under the law to do so.

It is the responsibility of the Central Valley Regional Water Quality Control Board (Board) to protect both those communities currently affected by nitrate contamination and those that could be impacted in future, through the adoption of effective and enforceable regulations on agricultural discharges. Specifically:

- An enforceable program with appropriate triggers and limits can provide a source of funding for communities without safe drinking water. The 2012 UC Davis nitrate report clearly identifies the impact of groundwater pollution by nitrates in the Tulare Lake Basin and Salinas Valley. Nearly a quarter million residents were directly exposed to nitrate contamination through their tap water between 2006-2010.

- Early and effective implementation of best practices will help the entire basin. According to the Nitrate Report, more than half of the residents of these regions receive their water from a community water system with at least one exceedance of the nitrate standard in their raw water supply in that same 5 year period – and that number was estimated to grow to 80% by 2050 *if current practices continue*. Nitrate contamination of groundwater is an economic as well as a public health threat to the residents of the Tulare Lake Basin. Limiting the increase in contamination is a clear Board mandate.

- No one knows how long full remediation will take, but some improvements in water quality can occur quickly. Remediation is a gradual process, but, just as shallow domestic wells currently reflect the greatest amount of contamination,[1] they can also respond more quickly to improvements in management practices on the surface. This is not a small population; information collected in the Tulare Lake Basin pilot project reinforces prior USGS estimates that as many as a quarter million residents of the basin are not served by a public water system.

- The oft-stated assumption that nitrate buildup in the vadose zone will inflate nitrate contamination for decades to come is not informed by an effective monitoring program and a robust Management Practices Effectiveness Program, and therefore it is unclear where and how much that will be an important piece of understanding impacts from current practices and informing groundwater management plans. It is important to note, however, that any "legacy" contamination problems are relevant to determining impact of current discharges. Nitrate concentrations already in high concentrations below the root zone and in unsaturated zone may still be discharges if continued irrigation practices move it to drinking water aquifers. Changing current irrigation and fertilization practices cannot affect what has occurred in the past, but it can affect the fate and continued movement and migration of already existing contaminants. For example, current and on-going groundwater pumping and recharge move those contaminants to different aquifers and locations, and can dilute or exacerbate concentrations of contaminants in the groundwater and therefore domestic water supplies.

- The major problem preventing better definition of the pathways of contamination is lack of information on farm practices and site conditions, and this permit must require sufficient reporting to collect this information. This is also relatively low cost, compared to installing monitoring wells on each field. Yet this Tentative Permit does not collect basic data on the farm level, particularly for all areas outside of high vulnerability areas.

[1] USGS conducted a domestic well survey in Tulare County in 2006 for GAMA, and found that 40% of the wells tested exceeded the drinking water standard for nitrates.

The Porter Cologne Water Quality Control Act[2] and the State's Anti-degradation Policy[3] require that the Regional Board issue waste discharge requirements that protect the region's water quality for designated beneficial uses, as set out in the Basin Plans. However, this Tentative Waste Discharge Requirements General Order For Growers within the Tulare Lake Basin (TLB Tentative Order or Tentative Order) allows the ***maximum*** amount of groundwater degradation and even pollution to continue from the region's approximately 2.9 million acres of irrigated lands in contravention of the Basin Plan, State Anti-degradation Policy, and the Porter Cologne Water Quality Control Act.[4] In doing so, the Tentative Order violates California's Anti-degradation policy, permits pollution and nuisance in violation of the Water Code, unlawfully delegates authority exclusively held by the Board to the Executive Officer and disproportionately impacts low-income, communities of color, in violation of California's Civil Rights and Fair Housing Laws.

Most fundamentally, the Board must stop continued contamination and pollution. The Board should not allow dischargers under any circumstance to continue to pollute water quality beyond the MCL, and instead, the Board should require dischargers to maintain the highest quality of water consistent with the maximum benefit to the people of the State. Unfortunately, this permit allows the maximum amount of degradation and even continued pollution to continue to impact the water we rely on for drinking water supplies and other beneficial uses, without any ability to do enforcement actions or require mitigation for impacted communities.

Support for Small Grower Technical assistance

We trongly support provision of technical assistance for small and disadvantaged growers in development of farm evaluation and management plans, etc. We believe everyone would be better served if the regional board and third party coalitions provided targeted technical assistance to those farmers, rather than just more time, as is provided in the revisions to this order. As implementation continues, we would appreciate it if the Board required regular reporting on whether and how such assistance is being provided.

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[2] California Water Code §§ 13000 et seq.

[3] Resolution 68-16.

[4] See California Water Code §§ 13240, 13241, and 13263, requiring that waste discharge requirements implement the relevant water quality control plans, including the Basin Plans, which in turn include the Anti-degradation Policy, as well as water quality objectives.

COMMUNITY WATER CENTER
EL CENTRO COMUNITARIO POR EL AGUA

CLEAN WATER ACTION CALIFORNIA

California Rural Legal Assistance Foundation

Obligations Under the Human Right to Water Act

While we appreciate finding 31 acknowledging the recently adopted state policy on the Human Right to Water, it does not sufficiently address the requirements of the statute. Beginning on January 1, 2013, AB 685 directs the Board to consider the human right to water "when revising, adopting, or establishing policies, regulations, and grant criteria." The duty to consider is an on-going obligation of the Board, which is not possible to discharge through a single administrative action. To fulfill the legislative directive "to consider," the Board should undertake a range of activities based on legal precedent regarding similar statutes[5]. First, when considering a range of policies or regulations, the Board should give preference and adopt policies that advance the human right to water. Second, the Board should refrain from adopting policies or regulations that run contrary to securing equal access to safe drinking water. Finally, the Board should note in its record of decision the consequences that its actions have on access to safe drinking water in California.

The intent of the legislation is to ensure that all Californians have access to affordable, accessible, acceptable and safe water and sanitation in sufficient amounts to protect their health and dignity. In accordance with domestic law and human rights principles, access for human consumption should be prioritized over other water uses—including water for agriculture and industry—and should be non-discriminatory. Special attention must be given to those who do not have access to safe water.

A human rights approach to water challenges also requires that individuals and communities have meaningful opportunity to participate in decision-making affecting their access to safe and affordable water. Communities most in need of clean drinking water should be a focus of the process as well as the outcome of short-term and long-term planning regarding state water resources. Interested persons should have the opportunity to participate in administrative decisions through submission of written input or oral testimony. The Board should adopt an inclusive and transparent approach to decision-making by fostering participation by communities that historically have been impacted by source water contamination. The Board should also

[5] *See generally City of Burbank v. State Water Res. Control Bd.*, 35 Cal. 4th 613, 625 (2005) (explaining that taking into consideration means "to take into account various factors," including those specified in legislation). *See also Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983); *City of Arcadia v. State Water Res. Control Bd.*, 191 Cal. App. 4th 156, 177 (2010); *City of Davis v. Coleman*, 521 F.2d 661, 679, 682 (1975); *San Joaquin River Exch. Contractors Water Auth. v. State Water Res. Control Bd.*, 183 Cal. App. 4th 1110, 1120 (2010).

publically disclose efforts to consider the human right to water policy as well as the impact of these efforts on its final action.

Concerns and recommendations for the order

We continue to have the following major concerns with the order, as detailed below;

1. The Tentative Order violates the State's Anti-degradation Policy, as outlined in detail below.
    a. Fails to establish a baseline or require information that would inform a baseline determination for anti-degradation analysis purposes.
    b. Fails to require sufficient monitoring and reporting to ensure that any prohibition or protection requirement in the Tentative Order is enforceable.
2. The Order allows unlawful pollution and nuisance to groundwater
3. Violation of Civil Rights and Anti-Discrimination Laws
4. The long timeline for implementation ensures that more communities will be impacted by groundwater contamination
5. Lack of transparency limits the public's right to know and the Board's ability to act to protect groundwater.

1. The Tentative Order would violate the State Anti-degradation Policy

A. The Tentative Order fails to require sufficient monitoring and reporting

The Tentative Order fails to require sufficient monitoring and reporting to ensure that any prohibition or protection requirement in the Tentative Order is enforceable. The Regional Board is relying on the Trend Monitoring to determine trends and degradation, and yet the monitoring requirements do not provide sufficient information to track trends or detect degradation for most contaminants.

1. Trend Monitoring Plans do not require monitoring of all Constituents of Concern.

The Tentative Order does not require Trend Monitoring Plans to include all constituents of concern (COCs) related to agricultural discharges in the region – specifically, deleterious minerals, pesticide run-off or degradation products from pesticides. Only through inclusion of these products in trend monitoring wells, can the Tentative Order determine actual degradation trends and ensure the General Order adequately protects groundwater from these contaminants.

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Similarly, lack of trend monitoring for Contaminants of Concern, particularly pesticides and degradants, means that the Board does not have a mechanism to detect degradation or ensure compliance with limitations for those constituents. The Order requires no continued monitoring for pesticides or degradates in groundwater.

The Tentative Order gives the Executive Officer the authority to require additional monitoring or the development of management plans if it is determined that "irrigated agriculture may be causing or contributing to a trend of degradation of groundwater." But it is unclear how that determination can be made if trend monitoring is only focused on the narrow band of contaminants of concern identified in Table 3 of the Monitoring and Reporting Program.

2. <u>Regional monitoring and reporting is inadequate</u>

Township level monitoring and reporting, as opposed to monitoring and reporting at smaller geographic units undermines meaningful efforts to protect groundwater. The township-level reporting requirement has no hydrologic justification. A 36-square mile region can straddle groundwater basins, contain plumes of contamination and dozens of crops with differing nitrogen application rates. This gross level of reporting will make it difficult, if not impossible, to confirm compliance with the Waste Discharge Requirements. A better example is the United States Geological Survey (USGS), which served as the technical lead for the State Water Board's Priority Basin Project, part of its Groundwater Ambient Monitoring and Assessment Program, beginning in 2004. The USGS was responsible for water quality sampling in California's groundwater basins to characterize the water quality in each basin and identify trends in groundwater quality. USGS used a grid of one well per square mile to provide an accurate overview of the aquifer.

3. <u>Reporting of Nitrogen use efficiency is not required for all waters</u>

Reporting of nitrogen use efficiency should be required for all waters, not just high vulnerability areas. We agree with current provisions in the Tentative Order that all growers should be required to develop nitrogen management plans. However, given that they are developing the plans, they should provide that information to the 3rd party Coalitions and have it included in the annual summary report to the Board, as is required for high vulnerability areas. The costs of submitting and compiling those reports are relatively small, and the need it vital to compiling with the requirements of the law. In order to ensure that all high quality waters are adequately protected under the anti-degradation policy, there must be a mechanism to determine whether degradation is occurring and a way of determining whether BPTC is being implemented. *Asociacion de Gente Unida por el Agua* at 1274.

B. *The Tentative Order fails to set appropriate Receiving Water Limitations for compliance to meet the requirements of anti-degradation.*

The Receiving Water Limitations in the General Order fail to comply with Anti-degradation Policy or the Basin Plans, and do not support the findings in the order. The order only requires that "wastes discharged from Member operations shall not cause or contribute to an exceedance of applicable water quality objectives in the underlying groundwater, unreasonably affect applicable beneficial uses, or cause or contribute to a condition of pollution or nuisance," and then, through the applicable footnote, allows at least up to 10 years of continued contribution to exceedances, pollution or nuisance. This means that the Tentative Order is not only authorizing the maximum amount of degradation possible, but also authorizing continued pollution or nuisance or exceedences of water quality objectives and undermining any ability to take enforcement actions for those causing or contributing to that. This is entirely unacceptable.

The groundwater limitations should 1) include a limitation on degradation consistent with minimizing degradation to ensure the highest water quality consistent with the maximum benefit to the people of the State and BPTC, as well as 2) delete the footnote in order to omit altogether any authorization of continued contribution to pollution, nuisance or exceedences of water quality objectives. Without clear compliance standards in the groundwater limitations, the Board undermines its own ability to conduct enforcement actions and therefore eliminates the basis for its own findings, and renders its protection measures illusory.

Similarly, the undue delay in the Management Practices Effectiveness Report – not due until 2023! – undermines the enforceability of BPTC and violates the Board's duty to ensure rapid compliance through this order.

C. *The Tentative Order allows for degradation without conducting the analysis needed, or requiring sufficient data to be collected, to form a basis for making required anti-degradation findings.*

State anti-degradation law requires that baseline water quality is to be maintained unless it has been demonstrated to the State that any change in water quality 1) will be consistent with the maximum benefit to the people of the state; 2) will not unreasonably affect present or probable future beneficial uses of such water; and 3) will not result in water quality less than prescribed in state policies.[6] Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

Thus, analysis of whether the General Order violates the anti-degradation policy is a 3 step process: (1) Will baseline water quality be maintained; (2) If not, has the board demonstrated that the change in water quality (a) will be consistent with the maximum benefit to the people of the state; (b) will not unreasonably affect present or probable future beneficial uses of such water; and (c) will not result in water quality less than prescribed in state policies and (3) has the Board established that the activities subject to this order that will or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

1. The Tentative Order fails entirely to protect baseline water quality by failing to establish a baseline or set in place a mechanism for doing so.

Baseline water quality has been interpreted to mean "the best quality of the receiving water that has existed since 1968,… unless subsequent lowering was due to regulatory action consistent with State and federal anti-degradation policies." APU 90-004. *See* Associacion de Gente Unida Para el Agua, at 1270. Additionally, the California Environmental Protection Agency, and the Regional Water Quality Control Board Central Valley Region's, *A Compilation of Water Quality Goals* (August 2003), defines background levels to be maintained as "the concentration of substances in natural waters that are unaffected by waste management practices or contamination incidents." p. 6. Under either interpretation, the Tentative Order would fail to protect baseline water quality. The Tentative Order fails entirely to protect baseline water quality by failing to establish a baseline or set in place a mechanism for doing so.

[6] See California Environmental Protection Agency, Regional Water Quality Control Board Central Valley Region. *A Compilation of Water Quality Goals* (August 2003), p. 6.

The failure to establish a baseline means it is virtually impossible to enforce the anti-degradation policy. Furthermore, the failure to require any information to establish a baseline in any of the plans or reports or analysis developed to implement the Tentative Order, make it impossible to determine levels of degradation occurring and permitted under this permit. When undertaking an anti-degradation analysis, the Regional Board must compare the baseline water quality to the water quality objectives. *Asociacion de Gente Unida por el Agua* at 1270. By failing to establish a baseline, the Tentative Order, ipso facto, makes anti-degradation analysis impossible and is thus violative of the anti-degradation policy at all stages of the Order's approval, implementation and enforcement.

We understand that it is difficult to determine historic baseline levels in every area under a general permit that covers such a large geographic area. However, the Regional Board must make best efforts to determine a baseline in order to provide a basis for any finding or determination of the level of degradation that is in the maximum benefit to the people of the State. At the very least, <u>the Board should require the Groundwater Assessment Reports (GAR) to develop a basic analysis of baseline water quality utilizing available existing data to estimate historic baseline levels for at least the constituents of concern in the region</u>. There is no such requirement in the Tentative Order for the GAR or any other report, analysis or action included in the Tentative Order. While establishment of an estimate of a baseline through the GAR would not inform the Board prior to approval of the WDR, it would at least provide the information needed to incorporate anti-degradation analysis into the implementation and enforcement of the permit going forward.

D. <u>*The Order fails to demonstrate that the change in water quality authorized by this permit will be consistent with the maximum benefit to the people of the state, and provides an inadequate basis for any determination that the benefits of the levels of degradation authorized are demonstrated to outweigh the costs of that degradation.*</u>

A determination as to whether degradation is consistent with maximum benefit to the people of the state is made on a case-by-case basis and is based on considerations of reasonableness under the circumstances. Factors to be considered include (1) past, present, and probable beneficial uses of the water (specified in Water Quality Control Plans); (2) economic and social costs, tangible and intangible, of the proposed discharge compared to the benefits, (3) environmental aspects of the proposed discharge; and (4) the implementation of feasible alternative treatment or control methods.[7] The Board, in this Tentative Order engaged in no such analysis, much less demonstrated that any change in water quality will be consistent with the maximum benefit to the people of the state. Furthermore, the Board neither demonstrated that the change in water quality would not unreasonably affect present or probable future beneficial uses of such water; <u>nor</u> result in water quality less than prescribed in state policies. To the extent that the Tentative Order conclusively states such, monitoring and reporting requirements, as discussed above, fail to ensure that this will be the case.

1. <u>This permit allows the maximum level of degradation without any finding or basis for that finding.</u>

If the General Order allows degradation up to water quality objectives and only sets that as the enforceable compliance goal, then it will permit all degradation from baseline up to just below the level of exceedance. If the Board wants to permit this maximum level of degradation, it needs to determine that this is the highest water quality for the maximum benefit to the people of the state. There is no such finding, nor any analysis or basis for such a finding.

2. <u>The Order fails to demonstrate that degradation will not unreasonably affect present or probable future beneficial uses of such water.</u>

Setting the effective level of degradation at essentially the same point as the level of exceedance creates a standard that will ensure impacts to domestic water users. Public water systems charged with treating drinking water to meet drinking water standards do not treat the water to just below the standard, but set a target well below that level to ensure that fluctuations in treatment or in the quality of the source water do not result in an exceedance of water quality standards. Additionally, systems that rely on source water that is near an MCL must meet significantly increased monitoring burdens to ensure that levels do not exceed an MCL (for example, if a system relies on water that is over ½ the MCL for nitrate they are required to conduct much more frequent monitoring, which can mean significant costs to systems and consumers). <u>This order must set a goal for degradation far enough below that water quality objective to ensure that high quality waters do not exceed water quality objectives and beneficial uses are not impaired.</u>

E. <u>*The Tentative Order fails to establish that discharges to existing high quality waters will result in the legally adequate best practicable treatment or control (BPTC)*</u>

[7] See [State Board] Order No. WQ 86-17, at 22,

The Tentative Order fails to establish that discharges to existing high quality waters will result in the best practicable treatment or control (BPTC) of the discharge necessary to assure that (a) pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

This Tentative Order would allow for discharge of pollutants above baseline, or highest quality, levels into the region's groundwater,[8] without imposing the best practicable treatment or control ("BPTC") requirements, which by definition require first determining that it will not result in degradation that will unreasonably affect present or probable beneficial uses and that it will result in maintaining the highest water quality consistent with maximum benefit to the people of the State.[9] As by definition BPTC cannot result in pollution or nuisance, while the requirements of the order expressly allow for those results for up to 10 years through a groundwater management plan, the permit on its face fails to meet BPTC requirements. For the reasons outlined above, this permit not only fails to make the necessary findings and determinations, but fails to require sufficient requirements to ensure those standards can be met. As such, this permit does not require the BPTC or adequate performance standards or sufficient reporting and monitoring requirements to protect high quality groundwater.

In particular, in the information sheet of the General Order, the Regional Board states that the SQMPs/GQMPs are reviewed periodically to determine whether adequate progress is being made to address the degradation trend or impairment. However, there is not only no determination of baseline, but there is no determination of the level of degradation allowed. <u>At a minimum, any GWQMP that is determined to have shown "inadequate progress" should be immediately deemed to no longer meet the requirements of the Groundwater Limitations, and any member causing or contributing to unauthorized levels of degradation or exceedences of water quality objectives should be subject to enforcement actions.</u> Fundamentally, the General Order fails to set the right goal and then fails to be able to measure whether it is meeting that goal. Therefore, by definition, this cannot be best practical treatment and control.

It is important to emphasize that where groundwater has already been polluted or degraded beyond the baseline, current dischargers should be required to do even more stringent management practices than they would have otherwise to ensure they are not contributing to exceedences of groundwater quality objectives, and therefore meet BPTC requirements. BPTC

[9] State Water Resources Control Board Resolution No. 68-16.

may therefore be different depending on conditions of receiving waters. Therefore, if a discharger is discharging into water at or above the water quality objective, it must, at a minimum, ensure it is not contributing to that exceedence in order to comply with BPTC. That may mean that dischargers in these areas must take extra measures to reduce loading impacts by current irrigation practices and comply with BPTC, including pump and fertilize, targeted recharge of high quality water to dilute discharge, in addition to instituting highly efficient nutrient management practices. More information on these practices is included in the UC Davis technical reports prepared and provided to the Board as part of SB2x1.

It is important that requirements take into account that there are areas where very rapid improvements in water quality may be seen if adequate management practices are implemented. Even in the Kern sub-region of the TLB, there are regions with groundwater as shallow as 0-20ft and areas of course and sandy soils with significant recharge and groundwater pumping that can further accelerate observed changes in groundwater concentrations due to changes in practices at the surface.

2. The Order allows unlawful pollution and nuisance to groundwater

According to the Water Code, "Pollution" means an alteration of the quality of the waters of the state by waste to a degree which unreasonably affects ...: (A) The waters for beneficial uses. (Cal. Water Code 13050(l)(1)). For all the reasons that the Order violates the state's anti-degradation policies, the Tentative Order, too, if implemented would result in Pollution as defined by the Water Code, by:

a) Allowing degradation up to the water quality objectives without the required findings permitting such degradation
b) Allowing discharges to contribute to exceedances of water quality objectives and nuisance for up to 10 years
c) Failing to establish a baseline to assess and analyze degradation or the impacts of discharge.
d) Failing to establish adequate monitoring and reporting procedures to adequately monitor degradation or potential impacts to beneficial uses.

"Nuisance" means anything which is (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property, (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, (3) Occurs during, or as a result of, the treatment or disposal of wastes. (Cal. Water Code 13050(m).

By allowing degradation of groundwater up to the water quality objective, by disregarding relevant public health goals in favor of often less protective water quality objectives, by failing to monitor for all constituents of concern, and allowing continued discharger contribution to exceedences of water quality objectives and nuisance for up to the next ten years, this Tentative Order would allow for discharge of waste that is both injurious to health and interferes with the enjoyment of property for those whose domestic water quality will be impacted.

Separate and apart from prohibitions in the State's anti-degradation policy, California law prohibits outright pollution and nuisance with respect to the state's groundwater. (Cal. Water Code Section 13050 *et seq.*) These prohibitions in state law are applicable to both high quality waters, subject also to the anti-degradation policy and other waters. Thus to the extent that this order permits discharges that constitute nuisance or pollution, as discussed above, this Order violates California law with respect to its treatment of and failure to protect all groundwater in the Tulare Lake Basin.

3. **Violation of Civil Rights and Anti-Discrimination Laws**

This Tentative Order, if implemented, would disproportionately impact low income communities and communities of color by failing to protect groundwater from continued degradation. The Tentative Order would allow further groundwater degradation, particularly nitrate contamination, which is the number one cause of drinking water well closure in the State. Already Latino and low-income communities are more likely to have contaminated drinking water in the Central Valley region, and this is most often due to high levels of nitrate in the groundwater.[10] Specifically in the San Joaquin Valley, small communities with high concentrations of Latinos are disproportionately impacted by nitrate contamination from agricultural waste, meaning Latino communities are more likely to have higher levels of nitrates in their drinking water[11]. Additionally, Latino and low-income communities are less likely to have health care and access to treatment or substitute water sources, and are more likely to be exposed to cumulative deleterious environmental impacts through other media (such as air).

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[10] Environmental Justice Coalition for Water, *Thirsty for Justice: A People's Blueprint for California Water (2005)*
[11] Carolina Balasz, et.al., *Social Disparities in Nitrate Contaminated Drinking Water in California's San Joaquin Valley,* Environmental Health Perspectives June 2011.

It is also important for the Board to understand that continued degradation and exceedences of groundwater objectives will cause less water availability for domestic and municipal use, resulting in fewer will-serve letters and therefore the inability to develop housing in the region.

By disparately impacting low income, communities of color, the Board's failure to enact adequate groundwater protections, violates our states commitment to equality and freedom from discrimination as laid out in California Government Code, Section 11135 which states that no person in the State of California shall, on the basis of race, national origin, ethnic group identification, religion, age, sex, sexual orientation, color, or disability, be unlawfully denied full and equal access to the benefits of, or be unlawfully subjected to discrimination under, any program or activity that is conducted, operated, or administered by the state or by any state agency. Furthermore, the Board's failure to enact groundwater protections threatens California's Fair Employment and Housing Act, California Government Code 12900, et seq., which guarantee all Californians the right to hold and enjoy housing without discrimination based on race, color or national origin.

The California Government Code Section 65008 renders null and void any action undertaken by a local governmental agency that denies to any individual or group of individual the enjoyment of their residence, landownership or tenancy. The Board's decision, if it fails to protect the drinking water for California's most vulnerable communities through adoption of this Tentative Order may be null and void.

Therefore, this General Order would disproportionately impact low-income communities and communities of color, in violation of California Government Code Section 11135, Fair Employment and Housing Act and other state and federal civil rights laws.

4. The long timeline for implementation ensures that more communities will be impacted by groundwater contamination

The continued delay in implementing basic groundwater protections has harmed hundreds of thousands of Central Valley residents. This order does little to remedy that inequity, with delays of at least a decade before growers must demonstrate that their actions are improving water quality.

- 1989 – CDFA nitrate report identifies nutrient management as a tool to stem nitrate pollution

- 1999 – Senate Bill 390 is signed into law, required the Regional Water Boards to review their existing waivers and to renew them or replace them with WDRs
- 2003-2004 - surface water monitoring begins
- 2008 – board agrees to include groundwater in future regulatory program
- 2013* – June: Tulare Lake Basin WDR approved
- 2013 (fall) – NOA issued for one or more 3rd party coalitions
- 2014 (1st quarter) – member enrollment closed -
- 2015 (spring)* – first nitrogen budgets due
    - first summary report due
    - Groundwater Assessment report due
- 2014 (fall/winter)* - trend and representative groundwater monitoring workplans due
- 2016* – groundwater trend monitoring begins; annual data submission to GAMA
- 2017* – Management Practices Effectiveness Program workplan due
- 2018 – first Farm Evaluation due for small operation in low vulnerability areas
    - Executive officer can relax reporting requirements
- 2023*- first Management Practices Effectiveness Report Due
- 2023 – Date of Compliance in WDR

* Estimated dates based upon the terms of the draft order

Under this timeline, the earliest results from trend monitoring won't be seen before 2017. Even worse, BPTC will only be confirmed (and then only for the highest priority crops and soils) in 2023, the same year that full compliance is required. It is clear that, if the order is adopted as currently written, enforcement based on actual impacts to water quality will not be possible for at least a decade, and communities will continue to suffer and pay for water quality degradation for the foreseeable future.

This order should have timelines that will provide for compliance by the date in the order, which means that the deadlines for trend monitoring and BPTC confirmation should be moved up. In the interim, the order can base enforcement upon reported nutrient ratios. <u>The Water Board should set a level for appropriate deviation from median for crop-based nitrogen budgets, and issue violation notices and fines to those growers who report nutrient budgets outside of that deviation. This fine could be set at a minimal level initially, and increase with each nutrient report, with the fines generated going to a SEP established to provide safe drinking water to communities with nitrate contamination.</u>

5. **<u>Lack of transparency limits the public's right to know about impacts to their water quality and the Board's ability to act to protect it.</u>**

Another barrier to enforcement is the limited amount of information to be made public by the 3rd party coalitions in their reports to the Board. While nitrogen budgets are extremely useful, they fail to provide needed information about nitrogen loading. <u>The order should require reporting of fertilizer application</u> which will, when combined with the nitrogen budget ratio, provide important information about nitrogen loading to groundwater. This information will be critical both to understanding groundwater monitoring data and in prioritizing growers for inspection and enforcement. Fertilizer use, much like pesticide use, is not a confidential trade secret and is an indicator that should be provided as part of the nutrient budgets to determine nitrogen loading of groundwater. This was one of the State Water Board's recommendations regarding the Nitrate Report.

Finally, as we have stated previously, this order contains little data to inform the Board's decision, and as implementation proceeds over the next decade, the Board has no continuing decision-making role. The Executive Officer, on the other hand, can make large-scale changes to the order – amending vulnerability areas, reducing reporting requirements, and determining where and how monitoring of constituents of concern will occur. The Board has a responsibility to ensure that this order is effectively and adequately implemented and enforced and should identify a trigger for ensuring that this responsibility is carried out.

Conclusion

We appreciate the opportunity to review this order and provide input. As you can see, we continue to have significant concerns about this order. We trust tha
these faults so that we can fully support this order.

Sincerely,

Laurel Firestone
Co-Executive Director and Attorney at Law
Community Water Center

Jennifer Clary
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Sent via E-Mail
DSholes@waterboards.ca.gov

April 15, 2013

David Sholes
Central Valley Regional Water Quality Control Board
1685 "E" Street
Fresno, CA 93706-2007

Re: Comments on the Tulare Lake Basin Area Tentative WDRs/MRP for Discharges from Irrigated Lands

Dear Mr. Sholes:

The California Farm Bureau Federation ("Farm Bureau") is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home, and the rural community. Farm Bureau is California's largest farm organization, comprised of 53 county Farm Bureaus currently representing more than 74,000 agricultural, associate, and collegiate members in 56 counties. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

Farm Bureau appreciates the opportunity to provide comments on the Tulare Lake Basin Area Tentative Waste Discharge Requirements ("Tentative WDR") and Monitoring and Reporting Program ("MRP") for Discharges from Irrigated Lands and respectfully presents the following remarks. Farm Bureau also respectfully incorporates the comments made in its previously submitted comment letter on the Draft WDR as well as the comment letter submitted by a collective of agricultural organizations on April 15, 2013.

Upon reviewing the Tulare Lake Basin Tentative WDR as well as the previously adopted Eastern San Joaquin River Watershed WDR, Farm Bureau is concerned that the general orders are not being individually developed and tailored, but rather are duplications of previously prepared orders. Each coalition represents unique geographic characteristics, including rainfall, hydrology, drainage, commodities grown, topography, etc. Given all of these vast differences, each general order should be individually drafted specific to the region it regulates.

General Order Page 1, Finding 1—Definition of "Waste"

The Tentative WDR seeks to regulate discharges of "waste" from irrigated lands. As referenced in the footnote to Finding 1, Attachment E defines the term "waste" to not only include the statutory definition found in Water Code section 13050(d), but also adds additional language to include the regulation of "earthen materials, inorganic materials, organic materials such as pesticides and biological materials" as wastes which "may directly impact beneficial uses or may impact water temperature, pH and dissolved oxygen." (Tentative WDR, Attachment E, p. 6.) No rationale is provided for the overly broad expansion of a statutorily defined term; as such, the term "waste" should be limited to its definition found in Water Code section 13050(d).

General Order Page 2, Finding 5—Regulation of Water Quality

The Tentative WDR amends the scope of regulatory coverage by deleting specific provisions limiting the regulation of water traveling through particular structures. (Tentative WDR, p. 2.) These deletions cause concern regarding the regulation of on-farm conveyances and between-farm conveyances, causing potential ambiguity regarding the point of demarcation for regulation. In order to provide clarity, Finding 5 should be revised.[1]

General Order Pages 9-10, Findings 32-36—Compliance with the California Environmental Quality Act

The Tentative WDR relies upon the environmental analysis conducted in the Program Environmental Impact Report ("PEIR") and concludes that "[a]lthough the Order is not identical to any of the PEIR alternatives, the Order is comprised entirely of elements of the PEIR's wide range of alternatives." (Tentative WDR, p. 9, ¶¶ 33-34.) Relying on such analysis, the Tentative WDR further concludes "the PEIR identified, disclosed, and analyzed the potential environmental impacts of the Order" and the "potential compliance activities undertaken by the regulated Dischargers…fall within the range of compliance activities identified and analyzed in the PEIR." (*Id.* at ¶ 33.) Notwithstanding pending actions challenging the adequacy of the PEIR, the Tentative WDR is not within the realm of alternatives analyzed within the PEIR, but rather goes beyond those alternatives as it includes provisions substantially different from elements in those alternatives, especially alternatives 3 through 5. These new components do not represent merely a "variation" on the alternatives in the PEIR but rather are elements that were not thoroughly considered previously and are likely to result in the imposition of new burdens on irrigated agricultural operations that that would have a significant and cumulatively considerable impact on the environment.

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[1] Finding 5 could be potentially revised to state: "This Order is not intended to regulate water in agricultural fields, including, but not limited to, furrows, beds, checks, and ancillary structures, contained on private lands associated with agricultural operations. This Order is not intended to address the lawful application of soil amendments, fertilizers, or pesticides to land."

Given the vastly new provisions in the Tentative WDR, such as provisions creating end-of-field discharge limitations as well as the farm management performance standards, not all potentially adverse environmental impacts of the Tentative WDR have been identified, disclosed, and analyzed in the PEIR. Thus, reliance on the PEIR for CEQA compliance is inappropriate.[2]

General Order Page 11, Finding 39—California Water Code Sections 13141 and 13241

Pursuant to the Water Code, the Regional Board is obligated to consider costs associated with the entire Long-Term Irrigated Lands Regulatory Program, as well as each individual general order, such as the Tulare Lake Basin Area WDR. (Wat. Code, § 13141.) Finding 39 incorrectly states that Section 13141 "does not necessarily apply in a context where an agricultural water quality control program is being developed through waivers and waste discharge requirements. (Tentative WDR Order, p. 11, ¶ 39.) Nothing within Section 13141 provides such limitations. Rather, a proper reading of Section 13141 *requires* looking only at the plain meaning of the statutory language. (*Riverview Fire Protection Dist. v. Workers' Comp. Appeals Bd.* (1994) 23 Cal.App.4th 1120, 1126, ["we first look to the plain meaning of the statutory language, then to its legislative history and finally to the reasonableness of a proposed construction."].) Upon examining the plain language of Section 13141, it does not state or imply that an estimation of costs is only required if an agricultural water quality control program is adopted into a Basin Plan. Rather, the plain and straightforward language states that "prior to implementation of *any* agricultural water quality control program, an estimate of the total cost of such a program, together with an identification of potential sources of financing, shall be indicated in any regional water quality control plan." (Wat. Code, § 13141.) Therefore, notwithstanding the fact that this agricultural water quality control program, the Long-Term Irrigated Lands Regulatory Program, is comprised of waste discharge requirements, the Regional Board is still statutorily obligated to conduct a cost estimation of the program. Given that this Tentative WDR proposes new costly regulatory components not previously analyzed during the environmental review stage, the Regional Board must analyze, evaluate, and estimate all of the costs of these new regulatory requirements.

General Order Page 15, Provisions III. A and III. B—Discharge Limitations

The use of "shall not cause *or contribute*" to an exceedance of applicable water quality objectives is overly expansive and creates an unreasonable standard that is undefined, ambiguous, and holds farmers and ranchers liable for even the smallest de minimus contribution. Accordingly, discharge limitations for both surface water and groundwater should be rewritten to state "wastes discharged from Member operations

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[2] Farm Bureau also questions the Regional Board's authority to require mitigation measures within the Draft WDR for farm level activities. Implementation of management practices at the farm level, which is the heart of the WDR, is not subject to a discretionary approval by the Regional Board. (See Pub. Resources Code, § 21080, CEQA generally applies only to discretionary projects.) Mitigation measures that cannot be legally imposed need not be proposed or analyzed. (CEQA Guidelines, § 15126.4(a)(5).)

shall not cause an exceedence of applicable water quality objectives in surface water [or the underlying groundwater], unreasonably affect applicable beneficial uses, or cause a condition of pollution or nuisance."

General Order Page 19, Provision IV. B. 7—Nitrogen Management Plans

Provision 7 requires all members to prepare and implement an annual nitrogen management plan. Such plans should analyze "nitrogen" application rather than "nutrient" application. (Tentative WDR Order, p. 19, ¶ 7.) As seen in previous drafts, only members in high vulnerable areas where nitrate is a constituent of concern were required to prepare annual nitrogen budgets and management plans. Rather than requiring all members to prepare nitrogen budgets and plans, as Provision 7 is currently written, the WDR should be revised to allow flexibility in the requirements for those areas that have no or a lower propensity to impact water quality.

General Order Pages 24-27, Provisions B, C, and D; Pages 20-24, Attachment A, Information Sheet—Template Requirements for Farm Evaluations, Nitrogen Management Plans, Nitrogen Management Plan Summary Reports, and Sediment and Erosion Control Plans

In previous discussions, as well as previous drafts of the WDRs, templates for Farm Evaluations, Nitrogen Management Plans, Nitrogen Management Plan Summary Reports, and Sediment and Erosion Control Plans were to be developed by the coalitions and approved by the Executive Officer. The Tentative WDR substantially changes how these documents will be developed, as they will no longer be developed by the coalitions, but rather by the Regional Board. (See Attachment A, Information Sheet, p. 20.) This change is problematic as all of these documents need to be developed by those directly in agriculture, with the assistance of professionals that work with agriculture (for example, qualified agronomists and/or agricultural engineers). Further, by substantially changing the process, the development of the templates has become akin to new permit requirements that require action and adoption by the Central Valley Board. (See Wat. Code, § 13222(a) limiting the duties that may be delegated from the Regional Board to the Executive Officer.)

Attachment B, MRP, Pages 10-11, Provision III. B. 3—Toxicity Testing

As currently drafted, the Tentative MRP suggests that both acute and chronic toxicity testing is required for all toxicity tests. (See Tentative Attachment B, MRP, pp. 10-11, footnotes 5 and 6 stating that chronic and acute toxicity testing should be completed in accordance with USEPA testing methods.) As stated in Farm Bureau's previous comments on the Eastern San Joaquin Administrative and Tentative WDR drafts, all MRPs for the Irrigated Lands Regulatory Program should only require acute toxicity testing. Since the inception of the Irrigated Lands Regulatory Program, surface water monitoring has occurred and has utilized acute aquatic toxicity testing. Given that the MRP contains no evidence to indicate that acute testing is no longer adequate, and since chronic testing is more costly, thus triggering the need for a new economic analysis of impacts, Farm Bureau respectfully requests that requirements for "chronic" testing be removed from the WDR, footnote 6 deleted in its entirety, and the continuation of the existing surface water acute toxicity testing be added in its place.

Thank you for the opportunity to provide our comments and concerns. We look forward to further involvement and discussion with the Regional Board on the Tulare Lake Basin Area WDR and MRP for Discharges from Irrigated Lands.

Very truly yours,

Kari E. Fisher
Associate Counsel

KEF:pkh

Letter 20

APRIL 15, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

Our family is now into the fourth generation as a California Citrus farming family operation. Our roots began developing in the mid 1930's here in the Great San Joaquin Valley. We are presently responsible for over 4,ooo acres state wide. Vertically integrated and horizontally spread throughout the citrus industry.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Our farming practices are cutting edge, technology based, and yet hands on practical. We use solid set fan jets and drip irrigation though out our orchards. Our Wells and Booster pumps are designed to high level efficiencies so as to not waste our most precious resource "water". We strive on a daily basis to manage and circumnavigate the daily requirements of our trees so as not to lose opportunity to grow the finest citrus in the world. Our use of soil supplements and nutrients are blended carefully so as to diminish and restrict subsurface loss of any product due to leaching. The ongoing escalation of cost continues to sharpen our needs to the utmost in our responsibilities so as to no waste or be irresponsible in the stewardship of operations.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Matthew J. [signature]

Matthew Fisher

Central Valley Regional Water Quality Control Board

11020 Sun Center Drive #200

Rancho Cordova, Ca. 95670-6114

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013).

Dear Board Members: We are a privately owned farming company in the Lamont/Arvin area of southern Kern County. We farm about 4500 acres of crops including Pistachios, Grapes, Alfalfa, Corn, Cotton and assorted feed crops.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern. On our farm we have raised organic matter in the soils by the addition of Compost from ½% to 3% in order to increase holding of water and nutrients in the soil. We have also utilized drip tape everywhere we can in order to conserve water. In addition we take petiole samples from our crops and perform annual laboratory soil test to further confirm that nutrients are used in proper agronomic amounts and do not leach into the soil profile.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination in groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense in our area.

Sincerely,

Tom Fry

1261 N. Wheeler Ridge Rd.

P. O. Box 716

Lamont, Ca. 93241-0716

Letter 22

M. CARATAN, INC.

COLUMBINE Vineyards

APRIL 12, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

I am the ranch agronomist, licensed pest control advisor at M. Caratan, Inc., a family owned farm in the Delano area. The third and now the fourth generation is farming table grapes planted by their grandfather. This family, like many others here, uses science and art to produce the finest produce in the world, in a sustainable way. They are farmers, not miners of resources. There is a critical difference in the definitions.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

I have a master's degree in soil and water science. I worked for a Kern County hydrologist/geologist and for the Dept. of Soils and Environmental Sciences at University of California, Riverside. Nitrogen use by many crops can be quite variable (*"The amount of nitrogen needed for a specific crop is not a constant but varies…" pg. 37 Ideas in Soil and Plant Nutrition by Joe Traynor, 1980*). Nitrogen leaching to usable groundwater is not at all clear and simple and is essentially eliminated under current practices. (*"Where water is costly or scarce, there is more likelihood that it will be managed intensively". "The southern San Joaquin Valley is a region where water is relatively scarce. The frequency of deficit irrigation as well as the general absence of runoff and run-on from or to irrigated fields are obvious symptoms of this fact." An Assessment of Irrigation Technology Performance in the Southern San Joaquin Valley of California" Water Resources Research, Vol 26. No1. Pgs. 35-41, Jan. 1990. Vaux, et.al.).*

As an agronomist, I take great pride in the conservation and efficient use of water, fertilizers and other products required to grow our crop. We use drip irrigation. Taking soil and plant measurements, we schedule our irrigations with the support of a professional consultant. We use

33787 Cecil Avenue • Delano, CA 93215-9597 • 661.725.2566 • fax 661.725.7233

the most current fertilizer technology and practices, utilizing professional consultants. We generate crop nutrient demand information from in-house plant tissue, soil and water analyses and production records. Market forces demand these practices. The continued employment of many people and the support of their families and health of our local communities compel this. The financial burden and potential adverse impact on our ability to produce, due to unreasonable regulatory oversight and compliance will compromise agriculture's ability to compete in a global market and may drive agriculture, like so many other tax paying industries, out of the state of California. To no benefit. There will be no improvement in the quality of our groundwater, no matter how onerous the regulations. At stake are businesses, the lives of employees and their families, our communities and the food security of this nation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. Many areas of Kern County have high nitrates and other salts often due to geologic or 'natural causes'. It may be that in the past, old farming practices did contribute to nitrate contamination of groundwater. Certainly, septic tanks continue to do so. Every day truckloads of southland sewage sludge continue to be dumped in an obscene disposal operation over and adjacent to the Kern Water Bank. In both the case of septic tanks and sludge dumping the Regional and State Boards have chosen to avoid doing what really needs to be done. The Board has chosen instead, to focus it's efforts, as all regulatory agencies do, on agriculture, the traditional whipping boy for nearly any public issue of interest. As long as septic tanks and sewage sludge disposal remains without address, the Board will not show progress. Regarding agriculture's role, the focus of the proposed Order, is current farming practices. I would hope that the Board make an informed decision and begin that process by supporting the appropriate studies to ***identify the current contributors to the problem***. This is opposed to relying on a non-peer reviewed document (Harter) that attempts to infer past practices from the current condition of the California's ground water. That horse is long gone from the barn. Furthermore, rather than taking the usual heavy handed regulatory approach, I would suggest that the ***Board assist in appropriate research and promotion of technologies and practices that are protective of the groundwater. It would be most productive if the Board chose to play an educational role in providing outreach of groundwater protective practices to the farming community through the coalitions, the University of California, resource conservation districts, and other means. These activities would likely result in greater success in a much less adversarial way***.

I ask that you not adopt the Tentative Order and instead, you develop in cooperation with our representatives, an alternative that makes sense for our area.

Sincerely,

Paul Giboney
Ranch Agronomist/Pest Control Advisor
M. Caratan Inc.
33787 Cecil Ave.
Delano, CA, 93215
(661) 720-2735
Fax (661) 720-2739
pgiboney@mcaratan.net

Excelsior/Kings River Resource Conservation District

April 5, 2013

David Sholes
CVRWQCB
1685 'E' Street
Fresno, CA 93706

Re: Irrigated Lands Regulatory Program, Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third-Party Group.

Dear Mr. Sholes and members of The Board,

Thank you for the opportunity to comment on the Central Valley Regional Water Quality Control Board's (RWQCB) Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area (herein after "Tentative Order"). The Excelsior/Kings River Resource Conservation District (RCD) appreciates the opportunity to review and comment of the Tentative Order and we hope that you take our comments into careful consideration.

The Excelsior/Kings River RCD works within the agriculture industry and the local community to conserve and protect our limited water resources within the Southern San Joaquin Valley. We have a strong history of working with many agricultural groups and individual producers to improve and protect groundwater and surface water. We hope that you may use our comments to strive toward these mutual goals.

In our review of the Tentative Order, we have found the following points of concern:

1. **Laws should include all major pollution sources:**
   a. While the Central Valley has a clear history with irrigated agriculture, there are many other major sources that can degrade and/or pollute water quality. The Central Valley has experienced a significant population increase, and each person living in this valley increases the risks to water quality. In addition to the population, the use of and affect each person has on water quality has significantly increased over the past few decades. Due to the population increase, comes the rise of the following risks:
      i. Private waste treatment systems (septic systems), particularly in "disadvantaged communities".
      ii. Nearly every residence in this valley is irrigated and applying nutrients to irrigated landscape.
      iii. Community irrigated landscape:
         1. Parks
         2. Golf Courses
         3. Cemeteries
         4. Schools
         5. Roadside landscaping
      iv. Community and Industrial Development:
         1. Right-of-ways and roads
         2. Storm Drainage
         3. Waste Treatment Facilities
   b. It is easy to see the new housing complexes, city parks, schools, golf courses being constructed. Each of these types of developments includes significant irrigation and nutrient applications that create significant risks to our limited water resources. Yet, the Irrigated Lands Regulatory Program and this Tentative Order do not address these significant and growing risks.

c. Similarly, we see pollution growth in unincorporated communities throughout this valley without waste treatment facilities. Most of these un-incorporated communities rely on septic waste systems that create direct nutrient and biological risks to water quality. Any regulations imposed on irrigated agriculture should be made in conjunction with all major risks to water quality.

2. **The Tentative Order and any other regulations must consider the costs involved:**
   a. As you are aware, the Central Valley of California is facing significant financial challenges such as: high unemployment, high levels of poverty, and limited economic growth. Our agricultural society cannot afford to lose economic development from cost-prohibitive and restrictive laws.
   b. This Tentative Order does not provide the necessary information to evaluate its cost effects on water quality or the community.

3. **These laws are untested and should be proven before they are imposed on society:**
   a. The Tentative Order is unclear as to whether or not these laws will improve water quality.
   b. If this cannot be proven, with certainty, then there are significant risks being imposed with an unknown reward. As public leaders, we ask that you be diligent and do not take significant risks to our society and resources.
   c. More time should be taken to ensure proposed regulations will actually provide the desired outcome.

4. **Regulations must include an educational component:**
   a. Excelsior/Kings River RCD improves resource conservation of individual producers with incentive programs to implement better management practices. Education and training are essential to ensure a management and practice change.
   b. We recommend that the RWQCB include an educational component within the Tentative Order that will provide a better understanding to growers, discharges, interested parties, and the general public. There is a time to push and a time to pull. The sheer size and geography of this Tentative Order will limit the effectiveness of a regulatory push. We believe pulling with an educational component will provide a more effective solution and should be incorporated within this Tentative Order.

Thank you for your time and consideration. We welcome the opportunity to work with the RWQCB to improve this Tentative Order. We believe the issues outlined in this letter should be addressed before the Tentative Order is considered for adoption.

Additionally, we hope sufficient time will be given for our society to comply with new and/or revised Waste Discharge Requirements on irrigated lands. We hope, and respectfully ask, that the RWQCB take additional steps to include more growers and industry groups in the future development of this Tentative Order as well as any other regulations.

Sincerely,

Jeff Gilcrease
Chairman

Giumarra VINEYARDS

April 15, 2013

Via E-mail to: dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re: Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

Giumarra Vineyards is a diversified farming operation in the southern end of the San Joaquin Valley. We are primarily known for growing table and wine grapes, but we also grow citrus, potatoes and other row crops. We have been farming in the area since the 1930s and we now have our 3rd generation of family members actively involved in the business.

I want to write to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

As farmers, we take pride in the conservation and efficient use of water, fertilizers and other products required to grow our crops. Therefore, we have converted several thousands of acres over to highly efficient drip-irrigation systems, capable of very precise nutrient application. The marketplace for our products is far too competitive for us to waste money on excessive fertilizer or water. We have made large capital expenditures to make our operations increasingly efficient, and I see our neighbors and competitors doing the same. It is frustrating to see additional financial burden associated with unreasonable regulatory oversight and compliance further compromising agriculture's ability to compete in a global marketplace.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact of groundwater quality. It may be that the past practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

P. O. Box 1969, Bakersfield, California 93303/telephone (661) 395-7000

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our region.

Sincerely,

Jeffrey Giumarra

From: Tim Holtermann [mailto:timh@bak.rr.com]
Sent: Friday, April 12, 2013 12:56 PM
To: Sholes, David@Waterboards
Subject: Tenative Order for KRWCA Area

HOLTERMANN FARMS
P O Box 8008
Wasco, CA 93280-8069

April 12, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

My family has farmed in the Wasco area since the early 1920's. Our family farming operation currently grows only almonds.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Due to the scarcity and high prices of water and fertilizers, Holtermann Farms has converted almost ninety percent of its acreage from flood to drip irrigation. Our plan is to convert the remaining ten percent of acreage to drip irrigation as these old orchards are replanted. Drip irrigations allow us to make multiple applications with smaller application amounts. Drip irrigation has enabled us conserve and better direct and hold our water and fertilizer to the root zone. This system provides us the ability to prevent significant leaching out of the root zone. Our neighbors also use similar practices.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of ground water (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with representatives from the KRWCA, an alternative that makes sense for our area.

Sincerely,

Tim Holtermann

Letter 26

Innovative Ag Services, LLC
1201 Delta View Road, Suite 5 Hanford, CA 93230
Office (559) 587-2800 Fax (559) 587-2801

April 12, 2013

David Sholes
CVRWQCB
1685 E. Street
Fresno, CA 93706

Re: Regional Water Quality Control Board (RWQCB) Central Valley Region Tentative Order R5-2013-XXXX, Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third-Party Group.

Dear Mr. Sholes and Members of the Board,

Thank you for the opportunity to comment on the Central Valley Regional Water Quality Control Board's Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area (herein after "Tentative Order"). We appreciate the opportunity to review, and hope that you take our thoughts into consideration.

Innovative Ag Services, LLC provides agronomic and environmental services to the agricultural industry in the Central Valley. We have a strong history of working with many agricultural groups and individual producers to improve their bottom line while faced with increased regulations. We have a team of professional agronomists and environmental professionals that work closely with the Dairy General Order, No. R5-2007-0035 and other waste discharge requirements. As such, we can provide a unique and valued prospective toward the proposed Tentative Orders in the Irrigated Lands Regulatory Program (ILRP). We hope the RWQCB will adopt a cost effective and practical means in protecting water quality and the agricultural community we live in. We hope that you may use our comments to strive toward these endeavors.

In our review of the Tentative Order, we have found the following points of concern:

1. **The Draft Order does not have the information needed to evaluated its effectiveness to protect water quality nor its effect on our agricultural community:**
   a. Throughout this lengthy and changing Tentative Order, there is very little information to evaluate what will be implemented with the adoption of this law. Instead, the Executive Officer (EO), of the RWQCB, will be given the discretion and authority to implement this law without a due process for interested parties and the public to evaluate the effects of the law. Each of the following are critical components identified within the Tentative Order that are left to the discretion and approval of the EO:
      i. Those who can operate as a third-party
      ii. Surface Water Quality Monitoring and Reporting
      iii. Groundwater Quality Assessment, Monitoring and Reporting
      iv. The Farm Evaluation Template and Reporting
      v. The Sediment and Erosion Control Plan Template and Reporting
      vi. The Sediment Discharge and Erosion Assessment and Reporting
      vii. Annual Nitrogen Budget Worksheet Template and Reporting
      viii. Management Practices Evaluation Workplan
      ix. Additional Technical Reports
      x. "Any information which the EO may request"
      xi. The format of any information being submitted

b. We recommend adding more descriptive parameters to guide the EO in establishing components to be established by the EO. By leaving these components open to the discretion and approval of the EO, the margin of interpretation is greatly and unnecessarily, increased.

2. **Agronomic Terminology:**
   a. Innovative Ag Services, LLC's experience with providing agronomic and environmental services to dischargers who comply with the WDRs has shown that the incorrect use of terminology creates confusion and misunderstanding.
   b. We recommend defining a "Nitrogen Management Plan" as a plan for what will happen with the nitrogen being applied and removed during a season.
   c. The Tentative Order identifies the use of a "Nitrogen Management Plan Summary Report". It is unclear what is meant with this terminology. The word 'plan' implies what will occur, yet we believe this report is asking for a historical summary of the nitrogen that was applied and removed. For historical reports, we recommend the use of a "Nitrogen Management Record Summary".
   d. These terms and others should be added within the definitions of the Tentative Order.

3. **Proprietary Nitrogen Management Plans and Nitrogen Application Records:**
   a. The Central Valley is home to some of the most progressive and innovative farmers in the world. Agronomist and farmers alike have dedicated their lives to the management of crops and the nutrients that are applied to the land. The success of a farmer is dependent on the management of nutrients and it is what gives them their competitive edge over other producers.
   b. While many growers have invested significant money into professional consultants like Innovative Ag Services, LLC, others have developed their unique Nutrient Management Plans over years of experience with a specific crop and/or specific property. A Nutrient Management Plan and the actual records of nutrient applications are proprietary information that should not be submitted for public record that can be easily accessed, and potentially misused or copied.
   c. We encourage the RWQCB to continue to protect the propriety information of individual growers, trade groups, and professionals with any proposed order.

4. **Define Nitrogen:**
   a. The Tentative Order most commonly addresses "nitrate-nitrogen" as the form of nitrogen identified as a water quality pollutant. Nitrate-nitrogen is also the most common form of nitrogen adsorbed by plants. Yet, this Tentative Order also refers to the "total nitrogen" and the "total nitrogen available".
   b. Similarly, the Information Sheet refers to "nitrogen fertilizer data", without clarifying what type of nitrogen this is accounting for. Chemically, there are many different forms of nitrogen and the use of different terminology to describe nitrogen should be carefully used and defined within the definitions of this order. As written, it is unknown if the Tentative Order will regulate only; nitrate-nitrogen, total nitrogen, available nitrogen, or other forms of nitrogen.
   c. As agronomist, we strive to educate and equip ourselves to provide professional agronomic services that will produce the best crop while protecting the environment. This includes addressing the many different forms of nitrogen they may all affect crop nutrition, soil health, and pollution. Agronomically, we must address the different forms of nitrogen to address crop health as nitrogen will change its chemical form according to many environmental conditions and cultural practices. We respectfully ask that the RWQCB specify the requirements in regards to the different forms and terminology of nitrogen.

5. **Include an Educational Component:**
   a. Innovative Ag Services, LLC has often worked with growers, dischargers, regulators and environmental groups to find acceptable outcomes. The first step to this process is providing understanding to each other's position. Clearly, there is significant misunderstanding between the different groups that will be affected by this Tentative Order.
   b. We recommend that the RWQCB include an educational component within the Tentative Order that will provide a better understanding to growers, discharges, interested parties and the general public. There is a time to push and a time to pull. The sheer size and geography of this Tentative Order will limit the effectiveness of a regulatory push. We believe pulling with an educational component will provide a more effective solution and should be incorporated within this Tentative Order.

Thank you for your time and consideration. We welcome the opportunity to work with the RWQCB to improve this Tentative Order. We believe that the issues outlined in this letter should be addressed before the Tentative Order is presented to the members of The Board for their consideration of adoption. Clearly more information is needed to develop technical standards of agronomic requirements, in which Innovative Ag Services, LLC is ready and willing to address with RWQCB staff.

Additionally, we hope sufficient time will be given for growers and professional service providers alike to comply with new and/or revised Waste Discharge Requirements on irrigated lands. We hope, and respectfully ask, that the RWQCB take additional steps to include more growers and service providers in the future development of this Tentative Order, and future orders alike.

We look forward to speaking with you soon.

Sincerely,

Warren Hutchings

Nathan Heeringa

Way Gin LP
P.O.Box 27
Edison, CA 93220

Central Valley Regional Water Quality Control Board
11020 Sun center Drive # 200
Rancho Cordova, CA 95670-6114

April 12, 2013

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for growers within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My family has farmed a wide variety of row and permanent crops south of Bakersfield in the Arvin-Edison Water Storage District for over 60 years. Over the years the acreage devoted to our crops has increased to approximately 3,000 acres.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, north of Fresno, where conditions are significantly different than Kern.

Due to the competitive pressures inherent in our business combined with inflation on crop inputs we are extremely conscious of minimizing detrimental impacts to the land from which we earn our living. As mentioned above we have farmed for over 60 years and this requires a long term sustainable approach. To minimize the impact on the land and the use of costly inputs we utilize drip irrigation wherever possible tailoring the crop inputs through continual monitoring by our trained personnel. Concerning water we continually monitor the crop needs in light of evaporation/ transpiration rates to ensure water does not penetrate beyond the root zone. The water monitoring relies on trained personnel utilizing soil probes to prevent water penetration beyond the root zone. Regarding fertilizer inputs, on permanent crops we use plant leaf tissue analysis to customize the application rate of nutrients and apply the nutrients in foliar applications to provide the nutrients on an as-needed basis. With the row crops, soil nutrient composition is tested at least annually and oftentimes twice a year depending upon our crop rotation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based upon my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed order is current farming practices

I ask that you not adopt the Tentative Order and instead you develop in cooperation with your representatives an alternative that makes sense for our area.

Sincerely,

Wayde Kirschenman,
General Partner

Wayde S. Kirschenman, Et. al
P.O. Box 27
Edison, CA 93220

Central Valley Regional Water Quality Control Board
11020 Sun center Drive # 200
Rancho Cordova, CA 95670-6114

April 12, 2013

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for growers within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My family has farmed a wide variety of row and permanent crops south of Bakersfield in the Arvin-Edison Water Storage District for over 60 years. Over the years the acreage devoted to our crops has increased to approximately 3,000 acres.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, north of Fresno, where conditions are significantly different than Kern.

Due to the competitive pressures inherent in our business combined with inflation on crop inputs we are extremely conscious of minimizing detrimental impacts to the land from which we earn our living. As mentioned above we have farmed for over 60 years and this requires a long term sustainable approach. To minimize the impact on the land and the use of costly inputs we utilize drip irrigation wherever possible tailoring the crop inputs through continual monitoring by our trained personnel. Concerning water we continually monitor the crop needs in light of evaporation/ transpiration rates to ensure water does not penetrate beyond the root zone. The water monitoring relies on trained personnel utilizing soil probes to prevent water penetration beyond the root zone. Regarding fertilizer inputs, on permanent crops we use plant leaf tissue analysis to customize the application rate of nutrients and apply the nutrients in foliar applications to provide the nutrients on an as-needed basis. With the row crops, soil nutrient composition is tested at least annually and oftentimes twice a year depending upon our crop rotation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based upon my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed order is current farming practices

I ask that you not adopt the Tentative Order and instead you develop in cooperation with your representatives an alternative that makes sense for our area.

Sincerely,

Wayde Kirschenman

Sonshine Properties LLC
P. O. Box 27
Edison, CA 93220

Central Valley Regional Water Quality Control Board
11020 Sun center Drive # 200
Rancho Cordova, CA 95670-6114

April 12, 2013

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for growers within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My family has farmed a wide variety of row and permanent crops south of Bakersfield in the Arvin-Edison Water Storage District for over 60 years. Over the years the acreage devoted to our crops has increased to approximately 3,000 acres.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, north of Fresno, where conditions are significantly different than Kern.

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I ask that you not adopt the Tentative Order and instead you develop in cooperation with your representatives an alternative that makes sense for our area.

Sincerely,

Wayne Kirschenman
Partner

Caffee Family Trust
P.O.Box 27
Edison, CA 93220

Central Valley Regional Water Quality Control Board
11020 Sun center Drive # 200
Rancho Cordova, CA 95670-6114

April 12, 2013

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for growers within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My family has farmed a wide variety of row and permanent crops south of Bakersfield in the Arvin-Edison Water Storage District for over 60 years. Over the years the acreage devoted to our crops has increased to approximately 3,000 acres.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, north of Fresno, where conditions are significantly different than Kern.

Due to the competitive pressures inherent in our business combined with inflation on crop inputs we are extremely conscious of minimizing detrimental impacts to the land from which we earn our living. As mentioned above we have farmed for over 60 years and this requires a long term sustainable approach. To minimize the impact on the land and the use of costly inputs we utilize drip irrigation wherever possible tailoring the crop inputs through continual monitoring by our trained personnel. Concerning water we continually monitor the crop needs in light of evaporation/ transpiration rates to ensure water does not penetrate beyond the root zone. The water monitoring relies on trained personnel utilizing soil probes to prevent water penetration beyond the root zone. Regarding fertilizer inputs, on permanent crops we use plant leaf tissue analysis to customize the application rate of nutrients and apply the nutrients in foliar applications to provide the nutrients on an as-needed basis. With the row crops, soil nutrient composition is tested at least annually and oftentimes twice a year depending upon our crop rotation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based upon my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed order is current farming practices

I ask that you not adopt the Tentative Order and instead you develop in cooperation with your representatives an alternative that makes sense for our area.

Sincerely,

Wayne & Virginia Kirschenman
P.O. Box 27
Edison, CA 93220

Central Valley Regional Water Quality Control Board
11020 Sun center Drive # 200
Rancho Cordova, CA 95670-6114

April 12, 2013

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for growers within the Tulare Lake Basin that are members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My family has farmed a wide variety of row and permanent crops south of Bakersfield in the Arvin-Edison Water Storage District for over 60 years. Over the years the acreage devoted to our crops has increased to approximately 3,000 acres.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, north of Fresno, where conditions are significantly different than Kern.

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I ask that you not adopt the Tentative Order and instead you develop in cooperation with your representatives an alternative that makes sense for our area.

Sincerely,

Wayne Kirschenman

Letter 32

KIRSCHENMANN
FARMS, INC.

April 10, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: ***Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)***

Dear Board Members:

Our company is located in Kern County, where we mostly farm potatoes and carrots. Our farms are set-up for sprinkler irrigation and we have tail water sumps to recover any runoff water from the fields which is put back into the irrigation system and re-used, mostly on our rotation crop of wheat. We use well water and surface water from Arvin Edison Water Storage District.

Our wells pump from 350' – 450'. Our irrigation time frame is late-February to late July on the potatoes and mid-August to mid-October on the carrots.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

We normally apply a ¼ to a ½ inch of water every 3-4 days and try to maintain the available moisture for growth and any fertilizer applied within that zone of about 18"of depth.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense four our area.

Sincerely,

P.O. BOX 577 · LAMONT, CA 93241 · (661) 845-2165 · FAX (661) 854-4579

California Grape Co., LLC
5201 California Ave., #460
Bakersfield, CA 93309

April 11, 2013

Via Email To: dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

We farm table grapes and citrus in the Arvin/Lamont area in Kern County, California. Our farm consists of approximately 1400 acres of grapes and 250 acres of citrus.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly than Kern.

Our water supplies are fairly limited and expensive. We utilize both well water and district water. All of the grapes are farmed under a fan jet system, which allows for direct and accurate water placement. The citrus is flood irrigated. We have a water monitoring service that sends weekly updates on soil moisture. They have placed sensors at 12, 24, & 36 inch depths to record and monitor the water moisture in the soil. Grapes require very low levels of nitrogen. We are careful not to over apply nitrogen. Not only is it costly to waste nitrogen, but it also slows the coloring process of red grapes. It can also be a problem with fruitfulness. The grapevine, if over fertilized, can make too much canopy and produce less bunches. We take soil and petiole samples in the spring and fall before dormancy. We also have a PCA who issues fertilizer recommendations. Most of the table grapes in our area are farmed similarly by our observation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Arnold S. Kirschenmann
Landowner/Grower

Wm. Bolthouse Farms, Inc.
7200 East Brundage Lane • Bakersfield, CA 93307-3016
661/366-7205 • Fax: 661/366-0297

Bolthouse™ FARMS
SINCE 1915

April 15, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Email: dsholes@waterboards.ca.gov

Re: Comments of Kern River Coalition Authority
Re: Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

Our company, Wm Bolthouse Farms, Inc. is a Bakersfield, CA-based farming operation that has been in business since 1915. We are known primarily for our carrot farming and premium juice operations. We have over 2,000 employees and consider ourselves good stewards of the land.

We take our environmental obligations very seriously, and consider any discharge into 'waters of the state" that now includes groundwater – that water that lies below the surface of the land we farm – as something that is a serious matter.

Our staff has attended workshops and two Board sessions in an effort to more completely understand the proposed regulations that our company and other farmers in the area would have to observe when a General Order is enacted.

We are gravely concerned that the Board's desire to monitor discharge into groundwater is going to result in a General Order that far exceeds what is necessary to monitor the discharge of nitrates into the soil that might migrate into the groundwater aquifers that could then migrate into the drinking water of local (or remote, depending how the aquifers flow) communities.

I am writing to express our company's objection to the Tentative Order. It seems to be a solution in search of a problem – a problem that is not proven to exist to the extent that such a costly and far-reaching regulatory program calls for.

A portion of our farming operations is within the Kern River Watershed Coalition Authority, and we incorporate the Coalition's comments on the Tentative Order. Our company does not believe that the Tentative Order is appropriate for our area. It is our understanding that the Tentative Order was based on the program developed for the East San Joaquin watershed, north of Fresno, where conditions are significantly different from the conditions in the Kern County area.

An orchard farmer, at the November 30th Board Meeting, during the public comments section, said that he "spoon fed" fertilizer onto his trees. The concept of "spoon feeding" – applying no more fertilizer than would penetrate to the root zone – is an application method that we use, as well. The days of saturating field with manure or other nitrogen-rich fertilizers have passed, not only because of the dangers of over-penetration of nitrates into groundwater or runoff off the property, but because farmers are watching costs more than in the past. The margin of profitability continues to shrink. Adding more costs per-acre as this Tentative Order would are going to impact farmers no matter what size they are.

As you well know, the cost of water and applying it to the soil, whether it is from a canal system maintained by a water district or by privately-owned water wells with pumps, continues to rise. Our company uses sophisticated methods to reduce the amount of water we use. We use the latest form of sprinkler heads and in some areas we use overhead pivot irrigation systems that tightly control the amount of water. We are currently testing the viability of drip irrigation to grow our carrots. These methods ensure that we do not overwater our crops and keep the water within the root zone of the carrots and other crops. We believe that we do not have "nitrogen build up" in the soil and that nitrogen is not migrating down into the water system.

The bottom line is: will these proposed new regulations make the waters of the state safer by reducing nitrates? We do not believe it will. We believe that a scaled-back program, using different forms of monitoring will give the same degree of data monitoring that Executive Officer, Pamela Creedon, asked for at the November 30, 2012 Central Valley Water Board Meeting at the Doubletree Hotel in Bakersfield. At that meeting, the study* cited by Timothy Souther and Gary Kramer, from AMEC Environmental and Infrastructure, Inc. (Fresno, California) showed that it takes from 55 to 60 years for nitrates to migrate down 300 feet below the surface. They stated that the average depth of groundwater in this area is from 200 feet to 600 feet. Some of the wells in the southern part of the valley are drawing from groundwater over 1,000 feet below the surface.

In this "low saturation ground" – land in this Mediterranean climate that receives less than 7 inches of rainfall per year – nitrates are not a problem in most areas. In the disadvantaged communities, such as East Orosi, CA and Monson, CA where nitrate levels are significantly higher than the NCL ("Nitrate Contamination Level"), efforts must be made to help the people there secure clean drinking water. In areas where nitrate levels are not shown to be above the NCL, regulations should not be a "one-size-fits-all" Order.

Our company asks that you not adopt the Tentative Order. We ask that, instead, you develop an alternative, in cooperation with our representatives, that makes sense for our area.

We understand and appreciate your efforts to ensure clean air and water for the people of California. We publicly support this goal. We do, however at this time, differ in how to reach this goal.

*This study can be found at
http://www.waterboards.ca.gov/centralvalley/board_decisions/tentative_orders/130102/ilrp_ind_wdrs/13_ind_wdr_krwca.pdf

Sincerely,

Michael W. Kovacevich

Michael W. Kovacevich
for Darren Filkins
V.P. of Agricultural Operation
Wm. Bolthouse Farms, Inc.
dfilkins@bolthouse.com
(661) 366-7205, Extension 1711

April 15, 2013
Via Email To: dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: **Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)**

Dear Board Members,

I am a Third Generation operator of a fully integrated vegetable and citrus farm located in the Edison and Arvin areas of Kern County. Our Company has been in operation in excess of 70 years, and I believe this long successful tenure serves as testimony to our responsible stewardship of this land.

I am writing to express my objection to the Tentative Order. Our Farm is within the Kern River Watershed Coalition Authority and we incorporate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different that Kern.

I believe our modern practices and those of my neighbors are not currently aggravating any existing ground water problem. One factor is pure economics. This is no longer post WWII farming where synthetic Nitrogen fertilizers were "New", "Plentiful" and "Cheap"! In recent years fertilizer costs have risen dramatically while commodity prices have not. It is not exaggerating to state that while cyclical, the wholesale prices for potatoes that we receive today, is no different than that of 40 years ago. To remain economically competitive, we must spend our fertilizer dollars wisely. With the aid of soil and tissue testing, wasteful applications are avoided.

The second factor is the cost of water and irrigation technology. More than ever, water is our most precious resource and input. Just as in the case of fertilizer, recent years have seen its cost to us soar to all-time heights. The days of flood and furrow irrigation methods do not exist in our part of the valley. Sprinkler, micro-jet and drip are the only methods feasible. As a result, only the amount of water needed to produce the crop is used and placed in a fashion the plants can best use it. The days of high volume irrigation, where water was pushed beyond the "root-zone" are gone.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is

Current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Ron Lehr Jr.

Ron Lehr, Jr.
Vice-President
Lehr Brothers, Inc.

Letter 36

PARAMOUNT FARMING COMPANY

33141 E. Lerdo Highway
Bakersfield, CA 93308-9767

(661) 399-4456
(661) 399-1735 Fax

APRIL 11, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

Paramount Farming Company is a grower of almonds, pistachios and pomegranates. This letter refers specifically to our farming operations on the west side of Kern and Kings Counties.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern and in particular the Westside, is appropriate for our area. Groundwater beneath the Westside of Kern County (generally the lands within Belridge Water Storage District and Berrenda Mesa, Lost Hills and Dudley Ridge Water Districts), is not usable to meet municipal standards and has severe limitations for most agricultural uses. Groundwater in these areas should be exempt from the order. The Westside Districts have, through separate correspondence with Regional Board staff, sought an exemption from the groundwater regulatory provisions of the ILRP, however, to date, staff has yet to respond to our request and the current Tentative Order does not appear to consider the unique groundwater conditions on the Westside.

I believe that there are much more effective, efficient, economical, and appropriate alternatives, which have been pointed out to board staff members repeatedly, than those proposed in the Draft Order. We would welcome the opportunity to work cooperatively with staff to develop measures that make sense for our area.

In the meantime, I request that you not adopt the Tentative Order in its current form.

Sincerely,

Joseph MacIlvaine
President

33141 E. Lerdo Highway
Bakersfield, CA 93308-9767

PARAMOUNT
FARMING COMPANY

Bus: (661) 399-4456
Fax: (661) 399-1735

April 15, 2013

VIA E-MAIL

Attn: David Sholes
Central Valley Regional Water Quality Control Board
1685 "E" Street
Fresno, CA 93706-2007
dsholes@waterboards.ca.gov

Dr. Karl Longley, Chair
Jennifer Lester Moffitt, Vice Chair
Jon Costantino, Board Member
Sandra Meraz, Board Member
Carmen Ramirez, Board Member
Robert Schneider, Board Member
Pamela Creedon, Executive Officer
Clay Rogers, Assistant Executive Officer
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

RE: Review of the tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third Party Group (March 2013)

Dear Board Chair, Vice Chair, Members, Ms. Creedon, Mr. Rogers and Mr. Sholes:

The Central Valley Regional Water Quality Control Board ("Regional Board") recently released for review the tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin Area that are Members of a Third Party Group ("Tentative TLB Order"). The below comments on the Tentative TLB Order are submitted on behalf of Paramount Farming Company and Paramount Citrus and their related entities ("Paramount"). These comments are in addition to those submitted by Paramount on April 11, 2013 which referred specifically to our farming operations on the west side of Kern and Kings Counties. Paramount has been engaged in the development of the various general orders making up the proposed Long-Term Irrigated Lands Regulatory Program ("ILRP") and is concerned the current process will not achieve the Regional Board goal of protecting and preserving groundwater, but instead will merely apply a standardized and ineffective administrative burden on landowners with no measurable benefit.

Paramount is a grower and processor of almonds, pistachios, pomegranates, and citrus. Agriculture is a critical component of the economy of the Central Valley. In order to grow crops and contribute to the economy, Paramount relies on, and is a steward of, our local groundwater and surface water supplies. Paramount supports meaningful, results oriented, cost effective and collaborative solutions, including, when appropriate, regulation, however opposes the Tentative TLB Order and the current framework being forwarded by the Regional Board in the ILRP process.

The ILRP should properly evaluate the cost and benefits of the reporting and monitoring requirements, assess potential alternatives, define and account for baseline conditions by specific geographic areas and provide measurable goals for each level of regulation, that if obtained, result in a defined, decreased level of future reporting and monitoring. Such a program would incentivize action where needed without burdening growers whose practices are already protective of groundwater or who do not have a "potential to discharge."

The ILRP, including the Tentative TLB Order, wrongfully assumes all irrigators are dischargers, is unnecessarily costly, fails to meet the "reasonable" standard of Water Code Section 13241 and lacks incorporation of data and research on current practices and approaches that have been presented to the Regional Board as effective implementation methods. For sake of brevity, Paramount incorporate by reference the comments submitted by the Kern River Watershed Coalition Authority ("KRWCA") and the Southern San Joaquin Valley Water Quality Coalition ("SSJWQC") which provide detailed technical background and research supporting the above topics. Additionally, Paramount incorporates its previous comments submitted on the Eastside Order, the TLB Order and the Individual Order as no substantive changes have been made to the underlying ILRP. We do however feel it is necessary to reiterate key comments that apply to the ILRP as a whole and specifically the Tentative TLB Order.

The Tentative TLB Order is a mirror of the Eastern San Joaquin Order adopted in December 2012 and previous draft orders on which we, and others, have provided significant comments and suggestions. The Regional Board and its staff have, on several occasions, committed to review and take into account in the general orders developed for the various third party areas and the individual order, the unique characteristics of areas throughout the Central Valley. Substantive comments and research, including a formal proposal for designating and assessing specific site's "potential to discharge" through use of a Nitrogen Hazard Index have been submitted on multiple occasions by the KRWCA, the SSJWQC and various members, including Paramount, with no response or recognition from the Regional Board. The process to date has not been a meaningful public input process, but merely a deadline driven, rush to regulate.

Paramount's position has consistently focused on cooperatively developing a cost effective, scientifically based, practical and meaningful ILRP. This necessitates site specific considerations, which can best be understood by working with those who have been engaged in local groundwater and surface water monitoring within the various areas under the scope of the Regional Board, using existing data and systems and identifying focal areas. The "one size fits all" program currently proposed will fail to improve groundwater quality and will simply increase regulatory burden.

The regulatory burden is currently undefined. The Regional Board has provided several cost estimates that vary tremendously. The incremental cost identified in the Tentative TLB Order is \$1.90/acre, however previous Regional Board estimates reached \$120/acre/year. Even the \$120/acre/year drastically underestimates the program costs as demonstrated through estimates submitted by the KRWCA and any expense shouldered by growers who do not have a potential to discharge is overly burdensome and unreasonable. The Regional Board needs a defined and cost breakdown to justify each component and to aide grower in understanding each component, including a method to exclude lands from regulation that have little or no potential to discharge.

The Tentative TLB Order was prepared based on the Regional Board's certification of a "Final Program Environmental Impact Report for the Long-Term Irrigated Land Regulatory Program" (Resolution No. R5-2011-0017) ("PEIR") which was challenged in court alleging, among other things, that the PEIR violates CEQA (Sacramento County Superior Court, Case Number 34-2012-80001186 [Consolidated Case Number RG12632180]). A Tentative Ruling on March 28, 2013 by the Honorable Judge Timothy M. Frawley stated the PEIR violated CEQA and commanded the Board to, "set aside its certification of the PEIR, and to prepare, circulate, and certify a legally adequate EIR (consistent with this ruling) before proceeding with any additional project approvals."

The Court has not yet issued a final ruling, the Judge gave no indication that he was going to change his opinion. It is suggested the Regional Board forgo approval of the Tentative TLB Order, at least until the completion of the new EIR, and use this time to work cooperatively towards two goals; designing a reasonable and cost effective reporting program that accounts for site specific considerations and assessing and selecting methods to address drinking water quality issues. We do not believe these two goals can be achieved merely through the on-farm regulations presented in the Tentative TLB Order and other proposed and adopted orders by the Regional Board.

As drafted, we oppose the Tentative TLB Order as it fails to incorporate scientific data supporting the need for variations in the regulation based on unique characteristics of irrigated agriculture throughout the Central Valley. We ask that you forgo adoption of the Tentative TLB Order and pursue review of the technical work presented to the Regional Board by the KRWCA, its various constituents and others. We reserve the right to provide further comments on the Tentative Order, pending the outcome of any revisions of the PEIR that is ordered by the Court. If you have any questions, please do not hesitate to contact Kimberly Brown or me at the contact information listed above.

Sincerely,

Joseph C. MacIlvaine
President

cc: State Water Resources Control Board

Letter 38

Val-Mar Farms, LLC
2101 Mettler Frontage East
Bakersfield, CA 93307
(661) 858-2888 Fax: (661) 858-2558

APRIL 15, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

Our farm is located in the Mettler / Wheeler Ridge area which is just north of the grapevine off of Hwy 99 and Hwy 166. We farm conventional and organic vegetables of which are sold throughout United States and Canada. We enjoy the work we do and are proud to be part of the many farmers that provide nutritious healthy food out of this part of the great San Joaquin Valley.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Water is a precious resource that we must have and by using drip irrigation, we have been able to reduce the amount per acre feet we apply in each crop. Over the years we have implemented micro-irrigation, soil sampling, tissue sampling, and various other measures to assist us in our inputs to grow our crops. Due to the rising costs of water, fertilizers, and other inputs, we had to adopt ways to stay competitive in the market place. We are using less of these costly, but necessary, resources and continue to learn new ways of how to more efficiently grow our crops.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Catalino Martinez
Member
Val-Mar Farms, LLC.

Letter 39

Carreon Vineyards, Inc.

April 15, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Our vineyards and orchards are all on drip type irrigation systems for water conservation and to help manage limited water supplies and to help control cost. In most cases we us liquid type fertilizers to conserve resources which also helps the environment and lowers air pollution. Our average well depth is 240 feet which is much deeper then that of wells north of Fresno.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Darrell McElwee
Carreon Vineyards, Inc.

Operations
14124 Weedpatch Highway
Bakersfield, CA 93307
(661) 845-2309

Accounting
6016 E. Texas, Suite 100
Bakersfield, CA 93307
(661) 366-5432

Letter 40

April 15, 2013
Via Email To:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

I manage a large farm in Kern County growing almonds and pistachios. Our organization has been farming and investing here for over 20 years using the best technology available to maximize efficiency of both water and fertilizer.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Our very first field planted to trees back in 1989 utilized a state-of-the-art micro-jet irrigation system which applies water, at a third party verified distribution uniformity of 90%+. As we have developed other orchards on our property throughout the past 20+ years, the old flood irrigation systems were closed and abandoned and we spent millions of dollars installing additional micro-jet systems on every field. Our entire property is now irrigated with these state-of-the-art irrigation systems.

Additionally, we monitor the quantity of water applied during each irrigation cycle, utilizing the best techniques and systems available such as CIMIS, neutron probes, Watermarks, etc. These techniques and systems ensure we are not leaching expensive water and nutrients past the root zone. Many of our neighbors have developed their fields in a similar manner over the years. The result of all of this is that we are not contributing to the nitrate load of the groundwater lying 350 feet below the surface of our property.

As applied in our area, I do not believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past others farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with our representatives, an alternative that makes sense for our area.

Sincerely,

Eric J. Miller
General Manager – South Valley Farms

-----Original Message-----
From: gwen@gwensite.com [mailto:gwen@gwensite.com]
Sent: Thursday, April 11, 2013 4:21 PM
To: Sholes, David@Waterboards
Subject: Tentative Waste Discharge Requirements

April 11, 2013

Via Email To:

dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements
General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group
(March 15, 2013)

Dear Board members:

Our family operation is located near Wasco, California where we have been farming some 60 years
producing carrots, garlic, almonds, peppers, wheat, pima cotton, tomatoes and other crops.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River
Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't
believe the tentative Order is appropriate for our area, which I understand was first developed for the
East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Currently we monitor and have reduced our water irrigation, fertilizer and pesticides use by field
stations directly linked to our computers.
This saves cost and resources to our operation while maximizing production. We are able to do this
through drip irrigation where fertilizer and water are only are able to reach the root zone for limited but
full use of these resources. No sumps are even needed for runoff due to irrigation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal
experience, current farming practices are not having an adverse impact on groundwater quality. Past
farming practices did not have access to these practices and facilities which could have contributed to
nitrate contamination of groundwater (along with natural and other causes, such as septic tanks)
especially in other areas. I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our
representatives an alternative that makes sense for our area.

Sincerely,

Gwendolyn (Wendy) Neufeld

From: Hannah Neufeld [mailto:hannahneufeld@hotmail.com]
Sent: Friday, April 12, 2013 6:10 AM
To: Sholes, David@Waterboards
Subject: Tentative Order

April 15, 2013
Via Email To:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge
Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party
Group (March 15, 2013)

Dear Board members:

Our family operation is located near Wasco, California where we have been farming some 60 years
producing carrots, garlic, almonds, peppers, wheat, pima cotton, tomatoes and other crops.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed
Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the
tentative Order is appropriate for our area, which I understand was first developed for the East San
Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Currently we monitor and have reduced our water irrigation, fertilizer and pesticides use by field stations
directly linked to our computers. This saves cost and resources to our operation while maximizing
production. We are able to do this through drip irrigation where fertilizer and water are only are able to
reach the root zone for limited but full use of these resources. No sumps are even needed for runoff due
to irrigation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal
experience, current farming practices are not having an adverse impact on groundwater quality. Past
farming practices did not have access to these practices and facilities which could have contributed to
nitrate contamination of groundwater (along with natural and other causes, such as septic tanks)
especially in other areas. I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our
representatives an alternative that makes sense for our area.

Respectfully Submitted,
Hannah M. Neufeld

April 15, 2013
Via Email To:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge
Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party
Group (March 15, 2013)

Dear Board members:

Our family operation is located near Wasco, California where we have been farming some 60 years
producing carrots, garlic, almonds, peppers, wheat, pima cotton, tomatoes and other crops.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed
Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the
tentative Order is appropriate for our area, which I understand was first developed for the East San
Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Currently we monitor and have reduced our water irrigation, fertilizer and pesticides use by field stations
directly linked to our computers. This saves cost and resources to our operation while maximizing
production. We are able to do this through drip irrigation where fertilizer and water are only are able to
reach the root zone for limited but full use of these resources. No sumps are even needed for runoff do
to irrigation.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal
experience, current farming practices are not having an adverse impact on groundwater quality. Past
farming practices did not have access to these practices and facilities which could have contributed to
nitrate contamination of groundwater (along with natural and other causes, such as septic tanks)
especially in other areas. I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our
representatives an alternative that makes sense for our area.

Letter 44

NICKEL FAMILY LLC
15701 Highway 178 • P. O. Box 60679 • Bakersfield, CA 93386-0679
(661) 872-5050 • Fax: (661) 872-7141

April 8, 2013

Via Email to:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive #200
Rancho Cordova CA 95670.6114

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements
General Order for Growers with the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

We farm approximately 1200 acres of permanent crops on the east side of Bakersfield along both sides of the Kern River, all of which is irrigated with drip or micro-sprinklers. There is no irrigation runoff into the river. All nutrients are applied either through the irrigation system or foliar applied, except for compost that is spread annually on some of the acreage. We have two irrigation wells on the property, which are approximately 2000 feet deep, with approximately 800 feet of overburden before water yielding sands are encountered. Based upon the above facts, we do not think our farming practices contribute to nitrate contamination of the groundwater. Hence, we do not feel the tentative Order is appropriate for our area.

We ask that you not adopt the Tentative Order, but instead develop a sensible alternative that applies to our area.

Sincerely,

James L. Nickel
President/CEO

JLN/rrd

Letter 45

April 3, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

I own 250 acres of almonds in Northern Kern County close to McFarland, CA. These almonds are irrigated with a double-line drip system. It is through this drip system that many of the orchards' nutrients are delivered to the trees, including Nitrogen, Potassium, and Gypsum.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

We have limited supplies of expensive water in Kern County, and thus, we don't apply any more water than is necessary. The same can be said of our fertilizer applications. The costs of fertilizer have more than tripled over the last five years. As it is, we don't and haven't used any more water or fertilizer than we need to in order to produce a profitable crop of almonds. We also don't apply large amounts of fertilizer at any one time, Nitrogen in particular. We have been dividing our Nitrogen needs into five equal applications, one at post-harvest then beginning again throughout the spring and early summer growing seasons. We do this so that we don't apply more Nitrogen at any one time than the trees need. This keeps us from leaching the Nitrogen below the root zone. Two of the major differences between us and areas North of Fresno are that we receive approximately 1/3rd or less of the annual rainfall of our Northern neighbors, and another is that our water table is at approximately 250 feet below the surface of the soil, considerably deeper than theirs. I have difficulty getting water down to six feet, much less ten, 50, or 250 feet deep. We do our best to apply the least amount of water, Nitrogen, and other inputs as possible, while still maintaining the maximum crop possible. We also work to closely match our irrigations with the amount of ET for our crop throughout the growing season. In doing so, we don't apply any more water than is needed, thus keeping any leaching below the root zone to a minimum. From my observations, we are doing what the better farmers in our area are doing, in terms of splitting our Nitrogen applications and minimizing our inputs while maximizing our profits.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past, farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with representatives from the KRWCA, an alternative that makes sense for our area.

Sincerely,

Wendel Nicolaus
Taylor Farms

April 12, 2013

Via Email To:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

Our family farms from Delano to Arvin and has for the past six decades. We have grown a host of vegetables and row crops, tree fruit and citrus, table grapes which are our primary focus.

Not excluding other properties in other water districts, the Arvin Edison Water Storage District is especially challenging. Water is expensive and limited in supply. Water conservation efforts are a day to day focus. The management practice lends itself to fertility input conservation as well. Every acre is drip. Total annual crop use is generally 2.5 - 3.25 acre ft/acre per year. That pretty much matches for a growing season if not less. Common sense tells you that not much water is traveling past the root zone, nor are any of the applied fertilizer.

Keeping this in mind I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Matt Pandol Jr.

Matt Pandol Jr.

April 12, 2013

Via Email To:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

I am a 3rd generation table grape grower in the Delano area. July will be my 37th year of employment with our company (not bad for a 47- year old). I serve as the ranch agronomist as well as a farm manager. My family are pioneers in the United States, installing the first computer controlled drip irrigation/fertilization systems in the early 1980's. The technology was imported from Israel and driven by a common goal of water conservation efficiently and "laser precision" fertilization. While the equipment has changed a bit, the practice of spoon feeding nutrients at specific plant use timings has not. The ongoing result is as close to 100% utilization as can be expected from the applied irrigation to the root zone. It is for these reasons that I feel the Tenataive Order is not applicable or reasonable for our water shed.

Thus, I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Andrew S. Pandol

A family of *Growing* companies.

APRIL 15, 2013

VIA EMAIL TO:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

Grimmway Farms is the operator of 24,500 acres of farmland in the Tulare Lake Basin of Kern County. We have concerns that the current rules that are being proposed in the General Order are over reaching for the area. I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments to the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin Watershed, North of Fresno, where conditions are significantly different than Kern.

For over a decade, Grimmway Farms has employed professional agronomists, researched and experimented with contemporary agricultural disciplines, and utilized advanced machinery in a focused effort to maximize viable economic farming practices while enhancing the environment. To ensure optimal efficacy, prevent significant leaching, and insure optimal yields, our farming operation has developed a site specific fertility management program centered on seasonal soil testing. Prior to planting, each field is grid sampled; this soil fertility data along with relevant retrospective field knowledge, yield expectations, and crop specific needs is then used to determine fertilizer rates. The result of this process is a fertilizer program that not only optimizes economic and agronomic efficiency, but also actively cultivates the improvement of our soil resources. Through the use of several forms of organic matter, soil amendments, and agricultural by-products, Grimmway is constantly reinvesting in the land. The efficient use of valuable water resources coincides with this fertility management system; making use of drip irrigation, cutting edge sprinkler technology, as well as modern piping systems to prevent backflow into underground aquifers. It is and has always been in our best interest to improve the health of all environmental systems to assure long term productivity and production. Grimmway farms strives to develop new ways to plant, cultivate, harvest and distribute crops to be able to meet the food needs of the world's population, while maintaining the integrity of our natural resources and prevent the migration of nitrate into the groundwater.

Farming Division
P.O. 81498 • Bakersfield, CA 93380-1498
tel: (661) 845-5289 • fax: (661) 845-5248
www.grimmway.com

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices. It would seem to make more sense to deal with areas with known nitrate problems on a case by case basis, instead of creating a bureaucratic quagmire for farmers to deal with that does not solve the problem.

I ask that you not adopt the tentative order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Kevin Pascoe
V.P. Farming Operations
Grimmway Enterprises Inc.

From: James Pflugh [mailto:jkpflugh@yahoo.com]
Sent: Monday, April 08, 2013 7:24 PM
To: Sholes, David@Waterboards
Subject: Water Quality Control

To whom It may concern

April 10, 2013
Via Email To:
dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114
Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I have a small farming operation (40 Acres, Permanente crop – nuts)

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

I have limited money and have to watch every dollar I spend, I limit the funds I spend on water & fertilizer and make every dollar count!!

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality.
It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

James K Pflugh

Letter 50

PORTER CITRUS INC.
ESTABLISHED 1908

BLS

SACRAMENTO
RWQCB

13 APR 12 PM 12:52

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

April 9, 2013

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are members Of a Third=Party Group (March 13, 2013)

Dear Board members:

My company is a medium sized family owned citrus growing operation located in the Arvin- Edison area. My family has been in the farming business since the early 1900s. Our operation consists of growing about 350 acres of citrus using micro-jet sprinkler irrigation. We apply 100% of our tree's nitrogen requirements via foliar (not soil) applications of N. This has been the case for at least fifteen years.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalitions Authority and we incorporated their comments on the Tentative Order. I do not believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different from Kern.

As I stated above, we use micro-jet sprinkler systems coupled with moisture reading indicator equipment which read moisture levels at depths of 12, 36 and 48 inches. This allows us to deliver water ONLY to the root zones of our trees. All of our water is sourced from wells. We closely monitor salt levels and Ph levels. All of our nitrogen is applied via foliar applications, not water or soil applications.

As applied in our area, I do not believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past, farming practices did contribute to nitrate contamination of groundwater. However I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Richard T. Porter

Richard T. Porter
President, Porter Citrus, Inc.

PHONE: 661/747.4921 • E-MAIL: bzyfrmr@aol.com • P.O. BOX 535, LAMONT, CALIFORNIA 93241-0535

Letter 51

SACRAMENTO
CVRWQCB

MARICOPA ORCHARDS, LLC

11 PM 12:51

ADMINISTRATION OFFICE
1306 W Herndon Ave, Suite #101, Fresno, CA 93711
Phone (559) 440-8350 • Facsimile (559) 432-2214

FARMING OFFICE
11701 Hwy 166, Bakersfield, CA 93313
Phone (661) 858-2881 • Facsimile (661) 858-4519

APRIL 9, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, Suite 200
Rancho, Cordova, CA 95670-6114

Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

Maricopa Orchards, LLC, C & A Farms, LLC and ACDF, LLC each own land within the area to be governed by proposed General Order for Growers within the Tulare Lake Basin area. The only crops grown by these farming entities are permanent crops on drip irrigation systems.

I am writing to express our objection to the Tentative Order. Our farms are within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are dramatically different than Kern. Because of related entities in that area, we are familiar with the groundwater conditions in that area, especially the depth to groundwater, and they are dramatically different than the Tulare Lake Basin area.

As you must be aware and as was brought to your attention at one of your hearings on the proposed general order, the days of flood irrigation on a vast scale are gone. Due to the high cost of water supplies and fertilizer inputs, there is almost no extra water or fertilizer that is permitted to go beyond the root zone of our crops. All water and inputs are closely monitored and metered through the meters on water district outlets and farm irrigation systems, as well as below ground sensors placed in our orchards to track the depth of water penetration. We have invested significant amounts of money in water sensors and database technology to monitor essentially every drop of water and fertilizer applied to our orchards.

The depth of water penetration is available to our personnel via the internet on a continuous basis for the sole purpose of making sure that we do not over irrigate our lands or allow water to escape beyond the root zone where it would be wasted.

We are not the only farm in our area with this technology since there are multiple companies in the areas in which we farm that provide this service. As farmers with an extremely limited water supply which comes at an expensive price, we are constantly on the lookout for ways to reduce water usage and other inputs. There is no reason we would want to over irrigate and every reason (both for tree health and cost savings) to reduce the amount of water or fertilizer applied to our orchards to the minimum amount required to produce a crop.

Further, several of our farms do not overlie usable groundwater or even any groundwater based on our own research in connection with looking for areas to drill irrigation wells. As a result, the Tentative Order would require us to take actions and incur additional expenses to protect groundwater which is either nonexistent or unusable for farming or domestic use.

As applied in our area, we do not believe the Tentative Order is reasonable. At best, the Tentative Order will require farmers to waste money on compliance that will have no impact on groundwater quality. At worst, the Tentative Order will further the general consensus that governmental regulations are unnecessarily overbroad.

In summary, most of our current farming practices are not having an adverse impact on groundwater quality in the Tulare Lake Basin area and the Board's attempt to regulate areas where the groundwater is over 100 feet below surface, nonexistent or otherwise unusable imposes unreasonable burdens on agricultural businesses. While it may be that past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) for those areas which actually have usable groundwater, the focus of the proposed Order is on current farming practices.

Based on the above, we request that you not adopt the Tentative Order and instead develop, in cooperation with representatives from the KRWCA, a region specific alternative that makes sense for our area.

Very truly yours,

Jon Reiter
Chief Executive Officer

JR: ja

cc: Ernest Conant, Esq.

Jeff Siemens

P.O. Box 471

Buttonwillow, CA. 93206

April 14, 2013

Via Email To:

dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board

11020 Sun Center Drive #200

Rancho Cordova, CA. 95670

Re; Comments of Kern River Watershed Coalition Authority, ie: Tentative Waste Discharge Requirements

Dear Board Members,

I am currently the V. P. of Operations for Nickel Family L.L.C. just East of Bakersfield, growing approximately 1200 acres of citrus, almonds and olives. I was previously a self employed farmer in the Shafter & Buttonwillow areas growing cotton, alfalfa, sugar beets and wheat for 19 years. In both cases irrigation and fertilization are and have been very closely monitored and metered due to the high cost of each and continuous improvement through the utilization of technological advancements in water application methods, soil & petiole sampling & analysis for nutrient requirements, as well as soil moisture monitoring programs have become an economical neccessity and standard operating procedure. When these practices are combined with the depth to water (800 feet East of Bakersfield and 220 to 300 feet to the West) and our average rainfall of 6" or less, leeching Nitrates into the groundwater table via agricultural irrigation is not a reasonable expectation. Because of these facts I would like to urge the Board to not adopt the proposed Tentative Order for the Tulare Basin Area, rather a reasonable alternative that actually applies to our area.

Thank you,

Jeff Siemens

April 3, 2013

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

I own and/or lease 160 acres of almonds and DOV Raisin Grapes in Northern Kern County close to McFarland, CA. These crops are irrigated with various types of irrigation systems including (1) double-line buried drip system, (2) a surface and buried drip line system, (3) fan jet/micro sprinkler systems, (4) and border-check flood irrigation system. We run many of our inputs through the drip/fanjet/micro sprinkler systems. Regarding the orchards with the flood system, we apply our Nitrogen and many other inputs by means of a surface-applied dribble tank and/or material spreader.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

We have limited supplies of expensive water in Kern County, and thus, we don't apply any more water than is necessary. The same can be said of our fertilizer applications. The costs of fertilizer have more than tripled over the last five years. As it is, we don't and haven't used any more water or fertilizer than we need to in order to produce a profitable crop of almonds or raisin grapes. We also don't apply large amounts of fertilizer at any one time, Nitrogen in particular. On our almonds, we have been dividing our Nitrogen needs into five equal applications, one at post-harvest then beginning again throughout the spring and early summer growing seasons. We do this so that we don't apply more Nitrogen at any one time than the trees need. This keeps us from leaching the Nitrogen below the root zone. In our raisin grapes, we use a minimal amount of Nitrogen. We apply approximately 10 pounds of Nitrogen weekly during the spring growing season for approximately 7 weeks beginning the first week of April or so.

Two of the major differences between us and areas North of Fresno are that we receive approximately 1/3rd or less of the annual rainfall of our Northern neighbors, and another is that our water table is at approximately 250 feet below the surface of the soil, considerably deeper than theirs. I have difficulty getting water down to six feet, much less ten, 50, or 250 feet deep. We do our best to apply the least amount of water, Nitrogen, and other inputs as possible, while still maintaining the maximum crop possible. We also work to closely match our irrigations with the amount of ET for our crops throughout the growing season. In doing so, we don't apply any more water than is needed, thus keeping any leaching below the root zone to a minimum. From my observations, we are doing what the better farmers in our area are doing, in terms of splitting our Nitrogen applications and minimizing our inputs while maximizing our profits.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past, farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with representatives from the KRWCA, an alternative that makes sense for our area.

Sincerely,

David M. Snell
Snell Partnership

-----Original Message-----
From: Jay Kroeker [mailto:jaykroeker@gmail.com]
Sent: Friday, April 12, 2013 4:38 PM
To: Sholes, David@Waterboards
Subject: Tentative WDR General Order for Irrigated Lands Regulatory Program

CVRWQCB Board members,

I am writing my comments regarding the tentative agricultural WDRs for possible nitrate levels in the ground water.
The bulk of our family farm is located on the western side of Kern County. We grow almonds, pistachios and oats on the west side ranch. We had grown cotton and alfalfa, but the crop income for those could not pay for the higher surface water costs. Our west side ranch has used surface irrigation water from the State Water Project (SWP), since the SWP was built. Starrh & Starrh Farms started farming on our west ranch location in 1992. Fred Starrh has farmed the same ranch since 1974. The SWP water has always been very expensive, with the cost increasing every year. After 2003, SWP water deliveries were being reduced dramatically, due to "environmental " concerns.
Our farm had to start a water bank account in the Pioneer Water Bank Project, just to be able to survive the SWP entitlement losses we were enduring. 2013 will be the 8th season to fallow over 1500 acres of our irrigated land, in order to have enough SWP water, to farm the balance of our acreage already in permanent crop production. We have been in a deficit irrigation status for many years on our present crops. Our west ranch has also had irrigation water monitoring for many years, because the SWP water deliveries have been expensive. These monitoring results have revealed that the irrigation water applied, has not traveled past the root zone for all the crops that were monitored. There has been a very intense irrigation water and fertilizer usage trial being conducted on our west ranch for over 10 years by the UC Extention, funded by the state of California and other sources. This trial has very detailed mapping of the irrigation water and fertilizer usage in pistachios, cotton and alfalfa. Seminars and workshops have been conducted for several years, using the data from these trial results coming from our west ranch farming operation.

In 2000, we discovered that our ground water had been polluted by the neighboring oil companies, Shell and Mobil, with their oil production waste water that was percolated through unlined waste disposal ponds, located up gradient and adjacent to our farming property. We filed a lawsuit with Aera Energy in 2001 for continuing trespass. We installed monitoring wells as we discovered more about the pollution of our ground water. Our monitoring wells on our property, revealed that the polluted water levels were very close to the soil surface at that time. There was trial evidence showing that the native ground water under our property, before it was polluted, had a useable quality, if blended with

SWP water. Since we
have had dramatically reduced water deliveries, we could have been using this previously unpolluted
native ground water to supplement our irrigation needs by blending with SWP water, helping us get
through the dry years with lower SWP entitlement deliveries. The state of the present ground water
under our property is massively high in concentrations of boron, chlorides and other constituents that
are harmful for growing crops as they reach toxic levels. There is even an elevated amount of radiation
in our ground water now, due to it being already in the oil field waste water, that comes from very deep
in the oil producing zones. Trial evidence has also indicated the role and involvement of the RWQCB in
this trespass incident. This pollution plume will out weigh any other ground water issues if it travels to
ground water underlying municipal areas in Kern County.

Fertilizer is expensive, as are the many other costs of growing a production crop for market. Fertilizer
cannot be wasted by letting it travel past the root zone. We have been diligent on our farm, in
monitoring our nutrient usage through tissue and soil sampling data. When nutrients get close to a level
that is recommended, that nutrient application is decreased or halted, until the tissue data indicates a
decreased recommended level. Then the particular nutrient in question, is applied until it reaches the
recommended level again. We will oppose further regulation of the nutrient monitoring practices that
we already must engage in, to have an efficient farming operation and survive the increasing growing
costs and fluctuating market pricing that always occurs with production agriculture. We don't need
more enemies to agriculture and our freedom.

Starrh & Starrh Family Farms

Letter 55

STIEFVATER ORCHARDS, LP

13 APR 15 PM 2:18
RECEIVED
SACRAMENTO
CVRWQCB

April 9, 2013

Central Valley Regional Water Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

RE: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

We are a farming family growing California Pistachios on the West Side of Kern County, directly south of Lost Hills, California. We obtain limited surface water delivered from the Belridge Water Storage District and blend natural well water.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Water is a precious commodity in our area, as we only receive district allocations of sixty (60) percent in wet years and thirty (30) percent in dry years. To make up the differential required by our permanent crops, outside water purchases are negotiated at $350 to $500 per acre foot. Believe me, we do not waste precious water through the root zone. All calculations are made via water sensors and fertilization is strictly followed at the recommendations of licensed PCAs. Ground water, in all three aquifers, comes from the coast range and has too many minerals for drinking. It is useless, impact farming, with cumbersome regulations, when the natural aquifers, in our area, cannot be used for human consumption.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be, that in the past, farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks), but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with our representatives, an alternative that makes sense for our area.

Sincerely,

Gary Stiefvater

STIEFVATER ORCHARDS, LP
BY: GARY STIEFVATER

*1090 Vallombrosa Avenue * Chico, CA 95926*

*Phone: 530-893-8611 * Fax: 530-893-1240 * E-mail: gssales.gary@gmail.com*

From: Louis Stull [mailto:louis@stullfarms.com]
Sent: Monday, April 08, 2013 1:42 PM
To: Sholes, David@Waterboards
Subject: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I am a Citrus Farmer with a family business in the Bakersfield/Edison Area with nearly 500 Acres. We are historically a family of Naturalists so rational conservation and utilization of the environment is important to us. Our farm is within the Kern River Watershed Coalition Authority. I am extremely concerned with the General Order.

I am writing to express my objection to the Tentative Order. I don't believe the tentative Order is appropriate for our area, which I understand was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern. I understand that the order may be highly appropriate for the East San Joaquin watershed area.

Due to the high cost and scarcity of water as well as the high cost of fertilizer, we use a drip system which incorporates fertilizer application. This ensures that these two precious resources are not squandered. It is in our best interest to keep fertilizer in the root zone as otherwise this is simply money wasted. My understanding and observations are that most (most likely all) of my "neighbors" employ similar practices for the same reason. We do use well water, as well as District Water, so it is in our best interest to ensure that the ground water is not contaminated with anything, nitrate included. I understand that you are concerned with the environment and that too is another factor that we try and take into consideration.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks and city runoff) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for our area.

Sincerely,

Louis Stull
President
Stull Farms

P.O. Box 248
Edison CA 93220

661-872-2099
louis@stullfarms.com

Letter 57

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April 15, 2013

VIA EMAIL

Karl Longley, Chair
Jennifer Moffitt, Vice Chair
Jon Costantino, Board Member
Sandra Meraz, Board Member
Carmen Ramirez, Board Member
Robert Schneider, Board Member
Pamela Creedon, Executive Officer
Joe Karkoski
Clay Rodgers
Adam Laputz
Davis Sholes
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments on the Tentative Order for Growers within the Tulare Lake Basin Area

Dear Board Chair, Board Members, Ms. Creedon, and Messers Karkoski, Rodgers, Laputz and Sholes:

The Southern San Joaquin Valley Water Quality Coalition (SSJVWQC) submits these comments on the Tentative Order for Growers within the Tulare Lake Basin Area (the "Tentative Order"). SSJVWQC is the existing third-party water quality coalition assisting growers in the Southern San Joaquin Watershed area and, at this writing, the entity that intends to submit a Notice of Intent to continue as the third-party coalition to assist its members in the Tulare Lake Watershed area under the applicable new General Order.

The SSJVWQC and its member subcoalitions have participated in many meetings with Regional staff and testified in writing and in presentations before the Board at workshops and at the hearings held in respect to the East San Joaquin General Order. Throughout all these events and in many discussions with the Regional staff, it has always been stated that there would be some general structural conformity between the several emerging General Orders; however, each would be crafted so as to reflect the characteristics of the particular coalition area. This has not yet transpired in respect to the Southern San Joaquin Coalition area, as it seems this approach has been overridden by considerations of absolute uniformity and administrative convenience.

The record is very clear that the Southern San Joaquin Valley Water Quality Coalition area is unique and particularly distinguishable from the East San Joaquin River's area, and therefore many regulatory adjustments must be included to make this general order harmonize with the actual hydrology and conditions in the Tulare Lake Basin area. This would also be required for this order to be in conformity with the statutory requirements of the California Water Code (CWC).

This General Order is predicated on compliance with CWC section 13263, which demands consistency with CWC section 13241 so as to "ensure the reasonable protection of beneficial uses . . . however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses." Similarly, Water Code section 13050(1) defines "pollution," which is what the Regional Board is to prevent, in part as the "alteration of quality of waters of the state by waste to a degree which unreasonably affects …waters for beneficial uses" (emphasis added). CWC section 13300 also limits regulatory actions by demanding they "reasonably considering demands being made on these waters."

For this order to meet this reasonable test, it must reflect the distinguishing characteristics of the Tulare Lake Basin. Some of those factors which are totally inconsistent with the East San Joaquin River area are that these surface waters have few water quality exceedances attributable to agriculture, very few 303d listings and no TMDLs. Our coalition area has fully engaged water districts which have been administering the waiver and will be doing so as to the General Order. The SSJVWQC area is totally covered with SB 1938 management plans and some of the state's leading Integrated Regional Management Plans. As to groundwater, the Tulare Lake Basin has limited rain, limited irrigation volumes, few live water courses running through the coalition area, and some of the state's greatest depths to groundwater. This area leads the state in groundwater banking and in other large areas of the coalition are historic lake beds where salts have accumulated and have impacted groundwater historically.

In order for this General Order to meet its statutory requirement of reasonableness, certain amendments from the provisions of the General Order adopted in the East San Joaquin River area must be included in the Tulare Lake Basin order.

Follows are several points which should therefore be addressed before adoption.

I. NEW PROPOSED FINDINGS

In light of recent discussions, meetings and court decisions, some additional findings would be advisable.

A. The federal Clean Water Act does not regulate non-point source agricultural irrigation. The federal Antidegradation Policy does not apply to groundwater. California, through the Porter-Cologne provisions of the California Water Code and the State Water Board's Antidegradation Policy of 1968 and Non-Point Source Policy, do extend to groundwater. These emerging General Orders are, therefore, the state's initial regulatory effort to deal with agricultural irrigation influences on underlying groundwater. The Central Valley region involves some 8-9 million irrigated acres encompassing over 35,000 farmers operating hundreds of thousands of farm fields. This initial regulatory effort constitutes an aggressive regulatory process, which will over time build on these initial regulatory provisions as further information is gained and additional efforts can be targeted. This is a massive regulatory effort to deal with the nation's initial effort to regulate agricultural irrigation drainage.

B. The Order is an aggressive approach to prohibit the discharge of waste to groundwater.

C. The Order relies on a mix of groundwater monitoring of existing wells in all areas of the coalition and targeted shallow monitoring wells linked to the evaluation of management practices associated with the hundreds of commodities grown in the Tulare Lake Basin.

D. The groundwater trend monitoring provisions couple with management practice implementations and additional targeted groundwater monitoring as an ambitious first regulatory step to assure no further degradation of groundwater.

E. The Order advances a multi-faceted regulatory program involving trend and targeted groundwater monitoring, coupled with identification of Best Management Practices to ensure Best Practical Treatment and Control.

F. The Central Valley of California is renowned worldwide as the most productive food production region of the world. Agriculture is the principal element of California's economy and it is the lifeblood of the Central Valley. The Tulare Lake Basin contains three of the nation's four leading agricultural counties. Fresno, Tulare and Kern Counties lead the nation being the only counties in the nation each exceeding $5 billion in ag production.[1] Correspondingly, agricultural employment in the San Joaquin Valley generally exceeds 220,000.[2] The region is unparalleled in food production, economic contribution and rural employment; therefore, maintaining the region's viable agricultural industry is of maximum benefit to the state's public interest.

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[1] California County Agricultural Commissioners Reports 2011 (published December 17, 2012).
[2] North American Industry Classification System Reports of California EDD.

II. WASTE DISCHARGE REPORT – GENERAL ORDER - FINDINGS

1. Pages 1 and 2 - All Irrigators are not Dischargers.

The Tentative Order seems to asserts, without evidence or scientific support, that all irrigators are potential dischargers of waste to groundwater, regardless of soil types, depth to usable groundwater, field practices and other conditions. The Kern subcoalition has recently arranged for several experts to submit data and testimony to this Board, specifically indicating that in many areas of our coalition it takes 50 or more years for any irrigation water to descent to aquifers and in other areas it is unlikely that such "discharge" ever occurs; therefore, the Board has either limited or no jurisdiction over these areas. The Regional Board must provide evidence to support this assertion of discharge to waters of the state and, without it, prescribe conditions that scientifically support the surface to groundwater connection.

2. Page 1, Footnote 1; Page 2, Finding 6 – Waste.

Finding No. 1 references that the Tentative Order applies to "waste" discharges. Footnote 1 provides that Attachment E defines the term "waste". Attachment E provides that the California Water Code defines "waste" in section 13050(d). Attachment E, however, goes well beyond statutory definition of "waste", and therefore is not the definition that is being used in the General Order. The Water Code defines "waste" as

> includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

The Tentative Order, however, expands that definition of "waste" so as to include

> earthen materials (such as soil, silt, sand, clay, rock), inorganic materials (such as metals, salts, boron, selenium, potassium, nitrogen, phosphorus), organic materials such as pesticides, and biological materials, such as pathogenic organisms. Such wastes may directly impact beneficial uses (e.g., toxicity of metals to aquatic life) or may impact water temperature, pH, and dissolved oxygen.

The Board has not provided the basis and authority for departing from the definition of waste provided by the Legislature in the Water Code. SSJVWQC requests that the Board present the authority that allows it to circumvent the State Legislature so that the public may review and comment.

Further, the definition of "waste" in the Tentative Order is ambiguous. The definition does not explain how or when sediment, nitrate or any other constituents become a "waste." If the constituent does not exceed the Basin Plan objective or trigger limit, does the Tentative Order label it a "waste"? These points need to be expressly identified and clearly stated in the General Order.

If the surface waters applied for irrigation of crops does not contain a constituent that exceeds the Basin Plan water quality objectives, or if such discharge is not classified as a "waste" as defined by Porter-Cologne [CWC, § 13050(d)], there seems to be no authority for the Regional Board to regulate or require a report of waste discharge, nor is there authority for the Board to control a landowner's operations.

3. Page 2, Finding 5, and Footnote 2 – Scope.

Finding 5 provides that the Tentative Order does not "regulate water quality as it travels through or remains on the surface of a Member's agricultural fields or the water quality of soil pore liquid within the root zone?" Footnote 2 provides that "[w]ater that travels through or remains on the surface of a Member's agricultural fields includes ditches and other structures (e.g., ponds, basins) that are used to convey supply or drainage water within that Member's parcel or between contiguous parcels owned or operated by that Member." Footnote 2 is helpful, but may remain somewhat ambiguous as to its trailing language, "owned or operated by that member." That should not be construed to mean the structure must only be owned by a single member.

Additionally, manmade conveyance structures, distribution systems, ancillary structures and canals are not waters of the state, irrespective of their size. If a farm has large retention ponds, or wide conveyance canals or distribution systems, that does not change their character as farm distribution or ancillary irrigation structures. Accordingly, the Tentative Order should state that it does not apply to manmade conveyance structures, distribution systems, ancillary structures and canals.

4. Page 3, Finding 12 and Attachment A, Page 24 – Small Farms.

We support the additional flexibility afforded the small farmers. Care should be given, however, to assure this now bifurcated system has the time deadlines sequenced so that this does not create unreasonable duplicative obligations on the coalitions at the same or overlapping times.

Additionally, the acreage and grower figures in Finding 12 should fully harmonize with the cost figures in Finding 39, addressed below.

5. Pages 3 and 4, Findings 13 and 14, (also Page 24, Section VII.A. on Reports).

There are nearly two million irrigated acres in the Southern San Joaquin which will have to be brought into the Regional Board's jurisdiction and this ILRP for the very first time. This is equivalent to the total size of the East San Joaquin, the San Joaquin and Delta, and the San Joaquin River Coalition combined areas. This effort is unique to our coalition, and is over and above the efforts of signing up the existing members. This will require extraordinary efforts by the coalition, and calls for total coordination and joint effort with the Regional staff. Therefore, this requirement needs to be afforded at least 180 days. We appreciate the proposed amendment to extend the member sign-up to 150 days; however, that is still insufficient and will merely result in many (perhaps hundreds) of operations being outside the coalition and order's coverage, and therefore those properties will become the responsibility of the Regional staff to impose individual WDRs on those operations, many of which will be very small operations.

6. Page 5, Finding 17 - Nitrate Exceedances.

Nitrates should not generally be classified as contaminants unless they cause or contribute to an exceedance of a water quality objective in a water of the state as so stated. It should also be balanced, however, by also stating that nitrate is the most essential nutrient for life and growth and that nitrogen is the most prevalent element in our atmosphere.

We have no problem with the first several lines before the footnote, which factually reflect the objective levels. The language which follows the footnote is background only, rather than a statement of the objective. That language should be in a separate paragraph or separate number altogether.

7. Page 6, Finding 21 - Section 13267 Reports.

Under Porter-Cologne, the Regional Board, or the Executive Officer through its delegated authority, have the authority to require technical reports, as necessary, under section 13267. However, section 13267 is not without limits. When the Regional Board is issuing such an order, section 13267 requires the Regional Board to show "[t]he burden on discharges of the Order, including costs to develop these reports which must bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports. In requiring these reports, the statute compels that the regional board shall provide the person with a written explanation with regard to the need for the reports, and shall identify the evidence that supports requiring that person provide the reports." (Wat. Code, § 13267(b)(1).) These requirements should be reflected in Finding 21.

8. Page 6, Finding 22 - Vulnerability.

We support the amendment clarifying that it is the coalitions who are charged with identifying their high vulnerability areas. The language can be read, however, that this is a false give as the revised language gives the Executive Officer total discretion to set these areas. Language needs to be added stating that, "the Executive Officer, upon review and making a finding that the proposed high vulnerability area is significantly inadequate, may make an amendment."

9. Page 7, Finding 24 - Water Quality Objectives.

The confusion as to the proper EC objective level needs to be clarified such that the general objective is 1000 EC unless there is a sensitive crop in the area, where the level would then be 700. Also, such sensitive crops need to be expressly identified.

The Tentative Order also need to include a provision to provide relief from several provisions of the Tentative Order dealing with groundwater for those areas where groundwater already exceeds water quality objectives and for water for which there is no actual beneficial use.

10. Page 9, Findings 34, Page 11, Finding 39 – The Inadequate EIR Alternative. Adoption.

Finding No. 34 and 39 incorrectly state that there were "2-6 alternatives in the EIR". This is expressly false, as only five alternatives were advanced and reviewed. This fact is well known by staff; however, they insist on continually advancing this falsehood. As the Board is aware, this matter is presently before Superior Court Judge Frawley, and his tentative order, the discussion at hearing and his supplemental brief order all indicate the EIR will be overturned expressly on this point and it will be required to recraft this EIR accordingly.

11. Page 10, Findings 37 and 38 – High Quality Water.

In 1968, the State Board wanted to provide special protection for the state's pristine "high quality waters," as distinct from mere "quality waters," which would be those represented by waters meeting the Basin Plan standards. For those pristine high quality waters, the antidegradation policy provided for specific regulatory efforts. This General Order should identify those waters which are classified as high quality, and those which are only quality waters. Certainly, the ag water in our distribution, conveyance and drainage systems are not pristine high quality water. Our Tulare Lake basin plan expressly states that some surface waters are not even suitable for some beneficial uses and it is widely recognized that much of the Southern Valley's ground water is not high quality. Consequently, these 1968 high quality waters must be specified.

12. Pages 10 and 11, Finding 39 – New Costs of Compliance.

Each recent version of the General Order has presented different figures for new costs associated with the new General Order. The actual EIR economic analysis targeted that this would require a new cost of $19 per acre. We have previously indicated that this $19/ac is under-evaluated. This most recent finding asserts that some $15.87 is presently borne for the current surface water waiver. This is certainly not true even where the surface water program applies, and our coalition has well over a million acres which are not in the existing program, which totally belies this analysis. All costs will be new as to those farmers.

There is also a discrepancy between the finding language and recent representations made at our sessions with Regional Board staff. It was represented that this cost finding anticipates only the costs of the third party coalitions and not the overall farmer compliance costs. Our sub-coalitions have analyzed these additional coalition costs of this new General Order and believe these new coalition costs will initially be between $4 and $5 per acre. The actual text language, however, asserts that these figures also cover the grower compliance for new monitoring wells and implementation of management practices. This is totally untrue. Such compliance costs are over and above the coalition costs addressed by this finding.

13. Page 11, Footnote 12 – Manner of Compliance.

This footnote is appropriately added and we concur that the Water Board cannot dictate to farms the specific manner of compliance with water quality objectives.

14. Page 11, Finding 39 – CWC Section 13141 Applicability.

Section 13141 of the Water Code states that "prior to implementation of any agricultural water quality control program, an estimate of the total cost of such a program, together with an identification of potential sources of financing, shall be indicated in any regional water quality control plan." (Wat. Code § 13141.) The fact that the long-term irrigated lands regulatory program is being implemented through a series of waste discharge requirements does not negate the applicability of section 13141 of the Water Code. Regardless, the costs of this program are significant and need to be considered by the Regional Board in its adoption of the Tentative WDR and all its requirements. By the Board's own assertion, thousands of acres would be regulated out of business, and the real costs will augment that impact greatly.

15. Page 12, Finding 42 – CV-SALTS.

The CV-SALTS process is not a codified regulatory program; therefore, it is improper to state that this order would be amended to conform to actions of an unofficial stakeholder process. The statement that salts and nitrates are "increasing" in the region, is not believed to be universally true, therefore it is improper to include that statement in a Finding.

Lastly, the proposal identified "reduction of salt imported with out-of-basin water supplies" as the only remedial option is inadequate. It should at least also identify salt disposal as an important remedy option.

16. Pages 12-13, Finding 44 – Coordination with the Dairy Order.

There has been considerable uncertainty regarding the interface of the Dairy Order and the existing ILRP waiver. This has been particularly evident involving the dairy operations' farm properties, whether they spread manure on such property or not. It has been stated by staff that the Dairy Order would be amended to require similar testing for constituents as required by this order, but that has yet to be accomplished by the Board.

17. Page 14, Findings 50 and 51 – Enforcement.

These Findings regarding enforcement clearly indicates that the Regional Board intends to hold growers responsible for meeting water quality objectives at the end of the field, and that the failure to do so will result in a priority enforcement action. End of field discharge limitations are not, nor have they ever been, appropriate waste discharge requirements. Such limitations are unreasonable and fail to comply with the Legislative intent of Porter-Cologne. By creating such limits here, the Regional Water Board is embarking on a completely different regulatory program than that which was evaluated in the Programmatic Environmental Impact Report, or as is conveyed publically to growers and Regional Board members. This is merely one example where the staff alternative adopted by the Regional Board went well beyond the five alternatives reviewed in the EIR.

18. Page 15, Finding 51b - Edge of Field Discharge.

Regulation at the end of the field is inappropriate and exceeds the Regional Board's authority. First, the Porter Cologne Water Quality Control Act (Porter-Cologne) states that "activities and factors that may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is <u>reasonable, considering all demands</u> being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." (Wat. Code, § 13000.) Regulating water quality directly at the end of the field is NOT reasonable and directly violates the legislative intent with respect to Porter-Cologne control of non-point discharges. Second, waste discharge requirements must be related to the conditions in the receiving waters upon or into which the discharge is made, or is proposed. (Wat. Code, § 13263(a).) Irrigation return flows or stormwater leaving a field may or may not discharge to or affect a water of the state. This is particularly true of the SSJVWQC coalition where about half of the irrigated lands do not drain to surface water and many of our irrigation wells exceed 800 feet. Accordingly, it is inappropriate to set forth requirements that specifically apply to water leaving the field.

III. WASTE DISCHARGE REPORT PROVISIONS

19. Page 18, Section III.A. and B. – Grower Responsibility for Each Molecule. Page 18, Section III.C - Ensure

The language “cause or contribute” to an exceedance is overbroad. It should state merely “cause” because a single molecule or grain of sediment would be a “contribution” to the exceedance, and that should not make a farmer wholly responsible. The “contribute” language is apparently sourced from non-applicable provisions of federal regulations and must be stricken. There is no federal or state law that compels this “no contribution” provision. If the groundwater is at its objective level, no further contribution would be allowed. If the groundwater is not at its objective level, then any contribution which does not exceed the objective would be lawful.

The word “ensure” in III.C. requires a “guarantee,” which is an unreasonable standard to utilize in this context. At our recent meeting, staff seemed open to more reasonable terms.

20. Page 19, Section IV.B.6. – Sediment.

Add the clarifying words “as a result of irrigation” to the following quote: “All Members shall implement effective sediment discharge and erosion prevention practices to minimize or eliminate the discharge of sediment above background levels as a result of irrigation.”

21. Pages 21-22, Section IV.C.9 – Coalition Reporting/Enforcement.

This section is a serious overreach as it compels coalitions to assume the reporting/enforcement of the General Order. Since the outset of the Region’s ag waiver in 2004 it was a fixed agreement that the coalitions will not be the enforcing agency. The first phrase (reporting on the members implementing farm practices) will not be known by the coalition and they should not be the farm cop. The second phrase (report on farmers failure) is also likely unknown and it is improper to call for the coalitions to be the general order police. The forth and new provision calls for conformation of participation at meetings. This is inconsistent with section IV.B.4. and this should be modified to be consistent therewith. The coalition will not know all the water training sessions the farmer will attend as many different parties will conduct these sessions.

22. Page 22, Section IV.C.11 - Requirements for the Third-Party Group – Fees.

The present language states:

> Collect any fees from Members required by the State Water Board pursuant to the fee schedule contained in Title 23 CCR. Such fees shall then be submitted to the State Water Board. The fees invoiced by the State Water Board will be based on the Membership List submitted by the third-

> party group. The third-party group is responsible for ensuring the Members identified in the Membership List have provided their required portion of the State Water Board fees.

The coalition is only the depositary for required fees submitted; but is not the collection agency for the State Board. The coalition remits to the state those fees paid through them. The Member is the responsible party for paying the fee. Therefore, the State should act as a collection agency not the coalition.

23. Page 22, Sections V.2, 3, 4 – Effective Dates.

The initial enrollment period needs to be extended from 150 days to 180 days. The SSJVWQC will have to enroll from one to two million irrigated acres that have not previously been subject to these Regional Board Orders. (See point 5 above.)

24. Page 24, Section VII.A. - Required Reports and Notices-Members.

The Notice of Confirmation/Notice of Intent/Membership Application language should be modified as follows:

> "Beginning 180 days after the Executive Officer issuance of a NOA to the third party, any growers within this Order's boundaries that are not yet Members of the third-party or a Coalition governed by the Coalition Group Conditional Waiver must submit…"

We should also add a new provision on page 24:

> "Any landowner or grower that either regains control or acquires control through a leasehold interest for land previously covered by this Order may be covered by providing within 180 days a completed membership application to the third party containing the information and certifications required in Section VII A. 2."

25. Page 26, Section VII, C.1. – Sediment Control Plan.
Page 26, Section VII, D.1.c. – Low Vulnerable Area Reports

The Sediment Water Management Plan (SWMP) is a new requirement which has not had sufficient discussion or understanding on what triggers the report or as to its content. It is peculiar that the small farmers in low vulnerable areas have only one year to submit their plans. This period should be lengthened. We appreciate the amendments to the plan requirements and the self-certification provisions.

As to reports by members in low vulnerable areas, it seems it is regulatory overreach to identify areas without significant contribution to nitrate groundwater problems and notwithstanding require them to prepare the same burdensome reports on nitrates as areas associated with nitrate problems.

26. Page 29, Section VIII.C. – Required Reports and Notices – Third Party.

These templates are now to be developed by the coalitions as is reflected in section C.1. It is appropriate for the coalitions, coordinating together, to develop these templates. (See our detailed discussion under the MRP, points 37, 38 and 39.) The MRP language is problematic as staff have now inappropriately reversed their position on these templates several times.

27. Pages 29 - 31, Section VIII.D. and Footnote 26, Page 32 – Groundwater Quality Management Plans.

It is unclear as to what constitutes a <u>groundwater</u> exceedance. It should be made clear that for this Order a groundwater exceedance is limited to a drinking water nitrate basin plan exceedance when it reaches a usable aquifer.

Groundwater quality conditions are contributed to by widespread non-point sources over wide geographical areas, perhaps far removed from the monitoring point, and perhaps many years prior. Therefore, they do not lend themselves to the same "management plan approach" as surface water.

The Trend Groundwater Monitoring Program is designed to determine baseline quality of groundwater in the third-party area, and to develop long-term groundwater quality information that can be used to evaluate the regional effects (i.e., not site-specific effects) of irrigated agriculture and its practices. Long periods or many decades may be needed depending on the hydrogeologic setting. Groundwater trend monitoring describes water quality results collected over a long period that are symptomatic of practices associated with regional land uses. The groundwater actually measured may have sourced many miles away, some 20 to 30 years previous.

The groundwater plans should identify areas where the coalition should concentrate its efforts on education and outreach to its Members, as well as identifying appropriate management practices for implementation. These areas would be prioritized based on a number of factors, including but not limited to, groundwater monitoring information, locations to urban areas, constituents of concern, and other influences.

28. Page 31, Section VIII.H.1. – SQMP/GQMP.

The second paragraph calls for the coalition to also submit their SQMP/GQMPs dealing with salt or nitrates to the CV-SALT Program. It is improper for a regulatory program to compel coalition or farmer filings to an unofficial non-regulatory group. (See point 15 above.)

29. Pages 32 and 33, Sections VIII.H.2 and 3 - SQMP/GQMP - Aquifer Ambient Conditions.

The following sentence should be added at the end of the section:

> "A GQMP may not be required if the Executive Officer determines that ambient background water quality exceeds (is better than) water quality objectives or if the beneficial uses have been de-listed through the Basin Plan amendment process."

30. Page 34, Section IX.2. – Reporting Provisions.

It needs to be clarified that the third party coalition managers are authorized to sign such reports.

31. Page 34, Section IX – Filings by Members.

This provision calls for the members to file reports. It does not, however, appear that the members are required to directly file <u>any</u> reports to the Board. If that is now not the case, why have this provision?

32. Page 34, Section IX.3. – Certifications.

The certification language raises particular problems in light of the extensive amendments in the General Order. The first clause of the second sentence should be eliminated as it would compel the coalition to affirmatively "inquire of the member farmers" as to their filed information. This is an unnecessary and problematic clause. Therefore, strike these words.

33. Page 36, Section XII. – Time Schedule.

The regulatory requirement that all surface and groundwater tests must not exceed required standards within ten years is unreasonable as to surface water and is totally improper as to groundwater. That has been directly expressed in the Harter report, and elsewhere, where he has publicly recognized these types of regulations will not have favorable impact on aquifers for perhaps 40 years. The ten-year restriction must be amended.

Irrigated agriculture is in compliance with water quality objective limitations if its discharges are not the principal cause, or do not significantly contribute to water quality objective exceedances even if the surface water or groundwater in question does not meet applicable water quality standards. The time schedules for compliance must also be specifically related to causing or significantly contributing to exceedances and not guaranteeing full compliance in the receiving water itself.

34. The Water Code Prohibits Unreasonable Regulations.

Throughout the Porter-Cologne Act, there is an underlying requirement of reasonableness to the regulation of water quality in the state. For example, under section 13300, the State may only regulate water quality "reasonabl[y], considering all demands being made and to be made on those waters." Similarly, under section 13050, "pollution means any alteration of the quality of water which may unreasonably affect" the waters of the state. While each regional board is required to ensure the "reasonable protection of beneficial uses,…it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses." (§ 13241 [setting forth the Act's water quality objectives].) These multiple references to reasonableness indicate the legislature's desire for moderation and balance. This General Order falls well short of that statutory requirement.

IV. MRP, ATTACHMENT B

35. MRP, Page 17, Section IV.A.5. – Irrigated Acres Information.

The MRP calls for the coalition to identify the commodities making up 80% of the coalition (or subcoalition) area in the high vulnerable areas. This is reasonable, but it goes on to also require review of the "irrigation and fertilization practices." It must be understood that because there would be several hundred combinations of such practices employed this report will by necessity be both general and summarized.

36. MRP, Pages 17 and 18, IV.B. – Achieving Objectives.

This section uses overly strong language. It requires the development of a work plan that will "achieve the MPEP requirement." It should be softened to something like "may lead to," "may," or "is likely to achieve" such requirements.

37. MRP, Page 18, Section IV.B.1 – Mass Balance.

The new bullet calls for calculating "mass balance models." Not only is this impossible, but is an unreasonable regulatory demand. It has also been stated in several meetings that staff would eliminate these mass loading and ratio references/requirements; however, this has not been done. In our more recent discussions with staff, they have been unable to clarify how a farmer would calculate mass balance analysis of nitrate use, uptake or loss.

At our most recent meeting with staff there was much confusion as to what is even to be required. Additionally, there has been no one at the Board who can even offer an opinion, much less definitively describe how the following language will be interpreted or how it can reasonably be complied with. "A mass balance and conceptual model of the transport, storage, and degradation/chemical transformation mechanisms for the constituents of concern…"

38. MRP, Pages 17, 18, Section IV.B.1 – Coalition MPEP.

The new language would compel reports identify site-specific and/or commodity-specific management practices. The staff continues to fail to understand that there are dozens of farm management practices, often varying between fields of the same farmer and same commodity. It is both unreasonable to require each management practice to be evaluated and nonsensical to demand some determination of each practice's connection to groundwater protection.

39. MRP, Pages 23, 24, Section V.C (Report 17) – Nitrogen Data.

The new language requires the coalitions to summarize several items which are excessive and unreasonable obligations. Those include:

1. Input, uptake and loss of nitrogen fertilizer.
2. Comparisons of the management of farms growing the same crops.
3. Summary of "nitrogen consumption ratios," "crop nitrogen needs."
4. Nitrogen conservation ratio (total nitrogen available vs. crop consumption).

It then requires summarizing at the township levels. Township summarizing is the right level, but the four components above are excessive.

40. Attachment E, Page 5, Section 39 – Subsidiary.

What is the purpose of the detailed definition of a subsidiary operation?

41. Attachment E, Page 5, Section 41 – Surface Water.

This definition of surface water points out that this may include waters in the agricultural drains and agricultural dominated waterways and irrigation channels. It needs to be recognized, however, that most of these surface waters are not waters of the state and therefore not subject to this General Order. This needs to harmonize with point 3 above.

42. Attachment E, Page 6, Section 47 – Waste.

See our comments in point 2 above.

Sincerely,

William J. Thomas
for BEST BEST & KRIEGER LLP

WJT:lmg

April 14, 2013
email to: dsholes@waterboards.ca.gov
Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, Ca. 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge
Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members:

My name is Daniel Tran, President of LT Farm, Inc. I raise Asian Vegetables year around in the Arvin, Ca., area.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority and we incorporate their comments on the Tentative Order. I don't believe the Tentative Order is appropriate for our area, which, I understand, was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than in Kern.

Since our business is very competitive, we carefully consider expenses in growing our crops. We use the minimum amount of fertilizer and crop protection materials. Our crops are irrigated with sprinklers, using only what is needed to activate nutrients and keep the plants from wilting, and preventing run-off.

I don't believe the Tentative Order is reasonable in our area. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that, in the past, farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks), but, I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead, you develop, in cooperation with our representatives, an alternative that makes sense for our area.

Thank you for your time and consideration of my request.

Sincerely,

Daniel Tran
President
LT Farm, Inc.

April 12, 2013

Via Email To:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I own and operate a 105 acre wine grape vineyard) adjacent to the city of Arvin in Kern County (APNs 189-352-12 and 189-352-14).

I am writing to express my objection to the Tentative Order. Our vineyard is within the Kern River Watershed Coalition Authority and would be subject to the Tentative Order. I don't believe the tentative Order is appropriate for our area. I understand the order was first developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

The vines are covered 100% by a drip irrigation system so we rarely if ever flood irrigate. Our flat terrain is such that irrigated waters (flood or drip) **never** leave our property. The flat terrain is typical of the Bakersfield Arvin area, so, like my neighbors, our runoff is very well controlled and non-existent.

We draw all water from our own, recently drilled, deep well, which has a standing water level in excess of 200 feet. Hence, there is extensive filtration of the low volume drip waters prior to reaching the water table. Water analysis shows that we have reasonably low nitrate levels; we even attempt to take those levels into consideration when establishing our chemical program.

As you can see, we have gone to significant expense to establish farming practices that carefully manage fertilizer and limited water supplies. We farm with a goal of limiting fertilizer applications so there is no significant leaching below the root zone. My farm manager, who operates well in excess of 1,000 vineyard acres in the Bakersfield/Lamont/Arvin area, uses these practices throughout his properties.

We carefully guard selected cultural practices with regard to timing and relative application amounts. We consider these practices as proprietary and are fearful that they may be disclosed in records or reports available to the public.

From a broader perspective, I am not clear on what the discharge objectives are and specifically what is the impact of our area's unique circumstances. It appears the board is attempting to establish a "one size fits all" which is likely to impose inconsistent, unnecessary and costly burdens on each of us. While we all have a vested interest in preserving the environment, we should do so in a fashion that does not impose any unnecessary hardship.

In Summary:

- Given our flat terrain, drip systems, management practices, and our area's deep standing water levels, it is difficult for me to understand how my practices can have any impact on either ground water or surface water.

- I object to the imposition of burdensome order, which requires a costly process, and which will draw upon and divert my limited manpower and resources to prepare reports, submit reports, hire consultants, and fund intermediary groups to represent my interests.

- Further, I am fearful that some of our proprietary practices, with regard to the timing and relative amounts of certain applications may be disclosed in public records or reports.

- As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on either groundwater or surface water quality.

Recommendation:

- Do not adopt the Tentative Order

- Consider either abandoning the order or exempting drip-irrigated properties in our area from any order.
    - Exempting drip growers could be an incentive for non-drip growers to install drip systems. This would be a positive move for better water management in Kern County and thereby further progress towards our irrigated lands objectives.

Please feel free to contact me regarding these comments

Sincerely,

Donald Urfrig

2910Club Drive
Los Angeles, CA 90064
310.497.3117 (Cell)
310.837.2222 (Res)

Letter 60

HANDEL AND WILSON FARMS, L.L.C.

GROWERS OF ALMONDS, GRAPES, COTTON & POTATOES

(661) 746-4423 • (661) 746-1620 FAX

P.O. Box 699, Shafter, California 93263

April 12, 2013

Via Email To:
dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board
11020 Sun Center Drive, #200
Rancho Cordova, CA 95670-6114

RE: Comments regarding Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

I represent a family farming operation that has farmed in the Shafter area for over 90 years. Our operation grows grapes, almonds, potatoes, carrots, and miscellaneous crops.

I am writing to express my objection to the Tentative Order. Our farm is within the Kern River Watershed Coalition Authority (KRWCA) and we incorporate their comments on the Tentative Order. I understand the Tentative Order for the KRWCA area is nearly identical to the one developed for the East San Joaquin watershed, North of Fresno, where conditions are significantly different than Kern.

Due to the high cost & limited supply of water, we are very careful in irrigation not to apply more water than necessary. We have 500 acres under micro irrigation and another 300 acres under sprinklers. Daily ET values are used to determine irrigation needs. Likewise fertilizer needs are determined by soil and petiole testing to ensure proper amounts. We are not unlike our neighbors who also employ similar techniques to measure water and fertilizer.

As applied in our area, I don't believe the Tentative Order is reasonable. Based on my personal experience, current farming practices are not having an adverse impact on groundwater quality. It may be that in the past farming practices did contribute to nitrate contamination of groundwater (along with other causes, such as septic tanks) but I understand the focus of the proposed Order is current farming practices.

I ask that you not adopt the Tentative Order and instead you develop, in cooperation with representatives from the KRWCA, an alternative that makes sense for our area.

Sincerely,

Stanley D. Wilson

Stanley D. Wilson
Manager

Letter 61

Gardiner Farms

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 1S, 2013)

Dear Board Members,

Gardiner Farms is a 3rd generation land owner who operates 2500 acres of irrigated almonds and row crops. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

Based on our personal experience, our current farming practices are not having an adverse impact on groundwater quality. Past farming practices may have contributed to the nitrate contamination of the groundwater, hence we have a legacy issue. However, our understanding is that the Tentative Order is focusing on current farming practices. These practices have been implemented to achieve greater efficiencies through intentional water and fertilizer placement. Engineered irrigation systems have been installed to achieve 95-98% irrigation efficiencies. These irrigation systems are design to be precise in their placement of water, leaving very little room for irrigation water to be wasted through leaching or run-off. With improved water efficiencies, it has allowed us to better regulate our applications of fertilizers. Fertilizers are now metered in smaller doses and only applied at critical growth stages in the plant's life cycle. Overlay these highly precise irrigation systems, with real time irrigation monitoring systems; we are able to monitor three critical root depths. This allows us to design the frequency and duration of irrigations so the soil is positioned for maximum yields. Using this scientific approach, we are able to achieve greater water, energy, and fertilizer efficiencies, which convert to savings.

California agriculture, and more specifically Kern County agriculture, is a bread basket to the world. We focus our attentions everyday on sustainable practices resulting in efficient operations, while protecting our employees and the environment at the same time. The Tentative Order is not designed to achieve the intended outcomes, while placing a significant burden of expense and time on growers. We ask that you NOT adopt the Tentative Order as structured. Instead, an alternative needs to be developed, in cooperation with representatives from the KRWCA that appropriately addresses our area to achieve the goals of your Agency.

Sincerely,

Geordy Wise

Geordy Wise
Gardiner Farms, Ranch Manager

P.O. Box 1200, Wasco, CA 93280 Tel. 661-587-2250
Fax 661-587-2254

Letter 62

King & Gardiner Farms, LLC

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members,

King & Gardiner is a 3rd generation land owner who operates 2100 acres of irrigated almonds and pistachios. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

Based on our personal experience, our current farming practices are not having an adverse impact on groundwater quality. Past farming practices may have contributed to the nitrate contamination of the groundwater, hence we have a legacy issue. However, our understanding is that the Tentative Order is focusing on current farming practices. These practices have been implemented to achieve greater efficiencies through intentional water and fertilizer placement. Engineered irrigation systems have been installed to achieve 95-98% irrigation efficiencies. These irrigation systems are design to be precise in their placement of water, leaving very little room for irrigation water to be wasted through leaching or run-off. With improved water efficiencies, it has allowed us to better regulate our applications of fertilizers. Fertilizers are now metered in smaller doses and only applied at critical growth stages in the plant's life cycle. Overlay these highly precise irrigation systems, with real time irrigation monitoring systems; we are able to monitor three critical root depths. This allows us to design the frequency and duration of irrigations so the soil is positioned for maximum yields. Using this scientific approach, we are able to achieve greater water, energy, and fertilizer efficiencies, which convert to savings.

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Sincerely,

Geordy Wise

Geordy Wise
King & Gardiner, Ranch Manager

P.O. Box 1200, Wasco, CA 93280
Tel. 661-587-2250 Fax 661-587-2254

PACIFIC AG
Management Inc.

Tel: 661-587-2250
Fax: 661- 587-2254

P.O.Box 1200
29341 Kimberlina Rd.
Wasco, CA 93280

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members,

Pacific Ag Management Inc. is an agricultural development and farm management company operating 12,000 acres for our clients. Clients, which are either new, or 2nd and 3rd generation land owners. Our goal is to manage their properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

Based on our personal experience, our current farming practices are not having an adverse impact on groundwater quality. Past farming practices may have contributed to the nitrate contamination of the groundwater, hence we have a legacy issue. However, our understanding is that the Tentative Order is focusing on current farming practices. These practices have been implemented to achieve greater efficiencies through intentional water and fertilizer placement. Engineered irrigation systems have been installed to achieve 95-98% irrigation efficiencies. These irrigation systems are design to be precise in their placement of water, leaving very little room for irrigation water to be wasted through leaching or run-off. With improved water efficiencies, it has allowed us to better regulate our applications of fertilizers. Fertilizers are now metered in smaller doses and only applied at critical growth stages in the plant's life cycle. Overlay these highly precise irrigation systems, with real time irrigation monitoring systems; we are able to monitor three critical root depths. This allows us to design the frequency and duration of irrigations so the soil is positioned for maximum yields. Using this scientific approach, we are able to achieve greater water, energy, and fertilizer efficiencies, which convert to savings.

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Sincerely,

Geordy Wise

Geordy Wise
Sr. V.P. Farming Operations
Pacific Ag Management Inc.

Letter 64

ROSEDALE RANCH

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members,

Rosedale Ranch is a 3rd generation land owner who operates 2800 acres of irrigated almonds. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

Based on our personal experience, our current farming practices are not having an adverse impact on groundwater quality. Past farming practices may have contributed to the nitrate contamination of the groundwater, hence we have a legacy issue. However, our understanding is that the Tentative Order is focusing on current farming practices. These practices have been implemented to achieve greater efficiencies through intentional water and fertilizer placement. Engineered irrigation systems have been installed to achieve 95-98% irrigation efficiencies. These irrigation systems are design to be precise in their placement of water, leaving very little room for irrigation water to be wasted through leaching or run-off. With improved water efficiencies, it has allowed us to better regulate our applications of fertilizers. Fertilizers are now metered in smaller doses and only applied at critical growth stages in the plant's life cycle. Overlay these highly precise irrigation systems, with real time irrigation monitoring systems; we are able to monitor three critical root depths. This allows us to design the frequency and duration of irrigations so the soil is positioned for maximum yields. Using this scientific approach, we are able to achieve greater water, energy, and fertilizer efficiencies, which convert to savings.

California agriculture, and more specifically Kern County agriculture, is a bread basket to the world. We focus our attentions everyday on sustainable practices resulting in efficient operations, while protecting our employees and the environment at the same time. The Tentative Order is not designed to achieve the intended outcomes, while placing a significant burden of expense and time on growers. We ask that you NOT adopt the Tentative Order as structured. Instead, an alternative needs to be developed, in cooperation with representatives from the KRWCA that appropriately addresses our area to achieve the goals of your Agency.

Sincerely,

Geordy Wise

Geordy Wise
Rosedale Ranch, Ranch Manager

P.O. Box 1200, Wasco, CA 93280 Tel. 661-587-2250
Fax 661-587-2254

Sierra Land & Farming, LLC

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 1S, 2013)

Dear Board Members,

Sierra Land & Farming is a partner who operates 250 acres of irrigated almonds. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

Based on our personal experience, our current farming practices are not having an adverse impact on groundwater quality. Past farming practices may have contributed to the nitrate contamination of the groundwater, hence we have a legacy issue. However, our understanding is that the Tentative Order is focusing on current farming practices. These practices have been implemented to achieve greater efficiencies through intentional water and fertilizer placement. Engineered irrigation systems have been installed to achieve 9S-98% irrigation efficiencies. These irrigation systems are design to be precise in their placement of water, leaving very little room for irrigation water to be wasted through leaching or run-off. With improved water efficiencies, it has allowed us to better regulate our applications of fertilizers. Fertilizers are now metered in smaller doses and only applied at critical growth stages in the plant's life cycle. Overlay these highly precise irrigation systems, with real time irrigation monitoring systems; we are able to monitor three critical root depths. This allows us to design the frequency and duration of irrigations so the soil is positioned for maximum yields. Using this scientific approach, we are able to achieve greater water, energy, and fertilizer efficiencies, which convert to savings.

California agriculture, and more specifically Kern County agriculture, is a bread basket to the world. We focus our attentions everyday on sustainable practices resulting in efficient operations, while protecting our employees and the environment at the same time. The Tentative Order is not designed to achieve the intended outcomes, while placing a significant burden of expense and time on growers. We ask that you NOT adopt the Tentative Order as structured. Instead, an alternative needs to be developed, in cooperation with representatives from the KRWCA that appropriately addresses our area to achieve the goals of your Agency.

Sincerely,

Geordy Wise

Geordy Wise
Partner, Ranch Manager
Sierra Land & Farming

P.O. Box 1200, Wasco, CA 93280
Tel. 661-587-2250 Fax 661-587-2254

Wasco Real Properties

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members,

Wasco Real Properties is a 3rd generation land owner who operates 3200 acres of irrigated almonds. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

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Sincerely,

Geordy Wise

Geordy Wise
Wasco Real Properties, Ranch Manager

P.O. Box 1200, Wasco, CA 93280
Tel. 661-587-2250 Fax 661-587-2254

Letter 67

Wise Farming

April 8, 2013

Central Valley Regional Quality Control Board
11020 Sun Center Dr, #200
Rancho Cordova, Ca 95670-6114

Re: Comments of Kern River Watershed Coalition Authority re Tentative Waste Discharge Requirement General order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board Members,

Wise Farming Concepts is a 1st generation land owner who operates 225 acres of irrigated row crops. Our goal is to manage our properties professionally, implementing Good Agricultural Practices while increasing efficiencies, in order to sustain these properties for generations to come.

We understand that the Tentative Order for the KRWCA is identical to the one developed for the East San Joaquin watershed. However, we believe the conditions in Kern County are significantly different. As applied in our area, we do not believe the Tentative Order is appropriate, and therefore will not be effective in achieving the desired outcomes.

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Sincerely,

Geordy Wise

Geordy Wise
Partner, Ranch Manager
Wise Farming

P.O. Box 1200, Wasco, CA 93280
Tel. 661-587-2250 Fax 661-587-2254

April 15, 2013

Via Email To:

dsholes@waterboards.ca.gov

Central Valley Regional Water Quality Control Board

11020 Sun Center Drive, #200

Rancho Cordova, CA 95670-6114

Re: Comments re Tentative Waste Discharge Requirements General Order for Growers within the Tulare Lake Basin that are Members of a Third-Party Group (March 15, 2013)

Dear Board members:

We farm pistachios, blueberries, almonds and olives in four different counties in the SJV. We are three generations of farmers. We are concerned about the environment and are doing our best to preserve our children's heritage.

All of our crops everywhere are either drip or micro sprinkler. Water is limited and expensive. We do not over water. We treat each block as a separate cost center, monitoring all input costs and results. We do not waste money or over apply fertilizer.

We object to your Tentative Order. We have attended several meetings to learn more about your plans. We are very alarmed at the lack of science and limited amount of research was conducted. And even more alarmed that your Tentative Order assumes, without proof, that the problem was caused by farmers and that regulating current farming practices will somehow change something that occurred many years ago when irrigation methods were vastly different and less precise than they are today. Plus, it attempts to apply its unproven conclusions to a wide area where conditions and water tables vary widely.

As being proposed, I don't believe the Tentative Order is reasonable.

I ask that you not adopt the Tentative Order and instead you develop in cooperation with our representatives an alternative that makes sense for the various regions within the San Joaquin Valley.

Sincerely,

Cliff Woolley

Chief Administrative Officer

Munger Farms