KERN RIVER WATERSHED COALITION AUTHORITY
SURFACE WATER MONITORING PLAN

Prepared for:

Kern River Watershed Coalition Authority

AUGUST 4, 2014

Prepared by:

EST. 1968
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ABBREVIATIONS

cfs ..... cubic feet per second
CVP ..... Central Valley Project
DPR ..... California Department of Pesticide Regulation
DWR ..... California Department of Water Resources
EPA ..... Environmental Protection Agency
ILRP ..... Irrigated Lands Regulatory Program
JPA ..... Joint Powers Authority
KCWA ..... Kern County Water Agency
KRWCA ..... Kern River Watershed Coalition Authority
MCL ..... Maximum Contaminant Level
MRP ..... Monitoring and Reporting Program
NRCS ..... Natural Resources Conservation Service
Order ..... General Order R5-2013-0120
PUR ..... Pesticide Use Report
QAPP ..... Quality Assurance Project Plan
Regional Board ..... Central Valley Regional Water Quality Control Board
SSJVWQC ..... Southern San Joaquin Valley Water Quality Coalition
SWAMP ..... Surface Water Ambient Monitoring Program
SWMP ..... Surface Water Monitoring Plan
SWP ..... State Water Project
SQMP ..... Surface Water Quality Management Plan
TDS ..... Total Dissolved Solids
TIE ..... Toxicity Identification Evaluation
TOC ..... Total Organic Carbon
TSS ..... Total Suspended Solids
TMDL ..... Total Maximum Daily Load
WQTL ..... Water Quality Trigger Limit

EXECUTIVE SUMMARY

The Kern River Watershed Coalition Authority (KRWCA) was formed in 2012 by several districts in Kern County in response to the Kern County Water Agency (KCWA) stepping down as the program manager for the Kern subwatershed portion of the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC). The SSJVWQC was originally formed in 2002 to address water quality issues common to agencies in the Tulare Lake Basin in response to an order of by the State's Central Valley Regional Water Quality Control Board (Regional Board) requiring monitoring and reporting programs by watershed coalition groups.. With the passing of General Order R5-2013-0120, the SSJVWQC will cease to be the implementing third party. Multiple third-party groups will implement the order in the Tulare Lake Basin, with each taking on responsibility of their respective regions or sub-regions. The original SSJVWQC's goal, being continued by the KRWCA, is to protect the quality and sustainability of water supplies and rights of its members and landowners.

The KRWCA will continue working with the Regional Board on behalf of its members to comply with the newly adopted General Order for the Irrigated Lands Regulatory Program (ILRP). The following report represents the KRWCA's Surface Water Monitoring Plan (SWMP) as required under the Regional Board Order No. R5-2013-0120. The KRWCA received its Notice of Applicability (NOA) to act as a third-party member on behalf of its growers on February 4, 2014.

Third-Party Area Description

The KRWCA covers most of the Kern River watershed portion of the Tulare Lake Basin. The Tulare Lake Basin is a closed-basin in the Southern San Joaquin Valley. The KRWCA sees the valley floor area as its Primary Area since it contains the bulk of the agricultural activity, with the mountain regions being considered as a Secondary Area due to the lack of farming. In total, the KRWCA's service area encompasses approximately 3.5 million acres.

The KRWCA now represents a majority of the original Kern River subwatershed portion of the SSJVWQC. The KRWCA represents primarily a majority of the Kern County valley floor but as a result of requirements set forth by the Regional Board is generally bounded by the crest of the Sierra Nevada Range on the east, the Buena Vista and West Kern Water Quality Coalitions on the west, the crest of the Tehachapi Range on the south, and the Kern County line on the north. Elevations range from approximately 200 feet above sea level on the valley floor to 14,500 feet above sea level at Mount Whitney near the headwater of the Kern River. The Kern River is the only perennial stream in the KRWCA and has an average annual flow of about 750,000 acre-feet. The north fork flows perennially into Lake Isabella. The south fork is an ephemeral stream as it nears the lake with flows occurring only during the winter and spring months.

Land Use and Management Practices

Irrigated agriculture is one of the largest land uses in the KRWCA, and had value of over $6 billion in 2012 in Kern County alone. Top commodities varied from tree and vines to row crops that included grapes, almonds, citrus, pistachios, carrots, potatoes, hay, alfalfa and many others. Other land uses in the KRWCA area include pasture lands, urban lands and natural lands.

Although a large amount of the region is dominated by irrigated agriculture, much of the potential exposure is mostly eliminated due to the current and on-going management practices used. Growers in

the area have begun to implement management practices in the area that are very innovative for both organic and conventional farming. These techniques are both effective and efficient for getting the most production out of their crops. Irrigation applications are generally timed for maximum benefit and reduction of tailwater generation, where applicable. Irrigation applications by growers are dominated by the use of pressurized systems, such as sprinklers and low-volume drippers and sprinklers. Land management practices have also changed over time. Pest and fertilizer management practices are constantly evolving and being incorporated.

Potential Discharges, Pollutants, and Water Quality Problems

Agricultural discharges in the KRWCA's boundary area are very limited for a variety of reasons. Primary reasons for this is due to limited annual rainfall, the scarcity and value of water and due to the fact that districts in the area generally do not allow discharges to surface water.

Data collected to this point by the SSJVWQC has not shown any persistent problems with agriculturally related discharges of pesticides in the KRWCA area. There is still high potential for exposure due to the region being dominated by irrigated agriculture; however, it is the belief of the KRWCA that because of the management practices used by growers in the area, more real risk may be attributed to spray drift, not irrigation or storm discharges. Due to the arid nature of the region, growers have become very efficient and effective with their use of water and other resources. Irrigation applications, land management, and pest and fertilizer practices have begun to be implemented that reduce the amount of discharges and pollutants used that could find their way to a water resource.

The monitoring in the KRWCA has not triggered a specific management plan to date. With continued public awareness and outreach, the KRWCA hopes to avoid triggering a specific management plan.

Surface Water Monitoring Plan Overview

The KRWCA and its Members are committed to continued development and implementation of a science-based water quality monitoring program designed to determine actual and potential water quality impacts on beneficial uses from agricultural operations in its area. The KRWCA is committed to continuing a monitoring strategy that takes the knowledge gained from the previous Monitoring and Reporting Program (MRP) program and expands upon it to ensure that KRWCA surface waters' beneficial uses are protected from influences from agricultural operations.

This document represents the KRWCA's SWMP for the MRP requirement under the Regional Board Order No. R5-2013-0120. KRWCA's SWMP provides information that determines whether discharges, if any, are in compliance with the conditions of the Order, including compliance with applicable water quality standards. The monitoring strategy in the KRWCA SWMP expects to primarily utilize Assessment Monitoring, Ephemeral Monitoring, and Representative Monitoring. If deemed necessary and useful, Core Monitoring and Special Project Monitoring may also be incorporated into the KRWCA monitoring strategy. In addition, this SWMP updates the previous MRP to answer key Program questions listed in the current Order:

1. Are receiving waters to which irrigated lands discharge meeting applicable water quality objectives and Basin Plan Provisions?

2. Are irrigated agricultural operations causing or contributing to identified water quality problems? If so, what are the specific factors or practices causing or contributing to the identified problems?
3. Are water quality conditions changing over time (e.g. degrading or improving as new management practices are implemented)?
4. Are irrigated agricultural operations of Members in compliance with the provisions of the Order?
5. Are implemented management practices effective in meeting applicable receiving water limitations?
6. Are applicable surface water quality management plans effective in addressing identified water quality problems?

Conclusions

The KRWCA takes its role as a third-party member seriously. The goal of the KRWCA is to continue the success of agriculture in its boundary while also maintaining quality and promoting sustainability of the water resource. With an existing MRP already in place, the KRWCA has the ability to preliminarily address the Regional Board's MRP Objectives by answering the six questions set out in the Order.

1. Receiving waters of irrigation and storm discharge regularly and consistently have been within standards provided by the State. Continuing the monitoring effort and management through this SWMP and Order is expected to continue to protect receiving waters.
2. Sources from agricultural operations that may contribute to water quality problems include sediment transport and pesticide use, however, these discharges are mostly captured on site and not discharged into surface water bodies. When exceedances in toxicity and/or constituents occur, continued monitoring and investigation to determine the specific causes will be pursued.
3. Water quality conditions in the KRWCA area should be improving as new innovative management practices are implemented. Monitoring should confirm this. Management practices, for the most part, reduce agricultural discharges to surface waters, which in turn reduces the potential pollution from constituents.
4. At this point in time, most Member irrigated agricultural practices are in compliance with provisions of the Order that have gone into effect. Surface water provisions have been implemented from previous MRP efforts, but as more provisions go into place with continued implementation of the newly adopted Order, the KRWCA will continue to assist members in staying compliant.
5. The growers within the KRWCA have been implementing innovative management practices for some time. These practices contribute to the reduction and/or elimination of agricultural runoff from fields. Irrigation management, pesticide application, field and soil preparation, and harvest management practices all contribute.
6. At this point in time, no management plans have been triggered in the newly formed KRWCA boundary. However, if circumstances change and trigger the need for a surface water quality management plan, the KRWCA believes it can develop effective plans for addressing any quality issues.

Table ES-1 relates the MRP requirements of the Order to the applicable section where that requirement is addressed in the SWMP.

Table ES-1: Applicable SWMP Sections to Address MRP Questions

MRP Requirement	Requirement	SWMP Section
Q #1	Are receiving waters to which irrigated lands discharge meeting applicable water quality objectives and Basin Plan provisions?	2
Q #2	Are irrigated agricultural operations causing or contributing to identified water quality problems? If so, what are the specific factors or practices causing or contributing to the identified problems?	2, 3
Q #3	Are water quality conditions changing over time (e.g., degrading or improving as new management practices are implemented)?	2
Q #4	Are irrigated agricultural operations of Members in compliance with the provisions of this Order?	3
Q #5	Are implemented management practices effective in meeting applicable receiving water limitations?	2, 3
Q #6	Are the applicable surface water quality management plans effective in addressing identified water quality problems?	2, 8

1 INTRODUCTION

The Kern River Watershed Coalition Authority (KRWCA), a Third-Party representative in Kern County, has prepared this Surface Water Monitoring Plan (SWMP) in accordance with the guidelines associated with the Monitoring and Reporting Program (MRP) of Order R5-2013-0120 Waste Discharge Requirements for Growers within the Tulare Lake Basin Area (Order). This SWMP will serve as the work plan for all aspects of the monitoring and reporting required by the Order to manage the quality of surface water within the KRWCA boundary as part of the Irrigated Lands Regulatory Program (ILRP).

1.1 Kern River Watershed Coalition Authority Background

The KRWCA is a joint powers authority (JPA) that was formed in 2012 by most of the irrigation and water districts in Kern County in response to the Kern County Water Agency (KCWA) stepping down as the program manager for the Kern Subwatershed portion of the Southern San Joaquin Valley Water Quality Coalition (SSJVWQC). The SSJVWQC was originally formed in 2002 to address water quality issues common to agencies in the Tulare Lake Basin in response to the Central Valley Regional Water Quality Control Board (Regional Board) requiring monitoring and reporting programs by watershed coalition groups. For the last two years the KRWCA has managed the Kern subwatershed valley floor portion of the SSJVWQC, however with the passing of the Order, the SSJVWQC is ceasing to be the implementing third party. Third-party member coalitions representing each subwatershed area are now taking on responsibility for their respective regions or sub-regions.

The KRWCA, which received its Notice of Applicability (NOA) to be a Third-Party member under the new Order on February 4, 2014, covers a majority of the original Kern Subwatershed area on the Central Valley floor (as the primary area), along with the upstream mountain portion of the Kern River Watershed (as a secondary coverage area). The KRWCA boundary grew to the secondary coverage area in response to the Regional Board requirement that third-party members must cover the entire Tulare Lake Basin Area from “mountain crest to crest.”

The goal of the KRWCA, taken over from the SSJVWQC, is to protect the quality and sustainability of water supplies and rights of its members and landowners. The KRWCA and its Members plan to continue monitoring efforts and advocacy that will protect and improve water quality and facilitate the success of its grower members.

1.1.1 Member Districts

The KRWCA signed a Joint Powers Agreement between local irrigation and water districts that joined together to represent growers located in the Kern County area. The member districts include:

- Arvin-Edison Water Storage District
- Henry Miller Water District
- Kern Delta Water District
- Kern-Tulare Water District
- North Kern Water Storage District
- Olcese Water District
- Rosedale-Rio Bravo Water Storage District
- Semitropic Water Storage District

- Shafter-Wasco Irrigation District
- Wheeler Ridge-Maricopa Water Storage District

It should be noted that the existing KRWCA formation consisting of water districts may switch to a landowner or grower based entity (i.e. non-profit organization or other).

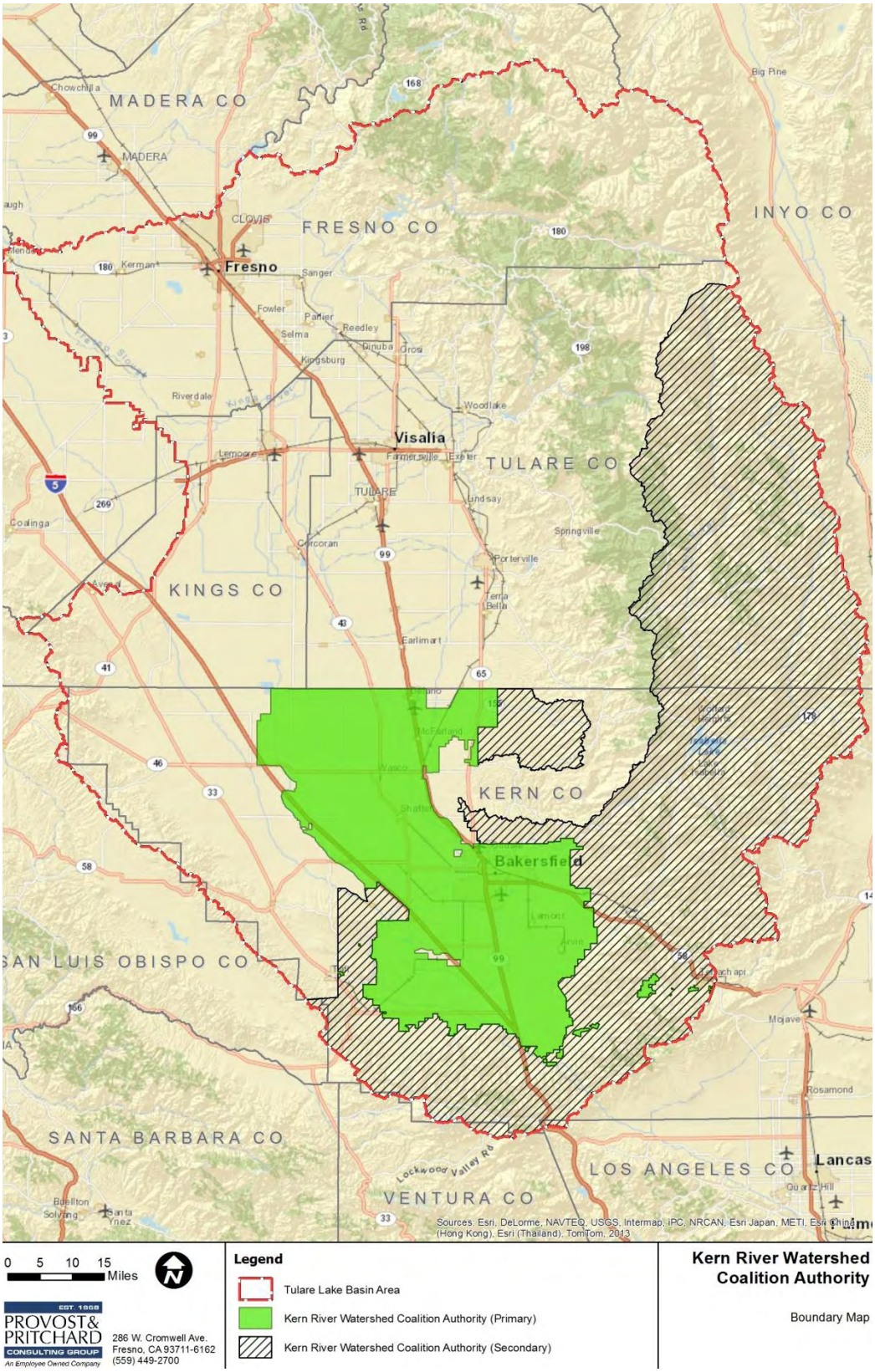

Figure 1-1: KRWCA Location Map

1.2 Description of Coalition Group Area

The KRWCA is located entirely within the Kern River Subwatershed at the southern end of Regional Board 5. The Kern River Subwatershed area is primarily the Kern County valley floor with a secondary area generally bounded by the crest of the Sierra Nevada Range on the east, the Buena Vista and Westside Water Quality Coalitions on the west, the crest of the Tehachapi Range on the south, and the Kern County line on the north. Elevations range from about 200 feet above sea level on the valley floor to 14,500 feet above sea level at Mount Whitney near the headwater of the Kern River. The KRWCA boundary area is broken into Primary and Secondary areas as shown in **Figure 1-1**. The Primary area, which contains most of the irrigated agriculture of the KRWCA, encompasses approximately 1,024,000 acres in total area. The Secondary area, which primarily contains the mountainous regions and little to no agriculture, adds an additional 2,556,000 acres. The total boundary covers approximately 3,580,000 acres however only about 645,000 acres are typically irrigated.

1.2.1 Kern River

The Kern River is the only perennial stream in the subwatershed. It has an average annual flow of about 750,000 acre-feet. The north and south forks of the Kern River are impounded in Lake Isabella near the eastern edge of the subwatershed. From the Isabella Reservoir, the river flows some 30 miles southwest through a steep and rugged canyon, eventually emptying out on the valley floor. The eastern edge of the valley is marked by foothills that gradually flatten to the valley floor.

The north fork of the Kern River flows perennially into Lake Isabella and is characterized by steep canyon walls with no significant industry. The town of Johnsondale, a former logging community, is located about 20 miles upstream of Kernville. The town of Kernville is located roughly two miles above Lake Isabella. Recreation and fishing are the primary activities on the north fork. Much of the Kern River upstream of the mouth of the Kern River Canyon is designated as a wild and scenic river.

The south fork of the Kern River is an ephemeral stream as it nears Lake Isabella. Several communities exist adjacent to the south fork of the Kern River, including Onyx and Weldon. Generally, flows occur in this stretch of the Kern River during the winter and spring months. It is common for the south fork to dry up completely during the summer and fall. Cattle ranching became the main economic activity within the Kern River Valley during the latter half of the 1870s. Agricultural uses and ranching still contribute both to the economy and to the area's history and heritage. Roughly, 1,000 acres of harvested cropland are located in the area. A recent land use survey showed crops within the Valley include alfalfa, pasture and grains. [1]

Lake Isabella captures flows from the north and south forks of the Kern River behind a 185-foot high earthen dam capable of storing 568,000 acre-feet. The lake lies at an elevation of 2,605 feet above sea level, covers 11,000 acres, and has 38 miles of shoreline when full. However, Lake Isabella is under restrictions by the Army Corps of Engineers not to exceed an elevation of 2,585.5 feet due to the presence of an earthquake fault line near the earthen dam. This elevation restriction limits the capacity of Lake Isabella to 361,250 acre-feet, or 63.6% of maximum.

Once the Kern River reaches the valley floor, water flows through First Point of Measurement, a flow measuring point established in 1893 and continuously used since then. First Point of Measurement is

[1] Kern County Water Agency land use survey for South Fork, May 2009.

upstream of the major diversion points on the river. Flows at First Point are allocated among water right holders. Just west of First Point is the Beardsley Canal head gate, the first major diversion point for Kern River water, which conveys the water to lands generally north of the river. The North Kern Water Storage District (WSD) operates the Beardsley Canal. Occasionally, North Kern WSD delivers surface water into Poso Creek for direct groundwater recharge. Because the Beardsley Canal diversion point is upstream of the Friant-Kern Canal, there is no potential for Friant-Kern storm water to enter North Kern's service area.

North Kern WSD operates two groundwater recharge areas for seasons when available water supplies exceed its instantaneous demands (i.e., power flows on the Kern River). When demands exceed supplies, it recovers the water and pumps it back into the Beardsley Canal for distribution.

In wetter seasons, North Kern WSD may also use the Calloway Canal to deliver water to its landowners and for groundwater recharge. The Calloway Canal also begins upstream of the Friant-Kern Canal.

The Kern Delta Water District diverts Kern River water to agricultural areas south of the Kern River, and to lands that historically were under the Kern Lake bed. When the Kern Lake and Buena Vista Lakes were in existence, Kern River water fed both lakes via Connecting Slough. Extensive wetlands were associated with the lakes and Connecting Slough. However, since the construction of Isabella Reservoir and because of upstream diversion and use of Kern River water, Connecting Slough is no longer in existence.

The City of Bakersfield delivers its First Point water rights to local water districts for agricultural uses. Some of the water districts are downstream of the Friant-Kern Canal terminus. However, the City of Bakersfield effectuates its deliveries to these agricultural water districts via the Beardsley Canal and/or River Canal.

Twenty miles downstream of First Point is Second Point of Measurement on the Kern River channel, another measuring point established in 1893 as required by the Miller-Haggin parties, which pre-dates a water master on the Kern River. The Buena Vista Water Storage District is the largest water right holder at Second Point of Measurement. Water is diverted from the Kern River or River Canal into the Eastside and Westside Canals, where it flows northerly to serve landowners within the Buena Vista WSD. Today, there is generally only water at Second Point when Kern River runoff exceeds about 150 percent of normal.

The Eastside and Westside Canals are on the borders of the Buena Vista WSD. All turnouts from the canals are made via Waterman gate valves. The canal banks are well maintained and scraped free of vegetation, providing essentially no habitat beneficial uses.

The Semitropic WSD operates a canal system that bisects the northern portion of the Buena Vista WSD from east to west. The canal system conveys water through pipes or lined canal from the California Aqueduct to its intersection with Semitropic's in-district distribution system. A turnout exists from the canal into the Eastside Canal, providing opportunity for State Water Project water deliveries to be made to waterfowl areas in the Goose Lake Slough area.

At the northern end of the Buena Vista WSD, beneficial uses of water change to wildlife habitat (WILD) because of the existence of duck clubs and waterfowl areas. Most of these receive surface water service from the Eastside Canal. Just south of Highway 46, the Eastside and Westside Canals merge with the Goose Lake Slough. This slough flows north approximately 15 miles to the northern Kern County line. Because of poor soil conditions, no agriculture exists north of Highway 46 in this area.

The Kern River's terminus is at the Kern River-California Aqueduct Intertie, a 3,500 cfs structure is designed to introduce flood flows from the Kern River into the California Aqueduct. This facility is only used during high flow events on the Kern River, although flows from the Kaweah and St. Johns Rivers (via the Friant-Kern Canal) have occasionally been diverted into the Kern River and through the Intertie. The State Department of Water Resources takes monthly water quality samples and analyzes them for inorganic chemistry and pesticides.[2] Analysis of the data during events when the Intertie was open shows that the Kern River water actually improves the water quality in the California Aqueduct, particularly electrical conductivity.

1.2.2 Friant-Kern Canal

The Friant-Kern Canal (FKC) flows from north to south (San Joaquin River watershed/Millerton Lake near Fresno to Kern River), along the eastern edge of the valley floor, providing irrigation water for several federal water contractors in Fresno, Kings, Tulare and Kern Counties. Surrounding lands slope gently from east to west. The FKC's design is such that rainfall runoff from the eastern foothills is introduced into the Canal to reduce flooding risks and to augment surface water supplies.[3] A number of Inlet drains are located within the Kern River subwatershed. It is not yet known how many of these drains allow storm runoff from agricultural fields to enter the Canal. The federal Central Valley Project (CVP) determines the policies and practices governing input of storm water into the FKC, and conducts their own monitoring. The KRWCA exercises no authority over the FKC; thus we view this conveyance as not being eligible for KRWCA monitoring. A sanitary survey of the FKC was completed in 1998. The sanitary survey was updated in 2009.

Water districts and customers that take delivery of water from the FKC within the KRWCA boundary have either concrete-lined or piped distribution systems. Water turned out on the west side of the FKC is generally gravity fed, while turnouts on the east side of the FKC are generally pressurized. At the southernmost point on the FKC, it terminates to the Kern River. During high flow events, excess Friant Division CVP water is diverted into the Kern River channel in Bakersfield. The water is used for groundwater recharge in the Kern River channel or re-diverted downstream into large groundwater recharge facilities on the Kern River Fan (e.g., Kern Water Bank, Pioneer Banking Project, City of Bakersfield's 2800 Acres). In this way, storm water intercepted into the FKC can affect downstream beneficial uses.

1.2.3 State Water Project

The State Water Project (SWP) provides water to Kern County via the California Aqueduct, which travels from north to south on the western portion of the valley floor and into the greater Los Angeles basin. The California Aqueduct does not allow storm or irrigation water to be intercepted, the opposite design philosophy from the CVP, except in the joint reach of the California Aqueduct south of San Luis Reservoir (storm water is intercepted in this joint reach, which does not stretch to Kern County).

At the northwestern portion of Kern County, turnouts deliver SWP water into lined or piped distribution systems. The Semitropic WSD operates a number of turnouts, one of which is intertied with the Goose

[2] See http://www.water.ca.gov/waterdatalibrary/waterquality/station_county/project_parameters.cfm for historical data at Tehachapi Afterbay (Check 41), which is downstream of the Kern River-California Aqueduct Intertie.
[3] Keller-Wegley Engineering. 1998. Sanitary Survey for the Friant-Kern Canal, a report prepared for the Friant Water Users Authority

Lake Slough. The Cross Valley Canal intersects with the SWP just north of the Kern River and transports SWP water to districts to the east. From this point, SWP water is delivered through various district conveyance systems.

1.2.4 Groundwater Banking Facilities

Various water districts in Kern County have developed groundwater banking and water management programs whereby surface water is recharged during periods of high flow and recovered for use during periods of low flow. In order to facilitate deliveries of previously banked or surface water, several water districts have agreements with the State Department of Water Resources (DWR) to turn in/deliver water into the California Aqueduct. These include the Semitropic WSD, Buena Vista WSD, Kern Water Bank, Kern County Water Agency, Rosedale-Rio Bravo WSD, Arvin-Edison WSD, and Wheeler Ridge-Maricopa WSD. Specific water quality criteria govern such inputs of water into the California Aqueduct. A facilitation group is responsible for reviewing plans and existing quality information and approving the district's plans to introduce water into the SWP.

Each water source is tested for Title 22 constituents prior to its being approved for input into the California Aqueduct. At start-up, each source is tested for constituents of concern (Arsenic, Bromide, Chromium-6, Nitrate, Sulfate, Total Organic Carbon, Total Dissolved Solids, and Uranium).

1.2.5 Minor Creeks and Streams

Poso Creek is the largest of Kern's minor streams and flows from the mountains northeast of Bakersfield to the valley floor (just east of Highway 46 and Highway 99). Poso Creek is monitored by the Cawelo Water District Coalition. Flows on Poso Creek average 20,000–25,000 acre-feet annually, as measured at a stream gage located at Coffee Canyon. The stream gage is operated by Kern County Water Agency (Agency). The creek flows through Cawelo WD, North Kern WSD and Semitropic WSD, terminating in the Kern National Wildlife Refuge and the Goose Lake Canal. In very large flood years it historically has broken out of its channel and flooded lands in the vicinity. Cawelo WD and North Kern WSD often use the dry creek bed for intentional groundwater recharge. Occasionally, Semitropic WSD diverts Friant-Kern water it obtains into Poso Creek for recharge and uses the creek to distribute surface water. Poso Creek is an ephemeral stream that almost never flows the entire year. The U.S. Geologic Survey started maintaining a stream gauge on Poso during the 1980s. The location of the gauge is in the foothills roughly eight miles east of Highway 65 (which marks roughly the eastern edge of agriculture in the valley) at Coffee Canyon. Hydrographs of this data published by the Kern County Water Agency show that the creek generally runs dry in June-July. The hydrographs are interesting because they reveal that, even in wet years (i.e., Kern River runoff at least 150 percent of normal) Poso Creek does not flow year-round. During flood flow events, Kern River water may be diverted into Poso Creek for recharge. While flowing through its watershed, Poso Creek may pick up petroleum products as it flows through the Mount Poso and Poso Creek oil fields. These fields contain extra heavy crude and are difficult to recover without steam injection technology. We understand that NPDES permits govern all oilfield wastewaters that may be discharged to Poso Creek.

Other minor streams within the KRWCA are quite small with small peak flows and short flow durations typically during large storm events or extremely wet years. Other minor streams include Caliente Creek, San Emigdio Creek, Tecuya Creek, El Paso Creek, Pleitito Creek, and Pleito Creek (Pleitito Creek flows into Pleito Creek). **Figure 1-2** shows the various waterways in the KRWCA area. In very wet years, Caliente Creek has flooded its banks and caused damage to both crops and residential structures.

Generally, these minor streams tend to have very low base flows with occasional peaks of short duration (a few hours to days). These minor stream watersheds drain to the north and terminate within the alluvial soils located in the foothills of the San Joaquin Valley.[4] No useable aquatic habitat is available in any of the minor streams because of the fact that they so seldom have flows of sufficient duration to sustain a fishery. Terrestrial and burrowing animals are found throughout the creek prisms highlighting the amount of dryness.

These creeks do not discharge into a surface stream or waterway, and most of the water evaporates or percolates to groundwater. These creeks are not listed as impaired under the Clean Water Act section 303(d) list (updated 2010) nor the Regional Board's 2010 triennial review of the Water Quality Control Plan for the Tulare Lakebed Basin. Crops around these creeks also tend to have high efficiency irrigation methods, such as drip irrigation, resulting in little to no runoff of a field.

Tecuya Creek flows out of the southern mountains onto the valley floor. It parallels the California Aqueduct just south of the Tejon Industrial Complex. When water is flowing in the creek, its quality ranges from 1,000 to 2,500 mg/L TDS[4]. From its point of emergence from the mountains to north of the Tejon Industrial Complex, there is no agriculture along the creek. Tejon Ranch Corp is restoring the portion of Tecuya Creek that borders the western boundary of the Tejon Industrial Complex.[4]

San Emigdio Creek flows out of the southern mountains onto the valley floor, crossing over the California Aqueduct approximately one-half mile north of Highway 166. Historically, the creek channel ended at approximately Copus Rd and from there meandered across its alluvial fan. The creek routinely flooded farm fields and other adjacent lands, depositing heavy loads of silt (which would subsequently alter the creek's flow path). After flood events in the early 1980s, landowners in the area constructed a confined channel north of Copus Rd to prevent flooding of their adjacent lands. At this time, the confined flood channel (owned and operated by the adjacent landowners) ceased as a natural water body. South of Highway 166 to the mountains there are no agricultural activities. The creek bed itself is generally barren, although a few scattered tamarisk trees and other bushes can be found. Historically, between Highway 166 and the California Aqueduct, the creek is bounded on the east and west with drip irrigated citrus. North of the California Aqueduct the creek adjacent lands are primarily drip-irrigated grapes. Under the previous Conditional Waiver, discussions with landowners north of Copus Road led to removal of potential discharge points where irrigation runoff could have entered the channel.

Pleito Creek flows out of the southern mountains onto the valley floor, crossing over the California Aqueduct approximately one-half mile north of Maricopa Hwy. Historically on the south of the California Aqueduct, crops bordering the creek include drip irrigated grapes, nectarines, and citrus. North of the California Aqueduct, crops bordering the creek historically include drip irrigated almonds and nectarines. North and south of the California Aqueduct, a high levee or berm channelizes both sides of the creek, primarily to protect the adjacent high value permanent crops from flood flows originating in the upper watershed. The creek bed is essentially barren, providing very little aquatic or terrestrial habitat.

Grapevine Creek flows out of the southern mountains near Interstate 5 and travels in a southeasterly direction. A high berm channelizes both sides of the incised creek. Very little irrigated agriculture exists on Grapevine Creek until it reaches Laval Road. At Laval Rd, approximately one quarter-section of drip-irrigated grapes borders the eastern edge of the creek. Approximately one mile north of Laval Rd, the

[4] Tejon RanchCorp. 2009. Tehachapi upland multiple species habitat conservation plan draft environmental impact report. Available at http://www.tejonranch.com/conservation/habitat-conservation-plan/.

creek bisects more drip-irrigated grapes. Past inspection of the creek bed and surrounding agriculture revealed no opportunities for either storm or irrigation water to enter the creek.

Pastoria Creek flows out of the southern mountains and flows through agriculture just north and south of Laval Rd. The creek is bermed on both sides to channelize its flow and is relatively barren. Agriculture adjacent to the creek has historically been drip-irrigated almonds or drip-irrigated vines. At Laval Rd, the creek completely loses its natural character and becomes integrated into a water conveyance lateral. Past inspection of the creek bed and surrounding agriculture revealed no opportunities for either storm or irrigation water to enter the creek where it maintains its natural character south of Laval Rd.

El Paso Creek flows westerly from the mountains onto the valley floor. Most of the watershed contains non-irrigated lands in the Sierra foothills used primarily for grazing. As the creek moves west towards the valley floor, it bisects a number of crops, primarily carrots, potatoes, and drip irrigated pistachios and vines. The micro irrigation systems effectively eliminate the possibility of irrigation runoff from entering the creek. Inspection of the creek identified a few locations in which storm water could enter the creek. North of Sebastian Road, the creek begins to move northwest through fields while losing much of its natural character. Continuing north, the creek finally reaches its terminus at David Road.

Tejon Creek flows westerly from the mountains onto the valley floor. Just east of the Arvin-Edison Canal and Tejon Spreading Grounds, drip irrigated grapes are the primary crops surrounding the creek. When the creek enters the Tejon Spreading Grounds, it is bounded on both sides by a high berm, bisecting this spreading facility from east to west. Once it emerges from the western side of the Tejon Spreading Grounds, the creek continues on a westerly course for two miles, then turns north for about another mile, at which point the creek becomes undefined. The creek bed's small native and non-native bushes, trees and grass (e.g., *Nicotiana* spp., *Tamarix* spp., *Avena* spp.) along the banks have historically provided some terrestrial habitat value. Irrigated acreage bordering this portion of the creek changes to primarily vegetable and field crops. Drainage pipes have been removed that drained irrigation water into the creek.

Caliente Creek is a 20-mile ephemeral stream flowing out of the eastern foothills. Tehachapi Creek runs into Caliente Creek just upstream of the valley floor. Once it crosses Edison Highway, the creek channel spreads out into an alluvial fan and becomes undefined. Historically, flows on Caliente Creek have caused flooding problems for agricultural lands in the Edison area, as well as for the City of Lamont. The County of Kern has installed several bermed ponds east of Lamont to reduce flooding by Caliente Creek. The creek's water is known to be very turbid with fine-grained materials, which tend to plug the surface pores of agricultural lands. The Kern County Water Agency has taken electrical conductivity measurements on Caliente Creek with a field meter for a number of years (upstream in the watershed). Typically, electrical conductivity is 600-700 μmhos. This is typical of the southern minor streams from Caliente Creek south. Flows on Caliente Creek are even less frequent than Poso Creek. Crops grown along Caliente Creek include a wide range of annual and permanent plantings. The majority of the crops are drip or sprinkler irrigated.

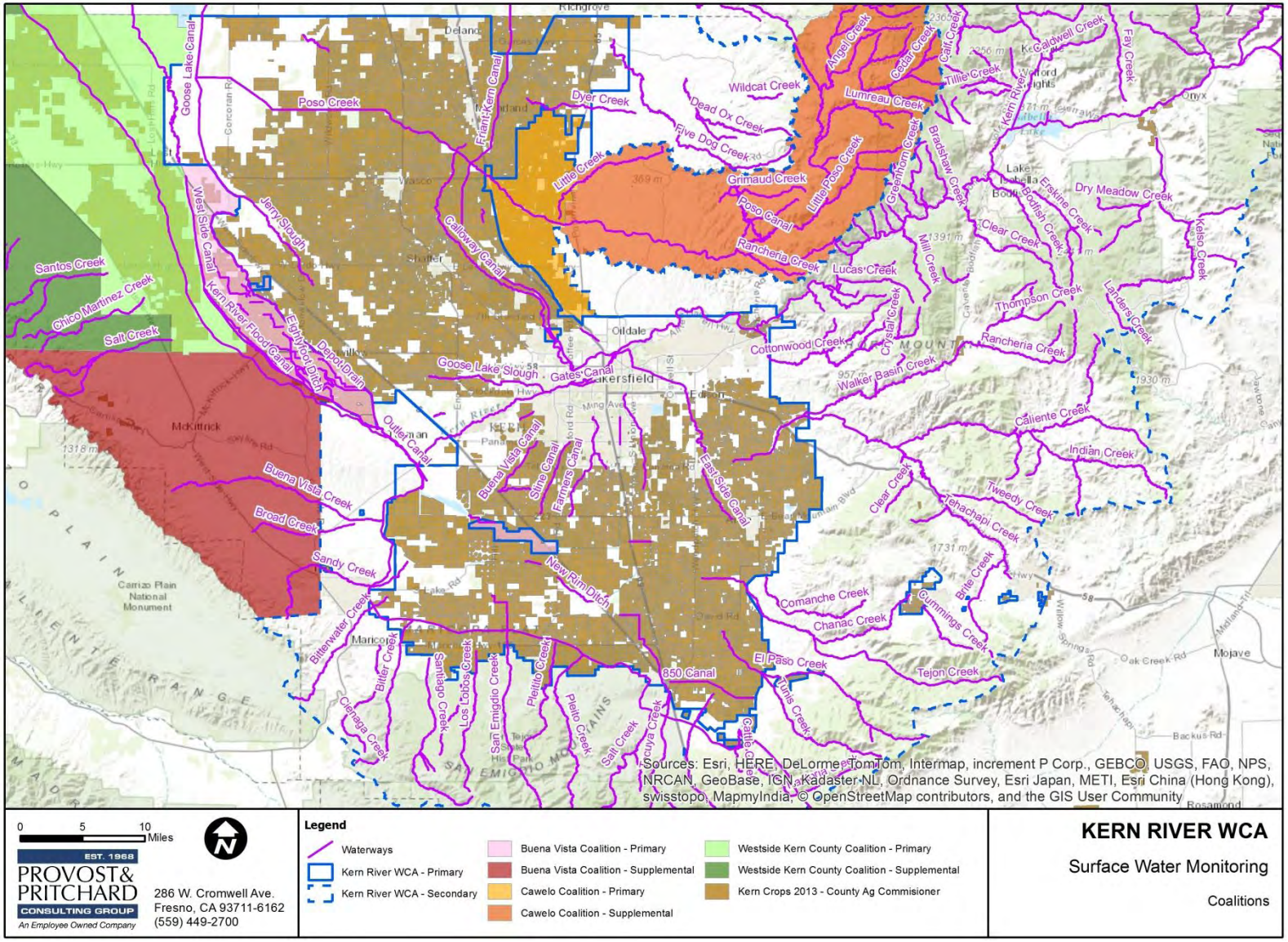

Figure 1-2: Creeks and Streams in the KRWCA Area

1.2.6 Water Conveyance Facilities

Paloma Ditch is all that remains as evidence of what was known as Connecting Slough, which historically connected the Kern and Buena Vista Lake beds. Channelization of the Kern River, upstream diversion and use of Kern River water, and the construction of Isabella Reservoir had all combined many decades ago to eliminate the natural lakes and marshes which existed in the southern end of the San Joaquin Valley. An on-farm ditch remains now, known over the last many decades as the Paloma Ditch. This ditch has fixed terminal ends, several intermediate interruptions and has no connection to any waters of the state. The ditch actually consists of three separate components, permanently divided at land ownership transitions. Each component is part of an independent, privately owned and operated on-farm irrigation system. No water is comingled among the separate components. Each separate system is operated to retain water on-farm for irrigation use. There is no potential for water to leave the system to reach waters of the state.

The Kern River Outlet Canal historically received outflows from the ancient Buena Vista Lake and transported it along the west side of the southern San Joaquin Valley to Tulare Lake. The Kern River Outlet Canal was historically known as the Buena Vista Slough. With construction of Isabella Dam, the outlet canal received far less flows, essentially wiping out seasonal flooding along the canal.[5] Flooding is now limited to extremely wet years (1983 was the last time that significant Kern River water was exported north out of Kern County via the Kern River outlet canal).

At roughly the intersection of Stockdale Hwy and Interstate 5 sits the Tule Elk State Natural Reserve, a 950-acre reserve for Tule Elk in Tupman, California. The primary water source for the Reserve is groundwater, although surface water is occasionally provided on approximately 65 acres of historical wetlands (a.k.a. “elk pen”) for direct recharge by Buena Vista Water Storage District; which is not under any obligation to provide water to this wetland. From this point north to the county line, the Kern River Outlet Canal flows through mostly native vegetation, with scattered fields of grain and alfalfa. North of Highway 46, the Outlet Canal flows approximately 15 miles to the Kern County line. Only scattered agriculture is found here due to the poor soils and poor groundwater quality, consisting of grains and alfalfa.

The James Canal is used to convey Kern River water, when available, across the now-defunct James-Pioneer Improvement District. Much of the Improvement District is now developed to groundwater banking facilities or is urbanized. The upper portion of the James Canal has been filled in for urban development, such that its historical connection with the Kern River is cut off. A section of the James Canal is used to convey surface water for recharge to various percolation basins of the Kern Fan groundwater banking facilities. There are no longer opportunities for storm or irrigation runoff to flow into the James Canal.

1.2.7 Soils

A wide variety of soil types cover the KRWCA boundary ranging from sand and silt alluvial deposits on the valley floor in the Primary Area to rock in the mountainous Secondary Area. Soils near the Kern

[5] Conrad ET, Waldron G. 1990. Tule Elk Management in the California State Park System: The Tupman Tule Elk Preserve today. Proceedings of the Western States and Provinces Elk Workshop. Found at http://www.muledeerworkinggroup.com/Docs/Proceedings/1990-Western States and Provinces Elk Workshop/Tule Elk Management in the California State Park System.pdf.

River as it leaves the Kern Canyon in the foothills tend to be coarser textured, sandy soils and become finer as they spread over the Kern Fan on the valley floor in the KRWCA. These alluvial soils are what have made the primary area of the KRWCA extremely fertile and allowed for great agricultural production. Generally slopes in the primary area, where most agricultural activities occur, are flatter with slopes ranging from 0% to 2%. **Figure 1-3** is a map of the soils located in the Primary Area of the KRWCA. The figure shows the transition of soils as they follow the different waterways that move away from the Kern River.

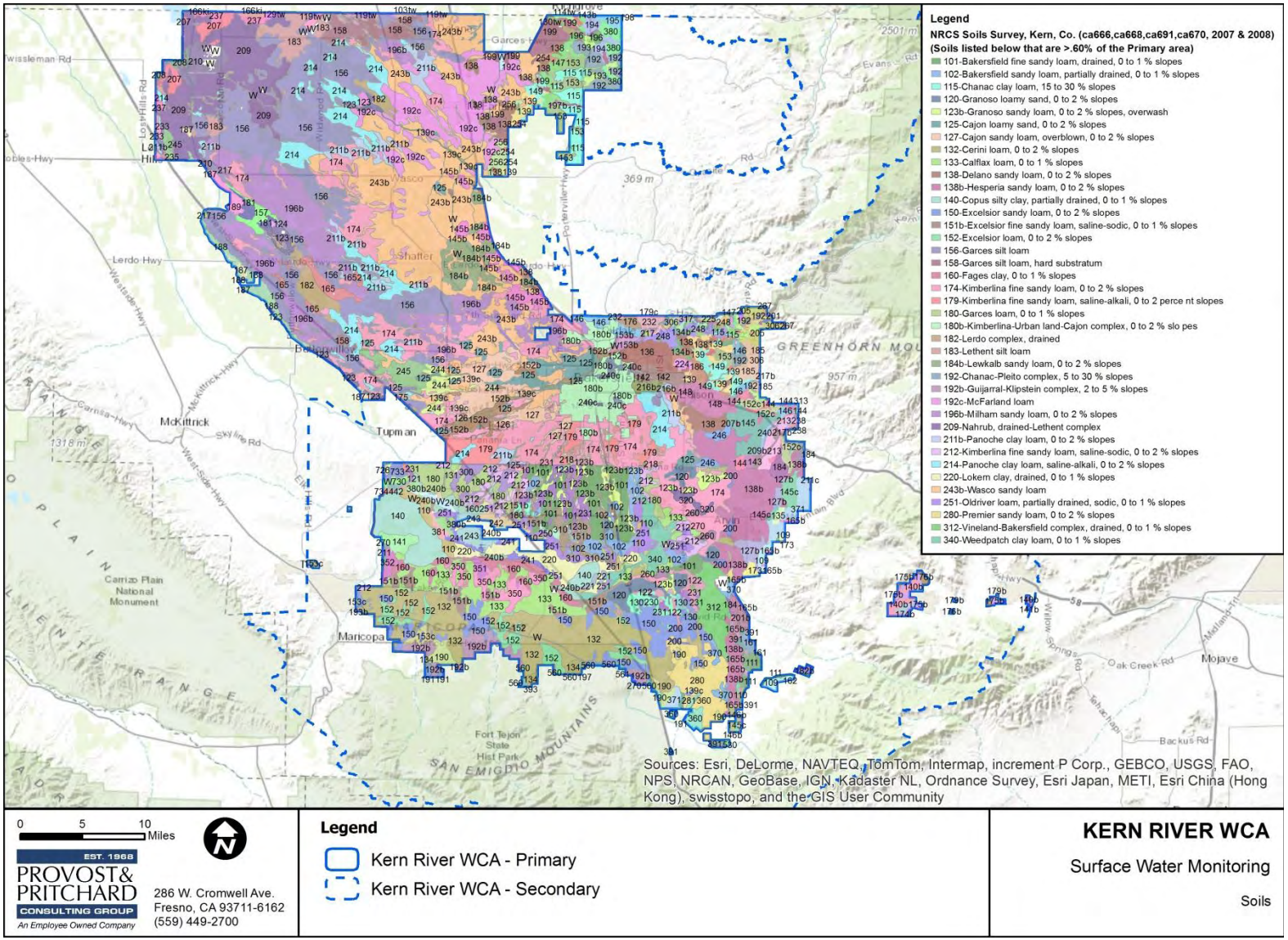

Figure 1-3: Soils of the KRWCA Primary Area

1.2.8 Climate & Hydrology

The climate in the KRWCA can be defined as a desert based on the amount of rainfall it receives. Desert regions are defined as receiving less than 10 inches of rainfall annually. The long-term average rainfall in the KRWCA is well below that limit at just above six (6) inches, based on historical statistics for the City of Bakersfield. Nearly 80% of the rainfall occurs between November and March, when most crops are not being irrigated. Rainfall during summer months, when irrigation is at its highest is basically negligible. A summary of the temperature and precipitation for the Primary Area of the KRWCA is provided in **Table 1-1**.

Storm intensities are generally insufficient to induce large runoff, except from impervious surfaces such as roads and parking lots typical of urban infrastructure. On the valley floor, average monthly rainfall during the wettest month of the year is only 1.16 inches, or an average of just over 0.04 inches per day. While rainfall intensities can vary, it is clear that generally, rainfall on the valley floor does not generate sufficient runoff volumes of concern.

Table 1-1: Climate Statistics for the KRWCA Primary Area (based on Bakersfield, CA records)

Month	Average High Temp. (°F)	Highest Temp. on Record (°F)	Average Low Temp. (°F)	Lowest Temp. on Record (°F)	Avg. Precip. (in)
January	56.2	82	39.3	20	1.04
February	62.8	87	42.4	25	1.16
March	68.7	94	46.5	31	1.12
April	75.0	101	50.2	33	0.67
May	83.5	107	57.5	37	0.21
June	90.9	114	64.2	44	0.07
July	97.1	115	70.5	52	0.01
August	95.8	112	69.0	52	0.04
September	90.0	112	64.0	45	0.10
October	79.4	103	55.0	29	0.30
November	65.7	94	44.6	28	0.59
December	56.6	83	39.0	19	0.85
Total	**76.9**	**--**	**53.6**	**--**	**6.17**

Temperature in the KRWCA can be classified as hot summer months with mild to cool winter months. Irrigation is at its peak during the summer months when temperatures can easily surpass 100 °F during the day. Winter months are generally fairly mild, but temperature can drop below freezing during nights, which can become problematic for citrus growers in the KRWCA. Some citrus growers use irrigation water in the winter to prevent crops from freezing.

1.2.9 Beneficial Uses

The Second Edition of the Tulare Lake Basin Plan (2004) was reviewed for listed surface water beneficial uses in the KRWCA. As the KRWCA Secondary Area includes the Kern River watershed in the mountainous regions of the Sierra Nevada Mountains, all beneficial uses (MUN through FRSH) are listed. **Table 1-2** depicts Table II-1 from the Basin Plan. However, since the primary focus of the General Order is impacts from irrigated agriculture, only the beneficial uses below Lake Isabella are listed since almost all agriculture in the KRWCA occurs in the primary area on the Valley floor. The beneficial uses below Lake Isabella have been identified as:

1. MUN Municipal
2. AGR Agricultural Supply
3. IND Industrial Service Supply
4. PRO Industrial Process Supply
5. POW Hydropower Generation
6. REC-1 Water Contact Recreation
7. REC-2 Non-Contact Water Recreation
8. WARM Warm Water Ecosystems
9. WILD Wildlife Habitat
10. RARE Rare, Threatened, or Endangered Species
11. GWR Groundwater Recharge

The waters of the Kern River are primarily used for MUN, AGR, REC-1, REC-2, WARM, WILD and GWR. Agricultural supply (AGR) represents the most prominent beneficial use within the KRWCA. Several agencies use surface water for groundwater recharge (GWR). Approximately 18% of the urban water supply is provided by the Kern River, while groundwater makes up the rest. Habitat and ecosystem benefits (WARM, WILD, RARE) are also realized during wetter years when water flows. Finally, REC-1 and REC-2 activities occur incidentally as a result of surface flows.

The beneficial uses of IND or PRO do not appear to apply to the Kern River since no uses have been identified that draw water directly from the river. POW is only used at or above Isabella Dam (Lake Isabella) upstream of most agricultural operations.

Table 1-2: Beneficial Uses in the Tulare Lake Basin Plan (2004)

TABLE II-1

TULARE LAKE BASIN

SURFACE WATER BENEFICIAL USES

Stream	MUN	AGR	IND	PRO	POW	REC-1	REC-2	WARM	COLD	WILD	RARE	SPWN	GWR	FRSH
552, 551 Kings River														
North Fork, Upper					•	•	•	•	•	•	•	•		•
Main Fork, Above Kirch Flat	•					•	•	•	•	•	•	•		•
Kirch Flat to Pine Flat Dam (Pine Flat Reservoir)					•	•	•	•	•	•				•
Pine Flat Dam to Friant-Kern	•	•			•	•	•	•	•	•		•	•	•
Friant Kern to Peoples Weir	•	•		•		•	•	•		•			•	
Peoples Weir to Stinson Weir on North Fork and to Empire Weir No. 2 on South Fork		•				•	•	•		•			•	
553, 558 Kaweah River														
Above Lake Kaweah	•				•	•	•	•	•	•	•	•		•
Lake Kaweah					•	•	•	•		•				•
Below Lake Kaweah	•	•	•	•		•	•	•		•			•	
555, 558 Tule River														
Above Lake Success	•	•			•	•	•	•	•	•	•	•		•
Lake Success		•			•	•	•	•		•				•
Below Lake Success	•	•	•	•		•	•	•		•			•	
554, 557 Kern River														
Above Lake Isabella	•				•	•	•	•	•	•	•	•		•
Lake Isabella					•	•	•	•	•	•				•
Lake Isabella to KR-1‡					•	•	•	•	•	•	•			
Below KR-1‡	•	•	•	•	•	•	•	•		•	•		•	
555, 558 Poso Creek		•				•	•	•	•	•			•	•
552 Mill Creek, Source to Kings River	•					•	•	•		•			•	•
552, 553, 554, 555 Other East Side Streams	•	•				•	•	•	•	•			•	
556, 559 West Side Streams		•	•	•		•	•	•		•	•		•	
551, 557, 558 Valley Floor Waters		•	•	•		•	•	•		•	•		•	

‡ KR-1: Southern California Edison Kern River Powerhouse No. 1.

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2 SURFACE WATER QUALITY STATUS

Surface water quality has been monitored by several sources in an effort to characterize watersheds and quantify constituent concentrations. Sources have included the Environmental Protection Agency (EPA), Department of Pesticide Regulation (DPR), and recently Third-party members like the KRWCA. The data collected has allowed for the determination of the current status and general trends of surface water quality. This previously collected data will be used to set a quality starting point for this Surface Water Monitoring Plan (SWMP) and will aid in determining the plan's effectiveness moving forward.

2.1 Current Status

Only one water body in the KRWCA boundary, Isabella Lake, was listed on the 2010 EPA 303(d) list of impaired water bodies for dissolved oxygen and pH, but no sources are known. Isabella Lake is located within the KRWCA Secondary Area that is primarily a mountainous region with little to no agricultural activities. Agricultural activities largely occur in the Primary Area of the KRWCA on the San Joaquin Valley floor. Districts in the KRWCA generally prohibit agricultural drain water from entering surface water bodies. This effort protects surface water and is believed to contribute to the lack of impaired water bodies in the KRWCA.

The KRWCA searched the DPR Surface Water Database, established through an agreement with the State Water Resources Control Board (SWRCB) in 1997, for sampling locations within Kern County and the KRWCA boundary. The DPR database search for pesticide records in Kern County resulted in finding some exceedances for Chlorpyrifos and Glyphosate, however, none of the exceedances occurred at the monitoring sites within the KRWCA boundary. Most data in the database was taken at locations now within another Third-party boundary (Main Drain Canal in Buena Vista Water Quality Coalition). The results from this search provide further evidence that local districts, agencies, and growers are acting in a manner that is protective of the surface water resource.

Surface water sampling for the Kern subwatershed began in 2005 under the direction of the SSJVWQC as part of the Irrigated Lands Regulatory Program (ILRP). Sampling included several constituents such as: field and physical parameters, metals, pesticides, and water column and sediment toxicity. This initial monitoring was performed during the winter storm season and summer irrigation season for two monitoring locations in Kern County: the Main Drain Canal and Poso Creek, which are no longer within the new KRWCA boundary. The locations still within the KRWCA boundary, Chanac Creek and El Paso Creek, were incorporated into the sampling effort along with other Kern locations in 2009 with Conditional Waiver R5-2008-0005 (more information about the sampling locations is provided in Section 4). The Conditional Waiver led to monthly monitoring instead of sampling based on storm or irrigation seasons.

Results collected from sites in Kern County (none in the present KRWCA) indicated that some pesticides, metals, and toxicity can be an issue. However, due to the dryer water years from 2009 to present, and the more ephemeral nature of Kern County creeks, there have not been many opportunities to sample surface water. In the future when more wet water years occur, continuing the sampling effort will further evaluate the presence or lack of pollutants in the KRWCA surface water bodies.

2.2 Monitoring Trends

As previously stated, over the last five (5) years the Kern subwatershed has seen very dry years. Due to the lack of water in the area, limiting sampling opportunities, water quality trends for sites in the KRWCA are not available. As the surface water monitoring effort continues in the future, more data will be collected about possible effects of agricultural activity, if any, on surface water quality.

2.3 Potential Discharges

Possible sources for potential discharges include: agricultural irrigation discharge and drainage, agricultural storm water discharge, and urban runoff. Generally, depths to groundwater do not allow for groundwater discharge to surface water except near areas in foothills and mountains along the Kern River. At these locations there are little to no farming operations that would pollute these discharges. With this SWMP pertaining to irrigated lands only, the focus will be on the agricultural irrigation and storm water discharges.

2.3.1 Agricultural Drainage

Agricultural discharges can impact water quality by directly discharging water containing constituents to a surface water body or operationally through pathways such as spray drift. Water districts in the KRWCA generally do not allow growers to discharge water into conveyance facilities and surface water bodies. This requires growers to capture and recirculate irrigation water on their property, reducing the potential for agricultural discharges. However, potential discharges can come if control is lost on a system. These tend to be rare occurrences that are short in duration.

2.3.2 Storm Water Runoff

Storm water discharges have potential to occur during the winter season when storms are more likely in Kern County. Although most growers in the area have facilities in place to capture water on their property, the duration and intensity of a storm and proximity to a surface water body can potentially lead to storm water runoff discharging into a surface water resource. Roads can also be a conduit for taking storm runoff towards a surface water body. Runoff discharges and flooding are more likely to occur during large events that capture facilities cannot handle. At these times there is potential for water to flow across agriculture and back into a surface water body possibly causing constituent exceedances. If flooding occurs often enough to trigger Surface Water Quality Management Plans (SQMPs), then management practices and facilities to control flooding will be considered for incorporation into the SQMP implementation plan to prevent future exceedances.

3 AGRICULTURAL MANAGEMENT PRACTICES

Growers in the KRWCA boundary produce a wide variety of crops which employ a wide variety of management practices. These on-farm management practices are beneficial for growers since they help maximize the efficient use of the water supply and prevent agricultural discharges while maintaining high crop production. KRWCA growers have been innovative over the years in developing and using better practices in water efficiency, soil management, and pesticide and fertilizer application.

3.1 Management Practices Trends in Kern County

Management practices in KRWCA have trended toward being more efficient as water supplies have decreased and available technology has improved. These practices have a two-fold benefit as they not only help a grower's profit with high production from efficient use of available resources, but also reduce potential pollutant discharges from reaching surface water bodies. Growers have implemented, and continue to implement, better practices in the fields of water, pesticide, and fertilizer application along with soil enhancement and control.

3.1.1 Water Application Practices

Surface water deliveries generally begin in March and terminate in September or October, depending upon crop demand and water availability, although some KRWCA areas irrigate year round. In some years, an irrigation or water district may not receive any surface water due to the hydrologic conditions of the source supply. Water supplies are generally limited, such that a grower is constrained from irrigating a field to the point of generating discharges.

Irrigation practices are increasing in efficiency, as the cost of pumping water and the reduction in available surface supplies impact growers' profit margins. Many permanent crops have converted to drip or micro-sprayer irrigation systems and application rates are being matched to crop water usage, reducing the amount of water that can potentially be lost to runoff or delivered below the root zone as deep percolation. However, this efficiency can contribute to increased soil salinity, if less water is applied than is necessary to leach salts below the root zone, to maintain a sustainable and productive crop yield system.

Improvements to water application practices have not only benefited production but have also led to the reduction of field runoff that could potentially discharge pesticides and other pollutants. Benefits of these improvements in water application can potentially allow for:

- Increased distribution uniformity of applied water, which contributes to better irrigation efficiency.
- Change in the amount, rate, or timing of water being applied to the crop to more closely match evapotranspiration. This can lead to improved irrigation efficiency by reducing deep percolation, while maintaining or improving crop production.
- Reduction of erosion caused by irrigation.

The addition of irrigation water additives may have the potential for reducing pesticides in the tail water by increasing infiltration during irrigation events, which also reduces erosion, and reduces the amount of pesticides that adhere to particulates by promoting the aggregation of dispersed soil colloids. These

water additives are primarily added to irrigation water for erosion control and/or improved water infiltration. Examples of additives include polyacrylamide (PAM), gypsum, and humic acid.

In the primary area of the KRWCA, general topography of the irrigated land is flat to gently sloping, so surface irrigation may still be practiced in some areas. In some areas where the slope and soils are adequate, the resulting irrigation efficiencies can be quite good. Irrigators with all practices are generally managing their irrigation carefully, because of the cost and availability of the water. Many growers rely on pumped groundwater at various times of the year, which can be very costly given the depth to water, and are not going to run their irrigation pumps any longer than necessary to properly irrigate their lands.

Some growers have extensive tail water recycling systems. Tail water recovery refers to the practice of collecting, sometimes temporarily storing, re-circulating, and reusing irrigation tailwater in an irrigation distribution system. These systems can contribute to higher irrigation efficiency by facilitating quicker advance across a field with higher flow rates, making infiltration opportunity time more even between the head and tail ends of the field.

3.1.2 Soil Enhancement and Control

Growers within the KRWCA's service area use both organic and conventional farming practices. Reduced tillage practices are being adopted by some growers along with the use of GPS-guided equipment. Increases in fuel costs are dictating less ground preparation which is leaving soil surfaces undisturbed for longer periods of time.

Raised berms at low ends of fields trap sediment as well as suspended or adsorbed pesticides, and reduce runoff of dissolved substances in fields with low slopes and sandy soil types by holding water, increasing runoff retention and allowing for infiltration. This is potentially applicable for both dormant and irrigation seasons.

Water and sediment control basins are used to form a sediment trap and water detention basin. Their purpose is to reduce erosion, trap sediment and pesticides adsorbed to soil particles, reduce and manage runoff, change the flow of nutrients and pesticides, and improve water quality. The control basin can be an earth embankment or a combination ridge and channel. It is generally constructed across the slope and the minor watercourses to form a sediment trap and water detention basin. The basins serve to increase residence time by temporarily storing runoff on-site. The basin releases water slowly, through infiltration or a pipe outlet and tile line. The increased residence time allows suspended particles to settle out, resulting in better water quality. Water and sediment control basins are applicable to both dormant and irrigation seasons.

Buffers are areas of land located along field edges that are maintained in permanent vegetation. The vegetation and soil buildup in buffers slow water movement and increase infiltration. By slowing its movement, field runoff is more likely to infiltrate into soil. Properly designed buffers also trap sediment, thereby reducing the offsite movement of pesticides adsorbed to soil particles. Microbes residing in soil and organic matter can then degrade pesticides that infiltrate into the upper soil layer or are trapped by vegetation and plant debris.

Orchard residues are now being shredded on site at a greater rate since the ban on agricultural waste burning has gone into effect. The crop residues are being reincorporated into the soil structure, where

they increase the infiltration rates of the soils. This is most beneficial during the winter months. The usage of composted materials is rising as well due to their benefits on soil biota.

Various vegetation management practices help reduce pesticide runoff by increasing soil infiltration, accelerating pesticide degradation at the soil surface and preventing the offsite movement of soil, nutrients, and pesticides during winter storm events. Cover crops can reduce pesticide runoff because pesticide particles are adsorbed to plant surfaces more strongly than to bare soil, pesticide persistence on plant surfaces is shorter than on or in soil, and because cover crops slow or prevent the off-site movement of water and sediment carrying pesticides. There are many types of cover crops, but they can be considered in two main groups: resident vegetation and seeded cover crops. Cover crops are not usually harvested for sale, but can provide several important functions:

- Anchor the soil during winter rains to prevent soil, nutrient, and pesticide runoff.
- Accelerate biodegradation of pesticides at the soil surface.
- Improve water infiltration and soil structure.
- Provide nitrogen (legumes).
- Add organic material to the soil.
- Help control weeds.
- Improve field access during wet weather.
- Provide nectar and habitat for beneficial insects.

Soil management is another component of controlling pesticides. Tillage is the term used for soil mechanical cultivation activities such as plowing, ripping, disking, aerating, and harrowing. These tillage practices are specifically designed to loosen soil, direct water flow, and encourage vegetation growth. If properly conducted, tillage can dramatically reduce runoff and increase infiltration. The effects of tillage on offsite pesticide movement depends greatly upon the specific tillage technique used, soil type, slope, soil organic matter, and a number of other site specific factors. Ripping is commonly used on fields to increase water infiltration. For orchards, shank depth must be shallow enough to avoid damage to tree roots. Ripping significantly increases the infiltration rate of soils and can render fields impassable to heavy equipment such as sprayers used during dormant treatments. Aerating orchard soils with specialized tillage equipment is another way to increase water infiltration. Aeration improves the soil profile with minimal disruption to the orchard floor. A finishing process may be required; however, for almond orchards where shake and sweep harvest methods are used. Aeration, therefore, may reduce pesticide runoff although no studies have been conducted.

3.1.3 Pesticide Application

Integrated pest management (IPM) has been gaining traction within the KRWCA as a means of controlling costs. IPM is an ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and non-target organisms, and the environment. The advent of “softer” materials (more pest specific, less broad spectrum) has further reduced both the frequency and volume of material applications, as now only the target pest is eliminated when a predetermined economic threshold is reached.

Management methods vary, and can be a combination of one or more aspects including biological control, cultural practices, pheromone disruption, pesticide treatment, etc. Biological control includes the use of natural enemies that attack pests. Use of such biological control agents, however, may not be enough to suppress pest populations to prevent them from reaching damaging levels. Cultural practices include field level practices that can affect the intensity of pest infestation. This includes practices such as orchard sanitation or proper pruning and painting of exposed wood to prevent sunburn as well as reduce tree susceptibility to wood-boring insects. Proper irrigation and fertilization may also help reduce certain pests.

Spray control practices are in place with many growers, primarily as a safety issue for field crews. Many growers have the applications done by the same company that sells the chemicals, and these operations recognize the benefits of higher efficiency spray equipment, as they are paid by the acres sprayed, not by the time it takes to do the work. Efficient spray equipment means that individual growers can be covered quicker, and more acres can be done per working day. Chemical costs are reduced due to only mixing what is needed to spray the crop, not the open spaces between the plants (net vs. gross acres). Orchards and row crops both benefit from such equipment.

3.1.4 Fertilizer Application

Fertilizer applications are also more efficient. Soil levels are typically tested during the winter months. Plant tissues are sampled for nutrient levels frequently during the growing season, and many plant nutrients are direct injected into the irrigation systems (known as fertigation) or applied as a foliar spray. Fertigation is characterized by the following advantages (Burt et al, 1995):

- Soil compaction is avoided because heavy equipment never enters the field;
- The crop is not damaged by root pruning, breakage of leaves, or bending over as occurs with conventional application methods;
- Less equipment may be required to apply the fertilizer;
- Less energy is expended in applying the fertilizer;
- Usually less labor is needed to supervise the application;
- The supply of nutrients can be more carefully regulated and monitored;
- The nutrients can be distributed more evenly throughout the entire root zone or soil profile;
- The nutrients can be supplied incrementally throughout the season to meet the actual nutritional requirements of the crop; and,
- Nutrients can be applied to the soil when crop or soil conditions would otherwise prohibit entry into the field with conventional equipment.

Some fertilizers are applied as banded applications within orchards, and are quickly incorporated by a following irrigation. Others are direct injected into planting beds for quick uptake by the soon to be planted crops.

3.2 Management Practices and Land Use

Management practices used largely depend on the land use or crop on a particular site. Agriculture in the KRWCA is very diverse and accounts for one of the largest land uses in the KRWCA area. **Figure 3-1** spatially shows the crop variety over the KRWCA boundary area. Reviewing the Kern County Agricultural Commissioner's 2012 Annual Crop Report, eight of the top ten commodities are crops. These top crops

also show the success and variety that make up much of the farming in the KRWCA as there are vine and tree crops and row crops listed. **Table 3-1** is a summary of the top ten commodities in Kern County for 2012. Kern County growers are national leaders in producing carrots. Kern County growers lead the State in almond production, for which California as a whole produces 80% of the world's almonds. Kern County growers also lead the State in production of pistachios, for which California as a whole produces 99% of the nation's pistachios. For reference, the complete 2012 Annual Crop Report is included in **Appendix A**.

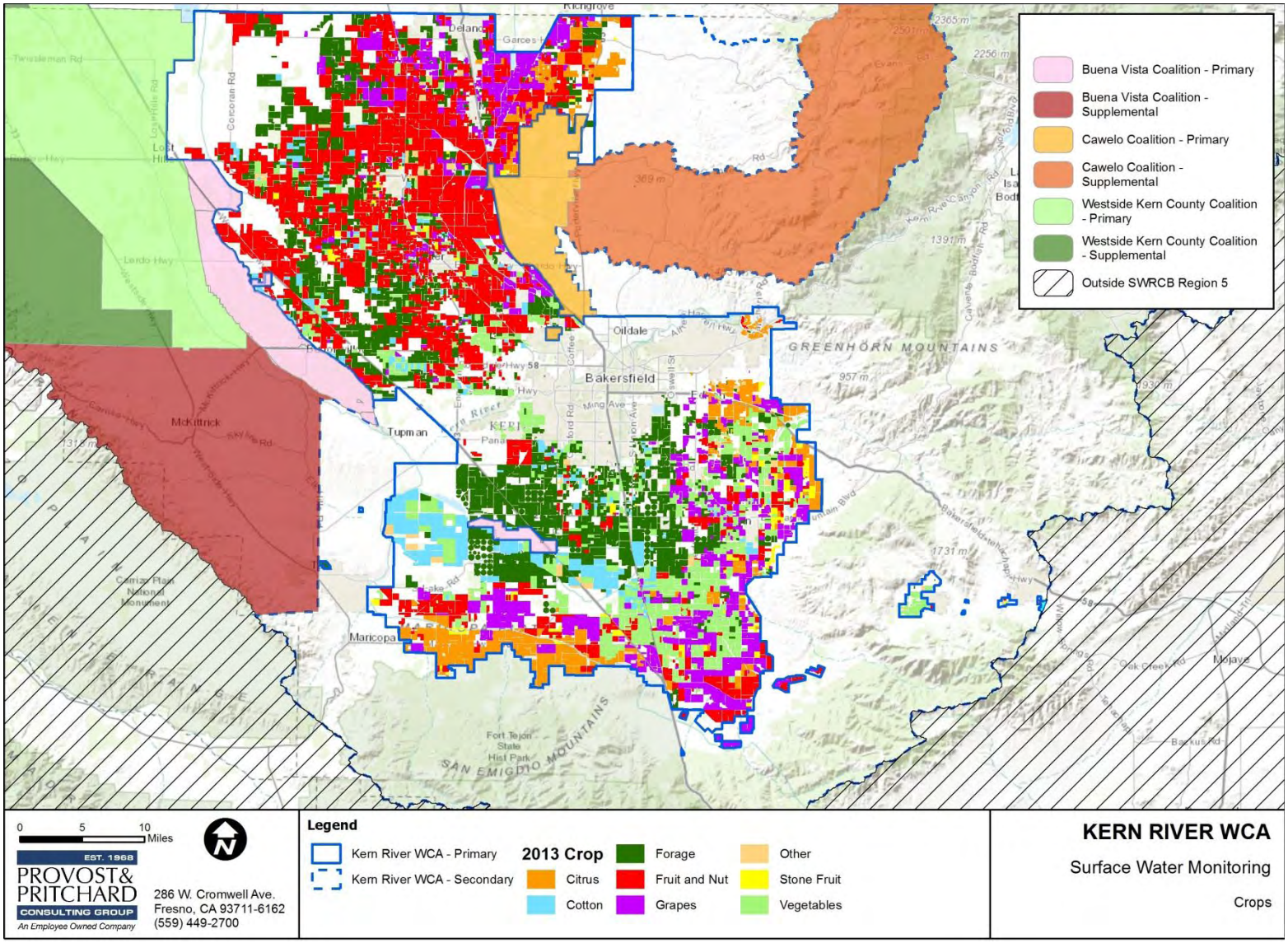

Figure 3-1: KRWCA Primary Area Crop Map (2013)

Table 3-1: 2012 Top 10 Kern Commodities

Kern County
10 Leading Commodities
2012

	Commodity		Value	2011 Rank
1	Grapes	$	1,498,987,000	1
2	Almonds	$	821,857,000	3
3	Milk	$	690,062,000	2
4	Citrus	$	620,350,000	4
5	Pistachios	$	486,213,000	6
6	Cattle & Calves	$	382,913,000	7
7	Carrots	$	350,439,000	5
8	Hay, Alfalfa	$	213,466,000	8
9	Cotton, Including Seed	$	147,637,000	10
10	Potatoes	$	85,102,000	11
Top 10 Total		**$**	**5,297,026,000**	

Source: Kern County Annual Crop Report 2012

In 2010 the Kern County Water Agency (KCWA) performed a management practices survey at the district level in Kern County. The KCWA asked districts to survey crops in their districts and share different methods and practices in place for the various crops. Several of the management practices are those described in the previous section.

The following tables show the responses from participating districts (within the KRWCA boundary). **Table 3-2** shows the summary for grapes, the number one commodity for Kern County in 2012.

Table 3-3 shows the almond management practices and **Table 3-4** shows cotton management practices. These tables show practices for vine, tree, and row crops. By 2010 many of the districts stated that their growers had converted to more efficient irrigation methods such as drip and mircrosprinkler. Even cotton, a crop known for surface irrigation, was shown to have buried drip and sprinkler applications. The summary also resulted in showing that most growers have tailwater recovery systems in place to ensure the most efficient use of the water resource. Other practices such as tillage, cover crop, and pesticide/herbicide application were also shared.

Table 3-2: Grape Management Practices from 2010 District Survey

District	AEWSD	KTWD	NKWSD	SWSD		SWID	WRMWSD
Crop -->	**Grapes**	**Grapes**	**Grapes**	**Wine Grapes**	**Table Grapes**	**Grapes**	**Grapes**
Crop Type	Table, Wine, Raisin	Fruit	Table, Wine	Fruit	Fruit	Table, raisins	Table, Wine, Raisin
Soil Type	1 thru 5	Not Specified	All	5	5	1 thru 5	2 thru 4
Crop Rotation	N/A	N/A	N/A	No	No	N/A	N/A
Mechanical Tillage	Light	Light, if any	Not Specified	No	No	Light, if any	Light
Cover Crop	Some	None	Some	Some	Some	None	Some
Herbicide Application Practice(s)	Ground	Ground	Not Specified	Ground	Ground	Ground	Ground
Pesticide Application Practice(s)	Ground, Air	Ground	Not Specified	Ground	Ground	Ground	Ground, Air
Harvest Method(s)	Hand, Mechanical	Hand	Hand, Mechanical	Mechanical	Hand	Hand, Mechanical	Hand, Mechanical
Irrigation Systems	Drip, Furrow, Microsprinkler	Drip, Microsprinkler	Drip, Furrow	Drip, Furrow	Drip, Furrow	Drip, Surface	Drip, Microsprinkler
Drainage System	None, Tailwater Return	None	None	Tailwater Return, Some Tile Drains	Tailwater Return, Some Tile Drains	None, Tailwater Return	None, Tailwater Return

Table 3-3: Almond Management Practices from 2010 District Survey

District	AEWSD	KTWD	NKWSD	SWSD	SWID	WRMWSD
Crop -->	**Almonds**	**Almonds**	**Almonds**	**Almonds**	**Almonds**	**Almonds**
Crop Type	Nuts	Nut	Nut	Nut, Animal Feed (Hulls)	Nut	Nuts
Soil Type	2 thru 5	Not Specified	All	5	1 thru 5	2 thru 4
Crop Rotation	N/A	N/A	N/A	No	N/A	N/A
Mechanical Tillage	No	Light, if any	Not Specified	No	Light, if any	None
Cover Crop	Some	None	Some	Some	None	Some
Herbicide Application Practice(s)	Ground	Ground	Not Specified	Ground	Ground	Ground
Pesticide Application Practice(s)	Ground	Ground	Not Specified	Ground	Ground	Ground
Harvest Method(s)	Mechanical	Mechanical	Mechanical	Mechanical	Mechanical	Mechanical
Irrigation Systems	Drip, Gravity, Microsprinkler	Drip, Microsprinkler	Border Strip, Drip, Microsprinkler	Border Strip, Drip, Mircrosprinkler, Sprinkler Border Strip,	Drip, Sprinkler, Surface	Drip, Microsprinkler
Drainage System	None, Tailwater Return	None	None	Tailwater Return, Some Tile Drains	None, Tailwater Return	None, Tailwater Return

Table 3-4: Cotton Management Practices from 2010 District Survey

District	HMWD	NKWSD	SWSD	SWID	WRMWSD
Crop -->	**Cotton**	**Cotton**	**Cotton**	**Cotton**	**Cotton**
Crop Type	Fiber, Seed, Feed	Fiber, Seed, Feed	Fiber, Seed, Feed	Fiber, seed, feed	Fiber, Seed, Feed
Soil Type	All	All	5	1 thru 5	2 thru 6
Crop Rotation	2-3 years, then other field crop or food crop	2 years, then rotate to other field crop	Yes	Rotate to other field crop	2 years, then rotate to other field crop
Mechanical Tillage	Disc Pre-Plant, Cultivate In-Season, Shred and Disc After Harvest, Deep Rip or Chisel	Not Specified	Yes	Disc Pre-Plant, Cultivate In-Season, Shred and Disc After Harvest	Disc Pre-Plant, Cultivate In-Season, Shred and Disc After Harvest
Cover Crop	No	No	No	None	None
Herbicide Application Practice(s)	Ground, Air	Not Specified	Ground, Air	Ground, Air	Ground, Air
Pesticide Application Practice(s)	Ground, Air	Not Specified	Ground, Air	Ground, Air	Ground, Air
Harvest Method(s)	Mechanical	Mechanical	Mechanical	Mechanical	Mechanical
Irrigation Systems	Buried Drip, Sprinkler, Furrow	Sprinkler, Furrow	Furrow, Sprinkler	Sprinkler, Furrow	Sprinkler
Drainage System	Sub-Surface, Tailwater Return	None, Tailwater Return	Tailwater return, some tile drains	None, Tailwater Return	None, Tailwater Return

The numbering system for the soil types is as follows:

1. Sand
2. Sandy Loam
3. Loam
4. Silty Loam
5. Clay Loam
6. Clay

3.3 Future Management Practice Implementation

As surface water monitoring moves forward, exceedances of constituent trigger limits have the potential to occur and possibly lead to implementation of a management plan. As these instances or other learning opportunities occur, the KRWCA and its Members will determine exceedance sources and the solutions to stopping and/or reversing these sources. When the KRWCA learns of successful, site-specific management practices, these practices will be shared with growers through various outreach and implementation efforts. KRWCA growers have been very proactive in implementing the best management practices on their farms as it leads to higher sustainability and efficiency. The KRWCA, in an effort to continue this trend, will document successful management practices and promote such success with implementation and reduced potential of polluting surface water in other areas. Successful management practices are expected to range from on-farm facility modification, changing chemicals, soil management, and/or methods of application (i.e. timing, nozzle calibration, etc.).

4 SURFACE WATER MONITORING SITE SELECTION & RATIONALE

Four different monitoring sites types are made available in the Order for third-party members to use for the surface water monitoring effort. These sites are: 1) fixed, long-term core sites, 2) assessment sites, 3) ephemeral sites, and 4) special project sites. Most of these sites are a continuation from the previous conditional waiver; however, the Order now includes provisions for ephemeral sites. Due to many of the low elevation watersheds and low average annual precipitation totals typical for much of the coalition boundary, the KRWCA believes most of the surface water bodies are ephemeral. For this reason, the KRWCA will make use of a representative ephemeral site to cover much of the boundary.

4.1 Proposed Monitoring Sites

The KRWCA proposes to initially use two sites to accomplish the surface water monitoring requirement of the Order. The two sites, Chanac Creek and El Paso Creek, were previously established by the Kern subwatershed of the SSJVWQC. The Kern subwatershed monitored six locations under the previous Conditional Waiver, but some of the monitoring sites are now managed by other third-party members. The two sites on the Main Drain Canal are managed by the Buena Vista Coalition. The Poso Creek site is monitored by the Cawelo Water District. The White River site in the Tulare County portion of Delano-Earlimart ID is now part of the Tule Basin Water Quality Coalition. **Figure 4-1** is a map showing the location of the monitoring sites in the KRWCA. GPS coordinates and Surface Water Ambient Monitoring Program (SWAMP) codes are provided in **Table 4-1**.

Table 4-1: KRWCA Monitoring Sites

Monitoring Site	Latitude	Longitude	Site Code
Chanac Creek	35.1080	118.6239	557CHCPLR
El Paso Creek	35.0450	118.8554	557ELPCRK

4.1.1 Chanac Creek

Chanac Creek is located in the Cummings Valley in the Tehachapi area that drains a watershed of about 1,225 acres. In the Cummings Valley, agricultural plantings have altered the original creek bed and channelized large portions. The creek bed reappears just downstream of the agricultural activities and runs through non-irrigated pasturelands and natural landscape until it enters Tejon Creek. During the previous conditional waiver the Chanac Creek monitoring site was moved from its established location at Banducci Rd to a location approximately 1.18 miles north of Banducci Rd and 0.8 miles west of Pellicer Rd. This new location is at the westerly edge of agriculture along Chanac Creek. The new location is more likely to show the impacts of irrigated agriculture than the old location.

Chanac Creek will serve as an Assessment Monitoring Site for the KRWCA. Monitoring will follow the Assessment Monitoring schedule and Assessment monitored parameters described in Sections 5 and 6, respectively. Monitoring at this location will allow for tracking surface water quality and management practice effectiveness in a mountainous farming region. This area near Tehachapi has a significant amount of farming and sees a different climate than the farming on the Central Valley floor. Due to these differences between valley floor and mountains, this site will only represent the Cummings Valley

watershed in which it is located. Assessment Monitoring was selected due to the lack of background information and data from this location in the past.

4.1.2 El Paso Creek

El Paso Creek is a southern stream with few areas where storm water from irrigated lands can runoff into the creek bed. Habitat values for El Paso Creek are limited because the creek prism is mostly barren and because the extremely porous soils absorb the infrequent storm or irrigation runoff quickly. Because of the infrequent stream flows, there are virtually no beneficial uses to be protected. The site was originally chosen because of the potential for storm runoff into the creek. A farther downstream location was not selected because porous soils reduce the frequency and quantity of water flows farther downstream.

El Paso Creek will serve as an Ephemeral Monitoring site as well as Representative Monitoring site for the KRWCA. Monitoring will follow the Ephemeral Monitoring schedule and Ephemeral monitored parameters described in Sections 5 and 6, respectively. This monitoring site was established under the previous Conditional Waiver and has been dry for several years due to the recent dry years, matching the definition of an ephemeral water body. The KRWCA believes that most surface water bodies in the KRWCA boundary are ephemeral, allowing for the use of El Paso Creek as a Representative Monitoring site. The KRWCA proposes to use the El Paso Creek site as representative for surface waters and agricultural activities in the southern portion and foothills of the KRWCA boundary. The El Paso Creek watershed is filled with a wide variety of crops, which also helps in representing the wide variety of crops planted throughout the KRWCA. **Table 4-2** shows the variety of crops within one mile of the creek.

4.2 Monitoring Site Coordination

Due to the transition of the Kern Subwatershed portion of the SSJVWQC into multiple Third-Party Coalitions, it may be important for the KRWCA and other Coalitions to collaborate on certain surface water bodies or monitoring sites. The Cawelo Water District Coalition and Buena Vista Coalition will be the two primary coalitions for the KRWCA to coordinate with given the location of past monitoring.

4.2.1 Cawelo Water District Coalition – Poso Creek

The Cawelo Water District Coalition (Cawelo) covers most of the Poso Creek watershed. The current Poso Creek monitoring site is now going to be managed by Cawelo. The location of this site was set in a location that was more likely to have flowing water. Moving further west onto the valley floor, and into the KRWCA area, Poso Creek has more tendency to remain dry during the year. In above average wet years, flows in Poso Creek may reach the portions of the KRWCA boundary. In years such as these, coordination between the KRWCA and Cawelo may be utilized to sample flows and analyze for potential agricultural impacts.

4.2.2 Buena Vista Coalition – Main Drain Canal

The Buena Vista Coalition (BVC) primarily covers the Buena Vista Water Storage District (BVWSD) and some of the southwestern foothills of Kern County. The Main Drain is a facility within the BVWSD that has two monitoring locations. With regards to the SWMP, the Main Drain is only relevant to BVWSD and not much coordination is expected to be needed between the KRWCA and BVC.

Table 4-2: Crop Variety Around El Paso Creek

Commodity	Approximate Acreage	Commodity	Approximate Acreage
CARROT	2,376	CABBAGE	132
GRAPE, WINE	1,767	LEEK	124
POTATO	1,181	ONION GREEN	124
PISTACHIO	893	ONION DRY ETC	107
GRAPE	841	ARRUGULA	83
ALMOND	567	PEAS	79
TANGERINE/SDLS	470	BLUEBERRY	78
BROCCOLI	419	TANGERINE	70
KALE	294	TOMATO PROCESS	66
TOMATO	268	BEET	65
CAULIFLOWER	265	SWISS CHARD	65
COLLARD	227	CILANTRO	62
PEPPER FRUITNG	218	DILL	62
BARLEY	217	PARSLEY	62
GARLIC	187	ALFALFA SEED	47
RADISH	187	SPINACH	42
LETTUCE LEAF	168	POMEGRANATE	40
GRAPE, RAISIN	156	PLUM	38
BEAN SUCCULENT	145	PEACH	31
DAIKON	144	APPLE	21
MUSTARD	144	SQUASH	14
RUTABAGA	144	CHERRY	6
TURNIP	144	OLIVE	5
BRUSSEL SPROUT	138	APRICOT	4
CORN, GRAIN	138	ORANGE	1

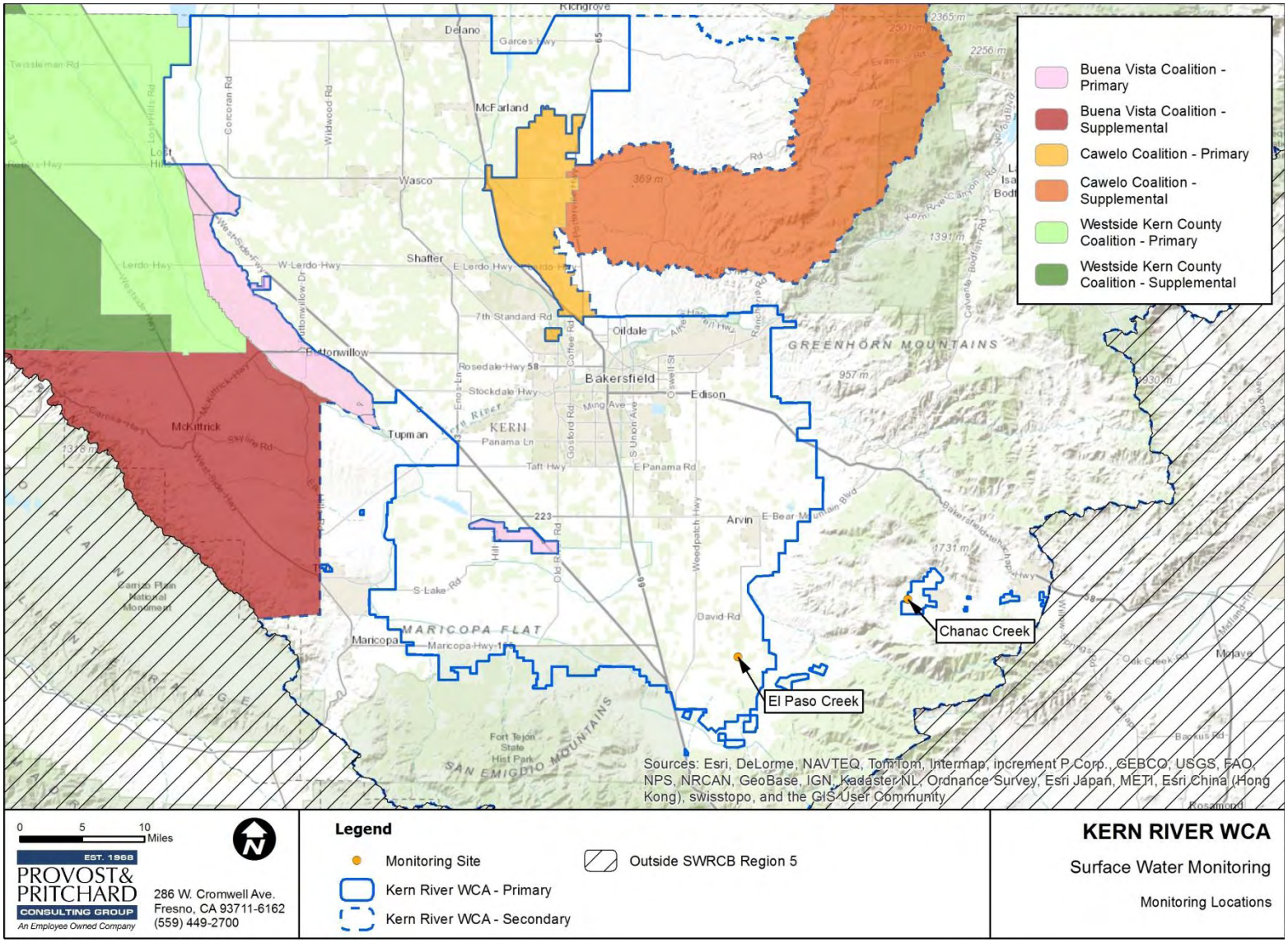

Figure 4-1: Map of KRWCA Monitoring Sites

4.3 Rejected Monitoring Sites

Several surface water locations were not included in the SWMP for various reasons. The primary reason for not monitoring many sites is due to the similarity of the small creeks and streams and proposed use of El Paso Creek as a Representative Monitoring site. Many of the creeks and streams within the KRWCA have small watersheds and are ephemeral in nature, and much like El Paso Creek, only flow during very large rainfall events or wetter years. Other reasons for not monitoring a site include lack of agricultural influence on the creek or lack of a defined channel once on the Valley floor. The Valley floor is the primary focus for monitoring. Additional brief explanations for different sites are provided below.

Caliente Creek

Caliente Creek is one of the channels that emerges from the foothills and becomes too undefined to establish a monitoring station. While Caliente Creek is larger than many of the other ephemeral creeks, it is not defined enough in the agricultural area to establish a successful monitoring site.

San Emigdio Creek

During the previous Conditional Waiver, the KCWA noted several drain pipes into the channel that could discharge storm or tail water in San Emigdio Creek. KCWA staff had discussions with the adjacent landowners regarding these drain pipes and that led to their removal by May 31, 2009. With no direct discharges to the channel and hydrology similar to El Paso Creek, this location was no included in favor of the representative El Paso Creek monitoring site.

Miscellaneous Small Creeks

Several small creeks were not included due to the lack of channel definition or lack of evidence for runoff from agricultural operations entering the channel. These creeks were: Grapevine Creek, Pastoria Creek, Pleito Creek, and Tecuya Creek.

Kern River Outlet Canal

The KCWA performed a physical survey of the Kern River Outlet Canal from the Tule Elk State Natural Reserve to Highway 46 under the previous Conditional Waiver and found two locations where irrigation or storm drainage from neighboring irrigated lands has potential to be introduced. However, this site was not included once the wide width of the Outlet Canal and the infrequency of irrigation were considered. It was determined that it would be unlikely to find sufficient water to draw a sample.

James Canal

The James Canal is no longer connected to agricultural irrigation. The remnants of the James Canal are used to convey surface water for recharge in various percolation basins of the Kern Fan groundwater banking facilities.

Connecting Slough

Much of the original Connecting Slough no longer exists and the remnants have been converted into tail water ponds with recirculating pumps. Runoff from adjacent irrigated lands is now retained on-farm.

Friant-Kern Canal

The Federal CVP designed and operates the inlets into the Friant-Kern Canal that allow introduction of storm water. The KRWCA is not authorized to monitor surface water quality in the canal. The Friant

Water Authority (FWA) collects the surface water quality data and regularly provides water quality reports.

4.4 Selection Rationale Summary

Monitoring sites were selected due to their representativeness for the KRWCA area and existing monitoring history. The KRWCA believes that maintaining the current monitoring sites will continue to develop a strong history record. As the record develops over time, trends and impacts can be more fully determined. The KRWCA also believes the creeks and streams in the Primary Area are very similar and that one Representative Ephemeral Monitoring site will satisfy the surface water monitoring at this time. In the future, if exceedances are encountered triggering a SQMP, other sites that were not included may be reviewed and potentially used to aid in monitoring for a SQMP.

5 SURFACE WATER MONITORING SCHEDULE

Monitoring schedules and frequency will conform to the guidelines set forth by the Regional Board in Attachment B of the Order. The KRWCA plans to continue monthly monitoring at proposed sampling locations. However, unlike monitoring under Conditional Waiver R5-2008-2005 that had a set monitoring time each month, the KRWCA will monitor weather and irrigation schedules to capture an event during the month, whenever it may occur. Only one sample will be taken per month. This effort will also satisfy the requirement to capture at least two storm runoff events a year, if such events occur. Records will be kept to identify whether a sample is from a storm or irrigation runoff event.

5.1 Assessment Monitoring Schedule

The Assessment Monitoring Schedule will commence upon approval of this SWMP by the Executive Officer, currently estimated for September 2014. The KRWCA proposes to follow a rotating three year cycle where Assessment sites are monitored for all Assessment parameters in Year 1 and then off for Years 2 and 3. This schedule should allow for determining trends and potential impacts to surface water quality by agricultural operations while reducing the financial burden to the KRWCA Members. The KRWCA is electing to follow the water year as its annual reporting period (October 1 to September 30). Thus, when this SWMP is approved, Year 1 Assessment Monitoring for Chanac Creek will run through September 2015 and then start again October 2017. Samples will only be taken when water is flowing, but photo documentation will be provided for each month of the one year monitoring cycle.

Assessment Monitoring parameters, when water is present and flowing, will include:

- General water quality;
- Pathogens;
- Nutrients;
- Metals;
- Pesticides;
- Water and sediment toxicity parameters; and,
- Possible parameters of concern identified by the Regional Board.

Monitoring parameters and frequency are summarized in **Table 5-1**. More parameter specific information is provided in Section 6: Monitored Parameters.

5.2 Ephemeral Monitoring Schedule

The Ephemeral Monitoring Schedule will also go into effect upon approval of this SWMP by the Executive Officer. Per Order requirements, the KRWCA will monitor rainfall forecasts to identify when water may be present in the channel. Monitoring forecasts will also allow for giving the laboratory field personnel adequate time to prepare for a sample and be ready to take a sample when needed. Many ephemeral creeks and streams do not have long flow times due to their small watersheds, making preparation and communication between the KRWCA and its laboratory, BSK, crucial to the success of ephemeral monitoring.

Due to the sporadic nature of ephemeral flows, every sampling event for an Ephemeral Monitoring site will monitor for all parameters, Core and Assessment. These parameters are summarized in **Table 5-1**.

Table 5-1: Assessment and Ephemeral Monitoring Schedule and Parameters

Parameters	Monitoring Frequency
Photo monitoring (digital)	Every monitoring event (wet or dry)
General Physical Parameters	Monthly
Nutrients	Monthly
Pathogens	Monthly
Water Column Toxicity	Monthly
Metals	Monthly
Pesticides	Monthly
Sediment Toxicity	Twice per year[6]

5.3 Core Monitoring Schedule

The Core Monitoring Schedule will commence upon approval of this SWMP by the Executive Officer, which is currently estimated for September 2014. Per Order requirements, Core Monitoring will operate on a repeating three year cycle beginning with Assessment parameters in Year 1 and Core parameters in Years 2 and 3. With the KRWCA electing to follow the water year as its annual monitoring period, Year 1 will begin when the SWMP is approved (expected for September 2014) and run through September 2015. The Core Monitoring Schedule Cycle is summarized in **Table 5-2**.

Table 5-2: Core Monitoring Cycle

Monitoring Type	Year 1	Year 2	Year 3
Assessment	X		
Core		X(1)	X

(1) Core will include Assessment parameters exceeding trigger limits in Year 1.

Core Monitoring Parameters will consist of monthly sampling, when water is present and flowing, for:

- General water quality;
- Pathogens;
- Nutrients;
- Water toxicity; and,
- Possible parameters of concern identified by the Regional Board.

Assessment Monitoring parameters, when water is present and flowing, will include:

- Metals;

[6] If water is present, one sample shall be collected between March 1 and April 30; the other sample shall be collected between August 15 and October 15.

- Pesticides;
- Sediment toxicity parameters; and,
- All Core parameters.

The monitoring parameters and frequency are summarized in **Table 5-3**. More parameter specific information is provided in Section 6: Monitored Parameters.

Table 5-3: Core Monitoring Schedule and Parameters

Parameters	Monitoring Frequency
Photo monitoring (digital)	Every monitoring event (wet or dry)
General Physical Parameters	Monthly
Nutrients	Monthly
Pathogens	Monthly
Water Column Toxicity	Monthly
Assessment Monitoring	Once every three years
Parameter(s) of Concern[7]	Monthly

5.4 Special Monitoring Schedule

Currently, the KRWCA does not have any Special Monitoring sites. The KRWCA will utilize these monitoring tools in cases where a new monitoring site is developed or if exceedances trigger a SQMP that includes developing more surface water monitoring sites. Incorporating this type of monitoring will help to classify surface water quality at a site and/or help the KRWCA track down the source that may be causing exceedances. Further discussion on parameters and schedule will be established during site development or in a SQMP, as necessary.

[7] Parameter(s) of Concern may be reasonably selected by the Executive Officer from Assessment analyses that result in an exceedance or degradation

6 MONITORED PARAMETERS

Surface water monitoring established under previous conditional waivers and continued under this Order comes with a whole suite of parameters that need to be monitored to characterize the state of water quality of a watershed or represented watershed. Primary focus of the monitored parameters is to determine the impact irrigated agriculture may have on surface waters, if applicable. The selection and type of monitored parameters are further discussed in this section. Samples will only be taken when water is flowing at the monitoring locations. Methods by which each parameter is analyzed will be discussed in the Quality Assurance Project Plan (QAPP) section.

6.1 Field Measurements

Field measurements are quick measurements taken in the field during each sampling event. These measurements help to classify the surface water as it is in the field. Field measurements will be taken for all monitoring site types when water is flowing. When water is not flowing at a site, only the photo documentation will be collected by the field technician.

Table 6-1: Measured Field Parameters

Field Parameter	Units
Estimated Flow	cfs
Photo Documentation	Site
Conductivity	µS/cm (at 25 °C)
Temperature	°C
pH	units
Dissolved Oxygen	mg/L

6.2 General Physical, Pathogen, and Nutrient Parameters

General physical, pathogen, and nutrient parameters further classify the state of the surface water in the field; however, these parameters are analyzed in a laboratory. These parameters start to determine the quality of the water as dissolved and suspended solids, different forms of Nitrogen, and coliforms are determined. The parameters in **Table 6-2** will be sampled at all monitoring site types.

Table 6-2: Monitored General Physical, Pathogen, and Nutrient Parameters

Hardness (as $CaCO_3$)	Soluble Orthophosphate	Total Ammonia (as N)
Total Suspended Solids (TSS)	Unionized Ammonia (calculated)	Total Organic Carbon (TOC)
Turbidity	Nitrogen, Nitrate+Nitrite	*E. coli*

6.3 Metals

The Regional Board has specified a list of metals to be evaluated for monitoring at sites in each subwatershed. The Third-party member is tasked to evaluate several factors that could lead to inclusion

or exclusion of a metal. These factors include but are not limited to: use, geological conditions, or prior monitoring data. The KRWCA has decided the most cost-effective effort is to currently monitor for all metals listed in the Order by the Regional Board. Laboratories can analyze for the whole spectrum of metals at very small incremental increases or decreases per metal. At this point, it is expected that the effort taken to evaluate the different factors for exclusion would be significantly more costly than the incremental change in metal monitoring costs. The full list of metals to be monitored is summarized in **Table 6-3**. Metals are monitored during Assessment and Ephemeral Monitoring events.

Although the KRWCA is choosing to initially proceed with monitoring all listed metals and metal fractions, it proposes to re-evaluate metal monitoring in the future. The KRWCA proposes to re-evaluate the monitoring data in three (3) years and use data to determine if there are metals that do not warrant monitoring at any of the testing locations. Data will be reviewed by the KRWCA and a list of metal(s) to remove from monitoring will be proposed to the Executive Officer if the following criteria are met:

(A) No exceedances occurred for the metal over the three (3) year monitoring period.
(B) The metal was not the cause of increased toxicity in the water or sediment.

If approved, the KRWCA thinks this method will be the most cost-effective process and is a compromise between the desires of the Regional Board and growers in the KRWCA boundary.

Table 6-3: Monitored Metals

Metal	Fraction
Arsenic	Total
Boron	Total
Cadmium	Total and Dissolved
Copper	Total and Dissolved
Lead	Total and Dissolved
Molybdenum	Total
Nickel	Total and Dissolved
Selenium	Total
Zinc	Total and Dissolved

6.4 Pesticides

Pesticide parameters are not listed in Attachment B of the Order. The Order states the Executive Officer will provide the list of pesticides requiring monitoring after coordinating with qualified scientists and the Department of Pesticide Regulation. At the time of this report, a Pesticide Evaluation Advisory Workgroup is developing a list of pesticides and evaluation criteria. Until further notice and guidance are provided from this Workgroup, the KRWCA intends to continue monitoring for the pesticides that were in the MRP under the Conditional Waiver R5-2008-0005. Once the pesticide list and evaluation criteria are developed and provided, the KRWCA will review and amend the list. The planned monitored

pesticides are listed in **Table 6-4**. Pesticides will be monitored during Assessment and Ephemeral monitoring.

Table 6-4: Monitored Pesticides

Pesticide Parameters			
Carbamates	**Organochlorines**	**Organophosphorus**	**Herbicides**
Aldicarb	DDD	Azinphos-methyl	Atrazine
Carbaryl	DDE	Chlorpyrifos	Cyanazine
Carbofuran	DDT	Diazinon	Diuron
Methiocarb	Dicofol	Dichlorvos	Glyphosate
Oxamyl	Dieldrin	Dimethoate	Linuron
	Endrin	Dimeton-S	Paraquat dichloride
	Methoxychlor	Disulfoton	Simazine
		Malathion	Trifluralin
		Methamidophos	
		Methidathion	
		Parathion methyl	
		Phorate	
		Phosmet	

6.5 303(d) Listed Constituents

The Order states that constituents listed on the 303(d) list must be included to the monitored parameters if irrigated agriculture is identified as the source. Upon reviewing the most recent 303(d) list (2010) the only listed water body in the KRWCA boundary is Lake Isabella. The listed constituents are dissolved oxygen and pH, but the source is unknown for both. Although the source is unknown, these parameters are already included to be monitored at every event.

6.6 Toxicity

The Order states that toxicity sampling of the water column and sediment is used for three primary purposes: 1) to evaluate compliance with the Basin Plan, 2) to identify causes of toxicity, and 3) to evaluate the potential cumulative toxic effect if multiple parameters are present. Survival rate or growth of the used organisms in samples will be the main indicator for whether the water or sediment is toxic. The KRWCA will continue to follow toxicity sampling protocols as part of the effort to determine impacts of agriculture on surface water quality.

6.6.1 Water Toxicity

Testing of toxicity in the water column will occur for all monitoring events and will analyze *Ceriodaphnia dubia* (water flea), *Pimephales promelas* (fathead minnow), and *Selenastrum capricornutum* (green algae). Survival rate for the water flea and fathead minnow will be analyzed, and growth will be analyzed for the algae. The triggers for further analysis, known as a Phase I Toxicity Identification Evaluation (TIE), are: 1) either the water flea or fathead minnow see a 50% or greater difference in mortality when comparing the ambient sample to the control, or 2) if there is a 50% or greater reduction in growth for the algae when comparing the ambient sample to the control.

The TIE will be conducted within 48 hours of a detection of reduced survival or growth. The purpose of this evaluation is to determine potential classes of parameters that may have caused the toxicity. General parameter classification and corresponding monitoring results should allow for the KRWCA to determine the source of the toxicity.

6.6.2 Sediment Toxicity

Sediment toxicity sampling is required at all specified monitoring locations if the appropriate sediment is present. If appropriate sediment is not present at the monitoring site, then an alternative site with the appropriate sediment must be designated for the sediment sampling. Appropriate sediments are small soil types such as clay and silt. Since all monitoring locations are in the creek channels, all water quality monitoring locations have the appropriate sediment and no alternative locations are necessary.

Sampling for sediment toxicity occurs only two times each year for Assessment and Ephemeral Monitoring, unlike the water column toxicity that occurs with every sample. One sample will be collected between August 15 and October 15 and the other sample will be collected between March 1 and April 30 each year as specified in the Order. The KRWCA intends to sample sediment in March and September each year. In the unlikely event an issue arises that prevents a sample in either of these months, there will still be flexibility to meet the specified Order requirements.

Sediment analysis will utilize *Hyalella azteca* and follow EPA Method 600/R-99/064. Similar to water toxicity analysis of the water flea and fathead minnow, *Hyalella azteca* is analyzed for organism survival. If less than 80% organism survival compared to the control, further parameters need to be analyzed in the sediment sample. The additional parameters are listed in **Table 6-5**. Performing a TIE is an optional tool that can be used in an event with increased organism mortality. The KRWCA will only perform a TIE on sediment samples if the additional sediment analysis does not detect any of the tested parameters.

Table 6-5: Sediment Parameters Analyzed with Increased Hyalella Mortality

Sediment Parameters	
Bifenthrin	Esfenvalerate/Fenvalerate
Chlorpyrifos	Fenpropathrin
Cyfluthrin	Lambda cyhalothrin
Cypermethrin	Permethrin
Deltamethrin	Piperonyl butoxide (PBO)

7 QUALITY ASSURANCE PROJECT PLAN (QAPP)

The Quality Assurance Project Plan (QAPP) governs the sampling and testing performed under this SWMP. Samples are collected during each month when water is flowing at each monitoring site, including at least one storm event (if applicable), and sediment samples are taken at two times during the year. Collection and analysis protocols will be established for each monitored constituent and analytical method used. BSK Associates (BSK) will be performing the sampling and photo documentation for the KRWCA and will follow the protocols set forth in the approved QAPP during each sampling event. A brief summary for the different components to sampling are set forth below. The full QAPP is submitted along with this SWMP in **Appendix B** as required by the Order.

7.1 Sample Collection

Sample collection includes several components to be compliant with the MRP requirements of the Order. Photo documentation is required at each site each month regardless of whether the water is flowing or not. Ambient water and sediment sampling only occur when water is present and flowing during a monthly event. Components of sample collection are summarized below.

7.1.1 Photo Documentation and Field Data

Photo documentation of the monitoring site will be performed at all monitoring events, regardless of whether water is present and/or flowing. Photos will be combined with field sheets to describe the site at each event. Field parameters are also recorded regardless of whether water is present and/or flowing. Field data includes time on site, weather observations, water and sediment characteristics, and any additional site descriptions or comments.

7.1.2 Ambient Water

Sampling for a site generally takes several hours on one day if water is flowing. To perform the water sampling, a specified quantity and type of bottles are filled with water from the channel based on the requirements of the analysis to be performed for a given sampling site as described in Sections 5 and 6 and the QAPP. Collected samples must be stored at a temperature less than or equal to 4°C and must be delivered within 24 hours to the necessary laboratories. Holding times for different constituents will govern the order of analyses performed. All bottles for a site will be given the same sample time and date to track the different results for a site. Quality Control samples such as field duplicates and samples for matrix spike analysis will also be filled during collection and stored and transported in the same manner as the other samples. Field blanks will also be used as part of the quality control process, but these bottles will be filled with deionized water. Flow in the channel will also be measured. Further detail regarding ambient water sampling is provided in the QAPP.

7.1.3 Sediment

Sediment is collected two times per year following the schedule provided in Section 5. Samples are taken from the topmost two (2) centimeters (cm) of channel bed substrate and placed into the containers for toxicity testing, grain size and total organic carbon (TOC) analyses. Other containers will be provided for additional sediment samples in the event any chemical analyses are necessary due to increased toxicity. Sediment samples for chemistry and grain size and TOC are frozen within 48 hours

while toxicity and grain size samples are held at 4°C until analysis begins. Further detail regarding sediment sampling is provided in the QAPP.

7.2 Laboratory Analysis

Analysis of samples will be handled by BSK. BSK performs most analyses in-house but subcontracts with Aquatic Bioassay and Consulting Laboratories, Inc. (ABC) for testing of water column and sediment toxicity. BSK and ABC will follow methods authorized by KRWCA and as accepted by the Regional Board and will provide written notification if another method is to be used. The quality assurance manuals and standard operating procedures (SOPs) for these organizations will be part of the KRWCA QAPP, but are also available by contacting the KRWCA. A summary of the analytical methods used and the trigger, reporting, and minimum detection limits are provided in **Table 7-1**.

7.3 Quality Control

Quality assurance and control objectives for sample collection and laboratory analysis are explicitly described in the QAPP. These objectives describe the criteria for making sure results are correct and complete. Criteria include discussion on equipment precision and accuracy, contamination either by the sampler or equipment, and completeness. Precision and accuracy are checked through various duplicate field and lab samples to confirm validity of results. Contamination is prevented through thorough cleaning of equipment and strict adherence to monitoring protocols. Completeness is gauged based on percentage of valid result data that is produced. The goal is to have at least 90% of the data meet all quality criteria. Failure to meet any of the criteria will result in data to be flagged with the appropriate SWAMP/CEDEN flag. Both BSK and KRWCA staff will review data for completeness and flag data as appropriately. The Electronic Data Deliverable (EDD) Checklist and Online Data Checker tools provided by the Regional Board will be utilized to check data submittal format and completeness. Review of the failures may result in rejection of the data.

In addition to the QAPP guiding laboratory and sampling practices, the KRWCA also proposes to follow actions that will reduce bias, variability, and uncertainty. The KRWCA will make an effort to sample the first water flow in a month where water is flowing, and each sample will be taken at the same location at a monitoring site. These two efforts should reduce bias and uncertainty for the monitoring program. This can lead to variability on whether storm or irrigation water is being sampled. This variability will be noted in the field reporting data as to when the sample was taken and what the surrounding lands and weather conditions were during and prior to an event.

Table 7-1: Analytical Methods and Limits

		BSK Reporting Information			
Constituent	**LTIL PQL**	**RL**	**MDL**	**Units**	**Method**
Physical Parameters					
Flow	1	-	-	cfs	Field
pH	0.1	0.1	-	pH Units	Field
EC	100	5	-	umhos/cm	Field
DO	0.1	0.1	-	mg/L	Field
Temp	0.1	-	-	°C	Field
Turbidity	1	0.1	-	NTU	SM 2130B
TDS	10	10	-	mg/L	SM 2540C
TSS	10	10	-	mg/L	SM 2540D
Hardness	10	0.41	0.19	mg/L	SM 2340B
Color	-	1	-	Color Units	SM 2120B
TOC	0.5	0.2	0.047	mg/L	SM 5310C
Pathogens					
E. coli	2	1.1	-	MPN/100mL	SM 9221F
Fecal coliform	2	1.1	-	MPN/100mL	SM 9221E
Water Column Toxicity					
Algae	NA	NA	NA	Cell/mL, % Growth	EPA 821-R-02-013
Water Flea	NA	NA	NA	% Survival	EPA 821-R-02-012
Fathead Minnow	NA	NA	NA	% Survival	EPA 821-R-02-012
Sediment					
Hyalella	NA	NA	NA	% Survival	EPA 600-R-99-064
Carbamates					
Aldicarb	0.5	0.4	0.0089	ug/L	EPA 8321A
Carbaryl	0.5	0.07	0.0078	ug/L	EPA 8321A
Carbofuran	0.5	0.07	0.0042	ug/L	EPA 8321A
Methiocarb	0.5	0.4	0.0054	ug/L	EPA 8321A
Methomyl	0.5	0.07	0.0098	ug/L	EPA 8321A
Thiobencarb	-	0.5	0.006	ug/L	EPA 8270C
Oxamyl	0.5	0.4	0.0413	ug/L	EPA 8321A
Organochlorines					
DDD	0.02	0.01	0.00072	ug/L	EPA 8081A
DDE	0.01	0.01	0.00061	ug/L	EPA 8081A
DDT	0.01	0.01	0.0007	ug/L	EPA 8081A
Dicofol	0.1	0.1	0.015	ug/L	EPA 8270C
Dieldrin	0.01	0.01	0.00097	ug/L	EPA 8081A
Endrin	0.01	0.01	0.00081	ug/L	EPA 8081A
Methoxychlor	0.05	0.01	0.0009	ug/L	EPA 8081A
Toxaphene	-	0.5	0.035	ug/L	EPA 8081A

		BSK Reporting Information			
Constituent	**LTIL PQL**	**RL**	**MDL**	**Units**	**Method**
Organophosphates					
Azinphos-methyl (Guthion)	0.1	0.1	0.032	ug/L	EPA 8270C
Chlorpyrifos	0.015	0.02	0.0029	ug/L	EPA 8270C
Diazinon	0.02	0.02	0.0036	ug/L	EPA 8270C
Dichlorvos	0.1	0.1	0.0048	ug/L	EPA 8270C
Dimethoate	0.1	0.1	0.0075	ug/L	EPA 8270C
Demeton-S (Demeton [O,S])	0.1	0.1	0.025	ug/L	EPA 8270C
Disulfoton	0.05	0.1	0.024	ug/L	EPA 8270C
Malathion	0.1	0.1	0.0046	ug/L	EPA 8270C
Methamidophos	0.2	0.2	0.021	ug/L	EPA 8270C
Methidathion	0.1	0.1	0.011	ug/L	EPA 8270C
methyl Parathion	0.1	0.1	0.003	ug/L	EPA 8270C
Phorate	0.2	0.1	0.0033	ug/L	EPA 8270C
Phosmet	0.2	0.2	0.029	ug/L	EPA 8270C
Herbicides					
Atrazine	0.5	0.5	0.028	ug/L	EPA 8270C
Simazine	0.5	0.5	0.024	ug/L	EPA 8270C
Cyanazine	0.5	0.5	0.036	ug/L	EPA 8270C
Diuron	0.5	0.4	0.0072	ug/L	EPA 8321A
Molinate	-	0.5	0.004	ug/L	EPA 8270C
Glyphosate	5	5	2.1	ug/L	EPA 547
Paraquat	0.5	0.4	0.21	ug/L	EPA 549.2
Linuron	0.5	0.4	0.0061	ug/L	EPA 8321A
Trifluralin	0.05	0.05	0.0056	ug/L	EPA 8270C
Metals					
Arsenic	1	0.2	0.045	ug/L	EPA 200.8
Boron	10	10	4.45	ug/L	EPA 200.8
Cadmium	0.1	0.1	0.025	ug/L	EPA 200.8
Copper	0.5	0.5	0.23	ug/L	EPA 200.8
Lead	0.5	0.2	0.045	ug/L	EPA 200.8
Molybdenum	1	0.5	0.0358	ug/L	EPA 200.8
Nickel	1	0.5	0.051	ug/L	EPA 200.8
Selenium	1	1	0.45	ug/L	EPA 200.8
Zinc	1	1	0.46	ug/L	EPA 200.8

		BSK Reporting Information			
Constituent	**LTIL PQL**	**RL**	**MDL**	**Units**	**Method**
Nutrients					
TKN	0.5	0.5	0.055	mg/L	EPA 351.2
Nitrate-N	0.05	0.06	0.0145	mg/L	EPA 300.0
Nitrite-N	0.05	0.05	0.043	mg/L	EPA 300.0
Ammonia	0.1	0.1	0.029	mg/L	SM 4500-NH3 G
Orthophosphate (as P)	0.01	0.01	0.0051	mg/L	SM 4500-P E
Phosphorus (as P)	0.01	0.01	0.0068	mg/L	EPA 365.4
Pyrethroids					
Bifenthrin	1.0	0.5	0.11	ug/Kg	EPA 8270C
Cyfluthrin	1.0	2.0	0.39	ug/Kg	EPA 8270C
Cypermethrin	1.0	2.0	0.53	ug/Kg	EPA 8270C
Esfenvalerate (+Fenvalerate)	1.0	1.0	0.44	ug/Kg	EPA 8270C
Fenpropathrin	1.0	0.5	0.077	ug/Kg	EPA 8270C
Permethrin (trans-Permethrin)	1.0	0.5	0.074	ug/Kg	EPA 8270C
Lamda Cyhalothrin	1.0	0.5	0.061	ug/Kg	EPA 8270C

8 REPORTING

Pursuant to the Monitoring and Reporting Program (MRP) under this Order, the KRWCA must submit its Surface Water Monitoring Plan to the Executive Officer within 180 days of receiving the Notice of Applicability (NOA) to be a Third-party member. The KRWCA received its NOA on February 4, 2014, making the submittal date for the Plan to be August 4, 2014. Any revisions to this Plan, if necessary, will be submitted according to a schedule determined by the Executive Officer.

In addition to development of a Surface Water Monitoring Plan, Quarterly and Annual Monitoring Reports, Exceedance Reports, and potentially Surface Water Quality Management Plans (SQMPs) are to be reported by the KRWCA, similar to requirements of the previous MRP under conditional waiver R5-2008-0005.

8.1 Quarterly Reporting

The purpose of the quarterly reporting is to supply surface water monitoring data to the Regional Board for the previous quarter's results. **Table 8-1** summarizes the due dates for the reporting period. Items to be included with the data for the quarterly reporting are listed on page 23 of Attachment B of the Order.

Table 8-1: Quarterly Surface Water Reporting Schedule

Reporting Period	Due Date
October 1st through December 31st of previous calendar year	March 1st
January 1st through March 31st of same calendar year	June 1st
April 1st through June 30th of same calendar year	September 1st
July 1st through September 30th of same calendar year	December 1st

8.2 Annual Reporting

Annual monitoring reports summarize the previous year's data and KRWCA efforts to inform, implement, and review practices that are to benefit water quality in the group boundary. These reports are quite extensive and include several required components, listed below. Minor changes have been made to the reporting period and due date from the previous MRP under conditional waiver R5-2008-0005. Under the newly adopted Order, the Monitoring and Reporting Program states the reporting period will be a hydrologic water year (October 1 through September 30) instead of a calendar year. Annual reports are due May 1st every year.

1. Signed Transmittal Letter;
2. Title page;
3. Table of contents;
4. Executive Summary;
5. Description of the Coalition Group geographical area;
6. Monitoring objectives and design;

7. Sampling site descriptions and rainfall records for the time period covered under the Monitoring Report;
8. Location map(s) of sampling sites, crops and land uses;
9. Tabulated results of all analyses arranged in tabular form so that the required information is readily discernible;
10. Discussion of data relative to water quality objectives, and water quality management plan milestones/Basin Plan Amendment Workplan updates, where applicable;
11. Sampling and analytical methods used;
12. Associated laboratory and field quality control sample results;
13. Summary of Quality Assurance Evaluation results (as identified in the most recent version of the third-party's approved QAPP for Precision, Accuracy, and Completeness);
14. Specification of the method(s) used to obtain estimated flow at each surface water monitoring site during each monitoring event;
15. Summary of exceedances of water quality objectives/trigger limits occurring during the reporting period and for surface water related pesticide use information;
16. Actions taken to address water quality exceedances that have occurred, including but not limited to, revised or additional management practices implemented;
17. Evaluation of monitoring data to identify spatial trends and patterns;
18. Summary of Nitrogen Management Plan information submitted to the third-party;
19. Summary of management practice information collected as part of Farm Evaluations;
20. Summary of mitigation monitoring;
21. Summary of Education and outreach activities; and
22. Conclusions and recommendations.

8.3 Exceedance Reporting

Exceedance reporting is required when monitoring results show an exceedance of adopted numeric water quality objectives or trigger limits for a monitored parameter. Exceedances must be determined within five (5) business days of receiving laboratory reports. Exceedance reports are to be emailed to a designated Regional Board staff contact the next business day after determining an exceedance. The KRWCA designated contact is Eric Warren, and his email is eric.warren@waterboards.ca.gov.

8.4 Surface Water Quality Management Plans (SQMPs)

The purpose of monitoring surface water quality is to first assess whether waters of the State within the KWRCA boundary are being improved or degraded as a result of farming operations and then make an effort to prevent further degradation. The degradation prevention effort, in part, is attempted to be achieved through Surface Water Quality Management Plans (SQMPs), which are triggered if during a three (3) year period more than one exceedance of the same parameter occurs at the same monitoring location. If this occurs, a schedule for SQMP development and implementation will be provided by the KRWCA to Regional Board staff within 10 business days. The KRWCA will work with Regional Board Staff to develop an approved SQMP in a reasonable timeframe. For a SQMP to be approved, several components needed for inclusion are: physical setting, plan strategy, monitoring methods, and data evaluation methodology. Each component is discussed further in Appendix MRP-1 of Attachment B of

the Order. Approved SQMPs will be updated on an annual basis on May 1 of each year the plan is in effect. The annual report will review all data collected, landowner outreach, management practice implementation, and any other actions taken during the previous year will be reported and reviewed.

Currently, no SQMP's have been triggered on the monitoring sites within the KRWCA. If at any time during the surface water monitoring effort exceedances trigger the need for a management plan, the KRWCA will follow the requirements set forth in this SWMP along with the Order. In situations where the KRWCA believes exceedances are not likely to be the result of agricultural operations and/or remedied or addressed by a SQMP, the KWRCA will submit to the Executive Officer a request of exemption from development of a SQMP.

9 KRWCA CONTACT INFORMATION

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Program Manager

Kern River Watershed Coalition Authority

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10 BIBLIOGRAPHY/REFERENCES

Below is list of the major references reviewed during development of this KRWCA Surface Water Monitoring Plan. A complete list of references can be made available upon request.

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APPENDICES

APPENDIX A

Kern Agricultural Commissioner

2012 Annual Crop Report

APPENDIX B

Quality Assurance Project Plan (QAPP)

(See QAPP Binder and CD for hard copy and electronic copy)

2012 Kern County Agricultural Crop Report

Department of Agriculture and Measurement Standards
1001 South Mount Vernon Avenue
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DEPARTMENT OF AGRICULTURE AND MEASUREMENT STANDARDS

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Agricultural Commissioner
Sealer of Weights and Measures

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August 6, 2013

THE HONORABLE BOARD OF SUPERVISIORS
COUNTY OF KERN

Mike Maggard, Chairman
Mick Gleason David Couch
Zack Scrivner Leticia Perez

AND

John Nilon
County Administrative Officer

KAREN ROSS, SECRETARY
CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE

It is my pleasure to submit the 2012 Kern County Agricultural Crop Report. This annual report presents statistical information on acreage, yield and gross values of Kern County agricultural products in accordance with Sections 2272 and 2279 of the Food and Agricultural Code. The figures in this report represent only gross values and do not take into account the costs of production, marketing, transportation, or other ancillary costs. No attempt is made to reflect net income or loss to the producers of these commodities.

The 2012 gross value of all agricultural commodities produced in Kern County is $6,212,362,100. This represents an increase (11%) from the revised 2011 crop value ($5,596,975,600).

The top five commodities for 2012 were Grapes, Almonds, Milk, Citrus and Pistachios, which make up more than $4 Billion (65%) of the Total Value; with the top twenty commodities making up more than 92% of the Total Value.

The 2012 Kern County Crop Report can be found on the Department of Agriculture and Measurement Standards website: www.kernag.com

I would like to thank all the members of the Agriculture and Measurement Standards staff who helped with the compilation and preparation of this report, especially Cerise Montanio, Agricultural Biologist/Inspector, and Glenn Fankhauser, Assistant Director. Most of all, I extend my thanks and appreciation to all of the agricultural producers, contributing organizations and those individuals who provided the necessary information for this report.

Respectfully Submitted,

Ruben J. Arroyo
Agricultural Commissioner/Sealer of Weights and Measures

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Note: Numbers published in this report may not compute exactly due to rounding.
Permanent Acreage may differ from actual Harvested Acreage for some commodities.

Feel free to contact us for more information:
www.kernag.com
E-mail address: *agcomm@co.kern.ca.us*

Kern County Department of Agriculture and Measurement Standards
1001 S. Mount Vernon Avenue
Bakersfield, California 93307
(661) 868-6300 phone
(661) 868-6301 fax

Top 20 Commodities - 2012

	COMMODITY	VALUE	2011 RANKING
1.	Grapes, All	$ 1,498,987,000	1
2.	Almonds, Including By-Products	821,857,000	3
3.	Milk, Market & Manufacturing	690,062,000	2
4.	Citrus, Fresh & Processing	620,350,000	4
5.	Pistachios	486,213,000	6
6.	Cattle & Calves	382,913,000	7
7.	Carrots, Fresh & Processing	350,439,000	5
8.	Hay, Alfalfa	213,466,000	8
9.	Cotton, Including Processed Cottonseed	147,637,000	10
10.	Potatoes, Fresh & Processing	85,102,000	11
11.	Silage & Forage	75,149,000	12
12.	Pomegranates, Fresh & Processing	58,781,000	14
13.	Nursery, Fruit and Nut Trees & Vines	57,555,000	19
14.	Apiary Products	56,707,000	13
15.	Tomatoes, Fresh & Processing	53,657,000	15
16.	Eggs & Egg Product	40,343,000	17
17.	Bell Peppers, Fresh & Processing	40,143,000	16
18.	Wheat	35,294,000	18
19.	Nursery, Roses	33,346,000	23
20.	Onions, Fresh & Dehydrator	28,350,000	22

Permanent Acreage - 2012

CROP	YEAR	BEARING	NON-BEARING	TOTAL
Almonds	2012	144,000	4,727	148,727
	2011	147,000	4,765	151,765
Apples	2012	1,110	3	1,113
	*2011	1,020	0	1,020
Apricots	2012	469	40	509
	2011	394	40	434
Blueberries	2012	642	69	711
	2011	559	152	711
Cherries	2012	6,000	1,862	7,862
	2011	5,876	994	6,870
Figs	2012	450	0	450
	2011	455	0	455
Grapefruit	2012	827	26	853
	2011	830	0	830
Grapes, All	2012	101,800	4,849	106,649
	*2011	104,700	4,286	108,986
Raisin	2012	19,800	294	20,094
	*2011	20,200	126	20,326
Table	2012	54,600	4,010	58,610
	*2011	54,200	3,610	57,810
Wine	2012	27,400	545	27,945
	*2011	30,300	550	30,850
Kiwi	2012	48	0	48
	2011	48	0	48
Lemons	2012	3,150	22	3,172
	2011	3,170	23	3,193
Nectarines	2012	675	0	675
	2011	805	131	936
Olives	2012	240	683	923
	2011	415	37	452

Permanent Acreage - 2012

CROP	YEAR	BEARING	NON-BEARING	TOTAL
Oranges, All	2012	35,670	161	35,831
	2011	36,890	178	37,068
Navels	2012	29,000	161	29,161
	2011	30,000	178	30,178
Valencias	2012	6,670	0	6,670
	2011	6,890	0	6,890
Peaches	2012	1,130	9	1,139
	2011	1,370	56	1,426
Pears	2012	32	0	32
	2011	11	0	11
Pecans	2012	578	0	578
	2011	580	0	580
Persimmons	2012	129	260	389
	2011	224	215	439
Pistachios	2012	72,500	2,410	74,910
	2011	62,800	2,310	65,110
Pomegranates	2012	14,397	1,970	16,367
	*2011	14,717	894	15,611
Prunes	2012	17	0	17
	2011	17	0	17
Tangerines & Tangelos	2012	14,100	1,260	15,360
	2011	13,100	206	13,306
Walnuts	2012	775	39	814
	2011	832	39	871
Miscellaneous	a/2012	94	0	94
	b/2011	92	0	92
Totals	**2012**	**398,833**	**18,390**	**417,223**
	***2011**	**395,905**	**14,326**	**410,231**

*Revised

Note: Some bearing acres may differ from harvested acres; although fruit-bearing, not always harvested, for various reasons.

a/ Includes: Avocado, Plumcot and Jujube.

b/ Includes: Plumcot and Jujube.

Fruit & Nut Crops - 2012

CROP	YEAR	HARVESTED ACRES	PRODUCTION PER ACRE	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Almonds	2012	144,000	1.13	a/163,000	Ton	$ 4,770.00	$ 777,306,000
	2011	147,000	1.28	a/188,000	Ton	$ 3,670.00	$ 690,610,000
Almond By-Products	2012	---	---	301,000	Ton	148.00	44,551,000
	2011	---	---	270,000	Ton	136.00	36,798,000
Apricots	2012	---	---	---	Ton	---	---
	2011	394	5.41	2,130	Ton	1,810.00	3,866,000
Blueberries	2012	642	6.15	3,950	Ton	4,090.00	16,144,000
	2011	559	3.88	2,170	Ton	5,700.00	12,370,000
Cherries	2012	5,110	0.90	4,580	Ton	5,380.00	24,654,000
	2011	5,830	4.92	28,700	Ton	7,910.00	227,121,000
Citrus, All	2012	53,747	17.17	922,700	Ton	---	620,350,000
	2011	53,990	16.10	869,450	Ton	---	540,035,000
Grapefruit	2012	827	18.74	15,500	Ton	765.00	11,857,000
	2011	830	9.94	8,250	Ton	672.00	5,543,000
Lemons	2012	3,150	11.56	36,400	Ton	999.00	36,358,000
	2011	3,170	13.34	42,300	Ton	847.00	35,819,000
Oranges, Navels	2012	29,000	13.62	395,000	Ton	713.00	281,834,000
	2011	30,000	12.37	371,000	Ton	652.00	241,979,000
Oranges, Valencia	2012	6,670	14.36	95,800	Ton	675.00	64,697,000
	2011	6,890	10.73	73,900	Ton	576.00	42,581,000
Tangerine & Tangelo	2012	14,100	8.30	117,000	Ton	1,660.00	194,200,000
	2011	13,100	9.77	128,000	Ton	1,550.00	198,437,000
Processing, All Citrus	2012	---	---	263,000	Ton	119.00	31,404,000
	2011	---	---	246,000	Ton	63.70	15,676,000
Grapes, All	2012	101,800	11.26	1,146,070	Ton	---	1,498,987,000
	*2011	104,700	9.42	985,890	Ton	---	955,416,000
Raisin Variety	b/2012	19,800	9.98	197,570	Ton	---	196,567,000
	*b/2011	20,200	7.72	155,890	Ton	---	94,553,000
Fresh Market	2012	---	---	109,900	Ton	1,480.00	162,443,000
	*2011	---	---	42,400	Ton	1,380.00	58,787,000
Raisins	c/2012	---	---	12,000	Ton	1,900.00	22,831,000
	c/2011	---	---	14,000	Ton	1,710.00	23,877,000
Processing	2012	---	---	4,970	Ton	362.00	1,797,000
	2011	---	---	3,990	Ton	340.00	1,358,000

Fruit & Nut Crops - 2012

CROP	YEAR	HARVESTED ACRES	PRODUCTION PER ACRE	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Crushed	2012	---	---	30,100	Ton	315.00	9,496,000
	*2011	---	---	42,900	Ton	245.00	10,531,000
Table	2012	54,600	12.17	664,500	Ton	---	$ 1,184,388,000
Variety	*2011	54,200	9.63	522,000	Ton	---	$ 746,386,000
Fresh	2012	---	---	605,000	Ton	$ 1,930.00	1,168,654,000
Market	*2011	---	---	436,000	Ton	$ 1,670.00	728,036,000
Crushed	2012	---	---	59,500	Ton	264.00	15,734,000
	*2011	---	---	86,000	Ton	213.00	18,350,000
Wine	2012	27,400	10.36	284,000	Ton	---	118,032,000
Variety	*2011	30,300	10.17	308,000	Ton	---	114,477,000
Crushed	2012	---	---	284,000	Ton	416.00	118,032,000
	*2011	---	---	308,000	Ton	372.00	114,477,000
Nectarines	2012	675	6.44	4,350	Ton	1,810.00	7,868,000
	2011	805	5.81	4,680	Ton	2,140.00	10,001,000
Olives	2012	---	---	---	Ton	---	---
	2011	415	4.99	2,070	Ton	989.00	2,047,000
Peaches	2012	1,130	14.87	16,800	Ton	1,100.00	18,443,000
	2011	1,360	6.10	8,300	Ton	1,400.00	11,596,000
Pistachios	2012	72,500	1.66	d/120,000	Ton	4,050.00	486,213,000
	2011	62,800	1.57	d/98,400	Ton	3,960.00	389,527,000
Tomatoes,	2012	470	15.37	7,230	Ton	460.00	3,329,000
Fresh	2011	193	15.05	2,900	Ton	608.00	1,763,000
Tomatoes,	2012	12,000	55.92	671,000	Ton	75.00	50,328,000
Processed	2011	13,000	50.23	653,000	Ton	74.30	48,517,000
Walnuts	2012	775	1.25	d/970	Ton	2,720.00	2,638,000
	2011	832	0.91	d/760	Ton	2,740.00	2,086,000
Miscellaneous	e/2012	18,900	---	198,000	Ton	---	99,238,000
	*f/2011	18,600	---	74,400	Ton	---	88,785,000
Totals	**2012**	**411,749**	**---**	**3,559,650**	**Ton**	**---**	**$ 3,650,049,000**
	***2011**	**410,478**	**---**	**3,190,850**	**Ton**	**---**	**$ 3,020,538,000**

*Revised

a/ Almond production stated in terms of Nut Meat Equivalents. b/ Total production includes raisins on a Fresh Equivalent basis.

c/ A combined value reflecting free tonnage and reserve tonnage: Dry Ratio: 2012 - 4.38 to 1 2011 - 4.75 to 1

d/ Pistachio and Walnut production stated in terms of In-Shell Equivalents.

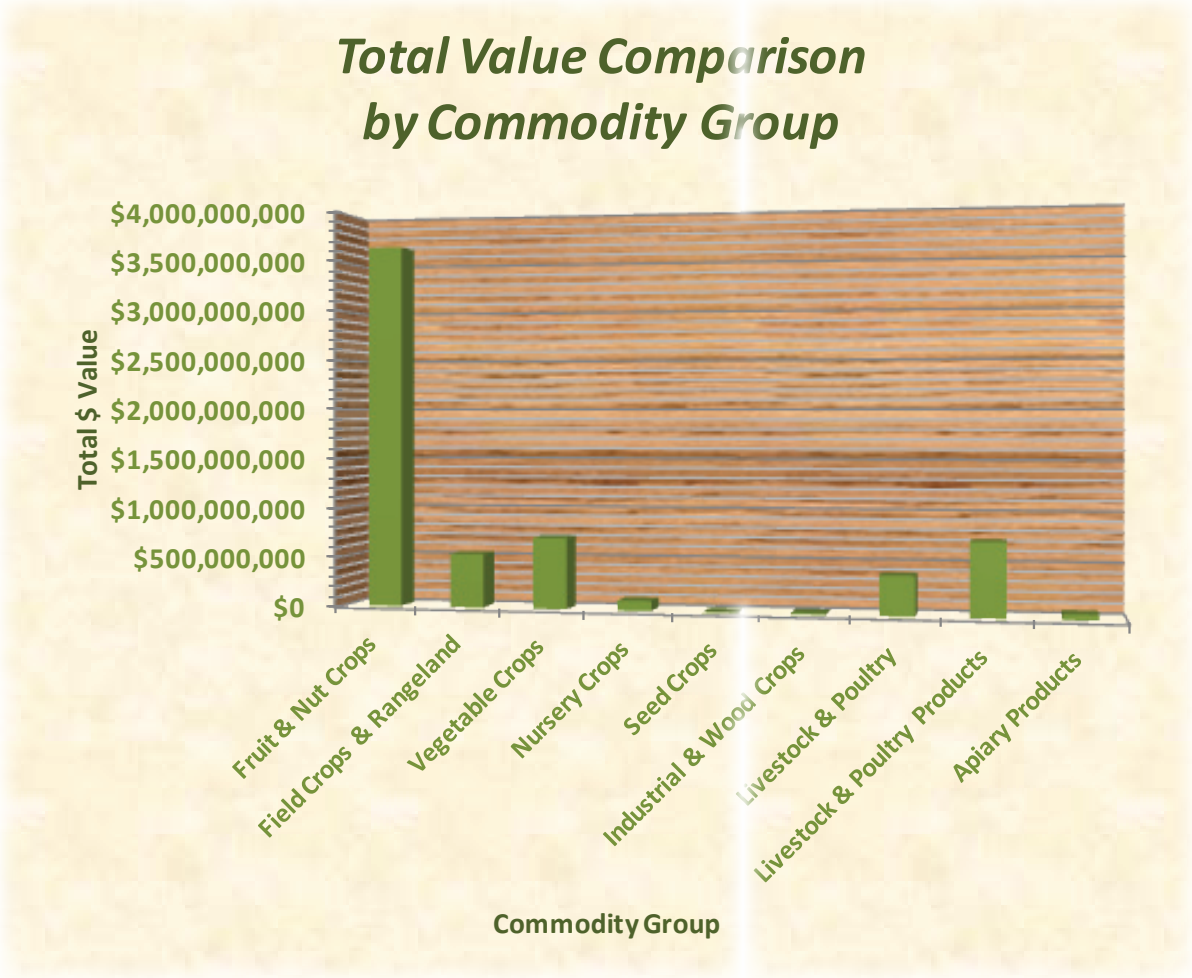
e/Includes: Apple (Fresh & Processed), Apricots, Avocado, Blackberry, Boysenberry, Fig (Fresh & Dry), Jujube, Kiwi, Lime, Olive, Peach (Processed), Pear, Pecan, Persimmon, Plum, Plumcot, Pluot, Pomegranate (Fresh & Juice), Prune, Raspberry, Strawberry, and Quince.

f/ Includes: Apple (Fresh & Processed), Avocado, Blackberry, Boysenberry, Fig (Fresh & Dry), Jujube, Kiwi, Lime, Peach (Processed), Pear, Pecan, Persimmon, Plum, Plumcot, Pluot, Pomegranate (Fresh & Juice), Prune, Raspberry, Strawberry and Quince.

Seed Crops - 2012

CROP	YEAR	HARVESTED ACRES	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Cotton	2012	3,999	4,970	Ton	a/$ 343.00	$ 1,707,000
	2011	7,285	7,790	Ton	a/$ 319.00	$ 2,487,000
Field	b/2012	1,270	3,450	Ton	---	2,070,000
	c/2011	2,140	4,800	Ton	---	1,337,000
Vegetable	d/2012	1,320	4,220	Ton	---	3,965,000
	e/2011	844	4,350	Ton	---	8,905,000
Totals	**2012**	**f/2,590**	**12,640**	**Ton**	**---**	**$ 7,742,000**
	2011	**f/2,984**	**16,940**	**Ton**	**---**	**$ 12,729,000**

a/ Includes a per acre approval.
b/ Includes: Alfalfa, Flower, Safflower, Triticale, and Wheat Seed.
c/ Includes: Barley, Blackeye, Cowpea (Garbanzo), Flower, Safflower, Sunflower, and Wheat Seed.
d/ Includes: Broccoli, Cabbage, Carrot, Green Onion, Lettuce, Onion, Potato, and Radish Seed.
e/ Includes: Broccoli, Cabbage, Carrot, Cauliflower, Green Onion, Lettuce, Onion, Parsley, Pea, Potato, Pumpkin, Radish, and Watermelon Seed.
f/ Does not include cotton acreage.



Field Crops - 2012

CROP	YEAR	HARVESTED ACRES	PRODUCTION PER ACRE	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Barley	a/2012	6,000	1.32	7,920	Ton	$ 250.00	$ 1,977,000
	a/2011	7,000	0.88	6,180	Ton	$ 209.00	$ 1,290,000
Beans, Dry Edible	2012	2,716	1.80	4,890	Ton	1,030.00	5,052,000
	2011	1,390	1.25	1,740	Ton	1,260.00	2,189,000
Cotton Lint, Upland & Acala	2012	22,515	b/1,670	75,000	Bale	d/1.01	37,907,000
	2011	21,860	b/1,430	62,600	Bale	d/0.95	29,748,000
Cotton Lint, Pima	2012	33,425	b/1,600	c/107,200	Bale	d/1.30	69,852,000
	2011	45,435	b/1,510	c/137,400	Bale	d/1.50	103,177,000
Cottonseed, Processing	2012	---	---	67,300	Ton	593.00	39,878,000
	2011	---	---	78,800	Ton	524.00	41,308,000
Hay, Alfalfa	2012	128,000	8.05	1,031,000	Ton	207.00	213,466,000
	2011	125,000	8.18	1,022,000	Ton	241.00	246,601,000
Hay, Grain	2012	20,000	3.51	70,100	Ton	178.00	12,506,000
	2011	24,000	3.09	74,100	Ton	205.00	15,216,000
Hay, Other	2012	9,200	6.86	63,100	Ton	155.00	9,773,000
	2011	14,000	3.60	50,400	Ton	150.00	7,560,000
Pasture, Irrigated	2012	7,000	---	---	Acre	140.00	980,000
	2011	7,000	---	---	Acre	160.00	1,120,000
Pasture, Other	2012	---	---	---	Acre	---	1,725,000
	2011	---	---	---	Acre	---	1,851,000
Pasture, Range	2012	1,479,000	---	---	Acre	15.00	22,187,000
	*2011	1,457,000	---	---	Acre	15.00	21,855,000
Safflower	2012	4,300	0.66	2,840	Ton	535.00	1,518,000
	2011	1,660	1.26	2,090	Ton	423.00	884,000
Silage and Forage	2012	88,000	20.28	1,785,000	Ton	42.10	75,149,000
	2011	90,000	21.26	1,913,000	Ton	43.90	83,894,000
Wheat	2012	47,500	2.80	133,000	Ton	265.00	35,294,000
	2011	64,000	2.55	163,000	Ton	223.00	36,354,000
Miscellaneous	e/2012	13,200	---	54,500	Ton	---	12,106,000
	f/2011	7,660	---	51,000	Ton	---	11,470,000
Totals	**2012**	**g/381,856**	**---**	**---**	**---**	**---**	**$ 539,370,000**
	***2011**	**g/409,005**	**---**	**---**	**---**	**---**	**$ 604,517,000**

a/ May contain dryland. b/ Pounds Lint per Acre. c/ 500 Pound Net Weight Bale. d/ Price per Pound.
e/ Includes: Field Corn (Grain), Rape, Sorghum-Milo, Straw and Triticale.
f/ Includes: Field Corn (Grain) and Sorghum.
g/ Does not include Range acreage.

Vegetable Crops - 2012

CROP	YEAR	HARVESTED ACRES	PRODUCTION PER ACRE	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Cantaloupe	2012	640	18.44	11,800	Ton	$ 360.00	$ 4,249,000
	2011	1,200	16.83	20,200	Ton	$ 477.00	$ 9,628,000
Garlic, Fresh	2012	2,170	7.47	16,200	Ton	1,040.00	16,899,000
	*2011	2,020	8.22	16,600	Ton	1,370.00	22,811,000
Garlic, Processed	2012	848	7.89	6,690	Ton	600.00	4,014,000
	*2011	810	9.01	7,300	Ton	579.00	4,226,000
Lettuce, Head	2012	---	---	---	Ton	---	---
	2011	320	16.88	5,400	Ton	---	3,377,000
Onions, Fresh	2012	3,040	20.03	60,900	Ton	232.00	14,120,000
	2011	2,530	20.00	50,600	Ton	270.00	13,657,000
Onions, Dehydrator	2012	3,400	20.71	70,400	Ton	200.00	14,230,000
	2011	3,990	18.47	73,700	Ton	150.00	11,060,000
Peppers, Bell Fresh	2012	2,110	18.06	38,100	Ton	1,020.00	38,744,000
	2011	1,960	21.07	41,300	Ton	1,000.00	41,118,000
Potatoes, All	2012	16,890	25.02	422,570	Ton	---	85,102,000
	2011	17,810	22.08	393,200	Ton	---	100,423,000
Potatoes, Spring	2012	13,570	27.87	378,200	Ton	---	76,528,000
	2011	14,310	24.44	349,700	Ton	---	87,947,000
Fresh Market	2012	---	---	205,000	Ton	256.00	52,495,000
	2011	---	---	177,000	Ton	328.00	58,071,000
Processing	2012	---	---	122,000	Ton	189.00	23,010,000
	2011	---	---	132,600	Ton	222.00	29,475,000
Culls	2012	---	---	51,200	Ton	20.00	1,023,000
	2011	---	---	40,100	Ton	10.00	401,000
Potatoes, Winter	2012	3,320	13.36	44,370	Ton	---	8,574,000
	2011	3,500	12.43	43,500	Ton	---	12,476,000
Fresh Market	2012	---	---	35,500	Ton	237.00	8,397,000
	2011	---	---	34,800	Ton	356.00	12,389,000
Culls	2012	---	---	8,870	Ton	20.00	177,000
	2011	---	---	8,700	Ton	10.00	87,000
Watermelons, Seeded/Seedless	2012	1,830	17.65	32,300	Ton	313.00	10,107,000
	2011	1,630	42.39	69,100	Ton	280.00	19,348,000
Miscellaneous	a/2012	48,500	---	1,409,000	Ton	---	527,025,000
	b/2011	40,600	---	1,268,000	Ton	---	459,219,000

Vegetable Crops - 2012

CROP	YEAR	HARVESTED ACRES	PRODUCTION PER ACRE	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Totals	**2012**	**79,428**	**---**	**2,067,960**	**Ton**	**---**	**$ 714,490,000**
	***2011**	**72,870**	**---**	**1,945,400**	**Ton**	**---**	**$ 684,867,000**

*revised

a/ Includes: Artichoke, Arugula, Asparagus, Basil, Beans Succulent (Fresh & Processed), Bok Choy, Broccoli, Brussel Sprouts, Butter Lettuce, Cabbage (Fresh & Processed), Cactus, Carrots (Fresh & Processed), Cauliflower, Chard, Celeriac, Celery, Chinese Greens, Chive, Cilantro, Collard, Corn (Sweet), Cucumber, Daikon, Dandelion Greens, Dill, Eggplant, Fennel, Gai Choy, Gai Lon, Green Onions, Herbs, Kale, Kohlrabi, Lettuce Head, Leaf Lettuce, Leeks, Melons (Other), Mustard, Napa Cabbage, Okra, Parsley (Fresh & Processed), Parsnip, Peas (Fresh & Processed), Peppers (Chili & Processed), Pumpkin, Radishes, Red Beets, Romaine Lettuce, Rutabaga, Shallots, Spinach, Squash, Sweet Potatoes, Tomatillo, Turnips and Yams.

b/ Includes: Artichoke, Arugula, Asparagus, Basil, Beans Succulent (Fresh & Processed), Bok Choy, Broccoli, Brussel Sprouts, Butter Lettuce, Cabbage (Fresh & Processed), Carrots (Fresh & Processed), Cauliflower, Chard, Celeriac, Celery, Chinese Greens, Chive, Cilantro, Collard, Corn (Sweet), Cucumber, Daikon, Dandelion Greens, Dill, Eggplant, Fennel, Gai Choy, Gai Lon, Green Onions, Herbs, Kale, Kohlrabi, Leaf Lettuce, Leeks, Melons (Other), Mustard, Napa Cabbage, Okra, Parsley (Fresh & Processed), Parsnip, Peas (Fresh & Processed), Peppers (Chili & Processed), Pumpkin, Radishes, Red Beets, Romaine Lettuce, Rutabaga, Shallots, Spinach, Squash, Sweet Potatoes, Tomatillo, Turnips and Yams.

Kern County Certified Farmers' Markets

LOCATION	SEASON	DAY	TIME
Brimhall Farmers' Market *NE Corner of Brimhall & Calloway, 9500 Brimhall Rd.*	Year Round	Saturday	9am - 1pm
Clinica Sierra Vista/Delano *Community Health Center, 1508 Garces Hwy.*	June through November	Tuesday	2:30pm - 5pm
Clinica Sierra Vista/East Bakersfield *Community Health Center, 815 Dr. Martin Luther King Jr. Blvd.*	June through November	Thursday	10am - 12pm
Clinica Sierra Vista/Lamont *Community Health Center, 8787 Hall Rd*	June through November	Tuesday	9am - 11am
Haggin Oaks Farmers' Market *Corner of Ming & Haggin Oaks, 8800 Ming Ave.*	Year Round	Sunday	9am - 2pm
Joe's Market *2300 E. Brundage Ln.*	May through August	Sunday	7:30am - 1:30pm
Lakeshore Farmers' Market *Lakeshore Lodge, 7644 Wofford Heights Blvd.*	Year Round	Saturday	9am - 1pm
Nuui Cunni Farmers' Market Lake Isabella *2600 Highway 155*	Year Round	Saturday	9am - 2pm
Paramount Produce Day *Lost Hills Recreation Center, Lost Hills Rd. & Hwy 46*	Year Round	Friday	2pm - 6:30pm
Smith Farms *Robby's Nursery, Allen Rd. & Hageman Frontage Rd.*	Year Round	Wednesday Saturday	3pm - 6pm 9am - 1pm
South West City Slickers Farmers' Market *6501 Schirra Ct. @ Ashe Rd.*	Year Round	Wednesday	4pm - 7pm
Taft Farmers' Market *Center St. between 5th & 6th St.*	May through September	Thursday	4pm - 7pm
Tehachapi Farmers' Market *Green St. between E & F St.*	June through August	Thursday	4pm - 7pm
Valley Farmers' Market Shafter *James St. & Central Ave.*	June through August	Wednesday	8am - 1pm
Valley Farmers' Market Bakersfield *Golden State Hwy. & F St.*	Year Round	Saturday	8am - 12pm

Nursery Crops - 2012

CROP	YEAR	HARVESTED ACRES	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Christmas Trees	2012	---	290	Tree	---	$ 13,100
	2011	---	360	Tree	---	$ 16,600
Fruit and Nut Trees & Vines	a/2012	732	28,987,000	Plant	---	57,555,000
	a/2011	1,264	10,534,000	Plant	---	28,589,000
Herbaceous Plants	2012	---	---	---	---	658,000
	2011	---	---	---	---	563,000
Ornamental Trees & Shrubs	a/2012	114	341,000	Plant	---	589,000
	a/2011	102	1,076,000	Plant	---	2,745,000
Propagative Material	2012	---	---	---	---	1,987,000
	2011	---	---	---	---	1,510,000
Roses	2012	1,767	17,174,000	Plant	$ 1.94	33,346,000
	2011	506	7,794,000	Plant	$ 3.13	24,388,000
Turf	2012	395	17,193,000	Sq Ft	0.39	6,676,000
	2011	249	10,825,000	Sq Ft	0.37	4,004,000
Totals	**2012**	**3,008**	**---**	**---**	**---**	**$ 100,824,100**
	2011	**2,121**	**---**	**---**	**---**	**$ 61,815,600**

a/ Includes container grown plants.

Industrial & Wood Crops - 2012

CROP	YEAR	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Almond Shells	2012	185,000	Ton	---	$ 9,752,000
	2011	165,000	Ton	---	$ 8,704,000
Biomass & Composting	2012	243,000	Ton	---	4,655,000
	2011	222,000	Ton	---	4,687,000
Timber	a/2012	3,943	Brd Ft	---	375,000
	a/2011	3,871	Brd Ft	---	176,000
Wood for Fuel	2012	2,733	Cord	b/$ 342.00	935,000
	2011	2,971	Cord	b/$ 304.00	903,000
Totals	**2012**	**---**	**---**	**---**	**$ 15,717,000**
	2011	**---**	**---**	**---**	**$ 14,470,000**

a/ Production and value based on information provided by: Timber Tax Division, Property Tax Department, State Board of Equalization.
b/ Price includes U.S. Forest Service Permits for woodcutting.

Livestock & Poultry - 2012

COMMODITY	YEAR	NUMBER OF HEAD	TOTAL LIVEWEIGHT	UNIT	UNIT VALUE	TOTAL VALUE
Cattle & Calves	2012	328,000	---	Head	$ 1,170.00	$ 382,913,000
	2011	327,000	---	Head	$ 1,040.00	$ 338,540,000
Sheep & Lambs	2012	95,000	90,000	Cwt	125.00	11,250,000
	2011	95,000	95,000	Cwt	155.00	14,725,000
Hogs	2012	1,756	3,970	Cwt	66.20	263,000
	2011	2,190	4,950	Cwt	70.70	350,000
Ostriches	2012	212	---	---	---	293,000
	2011	226	---	---	---	366,000
Miscellaneous	a/2012	---	---	---	---	359,000
	b/2011	---	---	---	---	883,000
Totals	**2012**	**---**	**---**	**---**	**---**	**$ 395,078,000**
	2011	**---**	**---**	**---**	**---**	**$ 354,864,000**

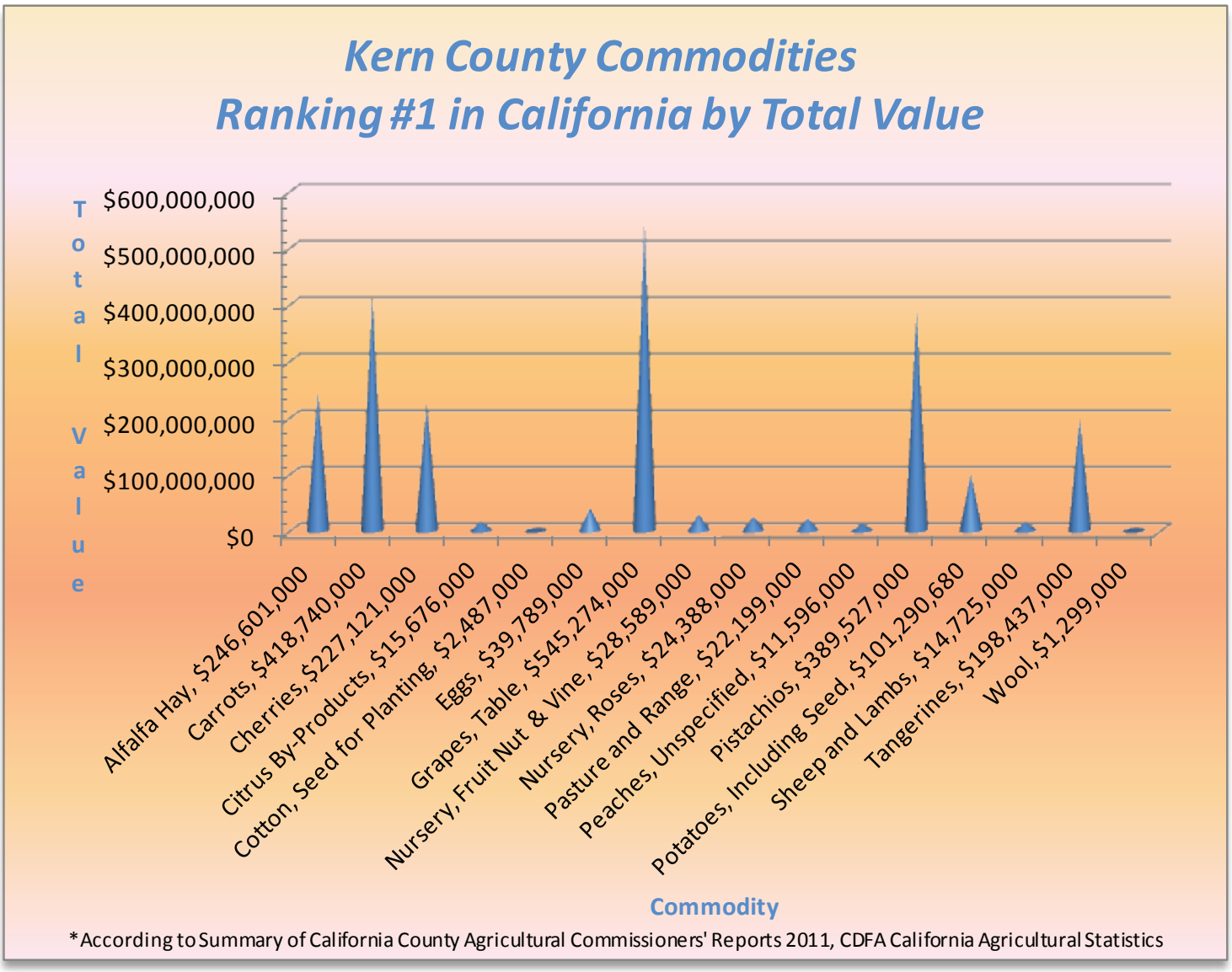
a/ Includes: Game Birds for Meat, Registered Freshwater Aquaculturists and Other.
b/ Includes: Game Birds for Meat, Registered Freshwater Aquaculturists and Other.

Livestock & Poultry Products - 2012

PRODUCT	YEAR	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Milk, Market	2012	40,580,000	Cwt	$ 17.00	$ 689,854,000
	2011	39,054,000	Cwt	$ 18.90	$ 739,298,000
Milk, Manufacturing	2012	11,500	Cwt	18.10	208,000
	2011	330,200	Cwt	18.70	6,168,000
Manure	2012	694,000	Ton	---	757,000
	2011	719,000	Ton	---	1,192,000
Wool	2012	764,000	Lb.	1.60	1,223,000
	2011	764,000	Lb.	1.70	1,299,000
Eggs & Egg Product	2012	---	---	---	40,343,000
	2011	---	---	---	39,789,000
Totals	**2012**	**---**	**---**	**---**	**$ 732,385,000**
	2011	**---**	**---**	**---**	**$ 787,746,000**

Apiary Products - 2012

COMMODITY	YEAR	TOTAL PRODUCTION	UNIT	UNIT VALUE	TOTAL VALUE
Honey	2012	3,908,000	Lb	$ 1.65	$ 6,449,000
	2011	3,888,000	Lb	$ 1.61	$ 6,260,000
Beeswax	2012	489,000	Lb	2.96	1,449,000
	2011	486,000	Lb	2.36	1,147,000
Pollination	2012	330,000	Colony	146.00	48,204,000
	2011	334,000	Colony	143.00	47,622,000
Other Apiary Products	2012	---	---	---	605,000
	2011	---	---	---	400,000
Totals	**2012**	**---**	**---**	**---**	**$ 56,707,000**
	2011	**---**	**---**	**---**	**$ 55,429,000**

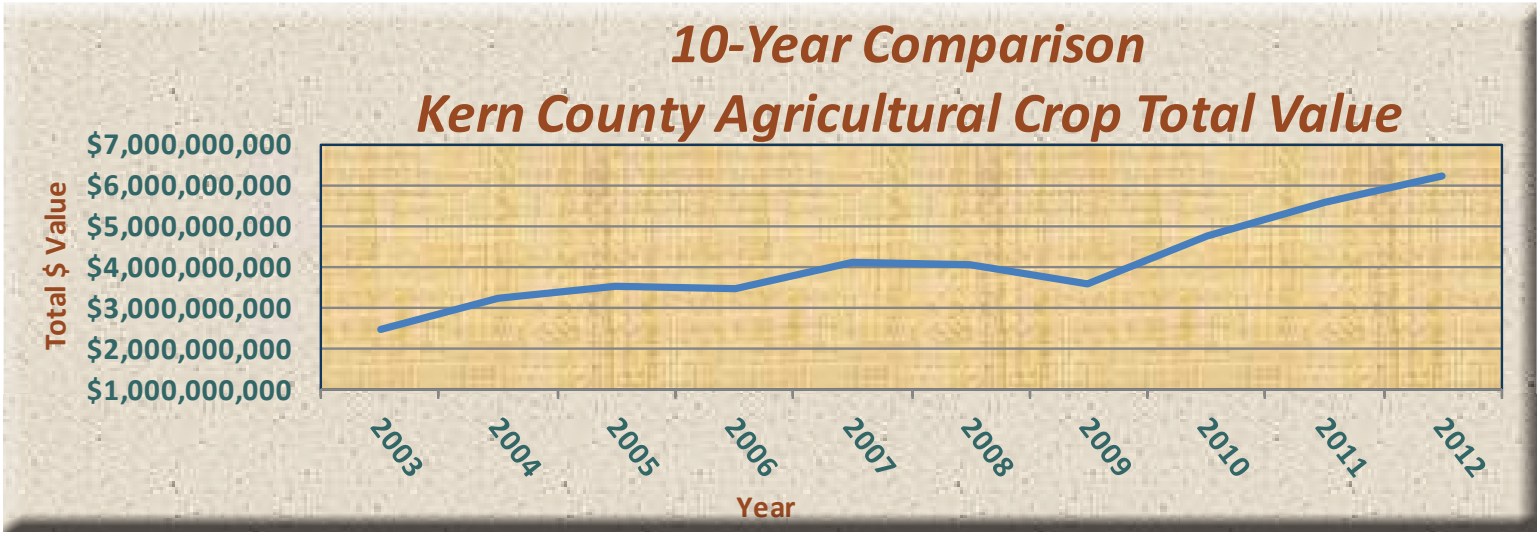


*According to Summary of California County Agricultural Commissioners' Reports 2011, CDFA California Agricultural Statistics

Summary - 2012

COMMODITY	YEAR	HARVESTED ACRES	RANGE	TOTAL VALUE
Fruit & Nut Crops	2012	411,749	---	$ 3,650,049,000
	*2011	410,478	---	$ 3,020,538,000
Field Crops & Rangeland	2012	381,856	1,479,000	539,370,000
	*2011	409,005	1,457,000	604,517,000
Vegetable Crops	2012	79,428	---	714,490,000
	*2011	72,870	---	684,867,000
Nursery Crops	2012	3,008	---	100,824,100
	2011	2,121	---	61,815,600
Industrial & Wood Crops	2012	---	---	15,717,000
	2011	---	---	14,470,000
Seed Crops	2012	2,590	---	7,742,000
	2011	2,984	---	12,729,000
Livestock & Poultry	2012	---	---	395,078,000
	2011	---	---	354,864,000
Livestock & Poultry Products	2012	---	---	732,385,000
	2011	---	---	787,746,000
Apiary Products	2012	---	---	56,707,000
	2011	---	---	55,429,000
Totals	**2012**	**878,631**	**1,479,000**	**$ 6,212,362,100**
	***2011**	**897,458**	**1,457,000**	**$ 5,596,975,600**
Total Value without Timber	2012			$ 6,211,987,100
	*2011			$ 5,596,799,600

*revised



Pest Prevention & Control - 2012

PEST EXCLUSION

INSPECTION TYPE	PREMISES VISITED	SHIPMENTS INSPECTED	PESTS A or Q
CA Overnight	208	446	0
U. S. Post Office	19	59	0
UPS	35	39	0
Federal Express	298	1,569	0
Federal Express Ground	8	1,050	0
Gypsy Moth	16	16	1
Florida/Southern States	14	396	0
Hawaii	27	49	0
Truck	55	60	0
Specialty Market	65	325	0
Beehives	221	100,700	0

EXPORT TRAPPING

CROP	TRAPS DEPLOYED	COUNTRY	PEST
Apples	95	Various	Apple Maggot (Rhagoletis pomonella)

PEST DETECTION & TRAPPING

TRAP NAME	NUMBER OF TRAPS DEPLOYED
Jackson Trap	
Light Brown Apple Moth (Epiphyas postvittana)	516
Mediterranean Fruit Fly (Ceratitis capitata)	508
Melon Fruit Fly (Bactrocera curcurbitae)	248
Oriental Fruit Fly (Bactrocera dorsalis)	317
McPhail Trap	
Mexican Fruit Fly (Anastrepha ludens)	266
Delta Trap	
Gypsy Moth (Lymantria dispar)	419
Japanese Beetle Trap (Popillia japonica)	402
Trogotrap Khapra Beetle (Trogoderma granarium)	49
European Corn Borer Trap (Ostrinia nubilalis)	28
European Pine Shoot Moth Trap (Rhyacionia buoliana)	3
Glassy-winged Sharpshooter (Homalodisca coagulata)	237
Champ Trap	391
Mexican Fruit Fly (Anastrepha ludens)	

PEST MANAGEMENT

Mating Disruption: on 20,295 acres of almonds, apples, apricots, citrus, grapes, peaches, pears, pistachios, plums & pomegranates

Beneficial Insects: predators and parasitoids were used on 14,869 acres of alfalfa, almonds, citrus, lettuce, grapes & pistachios

(data from voluntary survey sponsored by Kern Agricultural Commissioner, UC Cooperative Extension and Kern CAPCA)

Direct Marketing, Organic Farming, Exports & Pests - 2012

DIRECT MARKETING

DIRECT MARKETING PROGRAM

Direct Marketing is a system that allows Certified Producers to market their produce directly to consumers via Certified Farmers Markets. The Department of Agriculture & Measurement Standards regulates this program to insure that only certified produce is sold at Certified Farmers Markets. See a list of current Certified Farmers' Markets on Page 9 of this report.

ORGANIC FARMING

REGISTERED ORGANIC GROWER PROGRAM

Producers and growers who market their produce as "Organic" or "Organically Grown" must be certified by an accredited certifying agency and are required to register their organic fields with the state. The Department of Agriculture & Measurement Standards inspects these fields to insure compliance with applicable laws and regulations.

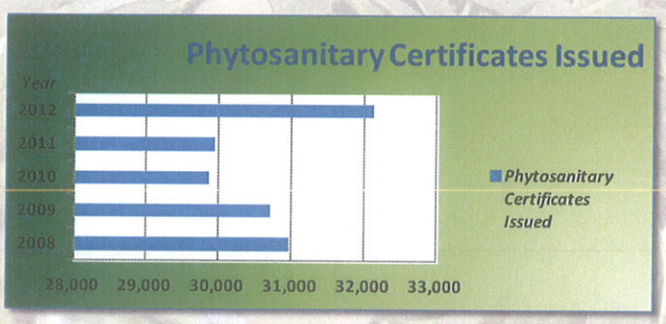
Registered Growers and Handlers - 73

Partial listing of registered crops: Alfalfa, Apples, Broccoli, Carrots, Cotton, Lettuce, Melons (Cantaloupe, Watermelons, etc.), Olives, Onions, Oranges, Potatoes, Raisins, Safflower, Stonefruit, Table Grapes, Tomatoes, and Wheat.

EXPORTS

Phytosanitary Certification is one of the largest programs within the Department of Agriculture. Depending on the agricultural commodity and destination country, Phytosanitary Certification may be required, which attests to the freedom from insects and diseases, by an Accredited Certifying Official.

Phytosanitary Certificates Issued (7% increase from Fiscal Year 2010-2011) 32,132



TOP 10 DESTINATION COUNTRIES & PHYTOSANITARY CERTIFICATES ISSUED (listed greatest to least):
China (4,037), Mexico (2,725), Japan (2,590), Australia (2,151), Canada (1,501), Republic of Korea (1,370), Indonesia (1,295), Hong Kong (1,256), Thailand (775), and United Arab Emirates (715).

TOP COMMODITIES EXPORTED (listed greatest to least):
Grapes, Almonds, Oranges, Pistachios, Carrots, Cotton, Potatoes, Stonefruit, Tangerines/Tangelos, and Lemons along with 49 other commodities.

Kern County issued 14% of all Phytosanitary Certificates in California, which is 2nd highest total number issued in the state

Kern County issued 6% of the total Phytosanitary Certificates in the United States

PEST ERADICATION

Pink Bollworm Program For Kern County, Cooperative Pink Bollworm Project

Trapping*	0	Natives Detected
Sterile Release*	0	Moths
Plowdown*	55,940	Acres

Agricultural Impact- 2012

AGRICULTURAL IMPACT

The Central Valley contains ~1% of the nation's farmland, but produces 25% of its food supply (U.S. Geological Survey)

California produces 80% of the world's almond production and Kern County leads the state, producing 23% (Almond Board of California)

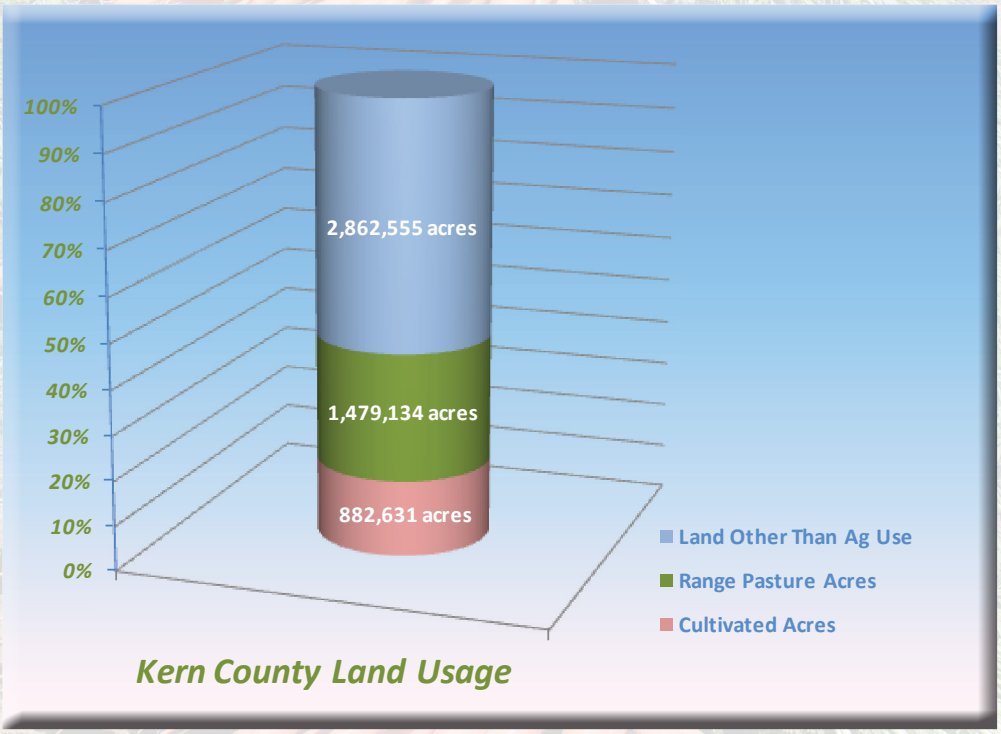
California produces more than 99% of the nation's pistachios and Kern County leads the state, producing 43% (Administrative Committee for Pistachios)

California leads the nation in Milk production with Kern County accounting for almost 10% (California Milk Advisory Board)

Kern County leads the nation in carrot production

Each dollar of farm production in the San Joaquin Valley produces a return of $1.89 to the local economy (UC Agricultural Issues Center)

Kern County's 2012 agricultural value is $6.2 billion, equating to $11.7 billion for the local economy



The economic benefits of agriculture extend far beyond crop sales, supporting millions of California jobs

1 job in agricultural processing is equivalent to 2.46 jobs in related fields (UC Agricultural Issues Center)

For every 38 acres of agricultural production in Kern County,1 job in agriculture is created, according to a survey by the Employment Development Department

24% of Kern County Private Sector Jobs were in Agricultural Production & Food Manufacturing (2012 KC Labor Market Study)

Jobs in agricultural processing, know as Value-added Agriculture, increased 18% from 2001-2011 (2012 KC Labor Market Study)

Food manufacturing in Kern County increased 63% from 2001-2011 (2012 KC Labor Market Study)