Exhibit 10

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF FEBRUARY 3, 2011
Prepared on January 10, 2011

ITEM NUMBER: **18**

SUBJECT: **Summary of Water Board Grant Funding for Agriculture**

DISCUSSION

Water Board Statewide Funding for Agriculture Related Projects: Over $600 Million Since 2000

Since the year 2000, the State and Regional Water Boards have made available over $608 million of public grant funds to address agricultural issues (Table 1, below). These funds came from Propositions 13, 40, 84, and 50, and addressed a myriad of water quality projects, watershed protection, and nonpoint source pollution control throughout the State. In addition, the State Water Board also allocates approximately $4.5 million per year in 319h program funding to address non point source pollution.

TABLE 1: Statewide Grant Funding for Agriculture Related Projects
State Water Resources Control Board
Propositions 13, 40, 84, and 50 Funding Programs

Prop	Grant Program	Local Assistance Available ($)
50	Agricultural Water Quality through FY05	20,215,736
40	Agricultural Water Quality through FY05	2,500,000
50	Agricultural Water Quality	9,284,264
40	Agricultural Water Quality	8,900,000
50	Coastal Non Point Source	33,200,000
40	Non point Source	19,000,000
40	Integrated Watershed Management	47,500,000
50	CALFED Drinking Water	20,500,000
50	Dairies	5,000,000
50	CalFED Watershed	20,000,000
50	Integrated Regional Water Management	183,000,000
13	Watershed Protection	82,800,000
13	Nonpoint Source Pollution Control	92,000,000
13	Coastal Nonpoint Source Pollution Control	50,502,000
84	Agricultural Water Quality	13,725,000
	TOTAL	**$608,127,000**

The $608 million in Table 1 does not include other agriculture related funding provided by many other state and federal agencies.

Recent Central Coast Grant Funding Related to Agriculture: Over $55 million

The amount of public Water Board grant funds recently awarded on the Central Coast for agriculture related projects is over $55 million. Most of these funds were awarded in the last ten years.

There are several grant programs that have provided (or are providing) funding for agriculture related projects on the Central Coast. The Integrated Watershed Regional Management (IWRM) grant funds are providing over $14 million for agriculture related projects, summarized below in Table 2. These projects are managed by the State Board or the Department of Water Resources.

TABLE 2: Central Coast Integrated Watershed Regional Management Grants Related to Agriculture

Funding Area	Grantee	Amount	Notes	Grant #
Santa Cruz	Santa Cruz County Resource Conservation District	$690,000	Watsonville Sloughs Integrated Watershed Restoration	07-507-550-0 Component 12
Santa Cruz	Santa Cruz County Environmental Health	$350,000	Coordinated Monitoring Program – Implementation Monitoring of Watershed Restoration	07-507-550-0 Component 15
Greater Monterey	Monterey County Water Resources Agency	$997,000	The Salinas Valley Fish Habitat and Monitoring Program	Prop 50 Supplemental (see below)
Pajaro	Pajaro Valley Water Management Agency	$4,664,640	Coastal Distribution System (Subset of larger project)	4600007652
Pajaro	City of Watsonville	$6,825,300	Recycled Water Treatment Facility (Subset of project below)	4600007652
Pajaro	Resource Conservation District of Santa Cruz County	$503,656	Erosion Control, Vegetative Treatment and Riparian Restoration (subset of larger project)	4600007652

TOTAL: $14,030,596

In addition, Table 3 lists Central Coast specific projects related to agriculture funded by the Proposition Bonds and Central Coast Water Board settlement funds. These agriculture related projects include research, BMP implementation and demonstration, treatment systems, monitoring, and habitat conservation and restoration. Table 3 is a PARTIAL list. The Water Board funded MANY more agriculture related projects in the 1980s, and 90s. The total from Table 2 and Table 3 is over $48 million.

TABLE 3: Summary of Central Coast Water Board Grants Related to Agriculture

Grant No.	Program	Project Name	Grant Amount	Grantee/ Project Director	Final Invoice
05-102-553-0 05-102-553-1 05-102-553-2	Prop 40 AWQGP	Long term, high res nutrient/sediment monitoring and characterizing	$499,999	UC Santa Cruz Marc Los Huertos	11/1/2008 11/1/2008 12/1/2008
06-128-553-0	319(h)	Morro Bay On-Farm Coastal Water Quality Implementation Project	$500,000	Coastal San Luis RCD Deborah Barker	2/1/2008
06-161-553-0 06-161-553-1	Prop 40 IWM	Integrated Watershed Restoration Program Ph II	$4,048,135	Santa Cruz Co. RCD Karen Christensen	2/1/2010
06-273-553-0 06-273-553-1	Prop 40 Prop 50 AWQGP	Research Implement. BMP's Protect Water Qual, Cent. Coast Vineyard	$499,830 $499,830	Santa Cruz Co. RCD Karen Christensen	5/1/2009
06-274-553-0	Prop 40 Prop 50 AWQGP	Demonstrate Capability Water Quality/Food Safety through Research Implementation	$600,000 $400,000	Central Coast Ag. Quality Coalition Dawn Mathes	4/1/2009
06-275-553-0	Prop 40 Prop 50 AWQGP	Research/Implement BMP's/ Protect Water Quality Cent. Coast Vineyard	$340,000 $340,000	Central Coast Vineyard Team Kris O'Connor	4/1/2009
7-090-253-0	319h NPS	San Lorenzo River Watershed Mgmt	$120,700	Coastal San Luis RCD	Closed
7-104-253-0		NPS Pollution in Salinas Valley-Carr Lake	$191,970	CA State University Monterey Bay	Closed

7-116-253-0	319h NPS	Nitrate Management	$80,000	Monterey County Water Resources Agency	Closed
8-065-253-0	319h NPS	Volunteer Monitoring Marine Sanctuary	$75,000	Center for Marine Conservation	Closed
8-115-253-0	319h NPS	Salinas Valley Eastside Watershed Project -Farm/Ranch Outreach	$102,000	Monterey County RCD	Closed
8-117-253-0	319h NPS	Reduce NPS Pollution in the lower Salinas River-Implementing regulatory coordination for ag management practices.	$60,000	Monterey Bay National Marine Foundation	Closed
8-257-130-0		Elkhorn Slough Watershed Ag Outreach Project	$327,647	Monterey County RCD	Closed
9-078-253-0	319h NPS	Monterey Bay Regional Marketing Initiative-Collaborate with ag community to develop programs to encourage BMPs.	$145,820	Community Alliance with Family Farmers (CAFF)	Closed
9-193-130-0	319h NPS	Citizens Monitoring Group	$49,998	Monterey Bay Sanctuary Found.	closed
00-097-253-0	319h NPS	Demonstration Farm & Outreach Program	$345,600	Ag Land Based Training Assoc, Inc (ALBA)	Closed
00-147-253-0	319h NPS	Erosion and Nutrient Mgmt I Salinas and Pajaro Valleys	$310,800	Monterey County RCD	Closed
00-148-253-0	319h	Outreach and Education Elements of the Salinas Valley Nitrate Mgmt Plan	$288,000	Monterey County Water Resources Agency	Closed
00-152-253-0		Morro Cojo Slough-Remediate NPS Pollution	$340,000	San Jose State University Found.	Closed
00-202-130-0	Cost Savings	Oso Flaco Creek Watershed Run-off Assessment and Outreach Plan	$200,000	Cachuma RCD	Closed

00-239-130-0	TMDL NPS	Pajaro River Watershed Enhancement Planning	$179,544	Monterey Bay Sanctuary Found.	Closed
01-066-253-0	Prop 13	Central Coast Vineyards-reduce off-site movement of silt and water	$256,680	Central Coast Vineyard Team	Closed
01-113-130-1	TMDL	Volunteer Monitoring Program	$34,999	Monterey Bay Sanctuary	Closed
01-134-253-0	Prop 13	San Antonio Coordinated Resource Mgmt Plan	$20,000	Cachuma RCD	Closed
01-142-253-0		Outreach and Education of BMPs	$130,000	Upper Salinas Las Tablas RCD	closed
01-204-130-0	TMDL	Watsonville Slough-Develop and implement specs for pathogens and sediment	$166,437	University of CA Foundation	Closed
01-244-130-0	TMDL	Santa Margarita Ranch Ag Run-off Monitoring	$28,930	Regents of University of CA	Closed
02-071-253-0	Prop 13	Vegetative Conservation Practices-Pajaro Valley	$331,298	CAFF	Closed
02-056-130-1	TMDL	Pajaro River Watershed Nutrient Loading Assessment	$149,853	Regents of University of CA	Closed
01-051-253-0		Farm WQ Planning	$345,004	Regents of University of CA; Ag and Natural Resources	Closed
03-069-553-0	319h	Central Coast Farmland Demonstrating WQ Improvements	$347,346	Cachuma RCD	Closed
03-174-253-0	TMDL	Regional Mapping and Pesticide Data Replication	$19,900	CSUMB	Closed
03-184-553-0	Prop 13	Soquel Creek Lagoon	$344,900	City of Capitola	Closed
03-187-553-0	Prop 13	Pajaro River Watershed WQ Protection & Wetland Restoration	$2,271,877	Santa Cruz Co. RCD	Closed

03-193-553-0	Prop 13	Gabilan Watershed-address pollutants, restore natural function of watershed, reduce erosion and sedimentation,	$1,400,184	San Jose State University Found - Moss Landing Marine Lab.	closed
04-133-553-0	319h	Arroyo Grande Creek On-farm Coast WQ Implementation Projects	$277,645	Coastal San Luis RCD	Closed
04-138-553-0	Prop 13	Biologically Integrated Farming Systems	$680,500	Central Coast Vineyard Team	Closed
04-143-553-0	Prop 13	Irrigation & Fertilization Mgmt Assistance	$899,995	Santa Clara Valley Water District	Closed
04-145-553-0	Prop 13	Gabilan Watershed Identification of Toxic Pesticides - determine effectiveness of Ag conservation practices & stream restoration	$190,000	Monterey County RCD	Closed
04-320-553-0	Prop 50 AWQGP	Vineyard Ag Waiver	$242,762	Central Coast Vineyard Team	Closed
04-326-553-0	Prop 50 AWQGP	WQ Practice Implementation on Irrigated Ag Lands	$1,000,000	Monterey County RCD	Closed
04-400-553-0	Prop 50 AWQGP	Mgmt Practices to Improve WQ San Luis Obispo and Santa Barbara Counties	$999,133	Central Coast WQ Preservation Inc	Closed
05-103-553-0	Prop 40 AWQGP	Determine Ag Sources of Persistent Impairment to WQ Reg 3	$499,900	Central Coast WQ Preservation Inc	Closed
05-105-553-0	Prop 50 AWQGP	Mgmt Practices to Improve WQ Pajaro, Salinas, Elkhorn Watersheds	$999,133	Central Coast WQ Preservation Inc	Closed
05-122-553-0	319h	Reduction Nutr. Pesticide Loads, Wetlands Treatment	$500,000	Monterey County RCD	Closed

05-176-553-0	Prop 50 AWQGP	Ag NPS Reduction Demonstration and Outreach	$206,463	Ag Land Based Training Assoc, Inc	Closed
05-185-553-0	Prop 50 AWQGP	Irrigated Ag BMP Implementation	$770,104	Cachuma RCD	Closed
06-045-553-0	319h	Vegetative Treatment Systems and Far WQ Plans (FWQP) Implementation	$999,397	Santa Cruz Co. RCD	closed
06-353-553-0	Prop 50 CNPS	Assessment of State-Funded Wetland Restoration Projects Region 3	$400,000	San Jose State University Found. - Moss Landing Marine Labs	Active
09-348-553-0	Prop 50 AWQGP	Nutrient, Pathogen & Sediment Pollution Reduction from Livestock Facilities	$999,689	Ecology Action of Santa Cruz	Active
09-350-553	Prop 50 AWQGP	Pajaro Watershed Ag Irrigation and Nutrient Mgmt Project	$750,000	Santa Cruz Co. RCD	Pending
10-415-553-0	Prop 84 AWQGP	Implementation of Irrigation and Nutrient Mgmt Projects in the Lower Pajaro Watershed	$500,000	Santa Cruz Co. RCD	Pending
10-423-553-0	Prop 84 AWQGP	Central Coast Irrigation and Nutrient Mgmt Program, Santa Maria Watershed	$1,250,000	Cachuma RCD	Pending
10-424-553-0	Prop 84 AWQGP	Salinas Valley Watershed Irrigation and Nutrient Mgmt Program	$1,250,000	Monterey Bay Sanctuary Foundation	Pending
10-440-553-0	319h NPS	Morro Bay Ag WQ Enhancement Program	$465,500	Coastal San Luis RCD	Pending
Following Projects Awarded by Regional Board from Settlement Funds					
01-RB-06	Unocal, Avila Settlement	South SLO Creek-restore functional wetland, improving WQ, reduce NPS pollution discharges	$50,000	SLO County Land Conservancy	Closed
98-289-8	Unocal, Guadalupe Settlement	Santa Maria Estuary Plan	$440,000	CA Coastal Conservancy	Closed

98-289-12	Unocal, Guadalupe Settlement	Central Coast Watershed Coordinator	$658,103	Central Coast Wine Growers Assoc.	Closed
98-289-15	Unocal, Guadalupe Settlement	Central Coast Farm WQ Courses	$49,924	UC Cooperative Extension SLO County	Closed
98-289-16	Unocal, Guadalupe Settlement	Central Coast Cooperative Monitoring	$622,321	Central Coast WQ Preservation Inc	Closed
2004-0579	PGE Monitoring Funds	Monitoring of long-term large scale watershed level	$250,000	Central Coast Ag WQ Coalition	Active
2004-0582	PGE Monitoring Funds	Watershed scale WQ trend monitoring for Carneros and Corn Cob Canyon Creek	$49,999	CSUMB	Active
2006-0387	PGE Monitoring Funds	Ambient Monitoring in Elkhorn Slough	$49,680	Elkhorn Slough Foundation	Active
2004-0575	PGE Project Funds	Design and Implement conservation practices to improve WQ in Moss Landing Harbor and tributaries	$282,290	Monterey County RCD	Active
2004-0576	PGE Project Funds	Plan, design supervise construction of conservation practices to arrest erosion at three gully sites on two properties	$49,925	Monterey County RCD	Active
2005-0438	PGE Project Funds	Irrigation and Nutrient Mgmt-Implement enhanced irrigation and nutrient mgmt practices in North Monterey County	$49,843	Monterey County RCD	Active
2004-0680	PGE Project Funds	Elkhorn Slough Watershed-underground pipe installation and sediment basin construction	$49,893	Monterey County RCD	Active

2004-0681	PGE Project Funds	Moro Cojo/Santa Rita Creek-underground pipe installation and sediment basin retrofits	$49,883	Monterey County RCD	Active
2004-0682	PGE Project Funds	Carneros Creek-underground pipe installation and sediment basin construction	$49,870	Monterey County RCD	Active
2005-0734	PGE Project Funds	1) Convert existing on-farm drainage canals and ditches into vegetated treatment systems/monitoring. 2) Stabilize 1000-foot section of Santa Rita Creek & and parcel immediately upstream.	$500,000	Monterey County RCD	Active
2005-0735	PGE Project Funds	Vegetative Treatment Systems-modeling calculations	$49,999	CSUMB	Active
2005-0437	PGE Project Funds	Wetland Restoration-Plans	$179,543	Ag Land Based Training Assoc, Inc	Active
2006-0384	PGE Project Funds	Wetland Restoration-Implementation	$190,000	Ag Land Based Training Assoc, Inc	Active
2006-0385	PGE Project Funds	Vegetative Waterways	$200,000	Central Coast Ag WQ Coalition - CAFF	Active
2008-0481	PGE Project Funds	Irrigation & Nutrient Mgmt	$49,980	UC Davis	Active
2009-0179	PGE Project Funds	Demonstrating Best Mgmt Practices for Coastal Vegetable Production	$47,897	UC Davis	Active
		TOTAL	**$34,191,652**		

AWQGP – Agricultural Water Quality Grant Program
CAFF – California Alliance with Family Farmers

In addition to the $48 million in grants listed above in Tables 2 and 3, the Central Coast Water Board also allocated $7 million to the Elkhorn Slough Foundation to mitigate impacts caused by the Moss Landing Power Plant. The Elkhorn Slough Foundation has successfully leveraged these funds into tens of millions of dollars in on-the-ground projects. These projects include funding for BMP research and demonstration, sustainable farming demonstration, and extraordinary habitat conservation and restoration. When this $7 million in funding, and leveraging, is included, the total amount of recent agriculture related grants on the Central Coast is well over $55 million. This does not include funding from many other state and federal agencies.

CONCLUSION

The amount of funding for agricultural related projects on the Central Coast in the past 10 to 15 years is over $55 million. With all this funding, the water quality problems, including pollution of drinking water wells, continue to get worse and the threat to public health is increasing dramatically. For water quality and public health problems of this severity and magnitude, our primary responsibility must be to establish meaningful and comprehensive requirements to reduce pollutant loading, establish meaningful time schedules to achieve compliance, have transparent on-site compliance monitoring, and initiate enforcement for non compliance. Future funding for agriculture related projects should only be done in concert with comprehensive requirements and large-scale treatment solutions. Grant funding in lieu of comprehensive requirements will only make the problems worse.

In reviewing these grants, there is a definitive lack of funding toward the Water Board's highest priority—protecting people from drinking water pollution. In preparing for the new Irrigated Agriculture Order, the Water Board and staff have learned much more about the severe impacts caused by nitrate pollution in groundwater, and that thousands of residential domestic wells may be polluted or threatened. This issue is staff's highest priority, and we are working to direct grant funds and other resources toward this priority (in addition to renewing the Irrigated Agriculture Order to address this critical issue).

RECOMMENDATION

This session is for discussion only.

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF FEBRUARY 3, 2011
Prepared on January 10, 2011

ITEM NUMBER: **19**

SUBJECT: **Discussion Regarding Technical Services Available to the Agriculture Industry and Potential Solutions to Water Quality Problems**

DISCUSSION

This item is a placeholder for a discussion regarding technical services available to the agriculture industry and potential solutions to water quality and habitat issues associated with irrigated agriculture.

There are many consulting companies and hundreds of individual experts who work in the field of environmental sciences, investigations, corrective actions, treatment system design, sampling, and reporting on the Central Coast. These companies and individuals provide technical services for thousands of cases regulated by the Water Board and other agencies, and are available to assist the agriculture industry in complying with Water Board requirements. Water Board staff will be compiling a list of such companies over the next several months (not as an endorsement, but as information).

In addition, the Natural Resource Conservation District (NRDC), County Resource Conservation Districts (RCDs), and UC Extension offices provide technical services to help the agriculture industry change its farming practices and achieve compliance.

There are also many non-profit agriculture organizations and initiatives that promote and demonstrate sustainable agriculture, and provide education and support.

Also, as reported in item No. 18, the Water Boards have provided hundreds of millions of dollars in public funds to assist the agriculture industry statewide, with tens of millions provided on the Central Coast.

Solving the severe groundwater and surface water pollution problems on the Central Coast is our top priority, and will require a comprehensive regulatory program designed to require significant reductions in pollution discharges on a defined schedule, compliance monitoring, and enforcement for non-compliance. As with all other Water Board programs, this approach will provide incentive to change, innovate, and implement treatment systems on individual, group, and regional scales.

RECOMMENDATION

This session is for discussion only.

Exhibit 12

United States
Department of
Agriculture

Natural
Resources
Conservation
Service

Agriculture
Handbook
Number 590

Ponds — Planning, Design, Construction

Preface

This handbook describes the requirements for building a pond. It is useful to the landowner for general information and serves as a reference for the engineer, technician, and contractor.

In fulfilling their obligation to protect the lives and property of citizens, most states and many other government entities have laws, rules, and regulations governing the installation of ponds. Those responsible for planning and designing ponds must comply with all such laws and regulations. The owner is responsible for obtaining permits, performing necessary maintenance, and having the required safety inspections made.

Acknowledgments

The first version of this handbook was prepared under the guidance of **Ronald W. Tuttle**, national landscape architect for the USDA, Natural Resources Conservation Service (NRCS), and **Gene Highfill,** national agricultural engineer (retired), NRCS, Washington, DC.

This version of the handbook was prepared by **Clifton Deal**, soil mechanic engineer, NRCS Portland, Oregon; **Jerry Edwards**, hydraulic engineer (retired), NRCS, Columbia, Missouri; **Neil Pellmann**, agricultural engineer, NRCS, Columbia, Missouri; **Ronald W. Tuttle**; and under the guidance of **Donald Woodward**, national hydrologist, NRCS, Washington, DC.

The appendixes material was originally prepared for Landscape Architecture Note 2—Landscape Design: Ponds by **Gary Wells**, landscape architect, NRCS, Lincoln, Nebraska.

Mary R. Mattinson, editor; **Lovell S. Glasscock**, editor; **John D. Massey**, visual information specialist; and **Wendy R. Pierce**, illustrator; NRCS, Fort Worth, Texas, provided valuable assistance in preparing the document for publishing.

Agriculture Handbook 590

Ponds — Planning, Design, Construction

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To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, DC, 20250, or call 1-800-245-6340 or (202) 720-1127 (TDD). USDA is an equal opportunity employer.

Ponds — Planning, Design, Construction

Introduction

For many years farmers and ranchers have been building ponds for livestock water and for irrigation. By 1980 more than 2.1 million ponds had been built in the United States by land users on privately owned land. More will be needed in the future.

The demand for water has increased tremendously in recent years, and ponds are one of the most reliable and economical sources of water. Ponds are now serving a variety of purposes, including water for livestock and for irrigation, fish production, field and orchard spraying, fire protection, energy conservation, wildlife habitat, recreation, erosion control, and landscape improvement.

This handbook describes embankment and excavated ponds and outlines the requirements for building each. The information comes from the field experience and observation of land users, engineers, conservationists, and other specialists.

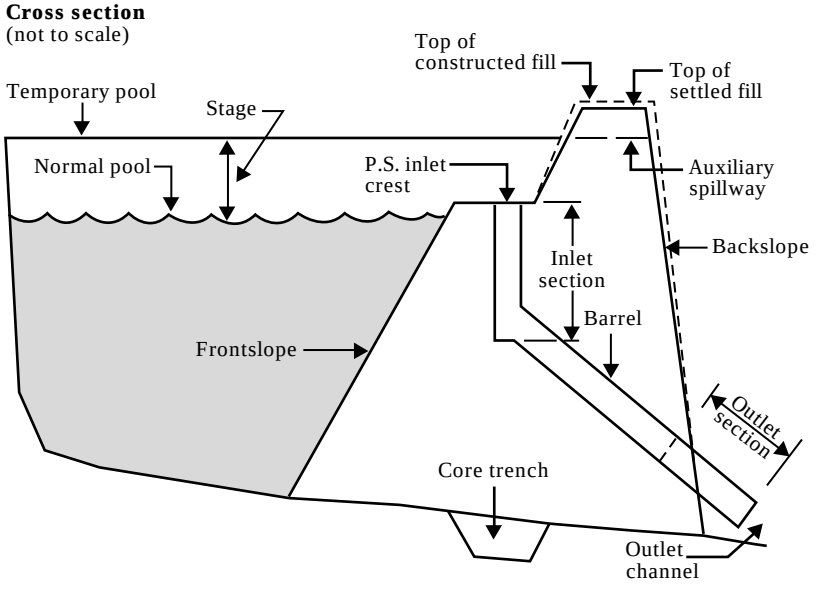
An embankment pond (fig. 1) is made by building an embankment or dam across a stream or watercourse where the stream valley is depressed enough to permit storing 5 feet or more of water. The land slope may range from gentle to steep.

An excavated pond is made by digging a pit or dugout in a nearly level area. Because the water capacity is obtained almost entirely by digging, excavated ponds are used where only a small supply of water is needed. Some ponds are built in gently to moderately sloping areas and the capacity is obtained both by excavating and by building a dam.

The criteria and recommendations are for dams that are less than 35 feet high and located where failure of the structure will not result in loss of life; in damage to homes, commercial or industrial buildings, main highways, or railroads; or in interrupted use of public utilities.

Local information is essential, and land users are encouraged to consult with specialists experienced in planning and building ponds.

Figure 1 Typical embankment and reservoir



Water needs

Livestock

Clean water and ample forage are equally essential for livestock to be finished out in a marketable condition. If stockwater provisions in pasture and range areas are inadequate, grazing will be concentrated near the water and other areas will be undergrazed. This can contribute to serious livestock losses and instability in the livestock industry.

Watering places must also be properly distributed in relation to the available forage. Areas of abundant forage may be underused if water is not accessible to livestock grazing on any part of that area (fig. 2).

Providing enough watering places in pastures encourages more uniform grazing, facilitates pasture improvement practices, retards erosion, and enables farmers to make profitable use of soil-conserving crops and erodible, steep areas unfit for cultivation.

An understanding of stockwater requirements helps in planning a pond large enough to meet the needs of the stock using the surrounding grazing area. The average daily consumption of water by different kinds of livestock shown here is a guide for estimating water needs.

Kind of livestock	Gallons per head per day
Beef cattle and horses	12 to 15
Dairy cows (drinking only)	15
Dairy cows (drinking and barn needs)	35
Hogs	4
Sheep	2

The amount of water consumed at one pond depends on the average daily consumption per animal, number of livestock served, and period over which they are served.

Figure 2 This pond supplies water to a stockwater trough used by cattle in nearby grazing area

Irrigation

Farm ponds are now an important source of irrigation water (fig. 3), particularly in the East, which does not have the organized irrigation enterprises of the West. Before World War II irrigation was not considered necessary in the humid East. Now many farmers in the East are irrigating their crops.

Water requirements for irrigation are greater than those for any other purpose discussed in this handbook. The area irrigated from a farm pond is limited by the amount of water available throughout the growing season. Pond capacity must be adequate to meet crop requirements and to overcome unavoidable water losses. For example, a 3-inch application of water on l acre requires 81,462 gallons. Consequently, irrigation from farm ponds generally is limited to high-value crops on small acreages, usually less than 50 acres.

The required storage capacity of a pond used for irrigation depends on these interrelated factors: water requirements of the crops to be irrigated, effective rainfall expected during the growing season, application efficiency of the irrigation method, losses due to evaporation and seepage, and the expected inflow to the pond. Your local NRCS conservationist can help you estimate the required capacity of your irrigation pond.

Fish production

Many land users are finding that fish production is profitable. A properly built and managed pond can yield from l00 to 300 pounds of fish annually for each acre of water surface. A good fish pond can also provide recreation (fig. 4) and can be an added source of income should you wish to open it to people in the community for a fee.

Ponds that have a surface area of a quarter acre to several acres can be managed for good fish production. Ponds of less than 2 acres are popular because they are less difficult to manage than larger ones. A minimum depth of 8 feet over an area of approximately 1,000 square feet is needed for best management.

Figure 3 Water is pumped out of this pond for irrigation

Field and orchard spraying

You may wish to provide water for applying pesticides to your field and orchard crops. Generally, the amount of water needed for spraying is small, but it must be available when needed. About l00 gallons per acre for each application is enough for most field crops. Orchards, however, may require 1,000 gallons or more per acre for each spraying.

Provide a means of conveying water from the pond to the spray tank. In an embankment pond, place a pipe through the dam and a flexible hose at the downstream end to fill the spray tank by gravity. In an excavated pond, a small pump is needed to fill the tank.

Fire protection

A dependable water supply is needed for fighting fire. If your pond is located close to your house, barn, or other buildings, provide a centrifugal pump with a power unit and a hose long enough to reach all sides of all the buildings. Also provide for one or more dry hydrants (figs. 5 and 6).

Although water-storage requirements for fire protection are not large, the withdrawal rate for fire fighting is high. A satisfactory fire stream should be at least 250 gallons per minute with pressure at the nozzle of at least 50 pounds per square inch. Fire nozzles generally are l inch to 1-1/2 inches in diameter. Use good quality rubber-lined firehoses, 2-1/2 to 3 inches in diameter. Preferably, the hose should be no more than 600 feet long.

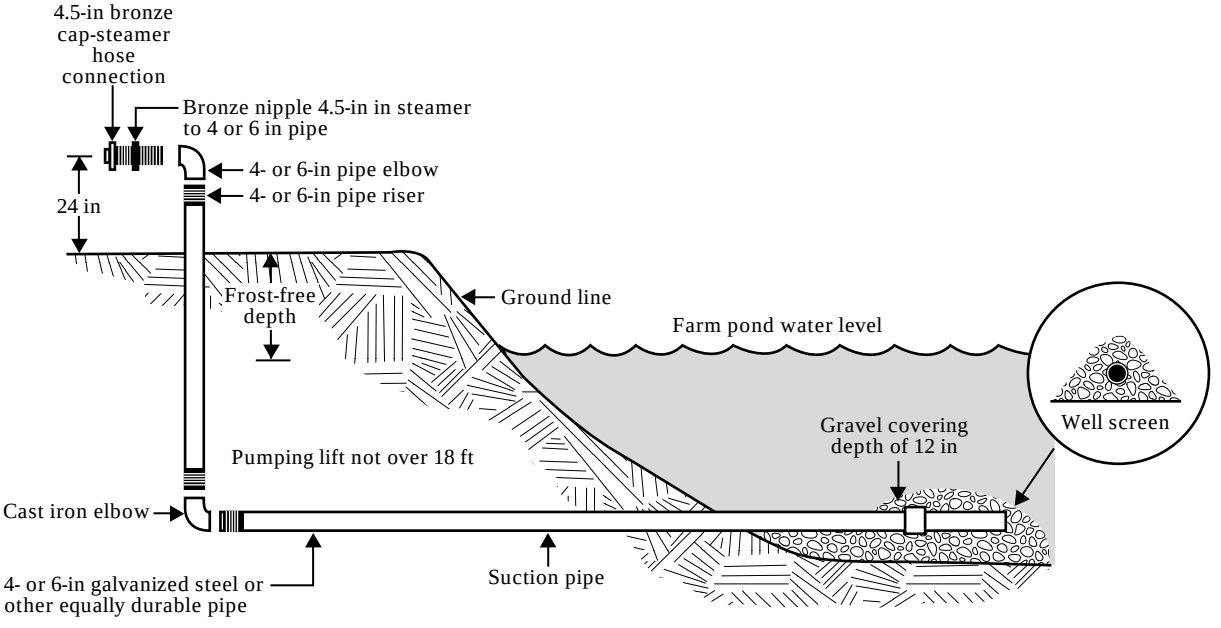
A typical firehose line consists of 500 feet of 3-inch hose and a 1-1/8 inch smooth nozzle. A centrifugal pump operating at 63 pounds per square inch provides a stream of 265 gallons per minute with a nozzle pressure of 50 pounds per square inch. Such a stream running for 5 hours requires 1/4 acre-foot of water. If you live in an area protected by a rural fire fighting organization, provide enough storage to operate several such streams. One acre-foot of storage is enough for four streams.

Your local dealer in pumps, engines, and similar equipment can furnish the information you need about pump size, capacity, and engine horsepower.

Figure 4 A pond stocked with fish can provide recreation as well as profit

Figure 5 A dry hydrant is needed when a pond is close enough to a home or barn to furnish water for fire fighting

Figure 6 Details of a dry hydrant installation



Not to scale

Recreation

A pond can provide many pleasant hours of swimming, boating, and fishing. The surrounding area can be made into an attractive place for picnics and games (fig. 7).

Many land users realize additional income by providing water for public recreation. If the public is invited to use a pond for a fee, the area must be large enough to accommodate several parties engaged in whatever recreation activities are provided.

If a pond is to be used for public recreation, supply enough water to overcome evaporation and seepage losses and to maintain a desirable water level. A pond used for swimming must be free of pollution and have an adequate depth of water near a gently sloping shore. Minimum facilities for public use and safety are also needed. These facilities include access roads, parking areas, boat ramps or docks, fireplaces, picnic tables, drinking water, and sanitary facilities.

To protect public health, most states have laws and regulations that require water supplies to meet certain prescribed standards if they are to be used for swimming and human consumption. Generally, water must be tested and approved before public use is permitted. There are also rules and regulations for building and maintaining public sanitary facilities. The state board of health or a similar agency administers such laws and regulations. Contact your local health agency to become familiar with those regulations before making extensive plans to provide water for public recreation.

Waterfowl and other wildlife

Ponds attract many kinds of wildlife. Migratory waterfowl often use ponds as resting places in their flights to and from the North. Ducks often use northern ponds as breeding places, particularly where the food supply is ample (fig. 8). Upland game birds use ponds as watering places.

Landscape quality

Water adds variety to a landscape and further enhances its quality. Reflections in water attract the eye and help to create a contrast or focal point in the landscape (fig. 9). A pond visible from a home, patio, or entrance road increases the attractiveness of the landscape and often increases land value. Ponds in rural, suburban, and urban areas help to conserve or improve landscape quality.

Figure 7 Ponds are often used for private as well as public recreation

Figure 8 Waterfowl use ponds as breeding, feeding, watering places, and as resting places during migration

Figure 9 The shoreline of a well-designed pond is protected from erosion by the addition of stone. Such a pond, reflecting nearby trees, increases the value of the surrounding land

Regardless of its purpose, a pond's appearance can be improved by using appropriate principles and techniques of design. Good design includes consideration of size, site visibility, relationship to the surrounding landscape and use patterns, and shoreline configuration.

Your local NRCS conservationist can help you apply the basic principles and design techniques. Consult a landscape architect for additional information and special designs.

Multiple purposes

You may wish to use the water in your pond for more than one purpose; for example, to provide water for livestock, fish production, and spraying field crops. If so, two additional factors must be considered.

First, in estimating your water requirements you must total the amounts needed for each purpose and be sure that you provide a supply adequate for all the intended uses.

Second, make sure that the purposes for which the water is to be used are compatible. Some combinations, such as irrigation and recreation, generally are not compatible. You would probably use most of the water during the irrigation season, making boating and swimming impractical.

Ponds used temporarily for grade control or as sediment basins associated with construction sites can be converted later into permanent ponds by cleaning out the sediment, treating the shoreline, and adding landscape measures (fig. 10). If a sediment basin is to be cleaned and reconstructed as a water element, the standards for dam design should be used.

Figure 10 This pond, which served as a sediment basin while homes in the background were being constructed, now adds variety and value to the community

Preliminary investigations

General considerations

Selecting a suitable site for your pond is important, and preliminary studies are needed before final design and construction. Analysis and selection of pond sites should be based on landscape structure and associated ecological functions and values. Relationship of the site to other ecological features within the landscape is critical to achieving planned objectives. If possible, consider more than one location and study each one to select the most ecologically appropriate, esthetic, and practical site. Weighing both onsite and offsite effects of constructing a pond is essential in site selection. Refer to figure 1 and the glossary to become familiar with the components of a pond and associated dam.

For economy, locate the pond where the largest storage volume can be obtained with the least amount of earthfill. A good site generally is one where a dam can be built across a narrow section of a valley, the side slopes are steep, and the slope of the valley floor permits a large area to be flooded. Such sites also minimize the area of shallow water. Avoid large areas of shallow water because of excessive evaporation and the growth of noxious aquatic plants.

If farm ponds are used for watering livestock, make a pond available in or near each pasture or grazing unit. Forcing livestock to travel long distances to water is detrimental to both the livestock and the grazing area. Space watering places so that livestock does not travel more than a quarter mile to reach a pond in rough, broken country or more than a mile in smooth, nearly level areas. Well-spaced watering places encourage uniform grazing and facilitate grassland management.

If pond water must be conveyed for use elsewhere, such as for irrigation or fire protection, locate the pond as close to the major water use as practicable. Conveying water is expensive and, if distance is excessive, the intended use of the water may not be practical.

Ponds for fishing, boating, swimming, or other forms of recreation must be reached easily by automobile, especially if the general public is charged a fee to use the pond. The success of an income-producing recreation enterprise often depends on accessibility.

Avoid pollution of pond water by selecting a location where drainage from farmsteads, feedlots, corrals, sewage lines, mine dumps, and similar areas does not reach the pond. Use permanent or temporary measures, such as diversions, to redirect runoff from these sources to an appropriate outlet until the areas can be treated.

Do not overlook the possibility of failure of the dam and the resulting damage from sudden release of water. Do not locate your pond where failure of the dam could cause loss of life; injury to persons or livestock; damage to homes, industrial buildings, railroads, or highways; or interrupted use of public utilities. If the only suitable pond site presents one or more of these hazards, hire a qualified person to investigate other potential sites to reduce the possibility of failure from improper design or construction.

Be sure that no buried pipelines or cables cross a proposed pond site. They could be broken or punctured by the excavating equipment, which can result not only in damage to the utility, but also in injury to the operator of the equipment. If a site crossed by pipelines or cable must be used, you must notify the utility company before starting construction and obtain permission to excavate.

Avoid sites under powerlines. The wires may be within reach of a fishing rod held by someone fishing from the top of the dam.

Area adequacy of the drainage

For ponds where surface runoff is the main source of water, the contributing drainage area must be large enough to maintain water in the pond during droughts. However, the drainage area should not be so large that expensive overflow structures are needed to bypass excess runoff during large storms.

The amount of runoff that can be expected annually from a given watershed depends on so many interrelated factors that no set rule can be given for its determination. The physical characteristics that directly affect the yield of water are relief, soil infiltration, plant cover, and surface storage. Storm characteris-

tics, such as amount, intensity, and duration of rainfall, also affect water yield. These characteristics vary widely throughout the United States. Each must be considered when evaluating the watershed area conditions for a particular pond site.

Figure 11 is a general guide for estimating the approximate size of drainage area needed for a desired water-storage capacity. For example, a pond located in west-central Kansas with a capacity of 5 acre-feet requires a drainage area of at least 175 acres under normal conditions. If reliable local runoff information is available, use it in preference to the guide.

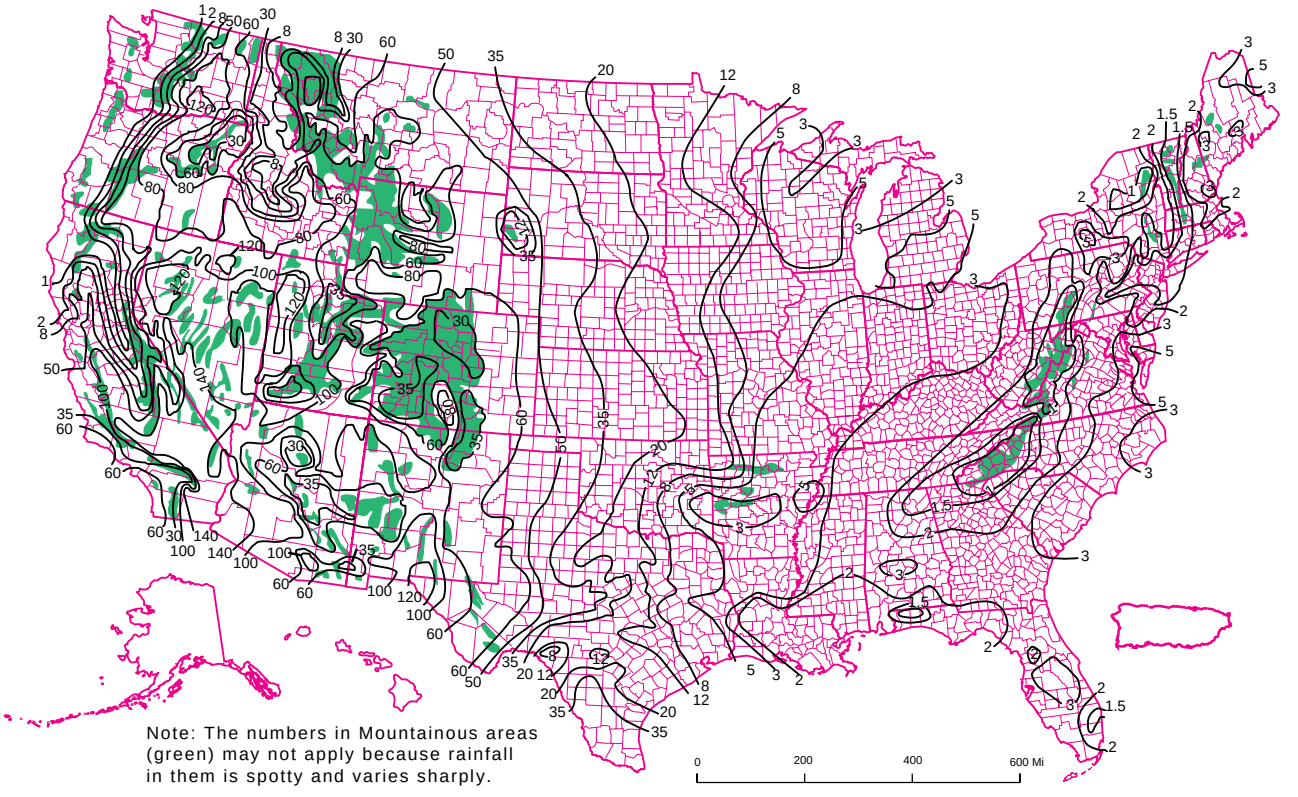
Average physical conditions in the area are assumed to be the normal runoff-producing characteristics for a drainage area, such as moderate slopes, normal soil infiltration, fair to good plant cover, and normal surface storage.

To apply the information given in figure 11, some adjustments may be necessary to meet local conditions. Modify the values in the figure for drainage areas having characteristics other than normal. Reduce the values by as much as 25 percent for drainage areas having extreme runoff-producing characteristics. Increase them by 50 percent or more for low runoff-producing characteristics.

Minimum pond depth

To ensure a permanent water supply, the water must be deep enough to meet the intended use requirements and to offset probable seepage and evaporation losses. These vary in different sections of the country and from year to year in any one section. Figure 12 shows the recommended minimum depth of water for ponds if seepage and evaporation losses are normal. Deeper ponds are needed where a permanent or year-round water supply is essential or where seepage losses exceed 3 inches per month.

Figure 11 A guide for estimating the approximate size of a drainage area (in acres) required for each acre-foot of storage in an embankment or excavated pond



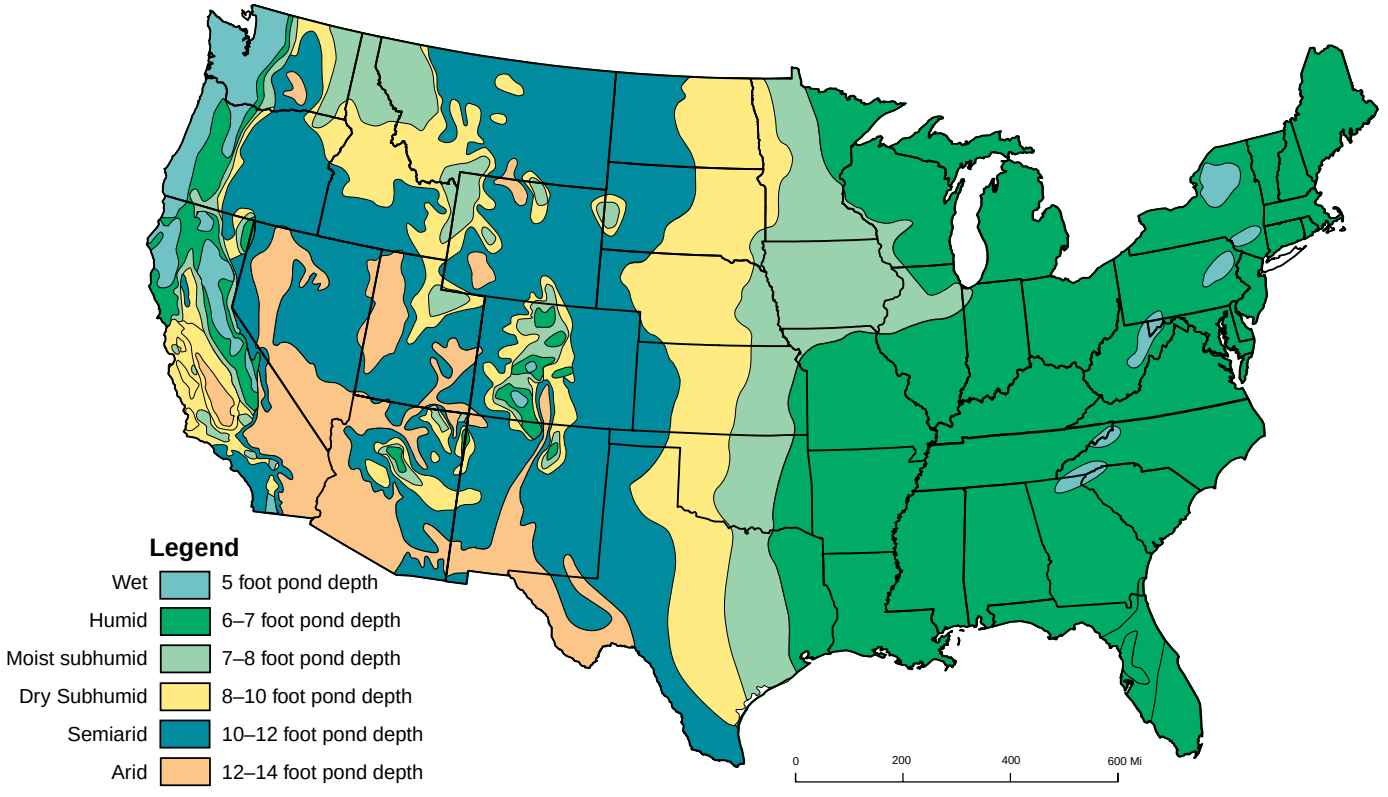
Drainage area protection

To maintain the required depth and capacity of a pond, the inflow must be reasonably free of silt from an eroding watershed. The best protection is adequate application and maintenance of erosion control practices on the contributing drainage area. Land under permanent cover of trees, grass, or forbs is the most desirable drainage area (fig. 13). Cultivated areas protected by conservation practices, such as terraces, conservation tillage, stripcropping, or conservation cropping systems, are the next best watershed conditions.

If an eroding or inadequately protected watershed must be used to supply pond water, delay pond construction until conservation practices are established. In any event, protection of the drainage area should be started as soon as you decide to build a pond.

Figure 13 Land with permanent vegetation makes the most desirable drainage area

Figure 12 Recommended minimum depth of water for ponds in the United States



Pond capacity

Estimate pond capacity to be sure that enough water is stored in the pond to satisfy the intended use requirements. A simple method follows:

- Establish the normal pond-full water elevation and stake the waterline at this elevation.
- Measure the width of the valley at this elevation at regular intervals and use these measurements to compute the pond-full surface area in acres.
- Multiply the surface area by 0.4 times the maximum water depth in feet measured at the dam.

For example, a pond with a surface area of 3.2 acres and a depth of 12.5 feet at the dam has an approximate capacity of 16 acre-feet (0.4 x 3.2 x 12.5 = 16 acre-feet) [1 acre-foot = 325,651 gallons].

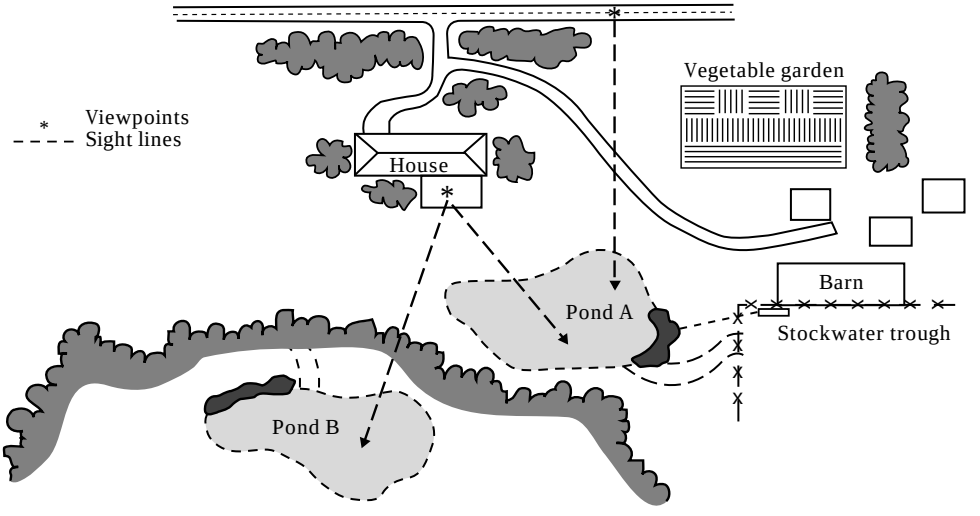
Landscape evaluation

Alternative pond sites should be evaluated for potential visibility and compatibility with surrounding landscape characteristics and use patterns (fig. 14). Identify major viewpoints (points from which the site is viewed) and draw the important sight lines with cross sections, where needed, to determine visibility. If feasible, locate the pond so that the major sight line crosses the longest dimension of water surface. The pond should be placed so that a viewer will see the water first before noticing the dam, pipe inlet, or spillway. Often, minor changes in the dam alignment and spillway location can shift these elements out of view and reduce their prominence.

If possible, locate your pond so that some existing trees and shrubs remain along part of the shoreline. Vegetation adds aesthetic value by casting reflections on the water, provides shade on summer days, and helps blend the pond into the surrounding landscape. A pond can often be located and designed so that an island is created for recreation, wildlife habitat, or visual interest.

In addition to the more typical farm and residential sites, ponds can be located on poor quality landscapes to rehabilitate abandoned road borrow areas, dumping sites, abandoned rural mines, and other low production areas.

Figure 14 A preliminary study of two alternative sites for a pond to be used for livestock water, irrigation, and recreation



Estimating storm runoff

The amount of precipitation, whether it occurs as rain or snow, is the potential source of water that may run off small watersheds. The kind of soil and the type of vegetation affect the amount of water that runs off. Terraces and diversions, along with steepness and shape of a watershed, affect the rate at which water runs off.

A spillway is provided to bypass surface runoff after the pond is filled. The tables and charts in the following sections should be used to estimate the peak discharge rates for the spillway. They provide a quick and reliable estimate of runoff rates and associated volumes for a range of storm rainfall amounts, soil groups, land use, cover conditions, and watershed slopes.

Hydrologic groupings of soils

Soils are classified in four hydrologic groups according to infiltration and transmission rates:

A—These soils have a high infiltration rate. They are chiefly deep, well-drained sand or gravel. The runoff potential is low.

B—These soils have a moderate infiltration rate when thoroughly wet. They are chiefly moderately deep, well-drained soils of moderately fine to moderately coarse texture.

C—These soils have a slow infiltration rate when wet. These moderately fine to fine texture soils have a layer that impedes downward movement of water.

D—These soils have a very slow infiltration rate. They are chiefly clay soils that have a high swelling potential, soils with a permanent high water table, soils with a claypan at or near the surface, and shallow soils over nearly impervious material. The runoff potential is high.

The NRCS district conservationist or your county extension agent can help you classify the soils for a given pond site in one of the four hydrologic groups.

Runoff curve numbers

Tables 1 through 4 show numerical runoff ratings for a range of soil-use-cover complexes. Because these numbers relate to a set of curves developed from the NRCS runoff equation, they are referred to as curve numbers (CN) in these tables.

The watershed upstream from a farm pond often contains areas represented by different curve numbers. A weighted curve number can be obtained based on the percentage of area for each curve number. For example, assume that the watershed above a pond is mainly (three-fourths) in good pasture and a soil in hydrologic group B. The remainder is cultivated with conservation treatment on a soil in hydrologic group C.

A weighted curve number for the total watershed would be:

3/4 x 61 = 46 (approximately)
1/4 x 76 = 20 (approximately)
Weighted = 66

Table 1 Runoff curve numbers for urban areas [1/]

Cover description	Average percent impervious area [2/]	Curve numbers for hydrologic soil group A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50 to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 3)					

1/ Average runoff condition, and $I_a = 0.2S$.
2/ The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4 in NRCS Technical Release 55, Urban Hydrology for Small Watersheds.
3/ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4/ Composite CN's for natural desert landscaping should be computed using figure 2-3 or 2-4 in Technical Release 55, based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5/ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 in Technical Release 55, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2 Runoff curve numbers for agricultural lands 1/

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment 2/	Hydrologic condition 3/	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Closed-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

1/ Average runoff condition, and $I_a = 0.2S$.
2/ Crop residue cover applies only if residue is on at least 5 percent of the surface throughout the year.
3/ Hydrologic condition is based on combination of factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes in rotations, (d) percentage of residue cover on the land surface (good > 20%), and (e) degree of surface roughness.
Poor: Factors impair infiltration and tend to increase runoff.
Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 3 Runoff curve numbers for other agricultural lands 1/

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition 3/	A	B	C	D
Pasture, grassland, or range—continuous grazing 2/	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element 3/	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 4/	48	65	73
Woods—grass combination (orchard or tree farm) 5/	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods 6/	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 4/	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1/ Average runoff condition, and I_a = 0.2S.
2/ Poor: <50% ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: >75% ground cover and lightly or only occasionally grazed.
3/ Poor: <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4/ Actual curve number is less than 30; use CN = 30 for runoff computations.
5/ CN's shown were computed for areas with 50% woods and 505 grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6/ Poor: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 4 Runoff curve numbers for arid and semiarid rangelands 1/

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition 2/	A 3/	B	C	D
Herbaceous—mixture of grass, forbs, and low-growing brush, with brush the minor element	Poor	—	80	87	93
	Fair	—	71	81	89
	Good	—	62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor	—	66	74	79
	Fair	—	48	57	63
	Good	—	30	41	48
Pinyon-juniper—pinyon, juniper, or both grass understory	Poor	—	75	85	89
	Fair	—	58	73	80
	Good	—	41	61	71
Sagebrush with grass understory	Poor	—	67	80	85
	Fair	—	51	63	70
	Good	—	35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1/ Average runoff condition, and I_a = 0.2S. For range in humid regions, use table 3.
2/ Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.
3/ Curve numbers for group A have been developed only for desert shrub.

Volume of storm runoff

Often knowing how much water runs off from a big storm as well as the rate at which it flows is good. The volume is needed to compute needed storage as well as the peak discharge rate.

The figures in table 5 are the depth (in inches) at which the storm runoff, if spread evenly, would cover the entire watershed. For example, the volume of runoff from a 3-inch rainfall on a 100-acre watershed with the weighted curve number of 66 would be:

0.55 inch (interpolated between 0.51 and 0.72 inches)
100 acres x 0.55 inch = 55 acre-inches
55 acre-inches ÷12 = 4.55 acre-feet
55 acre-inches x 27,152 gallons per acre-inch = 1.5 million gallons (approximately)

Table 5 Runoff depth, in inches

Rainfall	Curve number						
(inches)	60	65	70	75	80	85	90
1.0	0	0	0	0.03	0.08	0.17	0.32
1.2	0	0	0.03	0.07	0.15	0.28	0.46
1.4	0	0.02	0.06	0.13	0.24	0.39	0.61
1.6	0.01	0.05	0.11	0.20	0.34	0.52	0.76
1.8	0.03	0.09	0.17	0.29	0.44	0.65	0.93
2.0	0.06	0.14	0.24	0.38	0.56	0.80	1.09
2.5	0.17	0.30	0.46	0.65	0.89	1.18	1.53
3.0	0.33	0.51	0.72	0.96	1.25	1.59	1.98
4.0	0.76	1.03	1.33	1.67	2.04	2.46	2.92
5.0	1.30	1.65	2.04	2.45	2.89	3.37	3.88
6.0	1.92	2.35	2.87	3.28	3.78	4.31	4.85
7.0	2.60	3.10	3.62	4.15	4.69	5.26	5.82
8.0	3.33	3.90	4.47	5.04	5.62	6.22	6.81
9.0	4.10	4.72	5.34	5.95	6.57	7.19	7.79
10.0	4.90	5.57	6.23	6.88	7.52	8.16	8.78
11.0	5.72	6.44	7.13	7.82	8.48	9.14	9.77
12.0	6.56	7.32	8.05	8.76	9.45	10.12	10.76

Rainfall amounts and expected frequency

Maps in U.S. Weather Bureau Technical Paper 40 (USWP-TP-40), Rainfall Frequency Atlas of the United States, show the amount of rainfall expected in a 24-hour period. These maps have also been reprinted in Hydrology for Small Urban Watershed, Technical Release 55. Contact your local NRCS field office for rainfall amounts on maps.

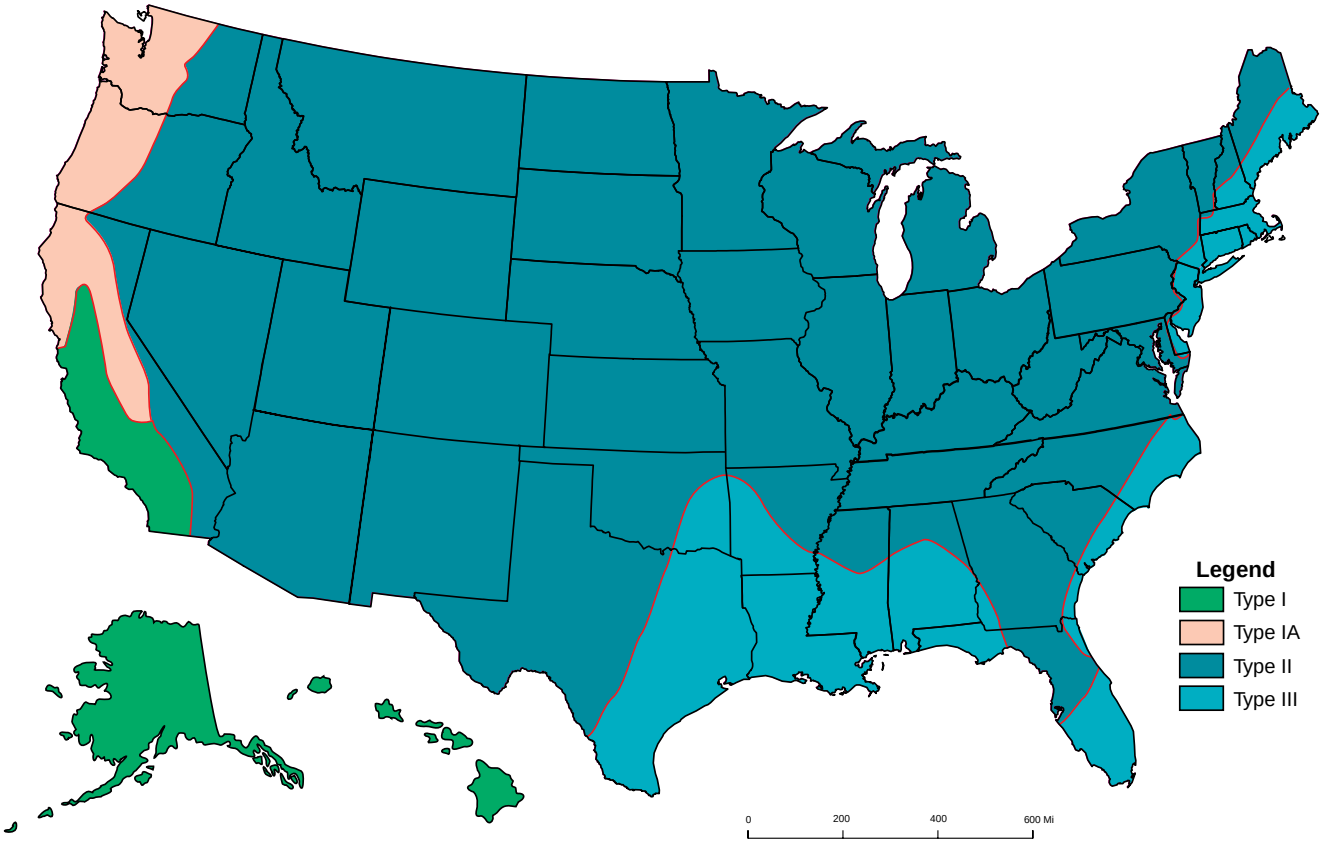
Designing an ordinary pond spillway to accommodate the peak rate of runoff from the most intense rainstorm ever known or anticipated is not practical. The spillway for an ordinary farm pond generally is designed to pass the runoff from a 25-year frequency storm. This means a storm with only a 4 percent chance of occurring in any year or the size beyond which larger storms would not occur more often than an average of once in 25 years. Designing for a 50-year storm frequency is recommended for spillways for larger dams. A 10-year storm frequency may be adequate for sizing the spillway in small ponds.

Rainfall distribution

The highest peak discharges from small watersheds are usually caused by intense, brief rainfalls that may occur as part of a longer duration storm. Different rainfall distributions with respect to time have been developed for four geographic areas of the United States. For each of these areas, a set of synthetic rainfall distributions having nested rainfall intensities were developed. These distributions maximize the rainfall intensities by incorporating selected storm duration intensities within those needed for longer durations at the same probability level.

In figure 15, type I and IA represent the Pacific maritime climate with wet winters and dry summers. Type III represents Gulf of Mexico and Atlantic coastal areas where tropical storms bring large rainfall amounts. Type II represents the rest of the country.

Figure 15 Approximate geographic boundaries for NRCS rainfall distributions



Peak discharge rate

The slope of the land above the pond affects the peak discharge rate significantly. The time of concentration along with the runoff curve number, storm rainfall, and rainfall distribution are used to estimate the peak discharge rate. This rate is used to design the auxiliary spillway width and depth of flow.

Time of concentration

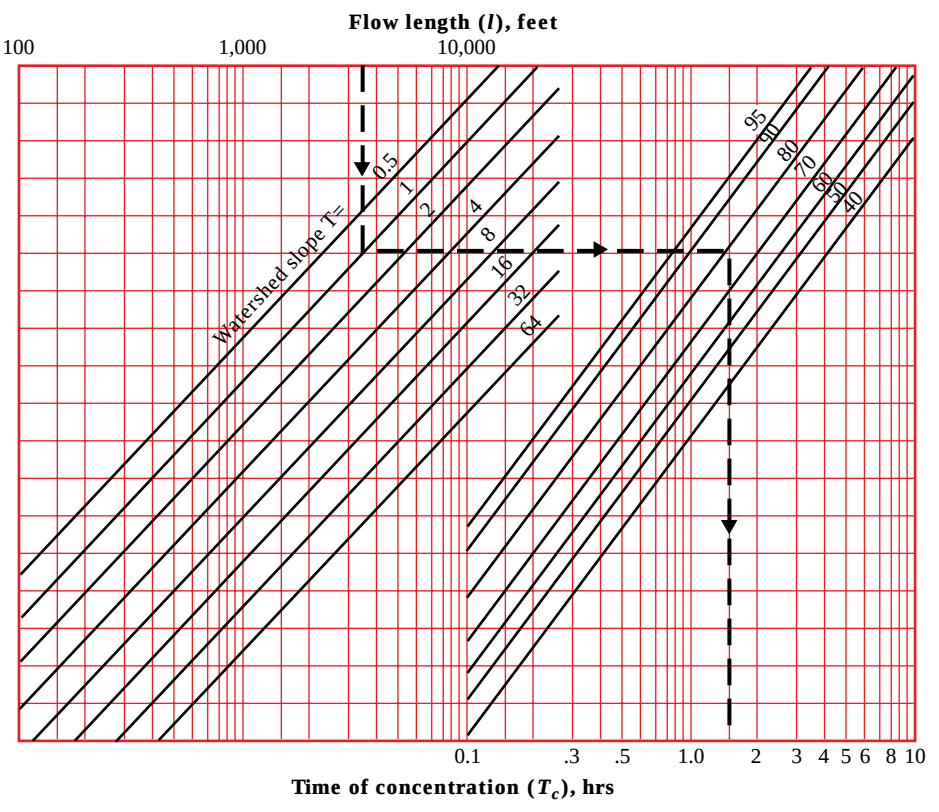
Time of concentration (T_c) is the time it takes for runoff to travel from the hydraulically most distant point of the watershed to the outlet. T_c influences the peak discharge and is a measure of how fast the water runs off the land. For the same size watershed, the shorter the T_c, the larger the peak discharge. This means that the peak discharge has an inverse relationship with T_c. T_c can be estimated for small rural watersheds using equation 1. Figure 16 is a nomograph for solving this equation.

$$T_c = \frac{l^{0.8}\left[\frac{(1000)-9}{CN}\right]^{0.7}}{1140\,Y^{0.5}} \qquad \text{[Eq. 1]}$$

where:

T_c = time of concentration, hr
l = flow length, ft
CN = runoff curve number
Y = average watershed slope, %

Figure 16 Time of concentration (T_c) nomograph



Average watershed slope

The average watershed slope (Y) is the slope of the land and not the watercourse. It can be determined from soil survey data or topographic maps. Hillside slopes can be measured with a hand level, lock level, or clinometer in the direction of overland flow. Average watershed slope is an average of individual land slope measurements. The average watershed slope can be determined using equation 2:

$$Y = \frac{100CI}{A} \qquad \text{[Eq. 2]}$$

where:

Y = average slope, %
C = total contour length, ft
I = contour interval, ft
A = drainage area, ft^2

Flow length

Flow length (l) is the longest flow path in the watershed from the watershed divide to the outlet. It is the total path water travels overland and in small channels on the way to the outlet. The flow length can be determined using a map wheel, or it can be marked along the edge of a paper and converted to feet.

I_a/P ratio

The watershed CN is used to determine the initial abstraction (I_a) from table 6. I_a/P ratio is a parameter that indicates how much of the total rainfall is needed to satisfy the initial abstraction. The larger the I_a/P ratio, the lower the unit peak discharge (q_u) for a given T_c.

Table 6 I_a values for runoff curve numbers

Curve number	I_a (in)	Curve number	I_a (in)
40	3.000	70	0.857
41	2.878	71	0.817
42	2.762	72	0.778
43	2.651	73	0.740
44	2.545	74	0.703
45	2.444	75	0.667
46	2.348	76	0.632
47	2.255	77	0.597
48	2.167	78	0.564
49	2.082	79	0.532
50	2.000	80	0.500
51	1.922	81	0.469
52	1.846	82	0.439
53	1.774	83	0.410
54	1.704	84	0.381
55	1.636	85	0.353
56	1.571	86	0.326
57	1.509	87	0.299
58	1.448	88	0.273
59	1.390	89	0.247
60	1.333	90	0.222
61	1.279	91	0.198
62	1.226	92	0.174
63	1.175	93	0.151
64	1.125	94	0.128
65	1.077	95	0.105
66	1.030	96	0.083
67	0.985	97	0.062
68	0.941	98	0.041
69	0.899		

Estimating peak discharge rates

The unit peak discharge (q_u) is obtained from figure 17 depending on the rainfall type. Figure 15 shows the approximate geographic boundaries for the four rainfall distributions. T_c and I_a/P values are needed to obtain a value for q_u from the exhibit. The peak discharge (q_p in ft^3/s) is computed as the product of the unit peak discharge (q_u in ft^3/s/ac-in), the drainage area (A in acres), and the runoff (Q in inches).

$$q_p = q_u \times A \times Q \qquad \text{[Eq. 3]}$$

Example 1 Estimating peak discharge rates

Known:

Drainage area = 50 acres
Cole County, Missouri
Flow Path 'l' = 1,600 feet
Watershed Slope 'Y' = 4 percent
25-year, 24-hour rainfall = 6 inches
Type II rainfall distribution
Runoff Curve Number = 66
(from example in runoff curve number section)

Solution:

Find T_c
Enter figure 16, T_c = 0.60 hours

Find I_a /P
Enter table 6, use CN = 66, I_a = 1.030
I_a /P = 1.030/6.0 inches = 0.172

Find runoff
Enter table 5, at rainfall = 6.0 inches and runoff curve number = 66,
Read runoff = 2.44 inches. (Note: It was necessary to interpolate between RCN 65 and 70.)

Find the peak discharge for spillway design.
Enter figure 17(c):
q_u = 0.7
$q_p = q_u$ x A x Q
q_p = 0.7 x 50 x 2.44 = 85 ft^3/s

Figure 17a Unit peak discharge (q_u) for Type I storm distribution

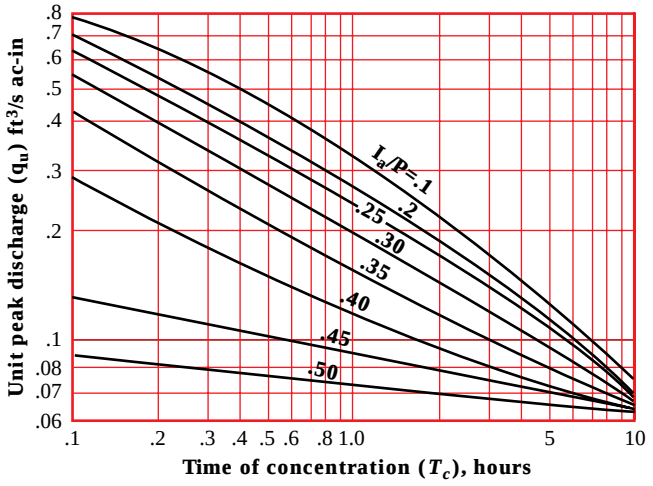


Figure 17b Unit peak discharge (q_u) for Type IA storm distribution

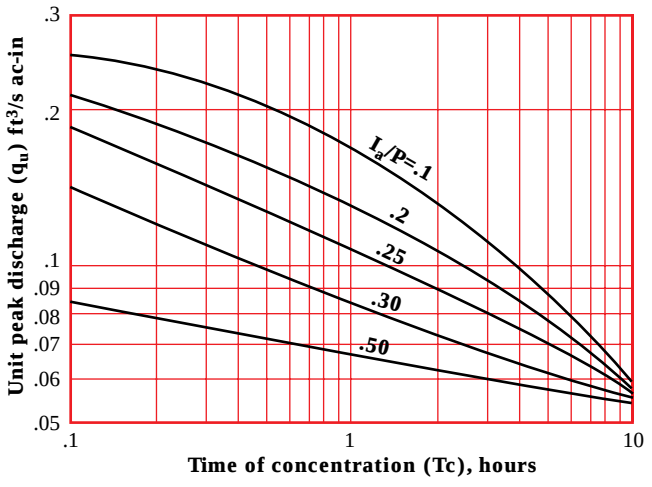


Figure 17c Unit peak discharge (q_u) for Type II storm distribution

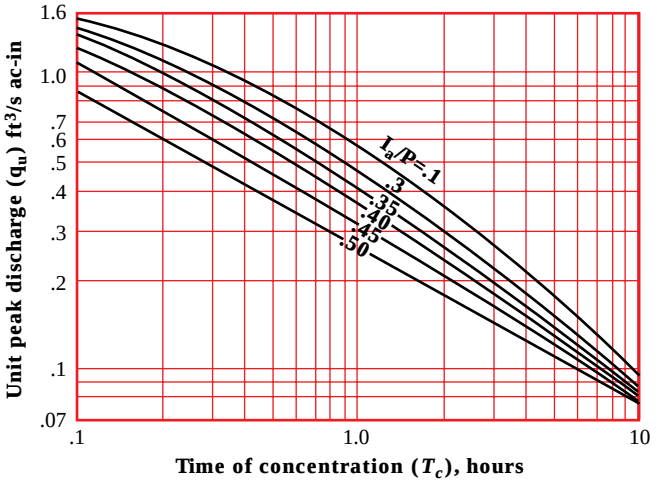
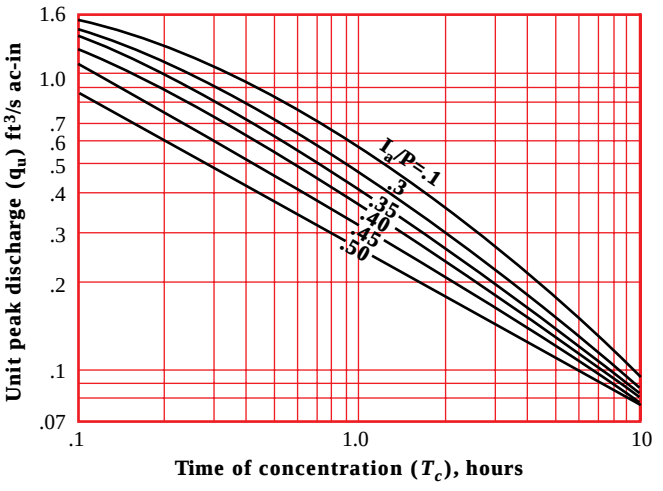


Figure 17d Unit peak discharge (q_u) for Type III storm distribution



Site surveys

Once you determine the probable location of the pond, conduct a site survey to plan and design the dam, spillways, and other features. Those unfamiliar with the use of surveying instruments should employ a licensed surveyor or other qualified professional.

Pond surveys generally consist of a profile of the centerline of the dam, a profile of the centerline of the earth spillway, and enough measurements to estimate pond capacity. A simple method of estimating pond capacity is described on page 12. For larger and more complex ponds, particularly those used for water supply or irrigation, you may need a complete topographic survey of the entire pond site.

Run a line of profile level surveys along the centerline of the proposed dam and up both sides of the valley well above the expected elevation of the top of the dam and well beyond the probable location of the auxiliary spillway. The profile should show the surface elevation at all significant changes in slope and at intervals of no more than 100 feet. This line of levels establishes the height of the dam and the location and elevation of the earth spillway and the principal spillway. It is also used to compute the volume of earthfill needed to build the dam.

Run a similar line of profile levels along the centerline of the auxiliary spillway. Start from a point on the upstream end that is well below the selected normal water surface elevation and continue to a point on the downstream end where water can be safely discharged without damage to the dam. This line serves as a basis for determining the slope and dimensions of the spillway.

All surveys made at a pond site should be tied to a reference called a bench mark. This may be a large spike driven into a tree, an iron rod driven flush with the ground, a point on the concrete headwall of a culvert, or any object that will remain undisturbed during and after construction of the dam.

Embankment ponds

Detailed soils investigation

Soils in the ponded area—Suitability of a pond site depends on the ability of the soils in the reservoir area to hold water. The soil should contain a layer of material that is impervious and thick enough to prevent excessive seepage. Clays and silty clays are excellent for this purpose; sandy and gravelly clays are usually satisfactory. Generally, soils with at least 20 percent passing the No. 200 sieve, a Plasticity Index of more than 10 percent, and an undisturbed thickness of at least 3 feet do not have excessive seepage when the water depth is less than 10 feet. Coarse-textured sands and sand-gravel mixtures are highly pervious and therefore usually unsuitable. The absence of a layer of impervious material over part of the ponded area does not necessarily mean that you must abandon the proposed site. You can treat these parts of the area by one of several methods described later in this handbook. Any of these methods can be expensive.

Some limestone areas are especially hazardous as pond sites. Crevices, sinks, or channels that are not visible from the surface may be in the limestone below the soil mantle. They may empty the pond in a short time. In addition, many soils in these areas are granular. Because the granules do not break down readily in water, the soils remain highly permeable. All the factors that may make a limestone site undesirable are not easily recognized without extensive investigations and laboratory tests. The best clue to the suitability of a site in one of these areas is the degree of success others have had with farm ponds in the immediate vicinity.

Unless you know that the soils are sufficiently impervious and that leakage will not be a problem, you should make soil borings at intervals over the area to be covered with water. Three or four borings per acre may be enough if the soils are uniform. More may be required if there are significant differences.

Foundation conditions—The foundation under a dam must ensure stable support for the structure and provide the necessary resistance to the passage of water.

Soil borings help to investigate thoroughly the foundation conditions under the proposed dam site. The depth of the holes should be at least 1-1/2 times the height of the proposed dam. Ensure there are not any steep dropoffs in the rock surface of the foundation under the dam. Steep dropoffs in the rock surface can result in cracking of the embankment. Study the natural banks (abutments) at the ends of the dam as well as the supporting materials under the dam. If the dam is to be placed on rock, the rock must be examined for thickness and for fissures and seams through which water might pass.

Coarse-textured materials, such as gravel, sand, and gravel-sand mixtures, provide good support for a dam, but are highly pervious and do not hold water. Such materials can be used only if they are sealed to prevent seepage under the dam. You can install a cutoff core trench of impervious material under the dam or blanket the upstream face of the dam and the pond area with a leak-resistant material.

Fine-textured materials, such as silts and clays, are relatively impervious, but have a low degree of stability. They are not good foundation materials, but generally are satisfactory for the size of dams discussed in this handbook. Flattening the side slopes of some dams may be necessary to reduce the unit load on the foundation. Remove peat, muck, and any soil that has a high organic-matter content from the foundation.

Good foundation materials, those that provide both stability and imperviousness, are a mixture of coarse- and fine-textured soils. Some examples are gravel-sand-clay mixtures, gravel-sand-silt mixtures, sand-clay mixtures, and sand-silt mixtures.

Less desirable but still acceptable foundation materials for ordinary pond dams are gravelly clays, sandy clays, silty clays, silty and clayey fine sands, and clayey silts that have slight plasticity.

Fill material—The availability of suitable material for building a dam is a determining factor in selecting a pond site. Enough suitable material should be located close to the site so that placement costs are not excessive. If fill material can be taken from the reservoir area, the surrounding landscape will be left undisturbed and borrow areas will not be visible after the pond has been filled (fig. 18).

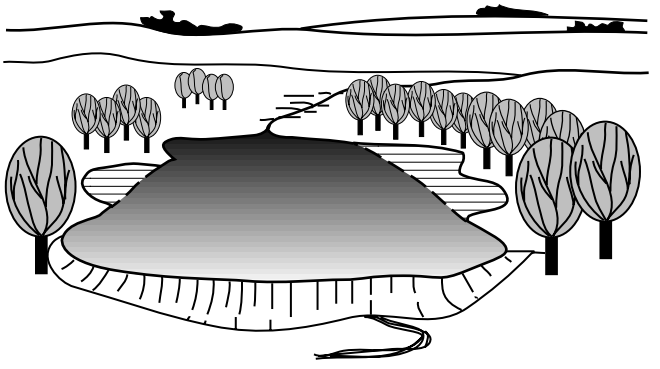
Materials selected must have enough strength for the dam to remain stable and be tight enough, when properly compacted, to prevent excessive or harmful percolation of water through the dam. Soils described as acceptable for foundation material generally are acceptable for fill material. The exceptions are organic silts and clays.

The best material for an earthfill contains particles ranging from small gravel or coarse sand to fine sand and clay in the desired proportions. This material should contain about 20 percent, by weight, clay particles. Though satisfactory earthfills can be built from soils that vary from the ideal, the greater the variance, the more precautions needed.

Soils containing a high percentage of gravel or coarse sand are pervious and can allow rapid seepage through the dam. When using these soils, place a core of clay material in the center of the fill and flatten the side slopes to keep the line of seepage from emerging on the downstream slope.

Fill material that has a high clay content swells when wet and shrinks when dry. The shrinkage may open dangerous cracks. If these soils are dispersive, they represent a serious hazard to the safety of the embankment and should be avoided. Dispersive soils can be identified by how easily they go into suspension in water, by the presence of a gelatinous cloud around a clod of soil in distilled water, and by the indefinite

Figure 18 Borrow material taken from within the reservoir area creates an irregular pond configuration



length of time they stay in suspension in still water. High sodium soils identified in the soil survey for the planned area of the embankment also indicate dispersive soils. If any of these indicators are found at the proposed site, an engineer should be hired to provide the necessary guidance for sampling, testing, and using these soils for fill. For soils consisting mostly of silt, such as the loess areas of western Iowa and along the Mississippi River in Arkansas, Mississippi, and Tennessee, the right degree of moisture must be maintained during construction for thorough compaction.

To estimate the proportion of sand, silt, and clay in a sample of fill material, first obtain a large bottle with straight sides. Take a representative sample of the fill material and remove any gravel by passing the material through a 1/4-inch sieve or screen. Fill the bottle to about one-third with the sample material and finish filling with water. Shake the bottle vigorously for several minutes and then allow the soil material to settle for about 24 hours. The coarse material (sand) settles to the bottom first, and finer material (clay) settles last. Estimate the proportion of sand, silt, and clay by measuring the thickness of the different layers with a ruler.

Landscape planning—The pond should be located and designed to blend with the existing landform, vegetation, water, and structures with minimum disturbance. Landforms can often form the impoundment with minimum excavation. Openings in the vegetation can be used to avoid costly clearing and grubbing. Existing structures, such as stone walls and trails, can be retained to control pedestrian and vehicular traffic and minimize disruption of existing use. In the area where land and water meet, vegetation and landform can provide interesting reflections on the water's surface, guide attention to or from the water, frame the water to emphasize it, and direct passage around the pond.

A pond's apparent size is not always the same as its actual size. For example, the more sky reflected on the water surface, the larger a pond appears. A pond surrounded by trees will appear smaller than a pond the same size without trees or with some shoreline trees (fig. 19). The shape of a pond should complement its surroundings. Irregular shapes with smooth, flowing shorelines generally are more compatible with the patterns and functions found in most landscapes. Peninsulas, inlets, or islands can be constructed to create diversity in the water's edge.

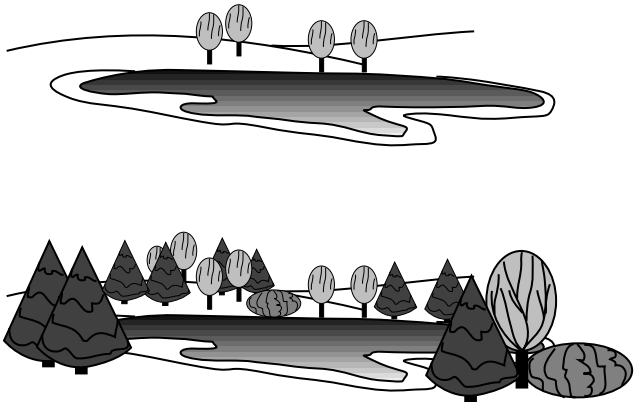
Spillway requirements

A pipe spillway often is used as well as an earth auxiliary spillway to control runoff from the watershed. The principal spillway is designed to reduce the frequency of operation of the auxiliary spillway. Commonly the principal spillway may be a hooded or canopy inlet with a straight pipe or may be a drop inlet (vertical section) that has a pipe barrel through the dam. The pipe shall be capable of withstanding external loading with yielding, buckling, or cracking. The pipe joints and all appurtenances need to be watertight. Pipe materials may be smooth metal, corrugated metal, or plastic. Design limitations exist with all materials.

A small principal spillway pipe, formerly called a trickle tube, only handles a small amount of flow. Its purpose is to aid in keeping the auxiliary spillway dry during the passage of small storm events.

Hooded or canopy inlets are common. A disadvantage of this type inlet is the larger amount of stage (head over the inlet crest) needed to make the pipe flow at full capacity. Conversely, a drop inlet spillway requires less stage because the size of the inlet may be enlarged to make the barrel flow full.

Figure 19 The apparent size of the pond is influenced by surrounding vegetation



The principal spillway normally is sized to control the runoff from a storm ranging from a 1-year to a 10-year frequency event. This depends on the size of the drainage area. For pond sites where the drainage area is small (less than 20 acres) and the condition of the vegetated spillway is good, no principal spillway is required except where the pond is spring fed or there are other sources of steady baseflow. In this case, a trickle tube shall be installed.

Earth spillways have limitations. Use them only where the soils and topography allow the peak flow to discharge safely at a point well downstream and at a velocity that does not cause appreciable erosion either within the spillway or beyond its outlet.

Soil borings generally are required for auxiliary spillways if a natural site with good plant cover is available. If spillway excavation is required, the investigations should be thorough enough to determine whether the soils can withstand reasonable velocities without serious erosion. Avoid loose sands and other highly erodible soils.

No matter how well a dam has been built, it will probably be destroyed during the first severe storm if the capacity of the spillway is inadequate. The function of an auxiliary spillway is to pass excess storm runoff around the dam so that water in the pond does not rise high enough to damage the dam by overtopping. The spillways must also convey the water safely to the outlet channel below without damaging the downstream slope of the dam. The proper functioning of a pond depends on a correctly designed and installed spillway system.

Auxiliary spillways should have the minimum capacity to discharge the peak flow expected from a storm of the frequency and duration shown in table 7 less any reduction creditable to conduit discharge and detention storage. After the spillway capacity requirements are calculated, the permissible velocity must be determined. Table 8 shows the recommended allowable velocity for various cover, degree of erosion resistance, and slope of the channel. Table 9 gives the retardance factors for the expected height of the vegetation.

Both natural and excavated auxiliary spillways are used. A natural spillway does not require excavation to provide enough capacity to conduct the pond outflow to a safe point of release (fig. 20). The requirements discussed later for excavated spillways do not apply to natural spillways, but the capacity must be adequate.

With the required discharge capacity (Q), the end slope of the embankment (Z_1), and the slope of the natural ground (Z_2) known, the maximum depth of water above the level portion (H_p) can be obtained from table 10. The depth is added to the elevation of the spillway crest to determine the maximum elevation to which water will rise in the reservoir.

Table 7 Minimum spillway design storm

Drainage area (acre)	Effective height of dam 1/ (ft)	Storage (acre-ft)	Minimum design storm: Frequency (yr)	Minimum design storm: Minimum duration (hr)
20 or less	20 or less	Less than 50	10	24
20 or less	More than 20	Less than 50	25	24
More than 20	20 or less	Less than 50	25	24
All others			50	24

1/ The effective height of the dam is the difference in elevation between the auxiliary spillway crest and the lowest point in the cross section taken along the centerline of the dam.

Table 8 Permissible velocity for vegetated spillways 1/

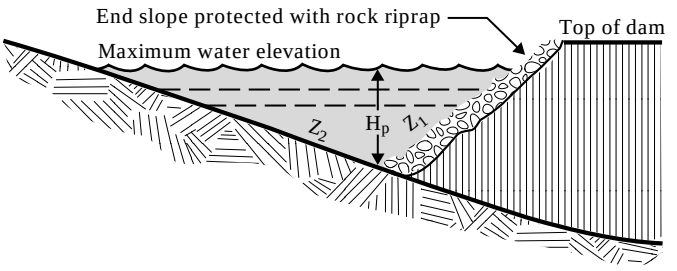
Vegetation	Permissible velocity 2/			
	Erosion-resistant soils 3/		Easily eroded soils 4/	
	Slope of exit channel (%)			
	0-5 (ft/s)	5-10 (ft/s)	0-5 (ft/s)	5-10 (ft/s)
Bermudagrass	8	7	6	5
Bahiagrass	8	7	6	5
Buffalograss	7	6	5	4
Kentucky bluegrass	7	6	5	4
Smooth brome	7	6	5	4
Tall fescue	7	6	5	4
Reed canarygrass	7	6	5	4
Sod-forming grass-legume mixtures	5	4	4	3
Lespedeza sericea	3.5	3.5	2.5	2.5
Weeping lovegrass	3.5	3.5	2.5	2.5
Yellow bluestem	3.5	3.5	2.5	2.5
Native grass mixtures	3.5	3.5	2.5	2.5

1/ SCS TP-61
2/ Increase values 10 percent when the anticipated average use of the spillway is not more frequent than once in 5 years, or 25 percent when the anticipated average use is not more frequent than once in 10 years.
3/ Those with a higher clay content and higher plasticity. Typical soil textures are silty clay, sandy clay, and clay.
4/ Those with a high content of fine sand or silt and lower plasticity, or nonplastic. Typical soil textures are fine sand, silt, sandy loam, and silty loam.

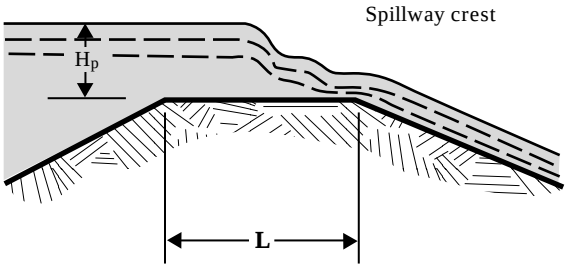
Table 9 Guide to selection of vegetal retardance

Stand	Average height of vegetation (in)	Degree of retardance
Good	Higher than 30	A
	11 to 24	B
	6 to 10	C
	2 to 6	D
	Less than 2	E
Fair	Higher than 30	B
	11 to 24	C
	6 to 10	D
	2 to 6	D
	Less than 2	E

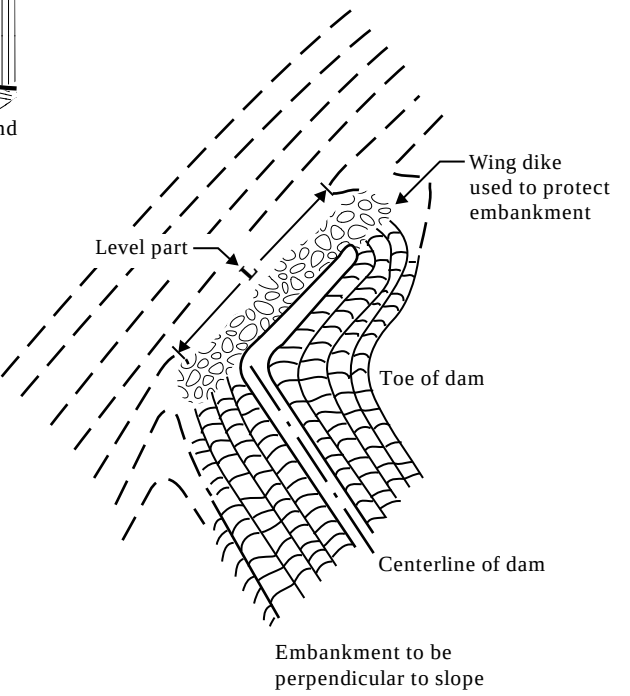
Figure 20 Plan, profile, and cross section of a natural spillway with vegetation



Typical control section



Profile



Plan view

Table 10 H_p discharge and velocities for natural vegetated spillways with 3:1 end slope (Z_1)

Natural ground slope Z_2 (%)	H_p (ft)	Retardance A Q (ft³/s)	A V (ft/s)	B Q (ft³/s)	B V (ft/s)	C Q (ft³/s)	C V (ft/s)	D Q (ft³/s)	D V (ft/s)	E Q (ft³/s)	E V (ft/s)	Slope Min. (%)	Slope Max. (%)
0.5	1.0	19	0.3	28	0.5	47	1.3	68	1.8	130	2.8	0.5	3
	1.1	21	.3	35	.5	76	1.5	108	2.1	154	3.0		
	1.2	29	.4	39	.6	97	1.6	122	2.3	204	3.2		
	1.3	36	.4	53	.6	125	2.0	189	2.5	250	3.4		
	1.5	61	.4	87	1.1	210	2.2	291	2.9	393	3.8		
	1.8	81	.5	187	1.8	384	2.9	454	3.5	651	4.5		
	2.0	110	.5	286	2.1	524	3.3	749	3.8	860	4.8		
1	1.0	10	0.4	16	0.5	31	2.0	45	2.6	64	3.4	1	3
	1.1	13	.4	18	.6	50	2.3	63	2.8	90	3.7		
	1.2	15	.5	21	.8	62	2.5	78	3.1	99	4.0		
	1.3	22	.6	39	1.0	86	2.7	144	3.4	139	4.3		
	1.5	40	.7	75	1.8	133	3.1	186	4.0	218	5.1		
	1.8	56	.8	126	2.3	280	3.8	296	4.5				
	2.0	98	1.1	184	2.8	328	4.3	389	5.0				
	2.5	171	2.5	472	4.1	680	5.4						
2	1.0	6	0.5	9	0.8	18	2.5	27	3.3	36	4.2	1	3
	1.1	7	.7	14	1.0	29	2.8	39	3.6	50	4.5		
	1.2	9	.8	19	1.1	40	3.1	51	3.9	64	4.9		
	1.3	13	.9	26	1.6	50	3.4	70	4.3	85	5.3		
	1.5	21	1.0	39	2.0	70	3.9	109	5.1	127	6.3		
	1.8	26	1.1	74	2.5	126	4.8	194	5.9				
	2.0	52	1.3	111	3.2	190	5.4	229	6.4				
	2.5	88	2.8	238	5.2	339	6.8						
3	1.0	4	0.7	7	0.8	15	2.8	21	3.7	28	4.8	1	3
	1.1	5	.8	10	.9	24	3.2	31	4.0	38	5.2		
	1.2	7	.9	14	1.1	33	3.6	41	4.4	49	5.6		
	1.3	10	1.0	20	1.5	42	3.8	57	4.8	67	6.1		
	1.5	16	1.2	34	2.8	62	4.4	89	5.7	104	7.2		
	1.8	23	1.3	57	3.0	112	5.5	143	6.7				
	2.0	39	1.5	81	3.7	163	6.2	194	7.2				
	2.5	85	3.1	212	6.0	300	7.8						
4	1.2	6	1.0	11	1.4	25	3.9	31	4.8	38	6.1	1	4
	1.5	15	1.3	29	3.1	49	4.8	69	5.5	81	7.9		
	1.8	20	1.4	47	4.1	98	6.1	116	7.3				
	2.0	30	1.6	65	4.7	139	6.7	161	7.8				
	2.5	72	3.3	167	6.6	238	8.5						
5	1.5	13	1.4	23	3.3	38	5.2	55	6.7	63	8.4	1	5
	1.8	17	1.5	37	4.4	76	6.5	95	7.9				
	2.0	23	1.7	48	5.1	112	7.1	130	8.1				
	2.5	64	3.7	149	7.1	191	9.2						

The following example shows how to use table 10:

Given:
Vegetation: good stand of bermudagrass
Height: 6 to 10 inches
Slope of natural ground: 1.0 percent

Solution:
From table 9, determine a retardance of C.

From table 10, under natural ground slope 1 percent and retardance C column, find Q = 88 ft^3/s at H_p = 1.3 ft, and V = 2.7 ft/s.

If the freeboard is 1.0 foot, the top of the dam should be constructed 2.3 feet higher than the spillway crest. The velocity is well below the maximum permissible velocity of 6 feet per second given in table 8. H_p can be determined by interpolation when necessary. For a Q greater than that listed in table 10, the spillway should be excavated according to the information in the next section, Excavated auxiliary spillways.

Excavated auxiliary spillways—Excavated spillways consist of the three elements shown in figure 21. The flow enters the spillway through the inlet channel. The maximum depth of flow (H_p) located upstream from the level part is controlled by the inlet channel, level part, and exit channel.

Excavation of the inlet channel or the exit channel, or both, can be omitted where the natural slopes meet the minimum slope requirements. The direction of slope of the exit channel must be such that discharge does not flow against any part of the dam. Wing dikes, sometimes called kicker levees or training levees, can be used to direct the outflow to a safe point of release downstream.

The spillway should be excavated into the earth for its full depth. If this is not practical, the end of the dam and any earthfill constructed to confine the flow should be protected by vegetation or riprap. The entrance to the inlet channel should be widened so it is at least 50 percent greater than the bottom width of the level part. The inlet channel should be reasonably short and should be planned with smooth, easy curves for alignment. It should have a slope toward the reservoir of not less than 2.0 percent to ensure drainage and low water loss at the inlet.

With the required discharge capacity, the degree of retardance, permissible velocity, and the natural slope of the exit channel known, the bottom width of the level and exit sections and the depth of the flow (H_p) can be computed using the figures in table 11. This table shows discharge per foot of width. The natural slope of the exit channel should be altered as little as possible.

The selection of the degree of retardance for a given auxiliary spillway depends mainly on the height and density of the cover chosen (table 9). Generally, the retardance for uncut grass or vegetation is the one to use for capacity determination. Because protection and retardance are lower during establishment and after mowing, to use a lower degree of retardance when designing for stability may be advisable.

The following examples show the use of the information in table 11:

Example 1 where only one retardance is used for capacity and stability:

Given:
Q = 87 ft^3/s (total design capacity)
So = 4 percent (slope of exit channel determined from profile, or to be excavated)
L = 50 ft

Earth spillway is to be excavated in an erosion-resistant soil and planted with a sod-forming grass-legume mixture. After establishment, a good stand averaging from 6 to 10 inches in height is expected.

Required:
Permissible velocity (V)
Width of spillway (b)
Depth of water in the reservoir above the crest (H_p).

Solution:
From table 8 for sod-forming grass-legume mixtures, read permissible velocity V = 5 ft/s.

From table 9 for average height of vegetation of 6 to 10 inches, determine retardance C.

For retardance C, enter table 11 from left at maximum velocity V = 5 ft/s. A 4 percent slope is in the slope range of 1–6 with Q of 3 ft³/s/ft.

H_p for L of 50 ft = 1.4 ft.

If the freeboard is 1 foot, the spillway should be constructed 29 feet wide and 2.4 feet deep.

For retardance C, enter table 11 from left at maximum velocity V = 5 ft/s. A 4 percent slope is in the slope range of 1–6 with Q of 3 ft³/s/ft.

H_p for L of 50 ft = 1.4 ft.

If the freeboard is 1 foot, the spillway should be constructed 29 feet wide and 2.4 feet deep.

Example 2 where one retardance is used for stability and another is used for capacity:

Given:
So = 4 percent (slope of exit channel determined from profile or to be excavated)
L = 50 ft

Earth spillway is to be excavated in a highly erodible soil and planted with bahiagrass. After establishment a good stand of 11 to 24 inches is expected.

Required:
Permissible velocity (V)
Width of spillway (b)
Depth of water in reservoir above the crest (Hp).

Solution:
From table 8 determine permissible velocity for bahiagrass in a highly erodible soil that has 8 percent slope V = 5 ft/s.

From table 9, select retardants to be used for stability during an establishment period that has a good stand of vegetation of 2 to 6 inches (retardance D).

Select retardance to be used for capacity for good stand of vegetation that has a length of 11 to 24 inches (retardance B).

From table 11, enter from left at maximum velocity V = 5 ft/s. A slope of 6 percent is in the range for Q = 2 ft³/s/ft.

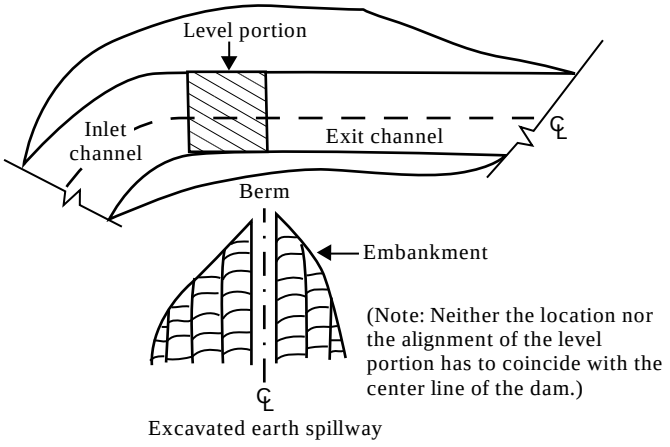
Then

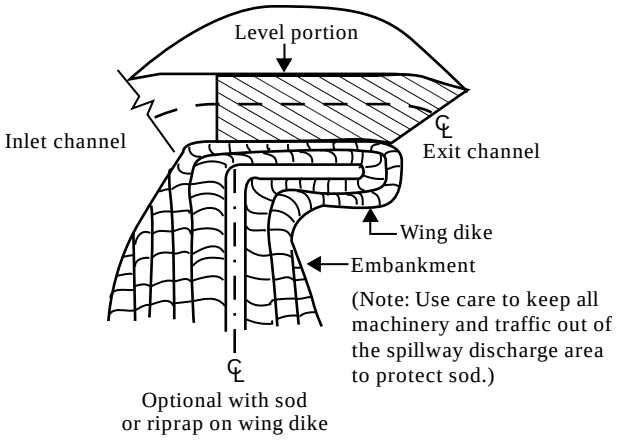
From table 11, enter q = 2 ft³/s/ft under retardance B and find H_p for L of 25 ft = 1.4 ft.

If the freeboard is 1 foot, the spillway should be constructed 50 feet wide and 2.4 feet deep.

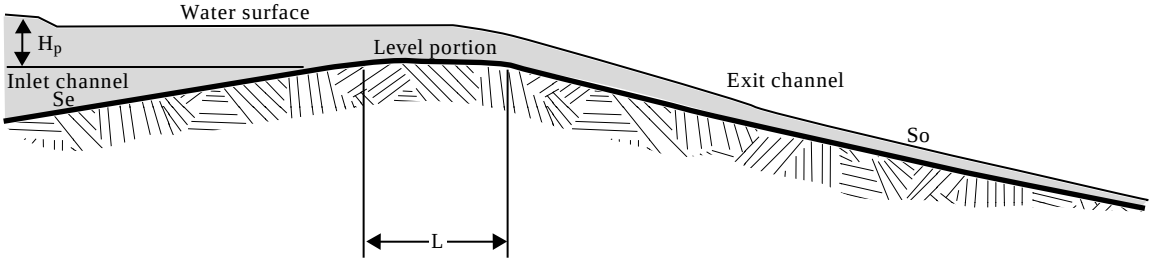
Protection against erosion—Protect auxiliary spillways against erosion by establishing good plant cover if the soil and climate permit. As soon after construction as practicable, prepare the auxiliary spillway area for seeding or sodding by applying fertilizer or manure. Sow adapted perennial grasses and protect the seedlings to establish a good stand. Mulching is necessary on the slopes. Irrigation is often needed to ensure good germination and growth, particularly if seeding must be done during dry periods. If the added cost is justified, sprigging or sodding suitable grasses, such as bermudagrass, gives quick protection.

Figure 21 Excavated earth spillway





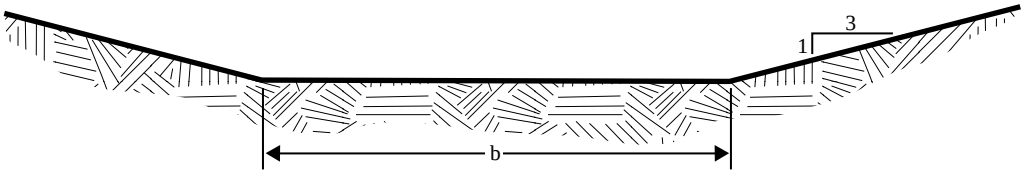
Plan view of earth spillways



Profile along centerline

Definition of terms:

H_p = depth of water in reservoir above crest
L = length of level portion min. 25 ft
b = bottom width of spillway
So = slope for exit channel
Se = slope of inlet channel



Cross section of level portion

Table 11 Depth of flow (H_p) and slope range at retardance values for various discharges, velocities, and crest lengths

	Maximum velocity	Discharge	H_p L 25	50	100	200	Slope Min.	Max.
	(ft/s)	(ft³/s/ft)	(ft)	(ft)	(ft)	(ft)	(%)	(%)
Retardance A	3	3	2.3	2.5	2.7	3.1	1	11
	4	4	2.3	2.5	2.8	3.1	1	12
	4	5	2.5	2.6	2.9	3.2	1	7
	5	6	2.6	2.7	3.0	3.3	1	9
	6	7	2.7	2.8	3.1	3.5	1	12
	7	10	3.0	3.2	3.4	3.8	1	9
	8	12.5	3.3	3.5	3.7	4.1	1	10
Retardance B	2	1	1.2	1.4	1.5	1.8	1	12
	2	1.25	1.3	1.4	1.6	1.9	1	7
	3	1.5	1.3	1.5	1.7	1.9	1	12
	3	2	1.4	1.5	1.7	1.9	1	8
	4	3	1.6	1.7	1.9	2.2	1	9
	5	4	1.8	1.9	2.1	2.4	1	8
	6	5	1.9	2.1	2.3	2.5	1	10
	7	6	2.1	2.2	2.4	2.7	1	11
	8	7	2.2	2.4	2.6	2.9	1	12
Retardance C	2	0.5	0.7	0.8	0.9	1.1	1	6
	2	1	0.9	1.0	1.2	1.3	1	3
	3	1.25	0.9	1.0	1.2	1.3	1	6
	4	1.5	1.0	1.1	1.2	1.4	1	12
	4	2	1.1	1.2	1.4	1.6	1	7
	5	3	1.3	1.4	1.6	1.8	1	6
	6	4	1.5	1.6	1.8	2.0	1	12
	8	5	1.7	1.8	2.0	2.2	1	12
	9	6	1.8	2.0	2.1	2.4	1	12
	9	7	2.0	2.1	2.3	2.5	1	10
	10	7.5	2.1	2.2	2.4	2.6	1	12
Retardance D	2	0.5	0.6	0.7	0.8	0.9	1	6
	3	1	0.8	0.9	1.0	1.1	1	6
	3	1.25	0.8	0.9	1.0	1.2	1	4
	4	1.25	0.8	0.9	1.0	1.2	1	10
	4	2	1.0	1.1	1.3	1.4	1	4
	5	1.5	0.9	1.0	1.2	1.3	1	12
	5	2	1.0	1.2	1.3	1.4	1	9
	5	3	1.2	1.3	1.5	1.7	1	4
	6	2.5	1.1	1.2	1.4	1.5	1	11
	6	3	1.2	1.3	1.5	1.7	1	7
	7	3	1.2	1.3	1.5	1.7	1	12
	7	4	1.4	1.5	1.7	1.9	1	7
	8	4	1.4	1.5	1.7	1.9	1	12
	8	5	1.6	1.7	1.9	2.0	1	8
	10	6	1.8	1.9	2.0	2.2	1	12

Table 11 Depth of flow *(H_p)* and slope range at retardance values for various discharges, velocities, and crest lengths—Continued.

	Maximum velocity	Discharge	H_p L 25	50	100	200	Slope Min.	Max.
	(ft/s)	(ft³/s/ft)	(ft)	(ft)	(ft)	(ft)	(%)	(%)
Retardance E	2	0.5	0.5	0.5	0.6	0.7	1	2
	3	0.5	0.5	0.5	0.6	0.7	1	9
	3	1	0.7	0.7	0.8	0.9	1	3
	4	1	0.7	0.7	0.8	0.9	1	6
	4	1.25	0.7	0.8	0.9	1.0	1	5
	5	1	0.7	0.7	0.8	0.9	1	12
	5	2	0.9	1.0	1.1	1.2	1	4
	6	1.5	0.8	0.9	1.0	1.1	1	12
	6	2	0.9	1.0	1.1	1.2	1	7
	6	3	1.2	1.2	1.3	1.5	1	4
	7	2	0.9	1.0	1.1	1.2	1	12
	7	3	1.2	1.2	1.3	1.5	1	7
	8	3	1.2	1.2	1.3	1.5	1	10
	8	4	1.4	1.4	1.5	1.7	1	6
	10	4	1.4	1.4	1.5	1.7	1	12

Pipes through the dam

Pipe spillways—Protect the vegetation in earth spillway channels against saturation from spring flow or low flows that may continue for several days after a storm. A pipe placed under or through the dam provides this protection. The crest elevation of the entrance should be 12 inches or more below the top of the control section of the auxiliary spillway.

The pipe should be large enough to discharge flow from springs, snowmelt, or seepage. It should also have enough capacity to discharge prolonged surface flow following an intense storm. This rate of flow generally is estimated. If both spring flow and prolonged surface flow can be expected, the pipe should be large enough to discharge both.

Drop inlet and hood inlet pipe spillways are commonly used for ponds.

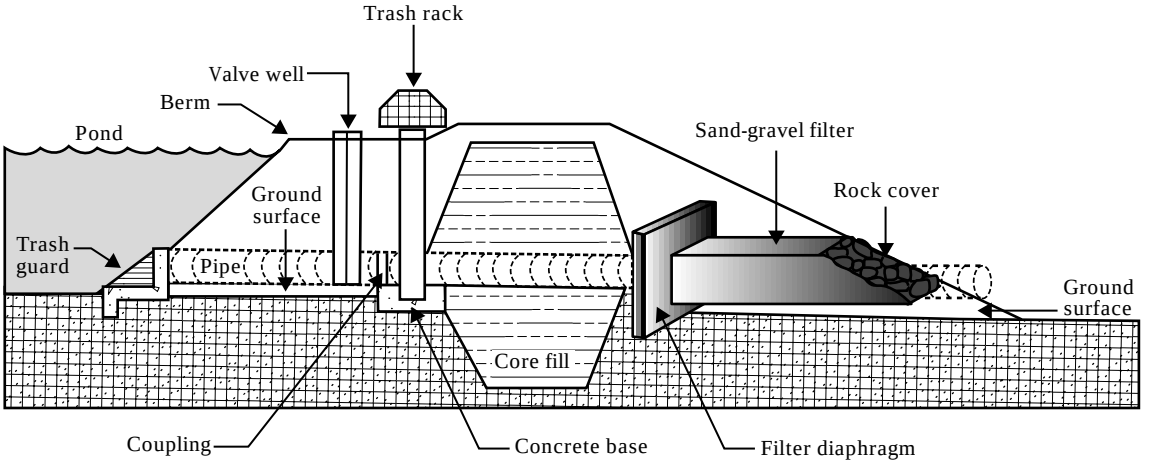
Figure 22 Drop-inlet pipe spillway with antiseep collar

Drop-inlet pipe spillway—A drop-inlet consists of a pipe barrel (fig. 22) located under the dam and a riser connected to the upstream end of the barrel. This riser can also be used to drain the pond if a suitable valve or gate is attached at its upstream end (fig. 23).

With the required discharge capacity determined, use table 12 or 13 to select an adequate pipe size for the barrel and riser. Table 12 is for barrels of **smooth pipe**, and table 13 is for barrels of **corrugated metal** pipe. The diameter of the riser must be somewhat larger than the diameter of the barrel if the tube is to flow full. Recommended combinations of barrel and riser diameters are shown in the tables. In these tables the total head is the vertical distance between a point 1 foot above the riser crest and the centerline of the barrel at its outlet end. Because pipes of small diameter are easily clogged by trash and rodents, no pipe smaller than 6 inches in diameter should be used for the barrel.

Figure 23 Drop-inlet pipe spillways

(a) With sand-gravel filter



(b) With antiseep collar

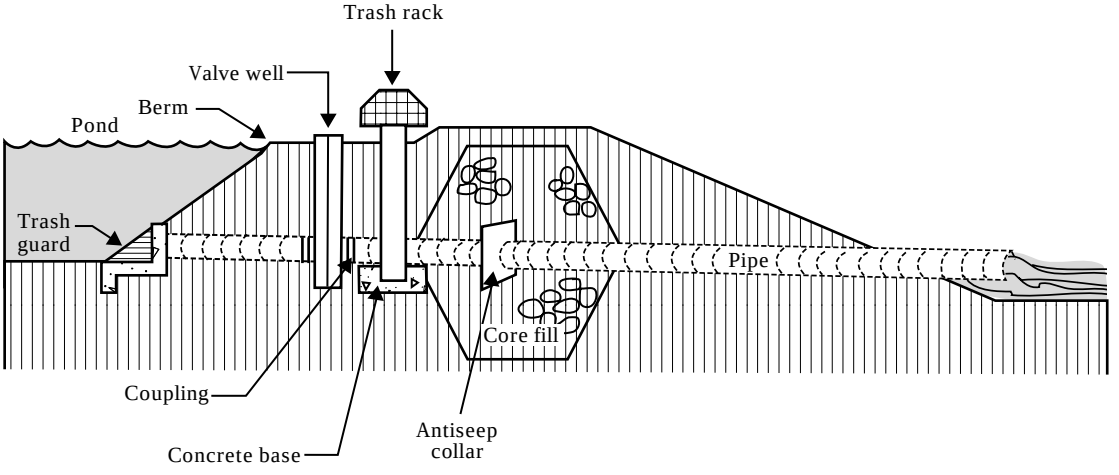


Table 12 Discharge values for **smooth pipe** drop inlets 1/

Total head	Ratio of barrel diameter to riser diameter (in)					
	6:8	8:10	10:12	12:15	15:24	18:36
(ft)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)
6	1.54	3.1	5.3	8.1	13.6	20.6
8	1.66	3.3	5.7	8.9	14.8	22.5
10	1.76	3.5	6.1	9.6	15.8	24.3
12	1.86	3.7	6.5	10.2	16.8	26.1
14	1.94	3.9	6.8	10.7	17.8	27.8
16	2.00	4.0	7.0	11.1	18.6	29.2
18	2.06	4.1	7.2	11.5	19.3	30.4
20	2.10	4.2	7.4	11.8	19.9	31.3
22	2.14	4.3	7.6	12.1	20.5	32.2
24	2.18	4.4	7.8	12.4	21.0	33.0
26	2.21	4.5	8.0	12.6	21.5	33.8

1/ Length of pipe barrel used in calculations is based on a dam with a 12-foot top width and 2.5:1 side slopes. Discharge values are based on a minimum head on the riser crest of 12 inches. Pipe flow based on Manning's n = 0.012.

Table 13 Discharge values for **corrugated metal pipe** drop inlets 1/

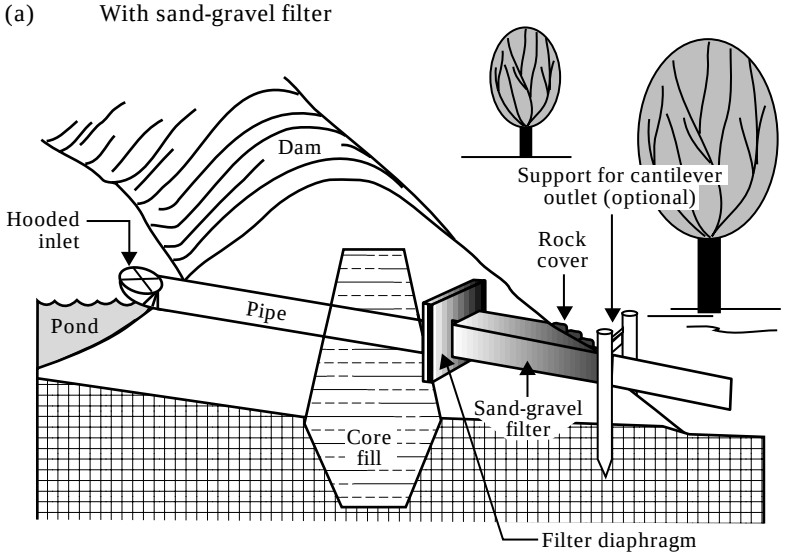
Total head	Ratio of barrel diameter to riser diameter (in)					
	6:8	8:10	10:12	12:15	15:21	18:24
(ft)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)	(ft^3/s)
6	0.85	1.73	3.1	5.1	8.8	14.1
8	0.90	1.85	3.3	5.4	9.4	15.0
10	0.94	1.96	3.5	5.7	9.9	15.9
12	0.98	2.07	3.7	6.0	10.4	16.7
14	1.02	2.15	3.8	6.2	10.8	17.5
16	1.05	2.21	3.9	6.4	11.1	18.1
18	1.07	2.26	4.0	6.6	11.4	18.6
20	1.09	2.30	4.1	6.7	11.7	18.9
22	1.11	2.34	4.2	6.8	11.9	19.3
24	1.12	2.37	4.2	6.9	12.1	19.6
26	1.13	2.40	4.3	7.0	12.3	19.9

1/ Length of pipe barrel used in calculations is based on a dam with a 12-foot top width and 2.5:1 side slopes. Discharge values are based on a minimum head on the riser crest of 12 inches. Pipe flow based on Manning's n = 0.012.

Hood-inlet pipe spillway—A hood-inlet consists of a pipe laid in the earthfill (fig. 24). The inlet end of the pipe is cut at an angle to form a hood. An antivortex device, usually metal, is attached to the entrance of the pipe to increase the hydraulic efficiency of the tube. Typical installations of hood inlets and details of the antivortex device are shown in figure 25. Often a hood-inlet can be built at less cost than a drop-inlet because no riser is needed. The major disadvantage of this kind of pipe spillway is that it cannot be used as a drain.

Figure 24 Dam with hooded inlet pipe spillway

(a) With sand-gravel filter



(b) With antiseep collar

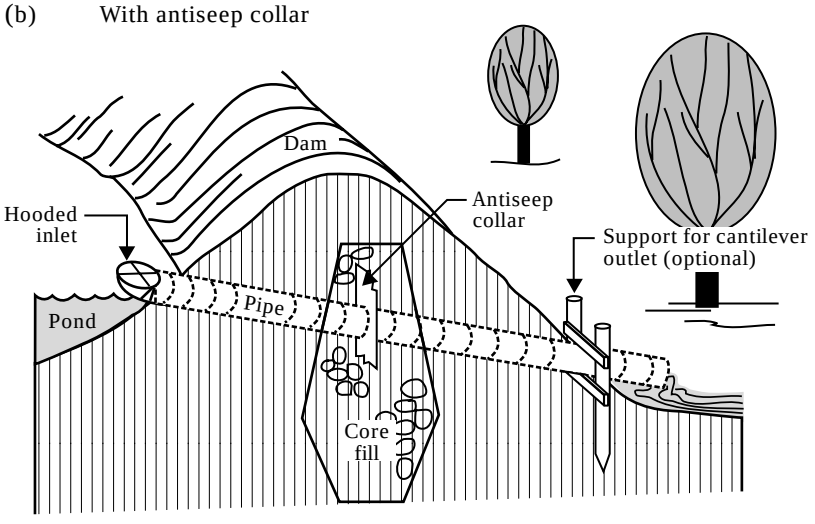
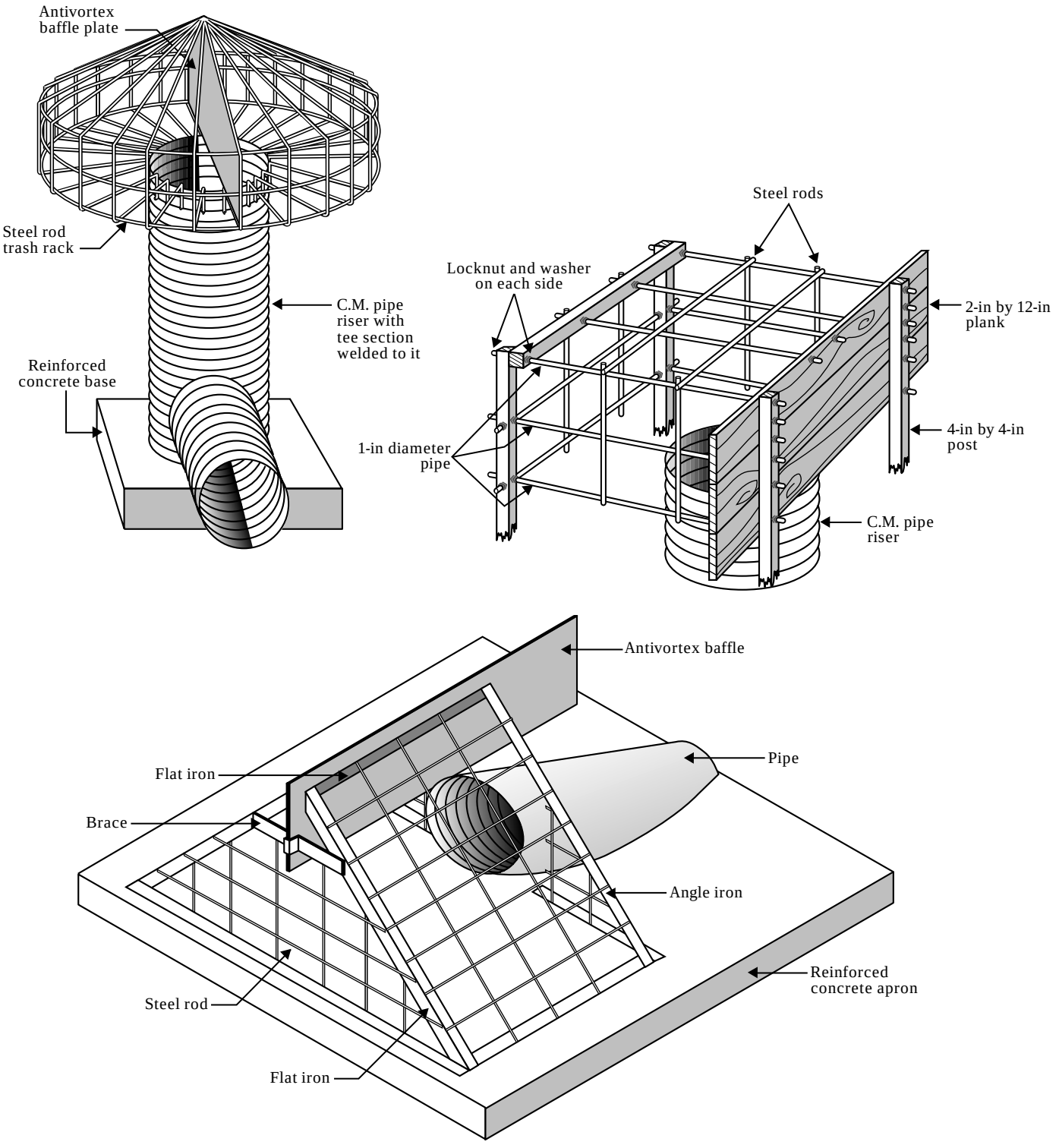


Figure 25 Pipe inlet spillways that have trash rack and antivortex baffle



The required diameter for a hood-inlet pipe can be selected from table 14 or 15 after estimating the discharge capacity, *Q*, and determining the total head, *H*. The tables also show the minimum head, *h*, required above the invert or crest elevation of the pipe entrance. Unless you provide this minimum head, the pipe will not flow full.

Pipe made of cast iron, smooth steel, concrete, plastic, or corrugated metal is suitable for either kind of pipe spillway. All joints must be watertight. A concrete cradle or bedding is needed for concrete pipe to ensure a firm foundation and good alignment of the conduit. Seal the joints of concrete pipe with an approved type of rubber gasket to give them the desired amount of flexibility. For all pipe spillways, use new pipe or pipe so slightly used that it may be considered equivalent to new pipe.

To retard seepage through the embankment along the outside surface of the pipe, compact the fill around the pipe and use a filter and drainage diaphragm around the pipe like that shown in figure 24.

One filter and drainage diaphragm should be used around any structure that extends through the embankment to the downstream slope. The diaphragm should be located downstream of the centerline of a homogeneous embankment or downstream of the cutoff trench. The diaphragm should be a minimum of 3 feet thick and extend around the pipe surface a minimum of 2 times the outside diameter of the pipe ($2D_o$). When a cradle or bedding is used under the pipe, the vertical downward $2D_o$ is measured from the bottom of the cradle or bedding. If bedrock is encountered within the $2D_o$ measurement, the diaphragm should terminate at the bedrock surface. The location

Table 14 Minimum head, *h* (ft), required above the invert of hood inlets to provide full flow, *Q* (ft^3/s), for various sizes of **smooth pipe** and values of total head, *H* 1/

Total head	Diameter of pipe in inches					
(ft)	6	8	10	12	15	18
6	h = 0.63	h = 0.85	h = 1.04	h = 1.23	h = 1.54	h = 1.82
	Q = 1.63	Q = 3.0	Q = 5.3	Q = 8.5	Q = 14.0	Q = 21.2
8	h = 0.65	h = 0.86	h = 1.06	h = 1.27	h = 1.57	h = 1.87
	Q = 1.78	Q = 3.5	Q = 6.0	Q = 9.3	Q = 15.5	Q = 23.3
10	h = 0.66	h = 0.87	h = 1.08	h = 1.30	h = 1.60	h = 1.91
	Q = 1.93	Q = 3.8	Q = 6.6	Q = 10.2	Q = 17.0	Q = 25.4
12	h = 0.67	h = 0.88	h = 1.09	h = 1.32	h = 1.63	h = 1.94
	Q = 2.06	Q = 4.1	Q = 7.1	Q = 10.9	Q = 18.3	Q = 27.5
14	h = 0.67	h = 0.89	h = 1.11	h = 1.33	h = 1.65	h = 1.96
	Q = 2.18	Q = 4.3	Q = 7.5	Q = 11.6	Q = 19.5	Q = 29.4
16	h = 0.68	h = 0.90	h = 1.13	h = 1.35	h = 1.67	h = 1.98
	Q = 2.28	Q = 4.5	Q = 7.8	Q = 12.2	Q = 20.5	Q = 31.0
18	h = 0.69	h = 0.91	h = 1.14	h = 1.36	h = 1.69	h = 2.00
	Q = 2.36	Q = 4.7	Q = 8.1	Q = 12.7	Q = 21.4	Q = 32.5
20	h = 0.69	h = 0.92	h = 1.15	h = 1.37	h = 1.70	h = 2.02
	Q = 2.43	Q = 4.9	Q = 8.4	Q = 13.2	Q = 22.2	Q = 33.9
22	h = 0.70	h = 0.93	h = 1.16	h = 1.38	h = 1.71	h = 2.04
	Q = 2.50	Q = 5.0	Q = 8.7	Q = 13.6	Q = 23.0	Q = 35.1
24	h = 0.70	h = 0.93	h = 1.16	h = 1.39	h = 1.72	h = 2.05
	Q = 2.56	Q = 5.1	Q = 9.0	Q = 14.0	Q = 23.7	Q = 36.3
26	h = 0.71	h = 0.94	h = 1.17	h = 1.40	h = 1.73	h = 2.07
	Q = 2.60	Q = 5.2	Q = 9.3	Q = 14.4	Q = 24.4	Q = 37.5

1/ Length of pipe used in calculations is based on a dam with a 12-foot top width and 2.5:1 side slopes. Pipe flow based on Manning's $n = 0.012$.

of the diaphragm should never result in a minimum soil cover over a portion of the diaphragm measured normal to the nearest embankment surface of less than 2 feet. If this requirement is exceeded, the filter and drainage diaphragm should be moved upstream until the 2-foot minimum is reached. The outlet for the filter and drainage diaphragm should extend around the pipe surface a minimum of 1.5 times the outside diameter of the pipe (1.5*Do*) that has 1 foot around the pipe being a minimum.

In most cases where the embankment core consists of fine-grained materials, such as sandy or gravely silts and sandy or gravely clay (15 to 85 percent passing the No. 200 sieve), an aggregate conforming to ASTM C-33 fine concrete aggregate is suitable for the filter and drainage diaphragm material. A fat clay or elastic silt (more than 85 percent passing No. 200 sieve) core requires special design considerations, and an engineer experienced in filter design should be consulted.

Using a filter and drainage diaphragm has many advantages. Some are as follows:

- They provide positive seepage control along structures that extend through the fill.
- Unlike concrete antiseep collars, they do not require curing time.
- Installation is easy with little opportunity for constructed failure. The construction can consist mostly of excavation and backfilling with the filter material at appropriate locations.

Antiseep collars can be used instead of the filter and drainage diaphragm. Antiseep collars have been used

Table 15 Minimum head, *h* (ft), required above the invert of hood inlets to provide full flow, *Q* (ft^3/s), for various sizes of **corrugated pipe** and values of total head, *H* 1/

Total head (ft)	Diameter of pipe in inches 6	8	10	12	15	18
6	h = 0.59	h = 0.78	h = 0.97	h = 1.17	h = 1.46	h = 1.75
	Q = 0.92	Q = 1.9	Q = 3.3	Q = 5.3	Q = 9.1	Q = 14.5
8	h = 0.59	h = 0.79	h = 0.98	h = 1.18	h = 1.48	h = 1.77
	Q = 1.00	Q = 2.1	Q = 3.6	Q = 5.8	Q = 10.0	Q = 16.0
10	h = 0.60	h = 0.79	h = 0.99	h = 1.19	h = 1.49	h = 1.79
	Q = 1.06	Q = 2.2	Q = 3.9	Q = 6.3	Q = 10.9	Q = 17.3
12	h = 0.60	h = 0.80	h = 1.00	h = 1.20	h = 1.50	h = 1.80
	Q = 1.12	Q = 2.3	Q = 4.2	Q = 6.7	Q = 11.6	Q = 18.5
14	h = 0.61	h = 0.81	h = 1.01	h = 1.21	h = 1.51	h = 1.82
	Q = 1.18	Q = 2.4	Q = 4.4	Q = 7.1	Q = 12.2	Q = 19.6
16	h = 0.61	h = 0.81	h = 1.01	h = 1.21	h = 1.52	h = 1.82
	Q = 1.22	Q = 2.5	Q = 4.6	Q = 7.4	Q = 12.7	Q = 20.5
18	h = 0.61	h = 0.81	h = 1.02	h = 1.22	h = 1.53	h = 1.83
	Q = 1.26	Q = 2.6	Q = 4.8	Q = 7.6	Q = 13.2	Q = 21.3
20	h = 0.62	h = 0.82	h = 1.03	h = 1.23	h = 1.54	h = 1.85
	Q = 1.30	Q = 2.7	Q = 4.9	Q = 7.8	Q = 13.7	Q = 21.9
22	h = 0.62	h = 0.83	h = 1.03	h = 1.24	h = 1.55	h = 1.86
	Q = 1.33	Q = 2.8	Q = 5.0	Q = 8.0	Q = 14.1	Q = 22.5
24	h = 0.63	h = 0.83	h = 1.04	h = 1.25	h = 1.56	h = 1.88
	Q = 1.35	Q = 2.8	Q = 5.1	Q = 8.2	Q = 14.5	Q = 23.0
26	h = 0.63	h = 0.84	h = 1.05	h = 1.26	h = 1.58	h = 1.89
	Q = 1.37	Q = 2.9	Q = 5.2	Q = 8.3	Q = 14.7	Q = 23.4

1/ Length of pipe used in calculations is based on a dam with a 12-foot top width and 2.5:1 side slopes. Pipe flow based on Manning's $n = 0.025$.

with pipe spillways for many years. More fabricated materials are required for this type of installation. Both types of seepage control are acceptable; in either case, proper installation is imperative.

If an antiseep collar is used, it should extend into the fill a minimum of 24 inches perpendicular to the pipe. If the dam is less than 15 feet high, one antiseep collar at the centerline of the fill is enough. For higher dams, use two or more collars equally spaced between the fill centerline and the upstream end of the conduit when a hood-inlet pipe is used. If a drop-inlet pipe is used, the antiseep collars should be equally spaced between the riser and centerline of the fill.

Use trash racks to keep pipes from clogging with trash and debris. Of the many kinds of racks that have been used, the three shown in figure 25 have proved the most successful.

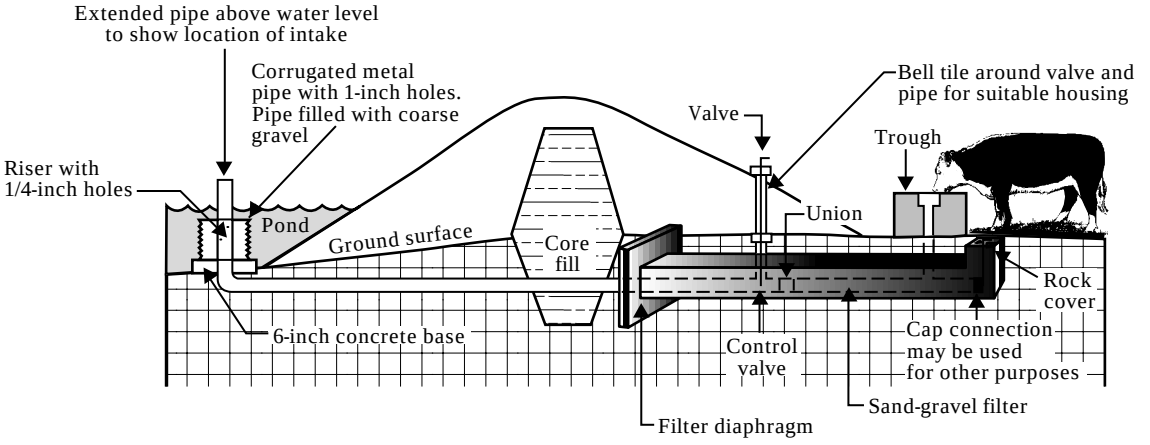
Extend the pipe 6 to 10 feet beyond the downstream toe of the dam to prevent damage by the flow of water from the pipe. For larger pipes, support the extension with a timber brace.

Drainpipes—Some state regulatory agencies require that provision be made for draining ponds completely or for fluctuating the water level to eliminate breeding places for mosquitoes. Whether compulsory or not, provision for draining a pond is desirable and recommended. It permits good pond management for fish production and allows maintenance and repair without cutting the fill or using siphons, pumps, or other devices to remove the water. Install a suitable gate or other control device and extend the drainpipe to the upstream toe of the dam to drain the pond.

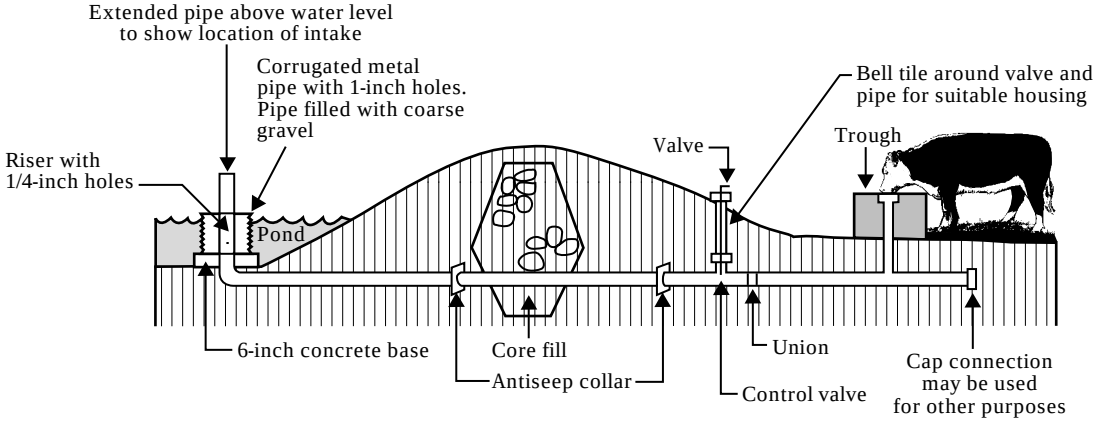
Water-supply pipes—Provide a water-supply pipe that runs through the dam if water is to be used at some point below the dam for supplying a stockwater trough, for irrigation, or for filling an orchard spray tank (fig. 26). This pipe is in addition to the principal spillway. A water-supply pipe should be rigid and have watertight joints, a strainer at its upper end, and a valve at its outlet end. For a small rate of flow, such as that needed to fill stockwater troughs, use steel or plastic pipe that is l-l/2 inches in diameter. For a larger rate of flow, such as that needed for irrigation, use steel, plastic, or concrete pipe of larger diameter. Water-supply pipes also should have watertight joints and antiseep collars or a filter and drainage diaphragm.

Figure 26 Water is piped through the dam's drainpipe to a stockwater trough

(a) Pipe with sand-gravel filter



(b) Pipe with antiseep collars



Planning an earthfill dam

Foundations—You can build a safe earthfill dam on almost any foundation if you thoroughly investigate the foundation and adapt the design and construction to the conditions. Some foundation conditions require expensive construction measures that cannot be justified for small ponds.

The most satisfactory foundation consists of soil underlain at a shallow depth by a thick layer of relatively impervious consolidated clay or sandy clay. If a suitable layer is at or near the surface, no special measures are needed except removing the topsoil and scarifying or disking to provide a bond with the material in the dam.

If the foundation is sand or a sand-gravel mixture and there is no impervious clay layer at a depth that can be reached economically with available excavating equipment, an engineer should design the dam. Although such foundations may be stable, corrective measures are needed to prevent excessive seepage and possible failure. A foundation, consisting of or underlain by a highly plastic clay or unconsolidated material requires careful investigation and design to obtain stability. If the foundation consists of such materials, consult an engineer.

Water impounded on a bedrock foundation seldom gives cause for concern unless the rock contains seams, fissures, or crevices through which water may escape at an excessive rate. Where rock is in the foundation, investigate the nature of the rock carefully.

Cutoffs—If the dam's foundation is overlain by alluvial deposits of pervious sands and gravels at or near the surface and rock or clay at a greater depth, seepage in the pervious stratum must be reduced to prevent possible failure of the dam by piping. To prevent excessive seepage, you need a cutoff to join the impervious stratum in the foundation with the base of the dam.

The most common kind of cutoff is made of compacted clayey material. A trench is excavated along the centerline of the dam deep enough to extend well into the impervious layer (fig. 27). This trench extends into and up the abutments of the dam as far as there is any pervious material that might allow seepage. The bottom of the trench should be no less than 8 feet wide (or the bulldozer blade width, whichever is greater), and the sides no steeper than 1.5:1. Fill the trench with successive thin layers (9-inch maximum) of clay or sandy clay material. Compact each layer thoroughly at near-optimum moisture conditions before placing the next layer. The moisture content is adequate for compaction when the material can be formed into a firm ball that sticks together and remains intact when the hand is vibrated violently and no free water appears.

Top width and alignment—For dams less than 10 feet high, a conservative minimum top width is 6 feet. As the height of the dam increases, increase the top width. The recommended minimum top width for earth embankments of various heights is:

Height of dam (ft)	Minimum top width (ft)
Under 10	6
11 to 14	8
15 to 19	10
20 to 24	12
25 to 34	14

If the top of the embankment is to be used for a roadway, provide for a shoulder on each side of the roadway to prevent raveling. The top width should be at least 16 feet. In some situations a curved dam align-

Figure 27 A core trench is cut on the centerline of a dam

ment is more desirable than a straight alignment. Curvature can be used to retain existing landscape elements, reduce the apparent size of the dam, blend the dam into surrounding natural landforms, and provide a natural-appearing shoreline.

Side slopes—The side slopes of a dam depend primarily on the stability of the fill and on the strength and stability of the foundation material. The more stable the fill material, the steeper the side slopes. Unstable materials require flatter side slopes. Recommended slopes for the upstream and downstream faces of dams built of various materials are shown in table 16.

For stability, the slopes should not be steeper than those shown in table 16, but they can be flatter as long as they provide surface drainage. The side slopes need not be uniform, but can be shaped to blend with the surrounding landforms (fig. 28).

Finish-grading techniques used to achieve a smooth landform transition include slope rounding and slope warping. Slope rounding is used at the top and bottom of cuts or fills and on side slope intersections. Slope warping is used to create variety in the horizontal and vertical pitch of finished slopes (fig. 29). Additional fill can be placed on the backslope and abutments of the dam, if needed, to achieve this landform transition.

Freeboard—Freeboard is the additional height of the dam provided as a safety factor to prevent overtopping by wave action or other causes. It is the vertical distance between the elevation of the water surface in the pond when the spillway is discharging at designed depth and the elevation of the top of the dam after all settlement. If your pond is less than 660 feet long, provide a freeboard of no less than l foot. The minimum freeboard is 1.5 feet for ponds between 660 and 1,320 feet long, and is 2 feet for ponds up to a half mile long. For longer ponds an engineer should determine the freeboard.

Settlement allowance—Settlement or consolidation depends on the character of the materials in both the dam and the foundation and on the construction method. To allow for settlement, build earth dams somewhat higher than the design dimensions. If your dam is adequately compacted in thin layers under good moisture conditions, there is no reason to expect any appreciable settlement in the dam itself, but the foundation may settle. For a compacted fill dam on unyielding foundation, settlement is negligible.

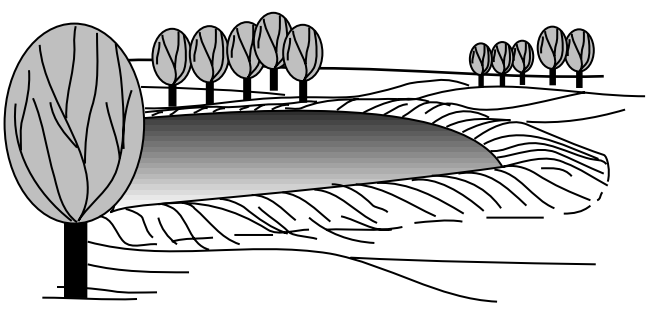
Most foundations are yielding, and settlement may range from l to 6 percent of the height of the dam, mainly during construction. The settlement allowance for a rolled-fill dam should be about 5 percent of the designed dam height. In other words, the dam is built 5 percent higher than the designed height. After settlement, the height of the dam will be adequate. Most pond dams less than 20 feet high, however, are not rolled fill. For these dams the total settlement allowance should be about 10 percent.

Estimating the volume of the earthfiIl—After planning is completed, estimate the number of cubic yards of earthfill required to build the dam. Also estimate excavation yardage in foundation stripping, core trench excavation, and any other significant excavations. This helps predict the cost of the dam

Table 16 Recommended side slopes for earth dams

Fill material	Slope	
	Upstream	Downstream
Clayey sand, clayey gravel, sandy clay, silty sand, silty gravel	3:1	2:1
Silty clay, clayey silt	3:1	3:1

Figure 28 Dam side slopes are curved and shaped to blend with surrounding topography



and serves as a basis for inviting bids and for awarding a construction contract. The estimate of the volume of earthfill should include

- volume in the dam itself including the allowance for settlement,
- volume required to backfill the cutoff trench,
- volume required to backfill stream channels or holes in the foundation area, and
- any other volume of earthfill the contractor is required to move.

Volume estimates for dams generally are made of the required number of cubic yards of earthfill in place. Probably the most efficient method of estimating the volume of earthfill is the sum-of-end-area method. The ground surface elevations at all points along the centerline of the dam where the slope changes significantly are established by the centerline profile. With the settled top elevation of the dam established, you can obtain the settle fill height at each of these points by subtracting the ground surface elevation from the settle top elevation. With the fill heights, side slopes, and top width established, find the end areas at each of these stations along the centerline in table 17.

For example, assume that a dam has slopes of 3:1 on both upstream and downstream sides and a top width of 12 feet. For a point along the centerline where the fill is 15 feet high, the table shows that the end area at that point is 675 plus 180, or 855 square feet. The number of cubic yards of fill between two points on the centerline of the dam is equal to the sum of the end areas at those two points multiplied by the distance between these points and divided by 54. The total volume of earthfill in the dam is the sum of all such segments. A sample volume estimate illustrating the use of the sum-of-end-areas method is shown in table 18.

Figure 29 Finished grading techniques

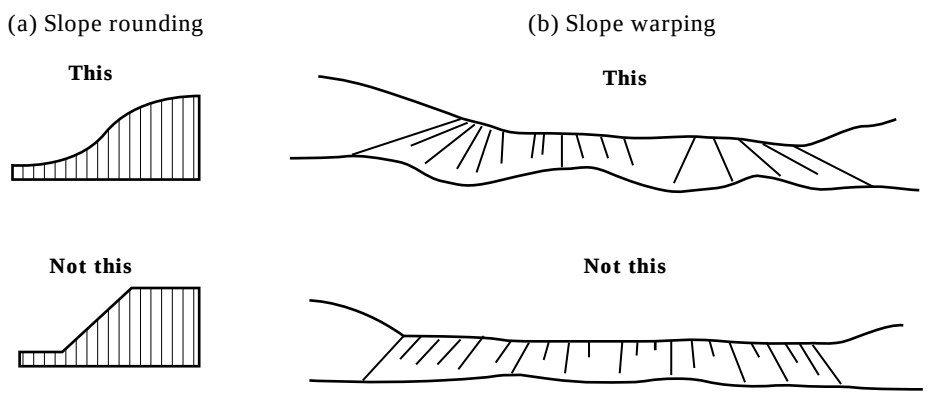


Table 17 End areas in square feet of embankment sections for different side slopes and top widths [1/]

Fill height (ft)	Side slopes: 2.5:1 2.5:1 2:1 3:1	2.5:1 3:1 2:1 3.5:1	3:1 3:1 2.5:1 3.5:1	3.5:1 3.5:1 3:1 4:1	4:1 4:1 3:1 5:1	Top width (ft): 8	10	12	14	16
1.0	3	3	3	4	4	8	10	12	14	16
1.2	4	4	4	5	6	10	12	14	17	19
1.4	5	5	6	7	8	11	14	17	20	22
1.6	6	7	8	9	10	13	16	19	22	26
1.8	8	9	10	11	13	14	18	22	25	29
2.0	10	11	12	14	16	16	20	24	28	32
2.2	12	13	15	17	19	18	22	27	31	35
2.4	14	16	17	20	23	19	24	29	34	39
2.6	17	19	20	24	27	21	26	31	36	42
2.8	20	22	23	27	31	22	28	34	39	45
3.0	22	25	27	32	36	24	30	36	42	48
3.2	26	28	31	36	41	26	32	38	45	51
3.4	29	32	35	40	46	27	34	41	47	55
3.6	32	36	39	45	52	29	36	43	50	58
3.8	36	40	43	50	58	30	38	46	53	61
4.0	40	44	48	56	64	32	40	48	56	64
4.2	44	49	53	62	71	34	42	50	59	67
4.4	48	53	58	68	77	35	44	53	61	71
4.6	53	58	63	74	85	37	46	55	64	74
4.8	57	63	69	81	92	38	48	57	67	77
5.0	62	69	75	87	100	40	50	60	70	80
5.2	67	74	81	94	108	42	52	62	73	83
5.4	73	80	87	102	117	43	54	65	75	87
5.6	78	86	94	110	125	45	56	67	78	90
5.8	84	93	101	118	135	46	58	69	81	93
6.0	90	99	108	126	144	48	60	72	84	96
6.2	96	106	115	135	154	50	62	74	87	99
6.4	102	113	123	143	164	51	64	77	89	103
6.6	109	120	131	152	174	53	66	79	92	106
6.8	116	128	139	162	185	54	68	81	95	109
7.0	123	135	147	172	196	56	70	84	98	112
7.2	130	143	156	182	207	58	72	86	101	115
7.4	138	152	165	193	219	59	74	89	103	119
7.6	145	159	174	203	231	61	76	91	106	122
7.8	153	168	183	214	243	62	78	93	109	125
8.0	160	176	192	224	256	64	80	96	112	128
8.2	169	185	202	235	269	66	82	98	115	131
8.4	177	194	212	247	282	67	84	101	117	135
8.6	186	204	222	259	296	69	86	103	120	138
8.8	194	213	232	271	310	70	88	105	123	141

See footnote at end of table.

Table 17 End areas in square feet of embankment sections for different side slopes and top widths [1/]—Continued.

Fill height (ft)	Side slopes 2.5:1 / 2.5:1 / 2:1 / 3:1	Side slopes 2.5:1 / 3:1 / 2:1 / 3.5:1	Side slopes 3:1 / 3:1 / 2.5:1 / 3.5:1	Side slopes 3.5:1 / 3.5:1 / 3:1 / 4:1	Side slopes 4:1 / 4:1 / 3:1 / 5:1	Top width (ft) 8	Top width (ft) 10	Top width (ft) 12	Top width (ft) 14	Top width (ft) 16
9.0	203	223	243	283	324	72	90	108	126	144
9.2	212	233	254	296	339	74	92	110	129	147
9.4	222	244	266	310	353	75	94	113	131	151
9.6	231	254	277	323	369	77	96	115	134	154
9.8	241	265	289	337	384	78	98	117	137	157
10.0	250	275	300	350	400	80	100	120	140	160
10.2	260	286	313	364	416		102	122	143	163
10.4	271	298	325	379	433		104	125	145	167
10.6	281	309	338	394	449		106	127	148	170
10.8	292	321	350	409	467		108	129	151	173
11.0	302	333	363	424	484		110	132	154	176
11.2	313	344	376	440	502		112	134	157	179
11.4	325	357	390	456	520		114	137	159	183
11.6	336	370	404	472	538		116	139	162	186
11.8	348	383	418	488	557		118	141	165	189
12.0	360	396	432	504	576		120	144	168	192
12.2	372	409	447	522	595		122	146	171	195
12.4	385	424	462	539	615		124	149	173	199
12.6	397	437	477	557	635		126	151	176	202
12.8	410	451	492	574	655		128	153	179	205
13.0	422	465	507	592	676		130	156	182	208
13.2	436	479	523	610	697		132	158	185	211
13.4	449	494	539	629	718		134	161	187	215
13.6	463	509	555	648	740		136	163	190	218
13.8	476	523	571	667	762		138	166	193	221
14.0	490	539	588	686	784		140	168	196	224
14.2	505	555	605	706	807		142	170	199	227
14.4	519	570	622	726	829		144	173	202	230
14.6	534	586	639	746	853		146	175	204	234
14.8	548	602	657	767	876		148	178	207	237
15.0	563	619	675	788	900		150	180	210	240
15.2	578	635	693	809	924		152	182	213	243
15.4	594	653	711	830	949		154	185	216	246
15.6	609	669	730	852	973		156	187	218	250
15.8	625	687	749	874	999		158	190	221	253
16.0	640	704	768	896	1,024		160	192	224	256
16.2	656	722	787	919	1,050			194	227	259
16.4	673	740	807	942	1,076			197	230	262
16.6	689	758	827	965	1,102			199	232	266
16.8	706	776	847	988	1,129			202	235	269
17.0	723	795	867	1,012	1,156			204	238	272

See footnote at end of table.

Table 17 End areas in square feet of embankment sections for different side slopes and top widths 1/—Continued.

Fill height (ft)	Side slopes: 2.5:1 / 2.5:1 / 2:1 / 3:1	2.5:1 / 3:1 / 2:1 / 3.5:1	3:1 / 3:1 / 2.5:1 / 3.5:1	3.5:1 / 3.5:1 / 3:1 / 4:1	4:1 / 4:1 / 3:1 / 5:1	Top width (ft): 8	10	12	14	16
17.2	740	814	888	1,036	1,183			206	241	275
17.4	757	833	909	1,060	1,211			209	244	278
17.6	774	852	930	1,084	1,239			211	246	282
17.8	792	871	951	1,109	1,267			214	249	285
18.0	810	891	972	1,134	1,296			216	252	288
18.2	828	911	994	1,160	1,325			218	255	291
18.4	846	931	1,016	1,186	1,354			221	258	294
18.6	865	951	1,038	1,212	1,384			223	260	298
18.8	884	972	1,060	1,238	1,414			226	263	301
19.0	903	993	1,083	1,264	1,444			228	266	304
19.2	922	1,014	1,106	1,291	1,475			230	269	307
19.4	941	1,035	1,129	1,318	1,505			233	272	310
19.6	960	1,056	1,152	1,345	1,537			235	274	314
19.8	980	1,078	1,176	1,372	1,568			238	277	317
20.0	1,000	1,100	1,200	1,400	1,600			240	280	320
20.2	1,020	1,122	1,224	1,428	1,632			242	283	323
20.4	1,040	1,144	1,248	1,457	1,665			245	286	326
20.6	1,061	1,167	1,273	1,486	1,697			247	288	330
20.8	1,082	1,190	1,298	1,515	1,731			250	291	333
21.0	1,103	1,213	1,323	1,544	1,764			252	294	336
21.2	1,124	1,236	1,348	1,574	1,798			254	297	339
21.4	1,145	1,254	1,374	1,604	1,832			257	300	342
21.6	1,166	1,283	1,400	1,634	1,866			259	302	346
21.8	1,188	1,307	1,426	1,664	1,901			262	305	349
22.0	1,210	1,331	1,452	1,694	1,936			264	308	352
22.2	1,232	1,356	1,479	1,725	1,971			266	311	355
22.4	1,254	1,380	1,506	1,756	2,007			269	314	358
22.6	1,277	1,405	1,533	1,788	2,043			271	316	362
22.8	1,300	1,430	1,560	1,820	2,079			274	319	365
23.0	1,323	1,455	1,587	1,852	2,116			276	322	368

1/ To find the end area for any fill height, add square feet given under staked side slopes to that under the top width for total section. Example: 6.4-foot 3:1 front and back slopes, 14-foot top width —123 plus 89, or 212 square feet for the section. Any combination of slopes that adds to 5, 6, or 7 may be used. A combination of 3.5:1 front and 2.5:1 back gives the same results as 3:1 front and back.

Table 18 Volume of material needed for the earthfill

Station (ft)	Ground elevation (ft)	Fill height 1/ (ft)	End area 2/ (ft^2)	Sum of end areas (ft^2)	Distance (ft)	Double volume (ft^3)
0 + 50	35.0	0	0			
				44	18	792
+ 68	32.7	2.3	44			
				401	32	12,832
1 + 00	25.9	9.1	357			
				1,066	37	39,442
+ 37	21.5	13.5	709			
				1,564	16	25,024
+ 53	20.0	15.0	855			
				1,730	22	38,060
+ 75	19.8	15.2	875			
				1,781	25	44,525
2 + 00	19.5	15.5	906			
				1,730	19	32,870
+ 19	20.3	14.7	824			
				1,648	13	21,424
+ 32	20.3	14.7	824			
				1,805	4	7,220
+ 36	18.8	16.2	981			
				2,030	4	8,120
+ 40	18.2	16.8	1,049			
				2,064	3	6,192
+ 43	18.5	16.5	1,015			
				1,911	3	5,733
+ 46	19.6	15.4	896			
				1,771	13	23,023
+ 59	19.8	15.2	875			
				1,650	41	67,650
3 + 00	20.8	14.2	775			
				1,023	35	35,805
+ 35	27.7	7.3	248			
				324	25	8,100
+ 60	31.6	3.4	76			
				76	36	2,736
3 + 96	35.0	.0	0			
					Total	379,548 3/

1/ Elevation of top of dam without allowance for settlement.
2/ End areas based on 12-foot top width and 3:1 slopes on both sides.
3/ Divide double volume in cubic feet by 54 to obtain volume in cubic yards; for example,

$$\frac{379{,}548}{54} = 7{,}029\ yd^3$$

$$\text{Allowance for settlement (10\%)} = 703\ yd^3$$

$$\text{Total volume} = 7.732\ yd^3.$$

The sample volume estimate of 7,732 cubic yards includes only the volume of earth required to complete the dam itself. Estimate the volume of earth required to backfill the core trench, old stream channels, and other required excavation and add it to the estimate for the dam. Also include an estimate of additional fill to be placed on the backslope and abutments. For example, assume that, in addition to the volume shown in table 18, there is a cutoff trench to be backfilled. The dimensions of the trench are:

Average depth = 4.0 ft
Bottom width = 8.0 ft
Side slopes = 1.5:1
Length = 177 ft

Compute the volume of backfill as follows:

$$\text{End area} = \left[w + \left(z \times d \right) \right] d \qquad \text{[Eq. 4]}$$

$$\text{Volume} = \frac{\left(\text{End area} \times l \right)}{27} \qquad \text{[Eq. 5]}$$

where:
d = average depth
w = bottom width
l = length
z = side slopes

$$\text{End area} = [8 + (1.5 \times 4)]4 = 56 \text{ ft}^2$$

$$\text{Volume} = \frac{56 \times 177}{27} = 367 \text{ yd}^3$$

Add this to the volume required for the dam and the total volume is 7,732 plus 367, or 8,099 cubic yards. This 8,099 cubic yards represents the required compacted volume. To account for shrinkage resulting from compaction, a minimum of 1.5 times this amount is generally necessary to have available in the borrow areas and required excavations. In this example you need a minimum of 12,148 cubic yards available to construct the dam.

Drawings and specifications—Record on the engineering drawings all planning information that would affect the construction of the dam. These drawings should show all elevations and dimensions of the dam, the dimensions and extent of the cutoff trench and other areas requiring backfill, the location and dimensions of the principal spillway and other planned appurtenances, and any other pertinent information. The drawings should also include a list of the estimated quantity and kind of building materials required. The construction and material specifications state the extent and type of work, site specific details, material quality, and requirements for prefabricated materials.

Observe all land disturbance laws by including temporary protective measures during construction to minimize soil erosion and sedimentation.

Unless you have all the necessary equipment, you will need to employ a contractor to build the pond. You may wish to receive bids from several contractors to be sure that you are getting the job done at the lowest possible cost. A set of drawings and specifications shows what is to be done. This provides a basis for contractors to bid on the proposed work, allows fair competition among bidders, and states the conditions under which the work is to be done. The specifications should

- give all the information not shown on the drawings that is necessary to define what is to be done,
- prescribe how the work is to be done if such direction is required,
- specify the quality of material and workmanship required, and
- define the method of measurement and the unit of payment for the various items of work that constitute the whole job.

Construction work of the quality and standards desired will not result unless there is a clear understanding of these requirements between the owner and the contractor. For these reasons specifications should be prepared for all ponds for which the owners award the construction contracts.

Assistance in preparing drawings and specifications is available from your local soil conservation district, NRCS specialists, or private consultants.

Staking for construction

Each job must be adequately and clearly staked before construction is started. Staking transmits the information on the drawings to the job site. This information locates the work and provides the lines, grade, and elevations required for construction in accordance with the drawings. Consider the contractor's wishes in staking so that he can make the most effective use of the stakes. The quality and appearance of the completed job reflect the care used in staking. The staking should be done by an engineer or other qualified person.

The areas to be cleared generally consist of the dam site, the auxiliary spillway site, the borrow area, and the area over which water is to be impounded. Mark each area clearly with an adequate number of stakes. In the pond area, locate the proposed water line with a level and surveying rod. This provides a base line from which clearing limits can be established.

To locate the dam, set stakes along its centerline at intervals of 100 feet or less. (Generally this has been done during the initial planning survey.) Then set the fill and slope stakes upstream and downstream from the centerline stakes to mark the points of intersection of the side slopes with the ground surface and to mark the work area limits of construction. These stakes also establish the height of the dam.

To locate the earth auxiliary spillway, first stake the centerline and then set cut and slope stakes along the lines of intersection of the spillway side slopes with the natural ground surface.

If fill material must be obtained from a borrow area, this area must be clearly marked. Set cut stakes to indicate the depth to which the contractor can excavate to stay within the limits of suitable material, as indicated by soil borings. This allows the borrow area to drain readily and marks the limits of construction.

Set stakes to show the centerline location of the principal spillway after foundation preparation has reached the point at which the stakes will not be disturbed. Locate the pipe where it will rest on a firm foundation. Mark the stakes to show cuts from the top of the stakes to the grade elevation of the pipe. With additional stakes, mark the location of the riser, drainage gate, filter and drainage diaphragm or antiseep collars, outlet structures, and other appurtenances.

Building the pond

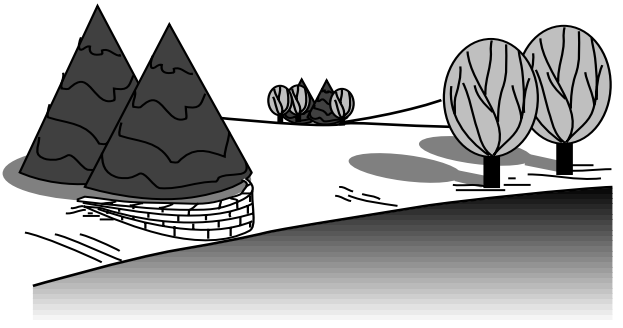
Attention to the details of construction and adherence to the drawings and specifications are as important as adequate investigation and design. Careless and shoddy construction can make an entirely safe and adequate design worthless and cause failure of the dam. Adherence to specifications and prescribed construction methods becomes increasingly important as the size of the structure and the failure hazards increase. Good construction is important regardless of size, and the cost is generally less in the long run than it is for dams built carelessly.

Clearing and grubbing—Clear the foundation area and excavated earth spillway site of trees and brush. In some states this is required by statute. Cut trees and brush as nearly flush with the ground as practicable and remove them and any other debris from the dam site. Should you or your contractor elect to uproot the trees with a bulldozer, you must determine if the tree roots extend into pervious material and if the resultant holes will cause excessive seepage. If so, fill the holes by placing suitable material in layers and compact each layer by compacting or tamping.

All material cleared and grubbed from the pond site, from the earth spillway and borrow areas, and from the site of the dam itself should be disposed of. This can be done by burning, burying under 2 feet of soil, or burying in a disposal area, such as a sanitary landfill.

Minimal clearing conserves site character and minimizes the difficulty and expense of reestablishing vegetation. Confine clearing limits to the immediate construction areas to avoid unnecessary disturbance.

Figure 30 A tree well preserves vegetation



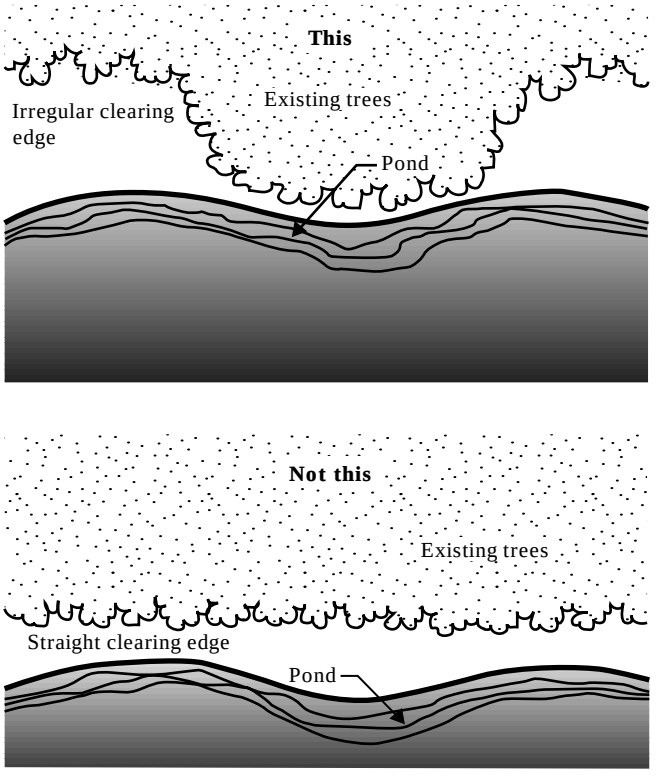
Removing all vegetation within the construction limits is not always necessary. Selected groupings of desirable plants can be kept. Trees and shrubs can often survive a 1- to 2-foot layer of graded fill over their root systems or they can be root-pruned in excavated areas. Tree wells and raised beds can also be used to retain vegetation (fig. 30).

Clearing limits should be irregular to create a natural-appearing edge and open area (fig. 31). Further transition with vegetated surroundings can be accomplished by feathering clearing edges. Density and height of vegetation can be increased progressively from the water's edge to the undisturbed vegetation (fig. 32). Feathering can be accomplished by selective clearing, installation of new plants, or both.

Preparing the foundation—Preparing the foundation includes treating the surface, excavating and backfilling the cutoff trench, and excavating and backfilling existing stream channels. If the foundation has an adequate layer of impervious material at the surface or if it must be blanketed by such a layer, you can eliminate the cutoff trench. Remove sod, boulders, and topsoil from the entire area over which the embankment is to be placed. This operation is best performed by using a tractor-pulled or self-propelled wheeled scraper. The topsoil should be stockpiled temporarily for later use on the site.

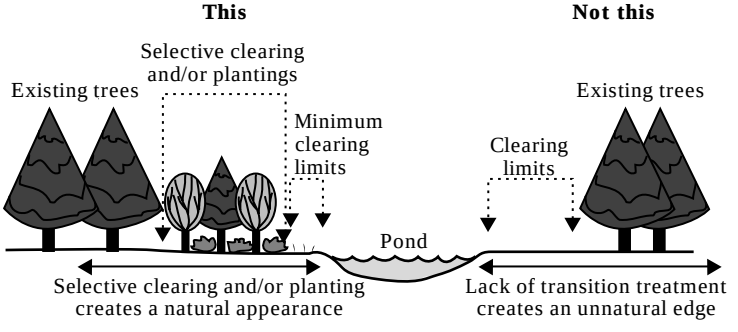
Fill all holes in the foundation area, both natural and those resulting from grubbing operations, with suitable fill material from borrow areas. Use the same method of placement and compaction as used to build the dam. Where necessary use hand or power tampers in areas not readily accessible to other compacting equipment.

Figure 31 Irregular clearing around the pond helps create a natural appearing edge



After filling the holes, thoroughly break the ground surface and turn it to a depth of 6 inches. Roughly level the surface with a disk harrow and then compact it so that the surface materials of the foundation are as well compacted as the subsequent layers of the fill. Dig the cutoff trench to the depth, bottom width, and side slopes shown on the drawings. Often the depths shown on the drawings are only approximate; you

Figure 32 Feathering vegetation at the pond's edge makes a natural transition with existing vegetation



need to inspect the completed trench before backfilling to be sure that it is excavated at least 12 inches into impervious material throughout its entire length.

Material removed from the trench can be placed in the downstream third of the dam and compacted in the same manner as the earthfill if the material is free of boulders, roots, organic matter, and other objectionable material.

A dragline excavator and a tractor-pulled or self-propelled wheeled scraper are the most satisfactory equipment for excavating cutoff trenches. Before backfilling operations are attempted, pump all free water from the cutoff trench. Some material high in clay content takes up more than twice its own weight of water and becomes a soggy mass. Such clay puddled in the cutoff of a dam may require many years to become stable. Also, in drying it contracts and may leave cracks that can produce a roof of the overlying impervious earthfill section and provide passageways for seepage through the dam.

Backfill the cutoff trench to the natural ground surface with suitable fill material from designated borrow areas. Place the backfill material in thin layers and compact it by the same methods used to build the dam.

Deepen, slope back, and widen stream channels that cross the embankment foundation. This is often necessary to remove all stones, gravel, sand, sediment, stumps, roots, organic matter, and any other objectionable material that could interfere with proper bonding of the earthfill with the foundation. Leave side slopes of the excavated channels no steeper than 3:1 when the channels cross the embankment centerline. If the channels are parallel to the centerline, leave the side slopes no steeper than 1:1. Backfill these channels as recommended for the cutoff trench.

Installing the pipe spillway—Install the pipe, riser (if applicable), filter and drainage diaphragm or antiseep collars, trash rack, and other mechanical components of the dam to the lines and grades shown on the drawings and staked at the site. To minimize the danger of cracks or openings at the joints caused by unequal settlement of the foundation, place all pipes and other conduits on a firm foundation.

Install pipes and filter and drainage diaphragm or antiseep collars and tamp the selected backfill material around the entire structure before placing the earthfill for the dam. The same procedure applies to all other pipes or conduits.

Excavating the earth spillway—The completed spillway excavation should conform as closely as possible to the lines, grades, bottom width, and side slopes shown on the drawings and staked at the site. Leave the channel bottom transversely level to prevent meandering and the resultant scour within the channel during periods of low flow. If it becomes necessary to fill low places or depressions in the channel bottom caused by undercutting the established grade, fill them to the established grade by placing suitable material in 8-inch layers and compacting each layer under the same moisture conditions regardless of the placement in or under the embankment.

Building the dam—Clear the dam and spillway area of trees, brush, stumps, boulders, sod, and rubbish. The sod and topsoil can be stockpiled and used later to cover the dam and spillway (fig. 33). This will help when vegetation is established. Get suitable fill material from previously selected borrow areas and from sites of planned excavation. The material should be free of sod, roots, stones more than 6 inches in diameter, and any material that could prevent the desired degree of compaction. Do not use frozen material or place fill material on frozen foundations.

Selected backfill material should be placed in the core trench and around pipes and antiseep collars, when used. The material should be compacted by hand tamping or manually directed power tampers around pipes. Begin placing fill material at the lowest point and bring it up in horizontal layers, longitudinal to the centerline of dam, approximately 6 inches thick. For fill placement around risers, pipes and filter, and drainage diaphragms, the horizontal layers should be approximately 4 inches thick. Do not place fill in standing water. The moisture content is adequate for compaction when the material can be formed into a firm ball that sticks together and remains intact when the hand is vibrated violently and no free water appears. If the material can be formed into a firm ball that sticks together, the moisture content is adequate for compaction. Laboratory tests of the fill material and field testing of the soil for moisture and compaction may be necessary for large ponds or special conditions.

If the material varies in texture and gradation, use the more impervious (clay) material in the core trench, center, and upstream parts of the dam. Construction equipment can be used to compact earthfill in an ordinary pond dam. Equipment that has rubber tires can be routed so each layer is sufficiently covered by tire tracks. For dams over 20 feet high, special equipment, such as sheepsfoot rollers, should be used.

Figure 33 The sod and topsoil in a pond construction area can be stockpiled for later use

Excavated ponds

Excavated ponds are the simplest to build in relatively flat terrain. Because their capacity is obtained almost solely by excavation, their practical size is limited. They are best suited to locations where the demand for water is small. Because excavated ponds can be built to expose a minimum water surface area in proportion to their volume, they are advantageous in places where evaporation losses are high and water is scarce. The ease with which they can be constructed, their compactness, their relative safety from flood-flow damage, and their low maintenance requirements make them popular in many sections of the country.

Two kinds of excavated ponds are possible. One is fed by surface runoff and the other is fed by ground water aquifers, usually layers of sand and gravel. Some ponds may be fed from both of these sources.

The general location of an excavated pond depends largely on the purpose or purposes for which the water is to be used and on other factors discussed previously in this handbook. The specific location is often influenced by topography. Excavated ponds fed by surface runoff can be located in almost any kind of topography. They are, however, most satisfactory and most commonly used in areas of comparatively flat, but well-drained terrain. A pond can be located in a broad natural drainageway or to one side of a drainageway if the runoff can be diverted into the pond. The low point of a natural depression is often a good location. After the pond is filled, excess runoff escapes through regular drainageways.

Excavated ponds fed by ground water aquifers can be located only in areas of flat or nearly flat topography. If possible, they should be located where the permanent water table is within a few feet of the surface.

Soils

If an excavated pond is to be fed by surface runoff, enough impervious soil at the site is essential to avoid excess seepage losses. The most desirable sites are where fine-textured clay and silty clay extend well below the proposed pond depth. Sites where sandy clay extends to adequate depths generally are satisfactory. Avoid sites where the soil is porous or is underlain by strata of coarse-textured sand or sand-gravel mixtures unless you are prepared to bear the expense of an artificial lining. Avoid soil underlain by limestone containing crevices, sinks, or channels.

The performance of nearby ponds that are fed by runoff and in a similar soil is a good indicator of the suitability of a proposed site. Supplement such observations of existing ponds by boring enough test holes at intervals over the proposed pond site to determine accurately the kind of material there. You can get some indication of permeability by filling the test holes with water. The seepage indicates what to expect of a pond excavated in the same kind of material.

If an excavated pond is to be fed from a water-bearing sand or a sand-gravel layer, the layer must be at a depth that can be reached practically and economically by the excavating equipment. This depth seldom exceeds 20 feet. The water-bearing layer must be thick enough and permeable enough to yield water at a rate that satisfies the maximum expected demand for water and overcomes evaporation losses.

Thoroughly investigate sites proposed for aquifer-fed excavated ponds. Bore test holes at intervals over the site to determine the existence and physical characteristics of the water-bearing material. The water level in the test holes indicates the normal water level in the completed pond. The vertical distance between this level and the ground surface determines the volume of overburden or excavation needed that does not contribute to the usable pond capacity, but may increase the construction cost considerably. From an economic standpoint, this vertical distance between water level and ground surface generally should not exceed 6 feet.

Check the rate at which the water rises in the test holes. A rapid rate of rise indicates a high-yielding aquifer. If water is removed from the pond at a rapid rate, as for irrigation, the water can be expected to return to its normal level within a short time after removal has ceased. A slow rate of rise in the test holes indicates a low-yielding aquifer and a slow rate of recovery in the pond. Check the test hole during drier seasons to avoid being misled by a high water table that is only temporary.

Spillway and inlet requirements

If you locate an excavated pond fed by surface runoff on sloping terrain, you can use a part of the excavated material for a small low dam around the lower end and sides of the pond to increase its capacity. You need an auxiliary spillway to pass excess storm runoff around the small dam. Follow the procedures for planning the spillway and provide protection against erosion as discussed in the *Excavating the earth spillway* section.

Ponds excavated in areas of flat terrain generally require constructed spillways. If surface runoff must enter an excavated pond through a channel or ditch rather than through a broad shallow drainageway, the overfall from the ditch bottom to the bottom of the pond can create a serious erosion problem unless the ditch is protected. Scouring can occur in the side slope of the pond and for a considerable distance upstream in the ditch. The resulting sediment tends to reduce the depth and capacity of the pond. Protect the slope by placing one or more lengths of rigid pipe in the ditch and extending them over the side slope of the excavation. The extended part of the pipe or pipes can be cantilevered or supported with timbers. The diameter of the pipes depends on the peak rate of runoff that can be expected from a 10-year frequency storm. If you need more than one pipe inlet, the combined capacity should equal or exceed the estimated peak rate of runoff.

Pipe diameter 1/ (in)	Pond inflow Q (ft^3/s)
15	0 to 6
18	6 to 9
21	9 to 13
24	13 to 18
30	18 to 30
36	30 to 46
42	46 to 67
48	67 to 92
54	92 to 122
60	122 to 157

1/ Based on a free outlet and a minimum pipe slope of 1 percent with the water level 0.5 foot above the top of the pipe at the upstream end.

In areas where a considerable amount of silt is carried by the inflowing water, you should provide a desilting area or filterstrip in the drainageway immediately above the pond to remove the silt before it enters the pond. This area or strip should be as wide as or somewhat wider than the pond and 100 feet or more long. After you prepare a seedbed, fertilize, and seed the area to an appropriate mix of grasses and forbs. As the water flows through the vegetation, the silt settles out and the water entering the pond is relatively silt free.

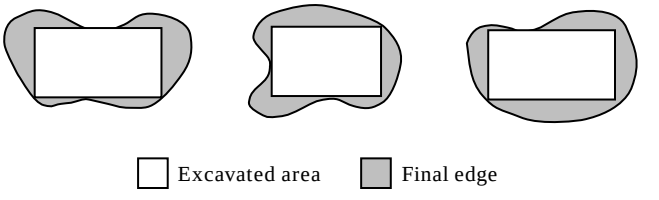
Planning the pond

Although excavated ponds can be built to almost any shape desired, a rectangle is commonly used in relatively flat terrain. The rectangular shape is popular because it is simple to build and can be adapted to all kinds of excavating equipment.

Rectangular ponds should not be constructed, however, where the resulting shape would be in sharp contrast to surrounding topography and landscape patterns. A pond can be excavated in a rectangular form and the edge shaped later with a blade scraper to create an irregular configuration (fig. 34).

The capacity of an excavated pond fed by surface runoff is determined largely by the purpose or purposes for which water is needed and by the amount of inflow that can be expected in a given period. The required capacity of an excavated pond fed by an underground waterbearing layer is difficult to determine because the rate of inflow into the pond can seldom be estimated accurately. For this reason, the pond should be built so that it can be enlarged if the original capacity proves inadequate.

Figure 34 Geometric excavation graded to create more natural configuration



Selecting the dimensions—The dimensions selected for an excavated pond depend on the required capacity. Of the three dimensions of a pond, the most important is depth. All excavated ponds should have a depth equal to or greater than the minimum required for the specific location. If an excavated pond is fed from ground water, it should be deep enough to reach well into the waterbearing material. The maximum depth is generally determined by the kind of material excavated and the type of equipment used.

The type and size of the excavating equipment can limit the width of an excavated pond. For example, if a dragline excavator is used, the length of the boom usually determines the maximum width of excavation that can be made with proper placement of the waste material.

The minimum length of the pond is determined by the required pond capacity.

To prevent sloughing, the side slopes of the pond are generally no steeper than the natural angle of repose of the material being excavated. This angle varies with different soils, but for most ponds the side slopes are 1:1 or flatter (fig. 35).

If the pond is to be used for watering livestock, provide a ramp with a flat slope (4:1 or flatter) for access. Regardless of the intended use of the water, these flat slopes are necessary if certain types of excavating equipment are used. Tractor-pulled wheeled scrapers and bulldozers require a flat slope to move material from the bottom of the excavation.

Estimating the volume—After you have selected the dimensions and side slopes of the pond, estimate the volume of excavation required. This estimate determines the cost of the pond and is a basis for inviting bids and for making payment if the work is to be done by a contractor.

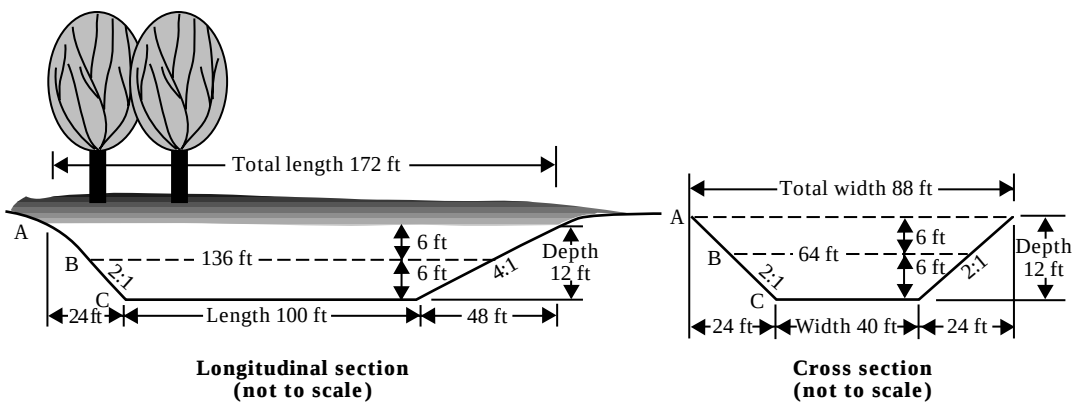
The volume of excavation required can be estimated with enough accuracy by using the prismoidal formula:

$$V = \frac{\left(A + 4B + C\right)}{6} \times \frac{D}{27} \qquad \text{[Eq. 6]}$$

where:

- V = volume of excavation (yd^3)
- A = area of the excavation at the ground surface (ft^2)
- B = area of the excavation at the mid-depth (1/2 D) point (ft^2)
- C = area of the excavation at the bottom of the pond (ft^2)
- D = average depth of the pond (ft^2)
- 27 = factor converting cubic feet to cubic yards

Figure 35 Typical sections of an excavated pond



Longitudinal section (not to scale) **Cross section (not to scale)**

As an example, assume a pond with a depth, *D*, of 12 feet, a bottom width, *W*, of 40 feet, and a bottom length, *L*, of 100 feet as shown in figure 35. The side slope at the ramp end is 4:1, and the remaining slopes are 2:1. The volume of excavation, *V*, is computed as follows:

$$A = 88 \times 172 = 15{,}136$$
$$4B = 4\left(64 \times 136\right) = 34{,}816$$
$$C = 40 \times 100 = 4{,}000$$
$$\left(A + 4B + C\right) = 53{,}952$$

Then

$$V = \frac{53{,}952}{6} \times \frac{12}{27} = 3{,}996 \text{ yd}^3$$

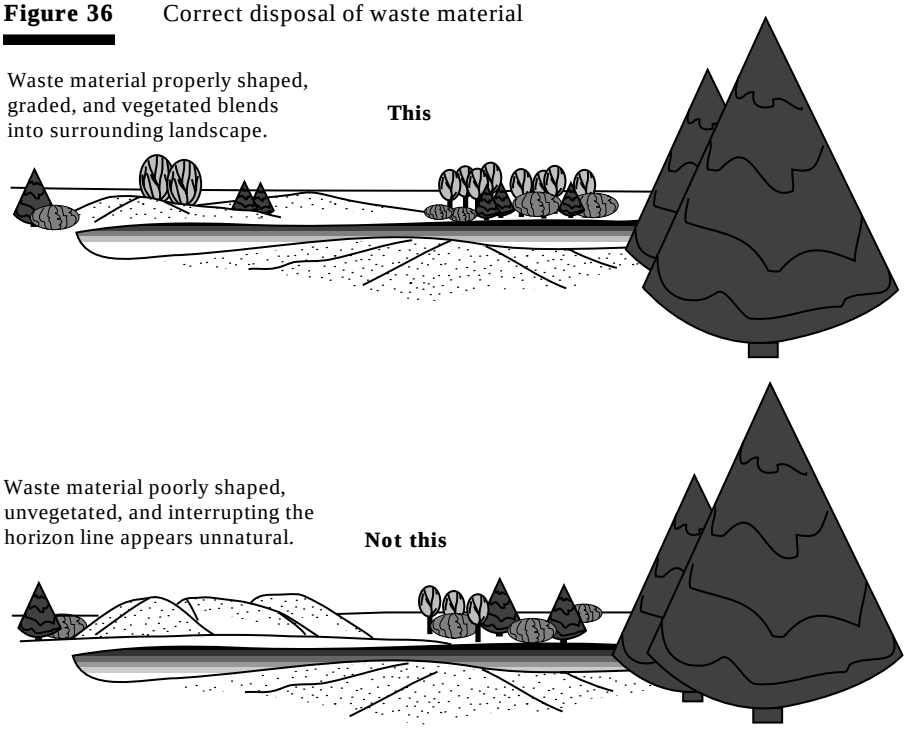
If the normal water level in the pond is at the ground surface, the volume of water that can be stored in the pond is 3,996 cubic yards times 0.00061963, or 2.48 acre-feet. To convert to gallons, 3,996 cubic yards multiplied by 201.97 equals 807,072 gallons. The sample procedure is used to compute the volume of water that can be stored in the pond if the normal water level is below the ground surface. The value assigned to the depth D is the actual depth of the water in the pond rather than depth of excavation.

A summary of methods for estimating the volume of an excavated pond is provided in appendix A. This summary information is reprinted from NRCS (formerly SCS) Landscape Architecture Note No. 2, Landscape Design: Ponds, September 2, 1988.

Waste material—Plan the placement or disposal of the material excavated from the pond in advance of construction operations. Adequate placement prolongs the useful life of the pond, improves its appearance, and facilitates maintenance and establishment of vegetation. The waste material can be stacked, spread, or removed from the site as conditions, nature of the material, and other circumstances warrant.

If you do not remove the waste material from the site, place it so that its weight does not endanger the stability of the side slopes and rainfall does not wash the material back into the pond. If you stack the material, place it with side slopes no steeper than the natural angle of repose of the soil. Do not stack waste material in a geometric mound, but shape and spread it to blend with natural landforms in the area. Because many excavated ponds are in flat terrain, the waste material may be the most conspicuous feature in the landscape. Avoid interrupting the existing horizon line with the top of the waste mound (fig. 36).

Figure 36 Correct disposal of waste material



Waste material can also be located and designed to be functional. It can screen undesirable views, buffer noise and wind, or improve the site's suitability for recreation (fig. 37). In shaping the material, the toe of the fill must be at least 12 feet from the edge of the pond. In the Great Plains you can place the waste material on the windward side of the pond to serve as a snow fence for collecting drifts in the pond. These banks can also reduce evaporation losses by breaking the force of prevailing winds across the pond.

Perhaps the most satisfactory method of handling waste material is to remove it from the site. Complete removal, however, is expensive and can seldom be justified unless the material is needed nearby. Waste material can sometimes be used advantageously for filling nearby low areas in a field or in building farm roads. If state or county highway maintenance crews need such material, you may be able to have them remove it.

Building the pond

Clear the pond area of all undesired vegetation. Mark the outside limits of the proposed excavation with stakes. On the stakes indicate the depth of cut from the ground surface to the pond bottom.

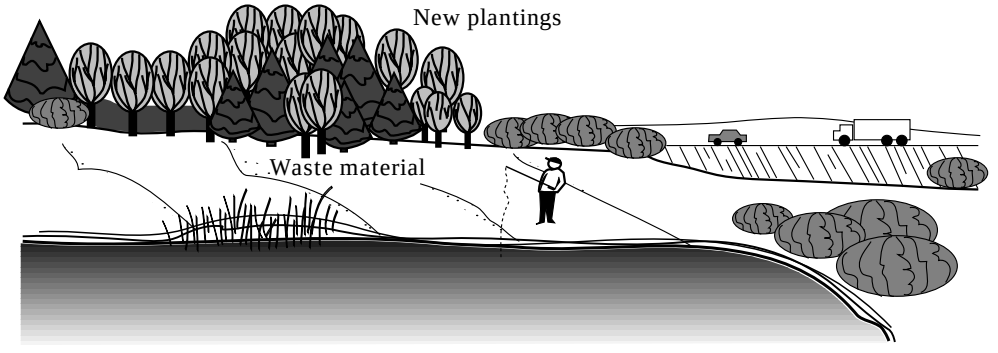
Excavation and placement of the waste material are the principal items of work in building this type pond. The kind of excavating equipment used depends on the climatic and physical conditions at the site and on what equipment is available.

In low-rainfall areas where water is unlikely to accumulate in the excavation, you can use almost any kind of available equipment. Tractor-pulled wheeled scrapers, dragline excavators, and track-type tractors equipped with a bulldozer blade are generally used. Bulldozers can only push the excavated material, not carry it; if the length of push is long, using these machines is expensive.

In high-rainfall areas and in areas where the water table is within the limits of excavation, a dragline excavator is commonly used because it is the only kind of equipment that operates satisfactorily in any appreciable depth of water. For ponds fed by ground water aquifers, a dragline is normally used to excavate the basic pond.

Excavate and place the waste material as close as possible to the lines and grades staked on the site. If you use a dragline excavator, you generally need other kinds of equipment to stack or spread the waste material and shape the edge to an irregular configuration. Bulldozers are most commonly used. Graders, either tractor-pulled or self-propelled, can be used to good advantage, particularly if the waste material is to be shaped.

Figure 37 Waste material and plantings separate the pond from a major highway



Sealing the pond

Excessive seepage in ponds is generally because the site is poor; that is, one where the soils in the impounding area are too permeable to hold water. Selecting a poor site is often the result of inadequate site investigations and could have been avoided. In some places no satisfactory site is available, but the need for water is great enough to justify using a site that is somewhat less than satisfactory. In this case the original pond design must include plans for reducing seepage by sealing (fig. 38). In some places excessive removal of the soil mantle during construction, usually to provide material for the embankment, exposes highly pervious material, such as sand, gravel, or rock containing cracks, crevices, or channels. This can be avoided by carefully selecting the source of embankment material.

To prevent excessive seepage, reduce the permeability of the soils to a point at which losses are insignificant or at least tolerable. The method depends largely on the proportions of coarse-grained sand and gravel and of fine-grained clay and silt in the soil.

Compaction

Some pond areas can be made relatively impervious by compaction alone if the material contains a wide range of particle sizes (small gravel or coarse sand to fine sand) and enough clay (10 percent or more) and silt to effect a seal. This is the least expensive method of those presented in this handbook. Its use, however, is limited to these soil conditions as well as by the depth of water to be impounded.

The procedure is simple. Clear the pond area of all trees and other vegetation. Fill all stump holes, crevices, and similar areas with impervious material. Scarify the soil to a depth of 16 to 18 inches with a disk, rototiller, pulverizer, or similar equipment. Remove all rocks and tree roots. Roll the loosened soil under optimum moisture conditions in a dense, tight layer with four to six passes of a sheepsfoot roller in the same manner as for compacting earth embankments.

Make the compacted seal no less than 12 inches thick where less than 10 feet of water is to be impounded. Because seepage losses vary directly with the depth of water impounded over an area, increase the thickness of the compacted seal proportionately if the depth of

Figure 38 Disking in chemical additive to seal a pond

water impounded exceeds 10 feet or more. The thickness of the compacted seal can be determined using equation 7.

$$d = \frac{k \times H}{\left(v - k\right)} \qquad \text{[Eq. 7]}$$

where:

- d = thickness of compacted seal
- k = coefficient of permeability of compacted seal, which is assumed to be 0.003 fpd unless testing is done
- H = water depth
- v = allowable specific discharge which is assumed to be 0.028 fpd unless otherwise specified

As an example, assume a pond with a depth, H, of 12 feet. No soil samples were taken for laboratory testing. Therefore, use the assumed values for k and v. Calculate the required minimum thickness of the compacted seal. Using the preceding equation:

$$d = \frac{0.003\,fpd \times 12\,ft}{0.028\,fpd - 0.003\,fpd}$$

$$= 1.4 \text{ ft}$$

If soil samples were taken and permeability tests were performed on the material of the compacted seal at the density it is to be placed, a thickness less than what was calculated may be possible. Without knowing whether the soil underlying the compacted layer will act as a filter for the compacted layer, the minimum thickness should never be less than 12 inches.

Compact the soils in two or more layers not exceeding 9 inches uncompacted over the area. Remove and stockpile the top layer or layers while the bottom layer is being compacted.

Clay blankets

Pond areas containing high percentages of coarse-grained soils, but lacking enough clay to prevent excessive seepage, can be sealed by blanketing. Blanket the entire area over which water is to be impounded as well as the upstream slope of the embankment. The blanket should consist of a well-graded material containing at least 20 percent clay. The requirements for good blanket material are about the same as those described for earth embankments. You can usually obtain material for the blanket from a borrow area close enough to the pond to permit hauling at a reasonable cost.

Thickness of the blanket depends on the depth of water to be impounded. The minimum compacted thickness is 12 inches for all depths of water under 10 feet. Increase this thickness by 2 inches for each foot of water over 10 feet and above.

Construction is similar to that for earth embankments. Remove all trees and other vegetation and fill all holes and crevices before hauling earth material from the borrow area to the pond site in tractor-pulled wheeled scrapers or similar equipment. Spread the material uniformly over the area in layers 6 to 8 inches thick. Compact each layer thoroughly, under optimum moisture conditions, by four to six passes of a sheepsfoot roller before placing the next layer.

Protect clay blankets against cracking that results from drying and against rupture caused by freezing and thawing. Spread a cover of gravel 12 to 16 inches thick over the blanket below the anticipated high water level. Use rock riprap or other suitable material to protect areas where the waterflow into the pond is concentrated.

Bentonite

Adding bentonite is another method of reducing excessive seepage in soils containing high percentages of coarse-grained particles and not enough clay. Bentonite is a fine-textured colloidal clay. When wet it absorbs several times its own weight of water and, at complete saturation, swells as much as 8 to 20 times its original volume. Mixed in the correct proportions with well-graded coarse-grained material, thoroughly compacted and then saturated, the particles of bentonite swell until they fill the pores to the point that the mixture is nearly impervious to water. On drying, however, bentonite returns to its original volume leaving cracks. For this reason, sealing with bentonite usually is not recommended for ponds in which the water level is expected to fluctuate widely. A laboratory analysis of the pond area material to determine the rate of application is essential.

Before selecting this method of sealing a pond, locate the nearest satisfactory source of bentonite and investigate the freight rates. If the source is far from the pond site, the cost may prohibit the use of bentonite.

As with other methods, clear the pond area of all vegetation. Fill all holes or crevices, and cover and compact areas of exposed gravel with suitable fill material.

The soil moisture level in the area to be treated is important. Investigate it before applying bentonite. The moisture level should be optimum for good compaction. If the area is too wet, postpone sealing until moisture conditions are satisfactory. If it is too dry, add water by sprinkling.

Spread the bentonite carefully and uniformly over the area to be treated at the rate determined by the laboratory analysis. This rate usually is 1 to 3 pounds per square foot of area. Thoroughly mix the bentonite with the surface soil to a depth that will result in a 6-inch compacted layer. This generally is an uncompacted thickness of approximately 8 to 9 inches. A rototiller is best for this operation, but a disk or similar equipment can be used. Then compact the area with four to six passes of a sheepsfoot roller.

If considerable time elapses between applying the bentonite and filling the pond, protecting the treated area against drying and cracking may be necessary. A mulch of straw or hay pinned to the surface by the final passes of the sheepsfoot roller gives this protection. Use rock riprap or other suitable material to protect areas where water inflow into the treated area is concentrated.

Chemical additives

Because of the structure or arrangement of the clay particles, seepage is often excessive in fine-grained clay soils. If these particles are arranged at random with end-to-plate or end-to-end contacts, they form an open, porous, or honeycomb structure; the soil is said to be aggregated. Applying small amounts of certain chemicals to these porous aggregates may result in collapse of the open structure and rearrangement of the clay particles. This dispersed structure reduces soil permeability. The chemicals used are called dispersing agents.

The soils in the pond area should contain more than 50 percent fine-grained material (silt and clay) and at least 15 percent clay for chemical treatment to be effective. Chemical treatment is not effective in coarse-grained soils.

Although many soluble salts are dispersing agents, sodium polyphosphates and sodium chloride (common salt) are most commonly used. Of the sodium polyphosphates, tetrasodium pyrophosphate and sodium tripolyphosphate are most effective. Soda ash, technical grade 99 to 100 percent sodium carbonate, can also be used. Sodium polyphosphates generally are applied at a rate of 0.05 to 0.10 pound per square foot, and sodium chloride at a rate of 0.20 to 0.33 pound per square foot. Soda ash is applied at a rate of 0.10 to 0.20 pound per square foot. A laboratory analysis of the soil in the pond area is essential to determine which dispersing agent will be most effective and to determine the rate at which it should be applied.

Mix the dispersing agent with the surface soil and then compact it to form a blanket. Thickness of the blanket depends on the depth of water to be impounded. For water less than 10 feet deep, the compacted blanket should be at least 12 inches thick. For greater depths, the thickness should be increased at the rate of 2 inches per foot of water depth from 10 feet and above.

The soil moisture level in the area to be treated should be near the optimum level for good compaction. If the soil is too wet, postpone treatment. Polyphosphates release water from soil, and the material may become too wet to handle. If the soil is too dry, add water by sprinkling.

Clear the area to be treated of all vegetation and trash. Cover rock outcrops and other exposed areas of highly permeable material with 2 to 3 feet of fine-grained material. Thoroughly compact this material. In cavernous limestone areas, the success or failure of the seal may depend on the thickness and compaction of this initial blanket.

Apply the dispersing agent uniformly over the pond area at a rate determined by laboratory analysis. It can be applied with a seeder, drill, fertilizer spreader, or by hand broadcasting. The dispersant should be finely granular, with at least 95 percent passing a No. 30 sieve and less than 5 percent passing a No. 100 sieve.

Thoroughly mix the dispersing agent into each 6-inch layer to be treated. You can use a disk, rototiller, pulverizer, or similar equipment. Operating the mixing equipment in two directions produces best results. Thoroughly compact each chemically treated layer with four to six passes of a sheepsfoot roller.

Protect the treated blanket against puncturing by livestock. Cover the area near the high-water line with a 12- to 18-inch blanket of gravel or other suitable material to protect it against erosion. Use riprap or other suitable material in areas where inflow into the pond is concentrated.

Waterproof linings

Using waterproof linings is another method of reducing excessive seepage in both coarse-grained and fine-grained soils. Polyethylene, vinyl, butyl-rubber membranes, and asphalt-sealed fabric liners are gaining wide acceptance as linings for ponds because they virtually eliminate seepage if properly installed.

Thin films of these materials are structurally weak, but if not broken or punctured they are almost completely watertight. Black polyethylene films are less expensive and have better aging properties than vinyl. Vinyl, on the other hand, is more resistant to impact damage and is readily seamed and patched with a solvent cement. Polyethylene can be joined or patched with a special cement.

All plastic membranes should have a cover of earth or earth and gravel not less than 6 inches thick to protect against punctures. Butyl-rubber membranes need not be covered except in areas traveled by livestock. In these areas a minimum 9-inch cover should be used on all types of flexible membranes. The bottom 3 inches of cover should be no coarser than silty sand.

Clear the pond area of all undesired vegetation. Fill all holes and remove roots, sharp stones, or other objects that might puncture the film. If the material is stony or of very coarse texture, cover it with a cushion layer of fine-textured material before placing the lining.

Some plants may penetrate both vinyl and polyethylene film. If nutgrass, johnsongrass, quackgrass, and other plants having high penetration are present, the subgrade, especially the side slopes, should be sterilized. Several good chemical sterilizers are available commercially. Sterilization is not required for covered butyl-rubber linings 20 to 30 mils thick.

Lay the linings in sections or strips, allowing a 6-inch overlap for seaming. Vinyl and butyl-rubber linings should be smooth, but slack. Polyethylene should have up to 10 percent slack. Be extremely careful to avoid punctures. Anchor the top of the lining by burying it in a trench dug completely around the pond at or above the normal water level. The anchor trench should be 8 to 10 inches deep and about 12 inches wide.

Establishing vegetation

Trees, shrubs, grasses, and forbs should be planted during or soon after construction. Their functions include erosion control, screening, space definition, climate control, and wildlife habitat. The vegetation should be able to survive under prevailing conditions with minimum maintenance. Native varieties are preferred for new plantings.

In many areas the exposed surface of the dam, the auxiliary spillway, and the borrow areas as well as other disturbed surfaces can be protected from erosion by establishing a vegetative community of appropriate species. Prepare a seedbed as soon after construction as practicable. This is generally done by disking or harrowing. Fertilize and seed with mixtures of perennial grasses and forbs appropriate for local soil and climatic conditions. If construction is completed when the soils are too dry for the seeds to germinate, irrigate the soils to ensure prompt germination and continued growth. Mulching with a thin layer of straw, fodder, old hay, asphalt, or one of several commercially manufactured materials may be desirable. Mulching not only protects the newly prepared seedbed, seeds, or small plants from rainfall damage, but also conserves moisture and provides conditions favorable for germination and growth.

Soil bioengineering systems should be employed to establish woody vegetation where appropriate on the shorelines of ponds. The systems best suited to these conditions include live stakes, live fascines, brushmattresses, live siltation, and reed clumps. Additional information about these and other soil bioengineering systems is in Part 650, Engineering Field Handbook, chapters 16 and 18.

Trees and shrubs that remain or those planted along the shoreline will be subject to flooding, wave action, or a high water table. The ability to tolerate such drastic changes varies greatly among species. Flood tolerance and resistance to wave action depend on root density and the ability to regenerate from exposed roots.

A planting plan indicating the species and rate of application of the vegetation can be helpful in achieving the desired results. For information on recommended plants and grass mixtures, rates of fertilization, and mulching procedures, contact the local representatives of the Natural Resources Conservation Service or the county agent.

Protecting the pond

Construction of the pond is not complete until you have provided protection against erosion, wave action, trampling by livestock, and any other source of damage. Ponds without this protection may be short lived, and the cost of maintenance is usually high.

Leave borrow pits in condition to be planted so that the land can be used for grazing or some other purpose. Grade and shape the banks or side slopes of borrow pits to a slope that permits easy mowing, preferably no steeper than 4:1, and allows the graded area to blend with the landscape. It is often desirable to establish vegetation to make the borrow area compatible with undisturbed surroundings.

Grade all areas or pits from which borrow material has been obtained so they are well drained and do not permit stagnant water to accumulate as breeding places for mosquitoes.

Wave action

Several methods are available to protect the upstream face of a dam against wave action. The choice of method depends on whether the normal pool level remains fairly constant or fluctuates. An irrigation pond is an example of the latter. In these ponds, water is withdrawn periodically during the growing season and the water level may fluctuate from normal pool level to near pond bottom one or more times each year. The degree of protection required also influences the choice of method.

Berms—If the water level in the pond is expected to remain fairly constant, a berm 6 to 10 feet wide located at normal pool level generally provides adequate protection against wave action. The berm should have a downward slope of about 6 to 12 inches toward the pond. The slope above the berm should be protected by vegetation.

Booms—Log booms also break up wave action. A boom consists of a single or double line of logs chained or cabled together and anchored to each end of the dam. Tie the logs end to end as close together as practicable. Leave enough slack in the line to allow the boom to adjust to fluctuating water levels. If you use double rows of logs, frame them together to act as a unit. For best results place the boom so that it floats about 6 feet upstream from the face of the dam. If the dam is built on a curve, you may need anchor posts on the face of the dam as well as at the ends to keep the boom from riding on the slope. Booms do not give as much protection as some other methods described, but they are inexpensive if timber is readily available. They generally are satisfactory for small structures.

Riprap—Rock riprap is an effective method of control if a high degree of protection is required or if the water level fluctuates widely. Riprap should extend from the top of the dam down the upstream face to a level at least 3 feet below the lowest anticipated water level. Riprap is dumped directly from trucks or other vehicles or is placed by hand. Hand placing gives more effective protection and requires less stone. Dumping requires more stone, but less labor. The layer of stones should be at least 12 inches thick and must be placed on a bed of gravel or crushed stone at least 10 inches thick. This bed keeps the waves from washing out the underlying embankment material that supports the riprap.

If riprap is not continuous to the upstream toe, provide a berm on the upstream face to support the layer of riprap and to keep it from sliding downslope. If possible, use stones whose color is similar to that in the immediate area. Allow grass and herbs to grow through the riprap to blend with surrounding vegetation, but control woody vegetation.

Livestock

Complete fencing of areas on which embankment ponds are built is recommended if livestock are grazed or fed in adjacent fields. Fencing provides the protection needed to develop and maintain a good plant cover on the dam, the auxiliary spillway, and in other areas. It enhances clean drinking water and eliminates damage or pollution by livestock. If you fence the entire area around the pond and use the pond for watering livestock, install a gravity-fed watering trough just downstream from the dam and outside the fenced area.

Fencing also enables you to establish an environment beneficial to wildlife. The marshy vegetation needed around ponds for satisfactory wildlife food and cover does not tolerate much trampling or grazing.

Not all ponds used for watering livestock need to be fenced. On some western and midwestern ranges, the advantages derived from fencing are more than offset by the increased cost and maintenance and the fact that fewer animals can water at one time. A rancher with many widely scattered ponds and extensive holdings must have simple installations that require minimum upkeep and inspection. Fencing critical parts of livestock watering ponds, particularly the earthfill and the auxiliary spillway, is usually advantageous even if complete fencing is impractical.

Operating and maintaining the pond

A pond, no matter how well planned and built, must be adequately maintained if its intended purposes are to be realized throughout its expected life. Lack of operation and maintenance has caused severe damage to many dams and spillways. Some structures have failed completely. For these reasons you must be fully aware of the need for adequate operation and maintenance, and you should carry out all measures required.

Inspect your pond periodically. Be sure to examine it after heavy rains to determine whether it is functioning properly or needs minor repairs. Repairing damage immediately generally eliminates the need for more costly repairs later. Damage may be small, but if neglected it may increase until repair becomes impractical and the entire structure must be replaced.

Fill any rills on the side slopes of the dam and any washes in the auxiliary spillway immediately with suitable material and compact it thoroughly. Fertilize as needed and reseed or resod these areas. If the upstream face of the earthfill shows signs of serious washing or sloughing because of wave action, install protective devices, such as booms or riprap. If seepage through or under the dam is evident, consult an engineer at once so that you can take proper corrective measures before serious damage occurs.

To maintain the protective plant cover on the dam and on the auxiliary spillway, mow it frequently and fertilize when needed. Mowing prevents the growth of woody plants where undesirable and helps develop a cover and root system more resistant to runoff. If the plant cover is protected by fencing, keep the fences in good repair.

Keep pipes, trash racks, outlet structures, valves, and watering troughs free of trash at all times.

In some localities burrowing animals such as badgers, gophers, beaver, and prairie dogs cause severe damage to dams or spillways. If this damage is not repaired, it may lead to failure of the dam. Using a submerged inlet or locating the inlet in deeper water discourages beavers from the pipe inlets. A heavy layer of sand or gravel on the fill discourages burrowing to some extent. Poultry netting can be used, but in time it rusts out and needs to be replaced.

Keep the water in your pond as clean and unpolluted as possible. Do not permit unnecessary trampling by livestock, particularly hogs. If fencing is not practical, pave the approaches to the pond with small rocks or gravel. Divert drainage from barn lots, feeding yards, bedding grounds, or any other source of contamination away from the pond. Clean water is especially important in ponds used for wildlife, recreation, and water supply.

In areas where surface water encourages mosquito breeding, stock the pond with topfeeding fish. Gambusia minnows are particularly effective in controlling mosquitoes. In malaria areas, do not keep any aquatic growth or shoreline vegetation and take special precautions in planning, building, and operating and maintaining the pond. Most states in malaria areas have health regulations covering these precautions. These regulations should be followed.

In some areas, algae and other forms of plant life may become objectionable. They can cause disagreeable tastes or odors, encourage bacterial development, and produce an unsightly appearance.

Pond safety

Ponds, like any body of water, attract people so that there is always a chance of injury or drowning. You may be planning to build a pond for watering livestock, irrigation, or any of the other purposes discussed in this handbook. However, your family and friends may picnic beside the pond or use it for fishing, swimming, boating, or ice skating, and you can never tell what a small child passing by may do.

Your pond can become a source of pleasure as well as profit, but only if it is safe. You can take some of the following steps to prevent injuries or drownings and to protect yourself financially.

Before construction

Almost all states have laws on impounding water and on the design, construction, and operation and maintenance of ponds. In many states small farm ponds are exempt from any such laws. You should become familiar with those that apply in your state and be sure that you and your engineer comply with them.

Find out what your community or state laws are regarding your liability in case of injury or death resulting from use of your pond, whether you authorize such use or not. This is particularly important if you intend to open your pond to the public and charge a fee for its use. You may find that you need to protect yourself with insurance.

You should decide how the water is going to be used so that you can plan the needed safety measures before construction starts. For example, if the water is to be used for swimming, guards over conduits are required. You may wish to provide for beaches and diving facilities; the latter require a minimum depth of about 10 feet of water.

During construction

Your contractor should take other safety measures during pond construction. Remove all undesirable trees, stumps, and brush and all rubbish, wire, junk machinery, and fences that might be hazardous to boating and swimming. Eliminate sudden dropoffs and deep holes.

After completion

Mark safe swimming areas and place warning signs at all danger points. Place lifesaving devices, such as ring buoys, ropes, planks, or long poles, at swimming areas to facilitate rescue operations should the need arise. Place long planks or ladders at ice skating areas for the same reason.

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Glossary

abutment	A portion of a valley cross section higher in elevation than the valley floor. The slope above the valley floor.
antiseep collar	A constructed barrier installed perpendicular to a pipe or conduit and usually made of the same material as the pipe or conduit. Its purpose is to intercept the flow of seepage along the pipe or conduit and to make the seepage path longer.
appurtenance	Interrelated elements or components of a designed system, or structure.
auxiliary spillway	The spillway designed to convey excess water through, over, or around a dam.
backslope	The downstream slope of an embankment.
bench mark	Point of known elevation for a survey. May be in relation to National Geodetic Vertical Datum (NGVD) or assumed for a given project.
berm	A strip of earth, usually level, in a dam cross section. It may be located in either the upstream side slope, downstream side slope, or both.
boom	A floating barrier extending across a reservoir area, just upstream from the dam, to protect the side slope from erosion.
borrow area	An area from which earthfill materials can be taken to construct the dam.
bottom width	A flat, level cross section element normally in an open channel, spillway, or trench.
coefficient of permeability	The rate of flow of a fluid through a unit cross section of a porous mass under a unit hydraulic gradient.
compaction	The process by which the soil grains are rearranged to decrease void space and bring them into closer contact with one another, thereby increasing the weight of solid material per cubic foot.
conduit (pipe)	Any channel intended for the conveyance of water, whether open or closed.
control section	A part of an open channel spillway where accelerated flow passes through critical depth.
core trench (excavation) of a trench)	The trench in the foundation material under an earth embankment or dam in which special material is placed to reduce seepage.
critical depth	Depth of flow in a channel at which specific energy is a minimum for a given discharge.
cross section	A section formed by a plane cutting an area, usually at right angles to an axis.

dam (earth dam) A constructed barrier, together with any associated spillways and appurtenant works, across a watercourse or natural drainage area, which permanently impounds and stores water, traps sediment, and/or controls flood water.

design elevation The height above a defined datum describing the required elevation of pool that will provide the required temporary storage.

diaphragm See Antiseep collar.

drain An appurtenance installed in the dam and/or its foundation to safely collect and discharge seepage water.

drawings A graphical representation of the planned details of the work of improvements.

drop inlet A vertical entrance joined to a barrel section of a principal spillway system.

earthfill Soil, sand, gravel, or rock construction materials used to build a dam and its components.

effective fill height The difference in elevation in feet between the lowest auxiliary spillway crest and the lowest point in the original cross section on the centerline of the dam. If there is no auxiliary spillway, the top of the dam becomes the upper limit.

embankment A structure of earth, gravel, or similar material raised to form a dam.

excavated pond A reservoir constructed mainly by excavation in flat terrain. A relatively short embankment section on the downstream watercourse side may be necessary for desired storage amount.

exit channel (of an open channel spillway) The portion downstream from the control section that conducts the flow to a point where it may be released without jeopardizing the dam.

fill height The difference in elevation between the existing ground line and the proposed top of dam elevation, including allowance for settlement.

filter and drainage diaphragm A soil piping and water seepage control device installed perpendicular to a pipe or conduit, consisting of a single, or multizones of, aggregate. Its purpose is to intercept the water flow along pipes or conduits and prevent the movement of soil particles that makeup the embankment.

flow depth The depth of water in the auxiliary spillway or any other channel.

foundation The surface upon which a dam is constructed.

freeboard The difference in elevation between the minimum settled elevation of the top of dam and the highest elevation of expected depth of flow through the auxiliary spillway.

hooded or canopy inlet	A fabricated assembly attached to the principal spillway pipe to improve the hydraulic efficiency of the overall pipe system.
inlet section (of an open channel spillway)	The portion upstream from the control section.
mulch	A natural or artificial layer of plant residue or other material, such as grain straw or paper, on the soil surface.
outlet channel	A section of open channel downstream from all works of improvement.
outlet section	The downstream portion of an open channel or of a principal spillway.
peak discharge	The maximum flow rate at which runoff from a drainage area discharges past a specific point.
pond	A still body of water of limited size either naturally or artificially confined and usually smaller than a lake.
pool area	The location for storing water upstream from the dam.
principal spillway	The lowest ungated spillway designed to convey water from the reservoir at predetermined release rates.
profile	A representation of an object or structure seen from the side along its length.
propped outlet	A structural support to protect the outlet section of a pipe principal spillway.
riprap	A loose assemblage of broken stones commonly placed on the earth surface to protect it from the erosive forces of moving water or wave action.
riser	The vertical portion of a drop inlet.
sealing	The process used to close openings in soil materials and prevent seepage of water.
sediment	Solid material, both mineral and organic, that is being transported in suspension, or has been moved from its site of origin by water, air, gravity, or ice and has come to rest on the Earth's surface either above or below the principal spillway crest.
settlement	Movement of an embankment or structure during the application of loads.
side slope (ratio)	The ratio of horizontal to vertical distance measured along the slope, either on an open channel bank or on the face of an embankment, usually expressed in "n":1; e.g., 2:1 (meaning two units horizontal to one unit vertical).
site investigation	Site visit to evaluate physical features of a proposed project or watershed including soils data and characteristics of the watershed.

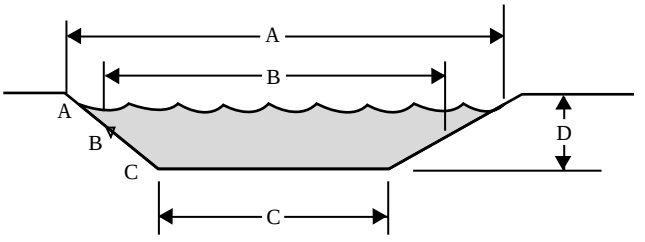
specifications	Detailed statements prescribing standards, materials, dimensions, and workmanship for works of improvement.
specific discharge	The theorical flow rate through the full flow cross sectional area of a porous media.
spillway	An open or closed channel, conduit or drop structure used to convey water from a reservoir. It may contain gates, either manually or automatically controlled, to regulate the discharge of water.
stage	The elevation of a water surface above its minimum plane or datum of reference.
storage volume	The total volume available from the bottom of the reservoir to the top of dam.
temporary storage	The volume from the crest of the principal spillway to the top of dam.
top width	The horizontal dimension (planned or existing) across the top of dam, perpendicular to the centerline.
valley floor	Part of a valley cross section that is level or gently sloping.
vegetative retardance	The amount of hindrance to flow caused by the type, density, and height of vegetation.
visual focus	An element in the landscape upon which the eyes automatically focus because of the element's size, form, color, or texture contrast with its surroundings.

Appendix A

Estimating the Volume of an Excavated Pond

The volume of a pond can be estimated by using the prismoidal formula:

$$V = \frac{(A + 4B + C)}{6} \times \frac{D}{27}$$



V = volume of excavation (yd^3)
A = area of excavation at ground level (ft^2)
B = area of excavation at the middle depth of the pond (ft^2)
C = area of excavation at the bottom of the pond (ft^2)
D = average depth of the pond in (ft)
27 = factor converting cubic feet to cubic yards

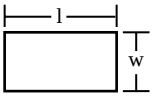
Note: When using meters for area and depth, 27 is not needed. The formula would then be:

$$V = \frac{(A + 4B + C)}{6} \times D$$

where:
V = volume of excavation (m^3)

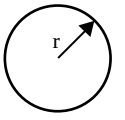
This formula can be used for ponds of any shape. The area of excavation can be determined either by planimetering the shape on the plans or by using geometric formulas for areas. The following formulas give the area of some common shapes.

Rectangle:



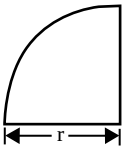
Rectangle A = wl

Circle:



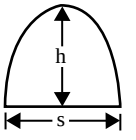
Circle A = πr^2 or $3.14r^2$

Quadrant:



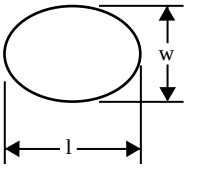
Quadrant A = $\frac{\pi}{4} r\left(r^2 \text{ or } 0.7854r^2\right)$

Parabola:



Parabola A = 0.67 sh

Ellipse:

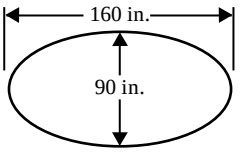


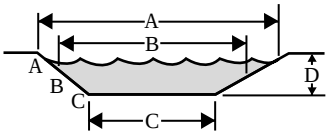
Ellipse A = $\frac{\pi}{4} wl$ or 0.7854 wl

Example A–1 Determing the volume of an elliptical pond

As an example, determine the volume of an elliptical pond with a major axis (*l*) of 160 ft, a minor axis (*w*) of 90 ft at the surface, a depth (*D*) of 8 ft, and 2:1 side slopes. Use the prismoidal formula:

$$V = \frac{(A + 4B + C)}{6} \times \frac{D}{27}$$





Step 1: Calculate the area of the surface (*A*) using the formula,

$$\text{Area} = \frac{(\pi)}{4} wl \text{ for an ellipse}$$

$$A = \frac{3.14}{4}(90 \times 160)$$

$$A = 11,304 \ ft^2$$

Step 2: Determine the dimensions of the bottom (*C*). Since the side slopes are 2:1 and depth is 8 feet, the bottom will be 16 feet narrower than the surface. The bottom dimensions would then be 58 feet (*w*) by 128 feet (*I*).

Step 3: Calculate the area of the bottom (*C*) using

$$C = \frac{3.14}{4}(58 \times 128)$$

$$C = 5,828 \ ft^2$$

Step 4: Determine the dimensions of the middle depth (*B*). Since the middle depth lies equally between the surface and the bottom, the dimensions can be determined by adding the surface and bottom dimensions together and dividing by 2.

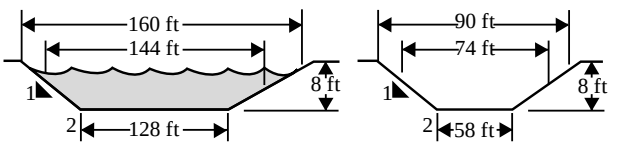
$$\frac{160 + 128}{2} = 144 \text{ (major axis)}$$

$$\frac{90 + 58}{2} = 74 \text{ (minor axis)}$$

Step 5: Calculate the area of the middle depth (*B*) using Area = (pi) *wl*.

$$B = \frac{3.14}{4}(74 \times 144)$$

$$B = 8,365 \ ft^2$$



Step 6: Determine the volume in cubic yards.

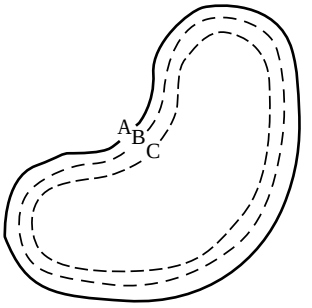
$$V = \frac{[11,304 + (4 \times 8,365) + 5,828]}{6} \times \frac{8}{27}$$

$$V = \frac{50,592}{6} \times \frac{8}{27}$$

$$V = 2,498 \text{ or approx. } 2,500 \ yd^3$$

Example A–2 Determining area of the surface, the middle depth, and bottom

The area of the surface, the middle depth, and bottom can also be determined by using a planimeter. In this example, the pond was drawn at a 1 inch = 40 feet scale and has a depth of 8 feet.



Scale: 1 inch = 40 feet

Step 1: Measure the surface area (*A*) using a planimeter. Convert the measurement from square inches into square feet. (A factor of 1,600 is used to convert square inches into square feet for a scale of 1 inch = 40 feet.)

$$A = 10.0\ in^2 \times 1,600 = 16,000\ ft^2$$

Step 2: Measure the middle depth (*B*) area and convert to square feet.

$$B = 7.7\ in^2 \times 1,600 = 12,320\ ft^2$$

Step 3: Measure the bottom (*C*) and convert to square feet.

$$C = 5.5\ in^2 \times 1,600 = 8,800\ ft^2$$

Step 4: Use the prismoidal formula to estimate volume of excavation in cubic yards.

$$V = \frac{(A + 4B + C)}{6} \times \frac{8}{27}$$

$$V = \frac{[16,000 + (4 \times 12,320) + 8,800]}{6} \times \frac{8}{27}$$

$$V = \frac{74,080}{6} \times \frac{8}{27}$$

$$V = 3,658\ yd^3$$

Appendix B

Flood-Tolerant Native Trees and Shrubs

Flooding creates several conditions that are unfavorable to most woody species. The most critical condition appears to be the depletion of soil oxygen that is critical to plants. The lack of oxygen favors anaerobic bacteria, which can lead to the development of toxic organic and inorganic byproducts. A plant's ability to survive flooding is dependent on many factors; among them are flood depth, flood duration, flood timing, plant age and size, wave action, and substrata composition.

The plant lists in tables B–1 through B–4 were taken from the Corps of Engineers Technical Report E-79-2, Flood Tolerance of Plants: A State-of-the-Art Review. The ratings used are intended only to be a relative classification. Tolerance will vary with local conditions. The plants are divided into four groups: very tolerant, tolerant, somewhat tolerant, and intolerant. Each plant was also given a range coinciding with the plant growth regions, figure B–1, developed from USDA Miscellaneous Publication 303, Native Woody Plants of the United States, by William R. Van Dersal.

Figure B–1 Plant growth regions

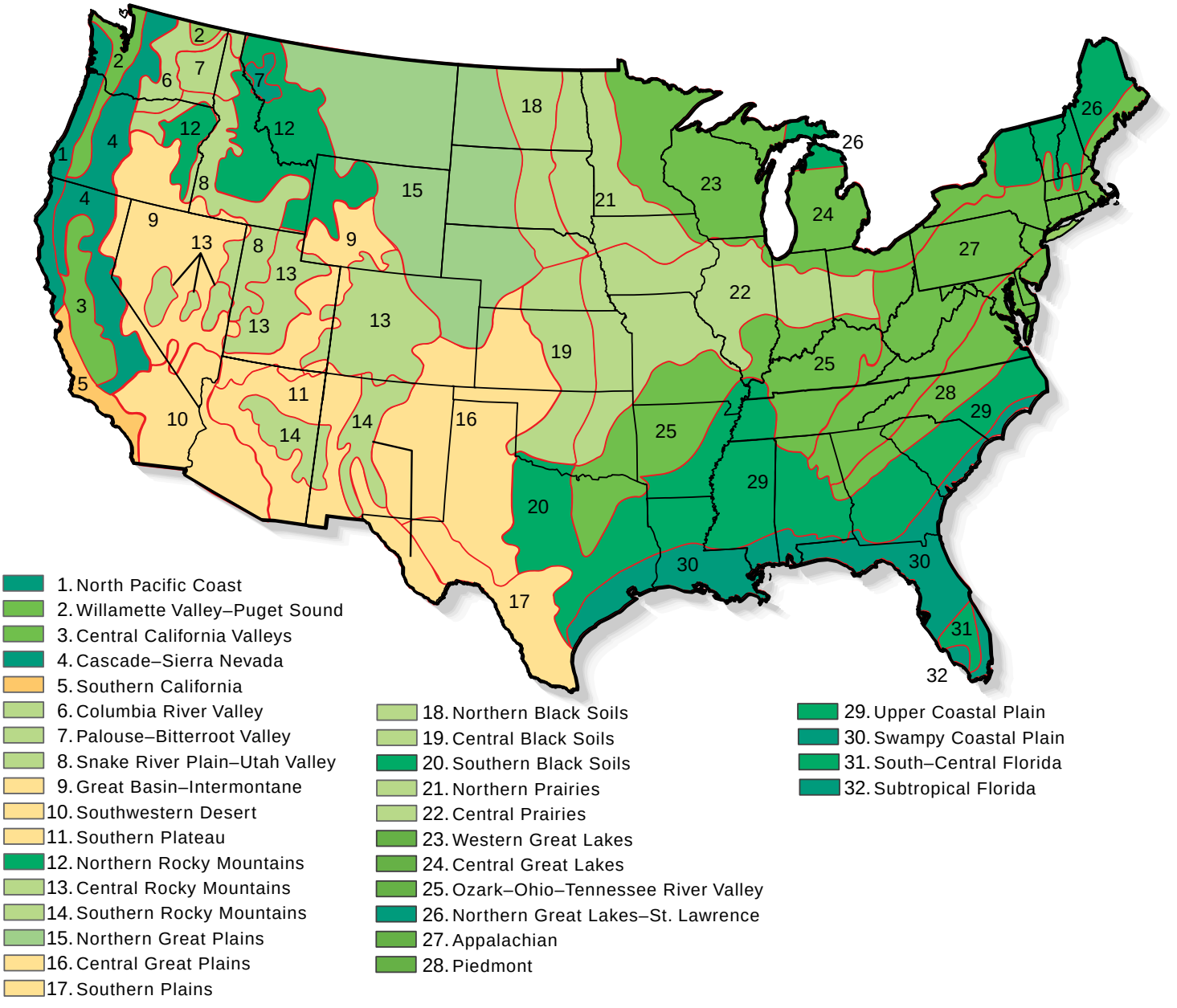


Table B–1 Flood tolerance of **very tolerant** native plants

[These plants are able to survive deep, prolonged flooding for more than 1 year.]

Scientific name	Common name	Range
Carya aquatica	Water hickory	20, 25, 28, 29, 30
C. illinoensis	Pecan	16, 20, 22, 25, 29, 30
Cephalanthus occidentalis	Buttonbush	3-5, 11, 16, 17, 19-30
Cornus stolonifera	Redosier dogwood	4, 7-9, 11-15, 18, 21 -28
Forestiera acuminata	Swamp privet	20, 22, 25, 29, 30
Fraxinus pennsylvanica	Green ash	15, 18, 20-30
Gleditsia aquatica	Waterlocust	20, 25, 28-30
Illex decidua	Deciduous holly	16, 17, 20, 25, 28-30
Nyssa aquatica	Water tupelo	25, 29, 30
Planera aquatica	Water elm	20, 25, 29, 30
Quercus lyrata	Overcup oak	20, 22, 25, 28-30
Salix exigua	Narrow leaf willow	4-16
S. hookeriana	Hooker willow	1
S. lasiandra	Pacific willow	1-5, 11, 13, 14
S. nigra	Black willow	16, 17, 19-30
Taxodium distichum	Baldcypress	17, 20, 25, 28-32

Table B–2 Flood tolerance of **tolerant** native plants

[These plants are able to survive deep flooding for one growing season, with significant mortality occurring if flooding is repeated the following year.]

Scientific name	Common name	Range
Acer negundo	Boxelder	17-30
A. rubrum	Red maple	19-30
A. saccharinum	Silver maple	18-30
Alnus glutinosa	Black alder	26-27
Amorpha fruticosa	False indigo	5, 10, 11, 15-29
Betula nigra	River birch	20, 22, 23, 25-29
Celtis occidentalis	Hackberry	15, 16, 18, 20-30
Diospyros virginiana	Persimmon	20, 22, 25, 27-31
Kalmia polifolia	Bog laurel	4, 12, 23, 24, 26, 27
Ledum groenlandicum	Labrador tea	4, 12, 23, 24, 26, 27
Liquidambar styraciflua	Sweetgum	20, 22, 25, 27-30
Nyssa sylvatica	Blackgum	20, 22, 24-30
Pinus contorta	Lodgepole pine	2, 4, 10, 12-15
Platanus occidentalis	Sycamore	16, 20-22, 24-30
Populus trichocarpa	Black cottonwood	1-8, 12, 13
Quercus lyrata	Overcup oak	20, 22, 25, 28-30
Q. palustris	Pin oak	21-25, 27, 29
Sambucus callicarpa	Pacific red elder	1,2,4
Spirea douglasii	Hardhack	1-4
Tamarix gallica	French tamarisk	3, 4, 9-11, 13, 16, 19, 22, 25, 29, 30
Thuja plicata	Western redcedar	1, 2, 4, 6, 7, 12
Ulmus americana	American elm	15, 16, 18-23, 25-30
Vaccinium uliginosum	Blueberry	1, 4, 12-14, 23, 24, 26, 27

Table B–3 Flood tolerance of **somewhat tolerant** native plants

[These plants are able to survive flooding or saturated soils for 30 consecutive days during the growing season.]

Scientific name	Common name	Range
Alnus rugosa	Hazel alder	20, 22-29
Carpinus caroliniana	Ironwood	20-30
Celtis laevigata	Sugarberry	11, 16, 17, 20, 22, 25, 29, 30
Cornus nuttallii	Pacific dogwood	1-5
Crataegus mollis	Downy hawthorn	
Fraxinum americana	White ash	20, 22-25, 27-30
Gleditsia triacanthos	Honeylocust	16, 20, 22-27, 29, 30
Ilex opaca	American holly	20, 25, 27-30
Juglans nigra	Black walnut	18-30
Juniperus virginiana	Eastern redcedar	18, 20-29
Malus spp.	Apple	
Morus rubra	Red mulberry	16-25, 27-30
Ostrya virginiana	Eastern hophornbeam	15, 18, 20-25, 27-30
Picea stichensis	Sitka spruce	1
Pinus echinata	Shortleaf pine	20, 25, 27-30
P. ponderosa	Ponderosa pine	4
Populus grandidentata	Bigtooth aspen	21-23, 25-28
Quercus alba	White oak	20, 22-30
Q. bicolor	Swamp white oak	21-28
Q. imbricaria	Shingle oak	22-25, 27, 28
Q. macrocarpa	Bur oak	15, 16, 18-30
Q. nigra	Water oak	17, 20, 25, 28-30
Q. phellos	Willow oak	20, 25, 27-30
Q. rubra	Northern red oak	21 -27
Rhus glabra	Smooth sumac	6-9, 11, 14, 15, 17-31
Tilia americana	American basswood	20-27
Tsuga heterophylla	Western hemlock	1 , 2, 4, 6, 12
Ulmus alata	Winged elm	17, 20, 25, 28-30
U. rubra	Red elm	25, 27, 29
Viburnum prunifolium	Blackhaw	20, 22-25, 27-30

Table B–4 Flood tolerance of **intolerant** native plants

[These plants are unable to survive more than a few days of flooding during the growing season without significant mortality.]

Scientific name	Common name	Range
Acer macrophyllum	Bigleaf maple	1-5
A. saccharum	Sugar maple	15, 18, 21-29
Alnus rubra	Red alder	1 , 2, 5, 6
A. sinuata	Sitka alder	2, 4, 6, 7, 12
Betula lutea	Yellow birch	21-28
B. papyrifera	Paper birch	12, 13, 15, 18, 21-24, 26, 27
B. populifolia	White birch	24, 26-28
Buxus sempervirens	Boxwood	
Carya cordiformis	Bitternut hickory	20, 22-30
C. laciniosa	Shellbark hickory	22, 24, 25, 27, 28, 29
C. ovata	Shagbark hickory	21-30
C. tomentosa	Mockernut hickory	20, 22, 24, 25, 27-30
Cercis canadensis	Eastern redbud	22-25, 27-30
Cornus florida	Flowering dogwood	20, 22-25, 27-30
Corylus avellana	Filbert	
C. rostrata	Hazel	15, 18, 21-29
Cotoneaster spp.	Cotoneaster	
Fagus grandifolia	American beech	20, 22-30
Gymnocladus dioica	Kentucky coffeetree	19, 21-25, 27
Ilex aquifolium	Holly	
Philadelphus gordonianus	Mock orange	4, 6-8, 12
Picea abies	Norway spruce	
P. pungens	Colorado spruce	9, 12, 13, 14
P. rubens	Red spruce	27
Pinus strobus	Eastern white pine	21-24, 27
P. taeda	Loblolly pine	19, 20, 22, 25, 28-30
Populus tremuloides	Quaking aspen	1, 2, 4, 6-9, 11, 15, 18, 21-27
Prunus americana	Wild plum	12-25, 27-30
P. emarginata	Bitter cherry	1, 2, 4, 6, 8-14
P. laurocerasus	Cherry-laurel	
P. serotina	Black cherry	11, 18-30
Psuedotsuga menziesii	Douglas fir	
Pyrus rivularis	Wild apple	1, 2, 4
Q. marilandica	Blackjack oak	16,19, 20, 22, 24, 25, 27-30
Q. muehlenbergii	Chinquapin oak	11, 16, 20-30
Q. shumardii	Texas oak	16, 20, 22, 24, 25, 27-29
Q. stellata	Post oak	19, 20, 22, 25, 27-30
Q. velutina	Black oak	20, 22-30
Rhamnus purshinana	Cascara	1-4, 6, 7, 9, 11, 12
Rubus procerus	Blackberry	

Table B–4 Flood tolerance of **intolerant** native plants—Continued.

[These plants are unable to survive more than a few days of flooding during the growing season without significant mortality.]

Scientific name	Common name	Range
Sassafras albidum	Sassafras	20, 22-30
Sorbus aucuparia	Rowan tree	21, 22, 27
Symphoricarpos occidentalis	Snowberry	15, 18, 21-24
Syringa vulgans	Lilac	
Thuja occidentalis	American arborvitae	22-24, 26, 27
Tsuga canadensis	Eastern hemlock	22-25, 27, 28

Exhibit 13

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

POND

(No.)

CODE 378

DEFINITION

A water impoundment made by constructing an embankment or by excavating a pit or dugout.

In this standard, ponds constructed by the first method are referred to as embankment ponds, and those constructed by the second method are referred to as excavated ponds. Ponds constructed by both the excavation and the embankment methods are classified as embankment ponds if the depth of water impounded against the embankment at the auxiliary spillway elevation is 3 feet or more.

PURPOSE

To provide water for livestock, fish and wildlife, recreation, fire control, develop renewable energy systems, and other related uses, and to maintain or improve water quality.

CONDITIONS WHERE PRACTICE APPLIES

This standard establishes the minimum acceptable quality for the design and construction of low-hazard ponds where:

Failure of the dam will not result in loss of life; damage to homes, commercial or industrial buildings, main highways, or railroads; or in interruption of the use or service of public utilities.

The product of the storage times the effective height of the dam is less than 3,000. Storage is the volume, in acre-feet, in the reservoir below the elevation of the crest of the auxiliary spillway. The effective height of the dam is the difference in elevation, in feet, between the auxiliary spillway crest and the lowest point in the cross section taken along the centerline of the dam. If there is no auxiliary spillway, the top of the dam is the upper limit.

The effective height of the dam is 35 feet or less.

General Criteria Applicable to All Ponds

All federal, State and local requirements shall be addressed in the design.

A protective cover of vegetation shall be established on all exposed areas of embankments, spillways and borrow areas as climatic conditions allow, according to the guidelines in conservation practice standard 342, Critical Area Planting.

Site conditions. Site conditions shall be such that runoff from the design storm can be safely passed through (1) a natural or constructed auxiliary spillway, (2) a combination of a principal spillway and an auxiliary spillway, or (3) a principal spillway.

Drainage area. The drainage area above the pond must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the structure. The drainage area shall be large enough so that surface runoff and groundwater will provide an adequate supply of water for the intended purpose unless an alternate water source exists to serve this purpose. The quality shall be suitable for the water's intended use.

Reservoir area. The topography and geology of the site shall permit storage of water at a depth and volume that will ensure a dependable supply, considering beneficial use, sedimentation, season of use, and evaporation and seepage losses. If surface runoff is the primary source of water for a pond, the soils shall be impervious enough to prevent excessive seepage losses or shall be of a type that sealing is practicable.

Design Criteria for Embankment Ponds

Geological Investigations. Pits, trenches, borings, review of existing data or other suitable means of investigation shall be

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service State Office or visit the Field Office Technical Guide.

conducted to characterize materials within the embankment foundation, auxiliary spillway and borrow areas. Soil materials shall be classified using the Unified Soil Classification System.

Foundation cutoff. A cutoff of relatively impervious material shall be provided under the dam if necessary to reduce seepage through the foundation. The cutoff shall be located at or upstream from the centerline of the dam. It shall extend up the abutments as required and be deep enough to extend into a relatively impervious layer or provide for a stable dam when combined with seepage control. The cutoff trench shall have a bottom width adequate to accommodate the equipment used for excavation, backfill, and compaction operations. Side slopes shall not be steeper than one horizontal to one vertical.

Seepage control. Seepage control is to be included if (1) pervious layers are not intercepted by the cutoff, (2) seepage could create swamping downstream, (3) such control is needed to insure a stable embankment, or (4) special problems require drainage for a stable dam. Seepage may be controlled by (1) foundation, abutment, or embankment filters and drains; (2) reservoir blanketing; or (3) a combination of these measures.

Embankment. The minimum top width for a dam is shown in table 1. If the embankment top is to be used as a public road, the minimum width shall be 16 feet for one-way traffic and 26 feet for two-way traffic. Guardrails or other safety measures shall be used where necessary and shall meet the requirements of the responsible road authority. For dams less than 20 feet in height, maintenance considerations or construction equipment limitations may require increased top widths from the minimum shown in Table 1.

Table 1. Minimum top width for dams

Total height of embankment	Top width
feet	*feet*
Less than 10	6
10 – 14.9	8
15 – 19.9	10
20 – 24.9	12
25 – 34.9	14
35 or more	15

Side Slopes. The combined upstream and downstream side slopes of the settled embankments shall not be less than five horizontal to one vertical, and neither slope shall be steeper than two horizontal to one vertical. All slopes must be designed to be stable, even if flatter side slopes are required. Downstream or upstream berms can be used to help achieve stable embankment sections

Slope Protection. If needed to protect the slopes of the dam from erosion, special measures, such as berms, rock riprap, sand-gravel, soil cement, or special vegetation, shall be provided (Technical Releases 56, “A guide for Design and Layout of Vegetative Wave Protection for Earth Dam Embankments” and 69, “Riprap for Slope Protection Against Wave Action” contain design guidance).

Freeboard. The minimum elevation of the top of the settled embankment shall be 1 foot above the water surface in the reservoir with the auxiliary spillway flowing at design depth. The minimum difference in elevation between the crest of the auxiliary spillway and the settled top of the dam shall be 2 feet for all dams having more than a 20-acre drainage area or more than 20 feet in effective height.

Settlement. The design height of the dam shall be increased by the amount needed to insure that after settlement the height of the dam equals or exceeds the design height. This increase shall not be less than 5 percent of the height of the dam, except where detailed soil testing and laboratory analyses or experience in the area show that a lesser amount is adequate.

Principal spillway. A pipe conduit, with needed appurtenances, shall be placed under or through the dam, except where rock, concrete, or other types of lined spillways are used, or where the rate and duration of flow

can be safely handled by a vegetated or earth spillway.

For dams with a drainage area of 20 acres or less, the principal spillway crest elevation shall not be less than 0.5 feet below the auxiliary spillway crest elevation. For dams with a drainage area over 20 acres, this difference shall not be less than 1.0 feet.

When design discharge of the principal spillway is considered in calculating peak outflow through the auxiliary spillway, the crest elevation of the inlet shall be such that the design discharge will be generated in the conduit before there is discharge through the auxiliary spillway.

Pipe conduits designed for pressure flow must have adequate anti-vortex devices. The inlets and outlets shall be designed to function satisfactorily for the full range of flow and hydraulic head anticipated.

The capacity of the pipe conduit shall be adequate to discharge long-duration, continuous, or frequent flows without flow through the auxiliary spillways. The diameter of the principal spillway pipe shall not be less than 4 inches. Pipe conduits used solely as a supply pipe through the dam for watering troughs and other appurtenances shall not be less than 1-1/4 inches in diameter.

If the pipe conduit diameter is 10 inches or greater, its design discharge may be considered when calculating the peak outflow rate through the auxiliary spillway.

Pipe conduits shall be ductile iron, welded steel, corrugated steel, corrugated aluminum, reinforced concrete (pre-cast or site-cast), or plastic. Pipe conduits through dams of less than 20 feet total height may also be cast iron or unreinforced concrete.

Pipe conduits shall be designed and installed to withstand all external and internal loads without yielding, buckling, or cracking. Rigid pipe shall be designed for a positive projecting condition. Flexible pipe shall be designed for a maximum deflection of 5 percent. The modulus of elasticity for PVC pipe shall be assumed as one-third of the amount designated by the compound cell classification to account for long-term reduction in modulus of elasticity. Different reductions in modulus may be appropriate for other plastic pipe materials.

The minimum thickness of flexible pipe shall be SDR 26, Schedule 40, Class 100, or 16 gage as appropriate for the particular pipe material. Connections of flexible pipe to rigid pipe or other structures shall be designed to accommodate differential movements and stress concentrations.

All pipe conduits shall be designed and installed to be water tight by means of couplings, gaskets, caulking, waterstops, or welding. Joints shall be designed to remain watertight under all internal and external loading including pipe elongation due to foundation settlement.

Pipe conduits shall have a concrete cradle or bedding if needed to provide improved support for the pipe to reduce or limit structural loading on pipe to allowable levels.

Cantilever outlet sections, if used, shall be designed to withstand the cantilever load. Pipe supports shall be provided when needed. Other suitable devices such as a Saint Anthony Falls stilling basin or an impact basin may be used to provide a safe outlet.

All steel pipe and couplings shall have protective coatings in areas that have traditionally experienced pipe corrosion, or in embankments with saturated soil resistivity less than 4000 ohms-cm or soil pH less than 5. Protective coatings shall be asphalt, polymer over galvanizing, aluminized coating or coal tar enamel as appropriate for the pipe type. Plastic pipe that will be exposed to direct sunlight shall be ultraviolet-resistant and protected with a coating or shielding, or provisions provided for replacement as necessary

Renewable Energy. For detailed criteria where the purpose is to develop renewable energy systems refer to interim conservation practice standard Renewable Energy Production (716).

Cathodic Protection. Cathodic protection is to be provided for coated welded steel and galvanized corrugated metal pipe where soil and resistivity studies indicate that the pipe needs a protective coating, and where the need and importance of the structure warrant additional protection and longevity. If cathodic protection is not provided for in the original design and installation, electrical continuity in the form of joint-bridging straps should be

considered on pipes that have protective coatings. Cathodic protection should be added later if monitoring indicates the need.

Seepage Control. Seepage control along a pipe conduit spillway shall be provided if any of the following conditions exist:

- The effective height of dam is greater than 15 feet.
- The conduit is of smooth pipe larger than 8 inches in diameter.
- The conduit is of corrugated pipe larger than 12 inches in diameter.

Seepage along pipes extending through the embankment shall be controlled by use of a drainage diaphragm, unless it is determined that anti-seep collars will adequately serve the purpose.

Drainage Diaphragm. The drainage diaphragm shall function both as a filter for adjacent base soils and a drain for seepage that it intercepts. The drainage diaphragm shall consist of sand meeting the requirements of ASTM C-33, for fine aggregate. If unusual soil conditions exist such that this material may not meet the required filter or capacity requirements, a special design analysis shall be made.

The drainage diaphragm shall be a minimum of 2 feet thick and extend vertically upward and horizontally at least three times the outside pipe diameter, and vertically downward at least 18 inches beneath the conduit invert. The drainage diaphragm shall be located immediately downstream of the cutoff trench, but downstream of the centerline of the dam if the cutoff is upstream of the centerline.

The drainage diaphragm shall be outletted at the embankment downstream toe using a drain backfill envelope continuously along the pipe to where it exits the embankment. Drain fill shall be protected from surface erosion.

Anti-seep Collars. When anti-seep collars are used in lieu of a drainage diaphragm, they shall have a watertight connection to the pipe. Maximum spacing shall be approximately 14 times the minimum projection of the collar measured perpendicular to the pipe but not more than 25 feet. The minimum spacing shall be 10 feet. Collar material shall be compatible with pipe materials. The anti-seep collar(s) shall increase by at least 15 percent the seepage path along the pipe.

Trash Guard. To prevent clogging of the conduit, an appropriate trash guard shall be installed at the inlet or riser unless the watershed does not contain trash or debris that could clog the conduit.

Other Outlets. A pipe with a suitable valve shall be provided to drain the pool area if needed for proper pond management or if required by State law. The principal spillway conduit may be used as a pond drain if it is located where it can perform this function.

Auxiliary spillways. Auxiliary spillways convey large flood flows safely past earth embankments and have historically been referred to as “Emergency Spillways”.

An auxiliary spillway must be provided for each dam, unless the principal spillway is large enough to pass the peak discharge from the routed design hydrograph and the trash that comes to it without overtopping the dam. The following are minimum criteria for acceptable use of a closed conduit principal spillway without an auxiliary spillway: a conduit with a cross-sectional area of 3 ft^2 or more, an inlet that will not clog, and an elbow designed to facilitate the passage of trash.

The minimum capacity of a natural or constructed auxiliary spillway shall be that required to pass the peak flow expected from a design storm of the frequency and duration shown in Table 2, less any reduction creditable to conduit discharge and detention storage.

The auxiliary spillway shall safely pass the peak flow, or the storm runoff shall be routed through the reservoir. The routing shall start either with the water surface at the elevation of the crest of the principal spillway or at the water surface after 10 days’ drawdown, whichever is higher. The 10-day drawdown shall be computed from the crest of the auxiliary spillway or from the elevation that would be attained if the entire design storm were impounded, whichever is lower. Auxiliary spillways shall provide for passing the design flow at a safe velocity to a point downstream where the dam will not be endangered.

Constructed auxiliary spillways are open channels that usually consist of an inlet channel, a control section, and an exit channel. They shall be trapezoidal and shall be located in undisturbed or compacted earth or in-situ

rock. The side slopes shall be stable for the material in which the spillway is to be constructed. For dams having an effective height exceeding 20 feet, the auxiliary spillway shall have a bottom width of not less than 10 feet.

Upstream from the control section, the inlet channel shall be level for the distance needed to protect and maintain the crest elevation of the spillway. The inlet channel may be curved to fit existing topography. The grade of the exit channel of a constructed auxiliary spillway shall fall within the range established by discharge requirements and permissible velocities.

Structural auxiliary spillways. If chutes or drops are used for principal spillways or auxiliary spillways, they shall be designed according to the principles set forth in the Part 650, Engineering Field Handbook and the National Engineering Handbook, Section 5, Hydraulics; Section 11, Drop Spillways; and Section 14, Chute Spillways. The minimum capacity of a structural spillway shall be that required to pass the peak flow expected from a design storm of the frequency and duration shown in table 2, less any reduction creditable to conduit discharge and detention storage.

Table 2. Minimum auxiliary spillway capacity

			Minimum design storm[2]	
Drainage area (Ac.)	Effective height of dam[1] (Ft.)	Storage (Ac-Ft)	Frequency (Years)	Minimum duration (Hours)
20 or less	20 or less	< than 50	10	24
20 or less	> than 20	< than 50	25	24
> than 20		< than 50	25	24
All others			50	24

1. As defined under “Conditions where Practice Applies”.

2. Select rain distribution based on climatological region.

Criteria for Excavated Ponds

Runoff. Provisions shall be made for a pipe and auxiliary spillway, if needed, that will meet the capacity requirements of Table 2. Runoff flow patterns shall be considered when locating the excavated pond and placing the spoil.

Side slopes. Side slopes of excavated ponds shall be stable and shall not be steeper than one horizontal to one vertical. If livestock will water directly from the pond, a watering ramp of ample width shall be provided. The ramp shall extend to the anticipated low water elevation at a slope no steeper than three horizontal to one vertical.

Inlet protection. If surface water enters the pond in a natural or excavated channel, the side slope of the pond shall be protected against erosion.

Excavated material. The material excavated from the pond shall be placed so that its weight will not endanger the stability of the pond side slopes and it will not be washed back into the pond by rainfall. It shall be disposed of in one of the following ways:

Uniformly spread to a height that does not exceed 3 feet, with the top graded to a continuous slope away from the pond.

Uniformly placed or shaped reasonably well, with side slopes assuming a natural angle of repose. The excavated material will be placed at a distance equal to the depth of the pond but not less than 12 feet from the edge of the pond.

Shaped to a designed form that blends visually with the landscape.

Used for low embankment construction and leveling of surrounding landscape.

Hauled away.

CONSIDERATIONS

Visual resource design. The visual design of ponds should be carefully considered in areas of high public visibility and those associated with recreation. The underlying criterion for all visual design is appropriateness. The shape and form of ponds, excavated material, and plantings are to relate visually to their surroundings and to their function.

The embankment may be shaped to blend with the natural topography. The edge of the pond may be shaped so that it is generally curvilinear rather than rectangular. Excavated material can be shaped so that the final form is smooth, flowing, and fitting to the adjacent landscape rather than angular geometric mounds. If feasible, islands may be added for visual interest and to attract wildlife.

Cultural Resources. Consider existence of cultural resources in the project area and any project impacts on such resources. Consider conservation and stabilization of archeological, historic, structural, and traditional cultural properties when appropriate.

Fish and Wildlife. Project location and construction should minimize the impacts to existing fish and wildlife habitat.

When feasible, structure should be retained, such as trees in the upper reaches of the pond and stumps in the pool area. Upper reaches of the pond can be shaped to provide shallow areas and wetland habitat.

If fish are to be stocked, consider criteria and guidance in conservation practice standard 399, Fishpond Management.

Vegetation. Stockpiling topsoil for placement on disturbed areas can facilitate revegetation.

Consider placement and selection of vegetation to improve fish and wildlife habitat and species diversity.

Water Quantity. Consider effects upon components of the water budget, especially:

- Effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
- Variability of effects caused by seasonal or climatic changes.
- Effects on downstream flows and impacts to environment such as wetlands, aquifers, and; social and economic impacts to downstream uses or users.
- Potential for multiple purposes.

Water Quality

- Consider effects on erosion and the movement of sediment, pathogens, and soluble and sediment-attached substances that are carried by runoff.
- Effects on the visual quality of onsite and downstream water resources.
- Short-term and construction-related effects of this practice on the quality of downstream water courses.
- Effects of water level control on the temperatures of downstream water to prevent undesired effects on aquatic and wildlife communities.
- Effects on wetlands and water-related wildlife habitats.
- Effects of water levels on soil nutrient processes such as plant nitrogen use or denitrification.
- Effects of soil water level control on the salinity of soils, soil water, or downstream water.
- Potential for earth moving to uncover or redistribute toxic materials such as saline soils.

PLANS AND SPECIFICATIONS

Plans and specifications for installing ponds shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An operation and maintenance plan shall be developed and reviewed with the landowner or individual responsible for operation and maintenance.

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

IRRIGATION RESERVOIR

(Ac.-Ft.)

CODE 436

DEFINITION

An irrigation water storage structure made by constructing a dam, embankment, pit, or tank.

PURPOSE

This practice may be applied as part of a resource management system to achieve one or more of the following purposes:

- Store water to provide a reliable irrigation water supply or regulate available irrigation flows.
- Improve Water Use Efficiency on irrigated land.
- Provide storage for tailwater recovery and reuse.
- Provide irrigation runoff retention time to increase breakdown of chemical contaminants.
- Reduce energy use.
- Develop renewable energy systems (i.e., hydropower).

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to irrigation water storage structures that meet one or more of the following criteria:

- The existing available water supply is insufficient to meet irrigation requirements during all or part of the irrigation season.
- Water is available for storage from surface runoff, stream flow, irrigation canals, or a subsurface source.
- A suitable site is available for construction of a storage reservoir.

This practice applies to planning and functional design of storage capacity, and inflow/outflow capacity requirements for irrigation storage reservoirs. Storage reservoirs shall be planned and located to serve as an integral part of an irrigation system.

This practice applies to reservoirs created by embankment structures or excavated pits to store diverted surface water, groundwater, or irrigation system tailwater for later use, or reuse.

The practice also applies to reservoirs created by embankment structures or excavated pits and tanks constructed of concrete, steel, or other suitable materials used to collect and regulate available irrigation water supplies to accomplish the intended purpose.

CRITERIA

General Criteria Applicable to All Purposes

Structure type selection (excavated pit, embankment, or tank) shall be based on a site specific assessment involving hydrologic studies, engineering and geologic investigations, available construction materials, and natural storage.

Storage Capacity. Design capacity computations shall be based on planned inflow volumes and rates over the storage period, and outflow volumes and rates required to meet planned irrigation system needs.

Structure storage capacity must provide sufficient volume to meet variations in water demand within the irrigation period.

Compute demand flow rates based on the consumptive use-time relationship using anticipated irrigation efficiencies, conveyance losses, and other uses such as leaching, frost control, seepage, and evaporation.

Irrigation storage reservoirs planned primarily to regulate irrigation flows shall have adequate

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service State Office or visit the Field Office Technical Guide.

capacity to provide design irrigation application flow rates.

Structure capacity shall provide adequate storage for inflow while maintaining sufficient water levels to insure proper operation of outlet works and provide uniform outflow rate during planned irrigation events.

Provide additional capacity as needed for sediment storage.

Foundation, Embankment, and Spillways. Earthen dams, embankments, pits, associated spillways, and appurtenant structures shall be designed to meet criteria in the applicable NRCS Conservation Practice Standards, Pond (378), or Dam (402).

Seepage. Prevent excessive seepage losses by use of an appropriate method of sealing or lining.

Overflow Protection. Overflow protection shall be provided if overflow of the irrigation storage reservoir is possible.

Inlet and Outlet Works. Design conduit and open spillways according to guidelines in appropriate chapters of the NRCS National Engineering Handbook.

Provide inlet works when needed to prevent erosion or control flows into the irrigation storage reservoir. Inlet works may consist of a direct pumping system, conduit, grassed channel, lined channel, chute, head gates, valves, or other appurtenances necessary to safely convey and control water entering the structure.

Outlet works shall be provided for controlled withdrawal, transfer, or release of irrigation water. Outlet works may consist of a direct pumping system or a conduit from the storage reservoir to an area of use. The capacity of the outlet works shall be adequate to provide the outflow rate needed to meet irrigation system demands.

Design and install specialized inlet or outlet works when needed to avoid entraining or impinging aquatic organisms.

Additional Criteria Applicable to Storage for Tailwater Recovery and Reuse

Capacity. When energy sources for tailwater pump back systems are subject to interruption and

- safe emergency bypass areas cannot be provided, or
- tailwater discharges violate local or state regulations,

Tailwater storage requirements shall, as a minimum, include a volume adequate to store all tailwater runoff from a single irrigation set.

Additional Criteria Applicable to Irrigation Runoff Retention Time to Increase Breakdown of Chemical Contaminants

Capacity. Where additional storage or flow regulation are required to provide adequate retention time for breakdown of chemicals in runoff waters, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular chemical of concern.

Additional Criteria Applicable to Reduce Energy Use

Provide analysis to demonstrate reduction of energy use from practice implementation.

Reduction of energy use is calculated as average annual or seasonal energy reduction compared to previous operating conditions.

Additional Criteria Applicable to Develop Renewable Energy Systems

Renewable energy systems shall meet applicable design criteria in NRCS and/or industry standards, and shall be in accordance with manufacturer's recommendations. Hydropower systems shall be designed, operated, and maintained in accordance with the Microhydropower Handbook, Sections 4 and 5, as appropriate.

CONSIDERATIONS

When planning this practice, the following items should be considered where applicable:

- Potential energy savings resulting from regulation of irrigation flows, tailwater reuse, improved pumping plant efficiency, or management changes.
- Planting of critical areas at the completion of construction to protect the structure and borrow areas, and prevent erosion.
- Effects of soil physical and chemical properties, as well as potential soil limitations, relating to embankment

construction, compaction, stability, bearing strength, pool area seepage, and soil corrosivity. Refer to soil survey data as a preliminary planning tool for assessment of pool and borrow areas, and conduct

- On-site soil investigations during the final planning stage.
- Perimeter fences to prevent human and animal access, and emergency escape facilities to minimize human safety hazards.
- Construction-related effects on air quality and on water quality of downstream water courses.
- Potential for earth moving construction to uncover or redistribute toxic materials or on-site invasive species.
- Development of water budgets, to quantify sources of inflow (precipitation and withdrawals), and outflow (evapotranspiration and losses).
- Impacts on downstream flows or aquifers that could affect other water uses or users.
- Impacts on the quantity of downstream flows, which could have undesirable environmental, social, or economic effects.
- Impacts of erosion, sediment, soluble contaminants, seeds or vegetative materials of invasive species, and contaminants attached to sediment in runoff.
- The movement of dissolved substances to ground water.
- Effects of water temperature changes on aquatic and wildlife communities.
- Timing of vegetation-disturbing maintenance activities, to avoid grassland bird nesting seasons.
- Impacts on wetlands or water-related wildlife habitats.
- Impacts on the visual quality of water resources and the landscape.
- Impacts on cultural resources.
- Performing periodic water quality analysis to evaluate salinity, nutrients, pesticides, and pathogens.
- Opportunities to include variety in vegetation for embankment stabilization or revegetation maintenance, that would provide pollinator forage from early spring to late fall.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation storage reservoirs shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

Plans and specifications for constructing earthen irrigation storage reservoirs shall be based on criteria found in NRCS Conservation Practice Standards, Pond (378), or Dam (402).

Plans and specifications for tanks constructed of non earthen materials shall be based on construction and materials specifications for NRCS Conservation Practice Standard, Watering Facility (614).

OPERATION AND MAINTENANCE

An Operation and Maintenance plan shall be prepared for landowner or operator use. The plan shall provide specific instructions for operating and maintaining facilities to ensure they function properly. The plan shall include the following provisions:

- Periodic cleaning and regrading of water storage facilities to maintain functionality.
- Periodic inspection, removal of debris, and repair if needed of trash racks and inlet and outlet structures to assure proper operation.
- Routine maintenance of mechanical components in accordance with manufacturer recommendations.
- Periodic inspection and maintenance of embankments and earth spillways to repair damage or control erosion and undesirable vegetation.
- Periodic removal of sediment from traps or storage facilities to maintain design capacity and efficiency.
- Periodic Inspection or testing of all pipelines and pumping plant components and appurtenances, as applicable.

REFERENCES

McKinney, J.D., et al. Microhydropower Handbook, IDO-10107, Volumes 1 & 2. U.S. Department of Energy, Idaho Operations Office.

Exhibit 14

Riparian Areas Environmental Uniqueness, Functions, and Values

RCA Issue Brief #11 August 1996

What are riparian areas?
Values and functions of riparian areas
Disturbances to riparian areas
Multiple benefits

Did you know ...

...that the flow of water through riparian soils regenerates ground water?

...that riparian vegetation can remove excess nutrients and sediment from surface runoff and shallow ground water? And that riparian vegetation shades streams to optimize light and temperature conditions for aquatic plants, fish, and other animals?

...that riparian areas provide important habitat for many endangered and threatened species and other wildlife and plants?

...that the appearance and boundary of riparian areas vary from site to site?

...that some riparian areas function and meet criteria established for wetlands?

...that the character of a riparian area is dependent upon the condition of the watershed in which it is located?

...that although riparian ecosystems generally occupy small areas on the landscape, they are usually more diverse and have more plants and animals than adjacent upland areas?

What are riparian areas?

Riparian areas are lands that occur along watercourses and water bodies. Typical examples include flood plains and streambanks. They are distinctly different from surrounding lands because of unique soil and vegetation characteristics that are strongly influenced by the presence of water.

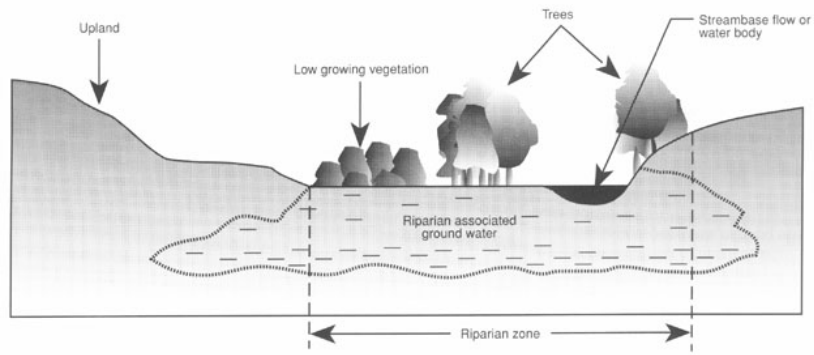
General indicators of riparian areas include:

- **Vegetation**
  The kinds and amounts of vegetation differ from adjacent upland vegetation because more water is supplied to plants from the associated watercourse or water body.
- **Soil**
  Soil in natural riparian areas consists of stratified sediments of varying textures that are subject to intermittent flooding or fluctuating water tables that may reach the surface. The duration of soil wetness depends on the water levels of the adjacent water body.
- **Water**

Riparian areas are directly influenced by water from a watercourse or water body. They occur along natural watercourses or next to natural lakes and constructed water bodies such as ditches, canals, ponds, and reservoirs.

In the western United States, riparian areas comprise less than 1 percent of the land area, but they are among the most productive and valuable natural resources. There is a significant difference between the water-rich riparian areas and the arid uplands. Riparian areas are the major providers of habitat for endangered and threatened species in the western desert areas. In the humid east, the riparian areas are more similar to the uplands. In many areas, the separation of the riparian zone from the upland is not distinct.

Major components of a stream or water body riparian area—Riparian areas can be symmetrical or asymmetrical in shape. The topography and hydrogeology determine the plant and animal communities associated with the width or meandering riparian area configurations.



Values and functions of riparian areas

Because of their variation across the country, riparian areas function in different ways. In spite of their differences, all riparian areas possess some similar ecological characteristics such as energy flow, nutrient cycling, water cycling, hydrologic function, and plant and animal population. These functions give riparian areas unique values relative to the surrounding landscape. Some of the more recognizable functions and values of riparian areas are:

Hydrology

Water flow that shaped the riparian zone affects soil development and growth of vegetation.

- Because riparian zones occupy low areas in the landscape, ground water is generally nearer to the surface and available for plants. The fine-textured sediments in flood plains are also able to hold large amounts of water. These two conditions promote productive and diverse plant communities.
- Nutrients for plant growth in riparian ecosystems depend on sedimentation of nutrient-rich organic matter and on the dissolved nutrients in the water. Riparian zones are often nutrient-rich ecosystems.
- Because flooding occurs periodically, and ground water moves through flood plain soils, the surface layers of soils are wetted and dried seasonally. The presence and movement of the surface and ground water enhance the recycling of nutrients and other chemical reactions beneficial to plant growth within the riparian zone.

The timing of flooding is important to the life cycle of many aquatics and some terrestrial species. A naturally occurring flood pulse enhances survivability of organisms within the riparian zone and promotes species diversity and biological productivity.

Base flow

Alluvial soil, which is sedimentary material deposited by flowing water, is usually deep and stores large amounts of water from rainfall and runoff. Many alluvial aquifers in the western United States are maintained by infiltration of upland runoff in the stream channel or riparian alluvial deposits. Base flow--that portion of water flowing in a stream that is due to ground water seepage into the channel--is further

maintained by riparian vegetation that shades the water, keeping it cooler and slowing evaporation.

Nutrient cycling

Once nutrients enter a riparian area, they are exposed to mechanisms that may use or change them. Some nutrients, especially nitrogen, phosphorus, calcium, magnesium, and potassium, are taken up by shallow-rooted riparian vegetation. Dissolved nutrients moving with the ground water and those that are leached in the soil may be taken up by deeper-rooted riparian vegetation. Some nutrients pass through without being detained, and some that are taken up by riparian vegetation may be reintroduced into the water column when the vegetation dies and decomposes.

Energy transfer

The uniqueness of riparian areas derives from the fact that litter-fall produced within the riparian ecosystem may be transported laterally and made available to in-stream animal communities as well as those downstream from the source of organic matter production. As compared with purely aquatic or terrestrial ecosystems, riparian organic matter has the potential of supporting a diversity of food webs within both habitats.

Downstream flooding

Riparian area vegetation is a key factor in reducing downstream flooding. As floodwater flows through a vegetated area, the plants resist the flow and dissipate the energy, increasing the time available for water to inflitrate into the soil and be stored for use by plants.

Water quality

As floodwater spreads over a flood plain, water velocities are reduced, making it less likely for sediment and nutrient-rich organic materials to reenter the stream. Sediment and nutrients carried by overland flow from adjacent uplands are also intercepted by the riparian area.

Aquatic life

Rooting herbaceous and woody vegetation helps shape aquatic habitat and stabilizes streambanks, retards erosion, and, in places, creates overhanging banks that serve as habitat for fish. Trapping sediment before it reaches the stream helps maintain a cleaner or more sediment-free stream bottom where aquatic organisms live. These organisms are important sources of food for fish and birds.

Terrestrial life

Riparian ecosystems are extremely productive and have diverse habitat values for wildlife. This is demonstrated most visibly in the western United States, where riparian habitat comprises less than 1 percent of the total land area at some time of the year but supports most of the terrestrial wildlife. The linear nature of riparian ecosystems provides distinct corridors that are important as migration and dispersal routes and as forested connectors between habitats for wildlife.

Some riparian areas meet the criteria established for wetlands. The functions of wetland and riparian areas generally depend on configuration, soils, vegetation, hydrology, and landscape context. Even nonwetland riparian areas share many characteristics, functions, and values with wetlands; such as surface or ground water, or both, and several varieties of plant and animal communities.

Disturbances to riparian areas

Flooding the the resulting erosion and deposition are common forces that shape the riparian area. During extreme flooding, these forces can sometimes appear devastating, but in most cases, the riparian area recovers rapidly. On the other hand, changes made by people often have long-term adverse effects on riparian areas. Building dams across channels, constructing levees, and the channelization of the streams may have the most adverse impact. These modifications significantly

alter the movement and storage of water that is so important to the riparian system. Water withdrawals from streams also may reduce base flow, depriving riparian areas of moisture.

People's most common disturbance to riparian areas involves clearing vegetation and converting the area to other uses such as cropland and urban land. Excessive logging can strip the banks of vegetation. Overgrazing concentrates livestock in riparian areas for extended periods, reduces the vegetation, and tramples streambanks. Recreational development can destroy natural plant diversity and structure, lead to soil compaction and erosion, and disturb wildlife. Exotic plants that take advantage of the good growing conditions found in riparian zones often invade these areas. As these plants dominate native plants, the overall vegetative diversity decreases, resulting in less favorable habitat for most wildlife species.

The character of a riparian area is dependent upon he condition of its watershed. Most important is the relationship of watershed hydrology to the riparian area. In general, the amounts and type of vegetative ground cover, the area of the watershed, and the slope of the terrain are directly related to the percentage of water that will enter the drainage system as surface flow or as percolated water. Riparian plant composition, habitat structure, and productivity are determined by the timing, duration, and extent of flooding. Land use changes, paved-over areas, or the removal of vegetation cause water to flow quickly from a watershed and through a riparian zone. Soil moisture storage and productivity are reduced. This can lead to prolonged periods of no flow or low flow and increase frequency and duration of flooding, resulting in a drastic decline in productivity.

Multiple benefits

- Riparian areas help control nonpoint source pollution by holding and using nutrients and reducing sediment.
- Riparian areas are often important for the recreation and scenic values. However, because riparian areas are relatively small and occur in conjunction with watercourses, they are vulnerable to severe alteration and damages caused by people.
- Riparian areas supply food, cover, and water for a large diversity of animals and serve as migration routes and stopping points between habitats for a variety of wildlife.
- Trees and grasses in riparian areas stabilize streambanks and reduce floodwater velocity, resulting in reduced downstream flood peaks.
- Alluvial aquifers help maintain the base flow in many rivers in humid areas because of high water tables. In drier climates, streams lose water that can help build up the water table deep beneath the stream.

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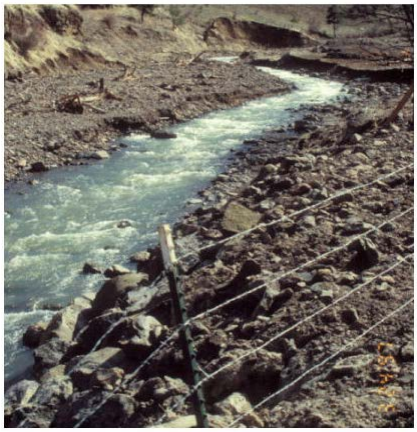

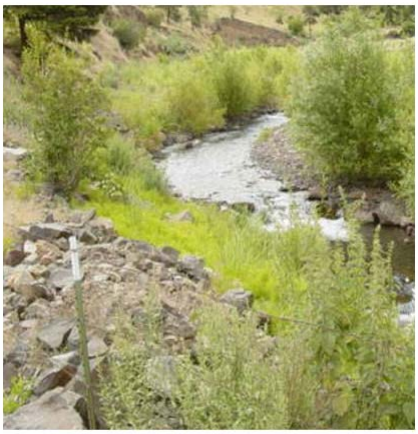

Stream Restoration information

Stream Corridor Restoration (National Engineering Handbook 653)

Stream Restoration Design (National Engineering Handbook 654)

NRCS Stream Corridor Restoration Team Workgroup

These files require **Adobe Acrobat**.

Channel Restoration Design for Meandering Rivers (8 Mb, Corps of Engineers)
Hydraulic Design of Stream Restoration Projects (10.5 Mb, Corps of Engineers)
Design of Spur-Type Streambank Stabilization Structures (10.5 Mb, FHWA)

- **Assessing Conditions of Riparian-Wetland Corridors at the Areawide Leve**
  Using Proper Functioning Condition (PFC) methodology — an interdisciplinary assessment tool (Technical Report, September 1999)

  Assessing Conditions of Riparian-Wetland Corridors (881 KB)

- **Engineered Log Jams**

  "We Be Jammin'" Article, Wildlife Conservation, Mar/Apr 1999 (1.4 MB)
  "Jammin' for the Salmon" Article, San Jose Mercury News, April 1999 (19.5 KB)

- **Let Rivers Teach Us**
  A paper presented by Luna Leopold

  Let Rivers Teach Us (11 KB)

- **A Reflection on the Johnson Creek Watershed Water Quality Improvemen Project**

1982-1999 (Draft Document)

A Reflection on the Johnson Creek Watershed Water Quality Improvement Project (10.1 MB)

The Restoration & Management of Small Wetlands of the Mountains & Piedmont in the Southeast
A Manual Emphasizing Endangered & Threatened Species Habitat with a Focus on Bog Turtles

Preface (277 KB)
Chapter 1: Introduction (420 KB)
Chapter 2: Ecology of Bog Turtles (286 KB)
Chapter 3: Identifying Important Small Wetlands and Potential Sites for Rare Species in the Southeast (205 KB)
Chapter 4: Planning for Success (631 KB)
Chapter 5: Managing Wetland Vegetation (584 KB)
Chapter 6: Managing Hydrology (613 KB)
Chapter 7: Programs and Permitting (151 KB)
Appendix A: Reference Wetland Plant Communities (98 KB)
Appendix B: Rare Animals and Plants of Southern Appalachian Wetlands (85 KB)
Appendix C: Example Handout on Endangered Species (75 KB)
Appendix D: Directory of Contacts for Rare Species (75 KB)
Appendix E: Wetland Site Data Sheet (90 KB)
Appendix F: Informative Handouts for Landowners (34 KB)
Appendix G: Additional Herbicide Information (15 KB)
Glossary (18 KB)
Biographies of the Authors (10 KB)

Riparian Forest Buffers

Introduction (880 KB)
Design Exercise (482 KB)
Model State Standard, January 2001 (364 KB)
Model State General Specifications, January 2001 (149 KB)
Conservation Practice Job Sheet, April 1997 (132 KB)

STREAM*A*SYST - Stream Corridor Inventory and Assessment Techniques
A guide to site, project and landscape approaches suitable for local conservation programs (Technical Report, January 2001, revised)

STREAM*A*SYST (879 KB)

Stream Corridor Inventory and Assessment Techniques
A guide to site, project and landscape approaches suitable for local conservation programs (Technical Report, January 2001, revised)

Stream Corridor Inventory and Assessment Techniques (2.55 MB)

Sugar Creek Watershed Project
An Application of Geomorphic Principles to Sands and Low Plasticity Silts

Case Study, July 1998 (143 KB)
Appendix 1a: Hierarchical River Inventory Levels (15 KB)
Appendix 1b: Major Stream Type Delineative Criteria (347 KB)
Appendix 1c: Natural River Classification Key (457 KB)

Watershed Condition Series

Biotic Condition Indicators for Water Resources (1.8 MB)
Index of Biotic Integrity (IBI) (921 KB)
The EPT Index (905 KB)

Last Modified: 03/14/2012

RIPARIAN FOREST BUFFER

PRACTICE INTRODUCTION

USDA, Natural Resources Conservation Service - practice code 391

RIPARIAN FOREST BUFFER

A riparian forest buffer is an area of trees and/or shrubs located adjacent to a body of water. The vegetation extends outward from the water body for a specified distance necessary to provide a minimum level of protection and/or enhancement.

PRACTICE INFORMATION

This practice applies to areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands and areas associated with ground water recharge.

The riparian forest buffer is a multi-purpose practice design to accomplish one or more of the following:

1. Create shade to lower water temperatures and improve habitat for aquatic animals.
2. Provide a source of debris necessary for healthy robust populations of aquatic organisms and wildlife.
3. Act as a buffer to filter out sediment, organic material, fertilizer, pesticides and other pollutants that may adversely impact the water body, including shallow ground water.

Dominant vegetation consists of existing or planted trees and shrubs suited to the site and purpose (s) of the practice. Grasses and forbs that come in naturally further enhance the wildlife habitat and filtering effect of the practice.

Headcuts and streambank erosion should be assessed and treated appropriately before establishing the riparian forest buffer.

Specifications for each installation are based on a thorough field investigation of each site.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

RIPARIAN FOREST BUFFER

(Ac.)

CODE 391

DEFINITION

An area predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies.

PURPOSE

- Create shade to lower or maintain water temperatures to improve habitat for aquatic organisms.
- Create or improve riparian habitat and provide a source of detritus and large woody debris.
- Reduce excess amounts of sediment, organic material, nutrients and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow ground water flow.
- Reduce pesticide drift entering the water body.
- Restore riparian plant communities.
- Increase carbon storage in plant biomass and soils.

CONDITIONS WHERE PRACTICE APPLIES

Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands. They are not applied to stabilize stream banks or shorelines.

CRITERIA

General Criteria Applicable to All Purposes

The riparian forest buffer shall be positioned appropriately and designed to achieve sufficient width, length, vertical structure/density and connectivity to accomplish the intended purpose(s).

Dominant vegetation will consist of existing, naturally regenerated, or seeded/planted trees and shrubs suited to the soil and hydrology of the site and the intended purpose(s).

The vegetation will extend a minimum width to achieve the purpose(s). Measurement shall begin at and perpendicular to the normal water line, bank-full elevation, or the top of the bank as determined locally.

Overland flow through the riparian area will be maintained as sheet flow.

For sites to be regenerated or planted, excessive sheet-rill and concentrated-flow erosion will be controlled.

Excessive sheet-rill and concentrated-flow erosion will be controlled in the areas immediately adjacent and up-gradient of the buffer site.

Use tree and shrub species that are native and non-invasive. Substitution with improved and locally accepted cultivars or purpose-specific species is allowed. For plantings and seeding, only viable, high-quality and adapted plant materials will be used.

Favor tree and shrub species that have multiple values such as those suited for timber, nuts, fruit, florals, browse, nesting, and aesthetics.

Periodic removal of some forest products such as high value trees, medicinal herbs, nuts, and fruits is permitted provided the intended purpose is not compromised by the loss of vegetation or harvesting disturbance.

Necessary site preparation and planting shall be done at a time and manner to insure

survival and growth of selected species for achieving the intended purpose(s).

Livestock shall be controlled or excluded as necessary to achieve the intended purpose. Refer to the standards Prescribed Grazing, 528, and/or Access Control, 472, as applicable.

Harmful plant and animal pests present on the site will be controlled or eliminated as necessary to achieve and maintain the intended purpose. If pesticides are used, refer to the standard Pest Management, 595.

Additional Criteria to Reduce Excess Amounts of Sediment, Organic Material, Nutrients and Pesticides in Surface Runoff and Reduce Excess Nutrients and Other Chemicals in Shallow Ground Water Flow

The minimum width shall be at least 35 feet measured horizontally on a line perpendicular to the water body beginning at the normal water line, bank-full elevation, or the top of the bank as determined locally.

The width will be extended in high nutrient, sediment, and animal waste application areas, where the contributing area is not adequately treated or where an additional level of protection is needed.

Existing, functional underground drains through the riparian area will pass pollutants directly to the outlet. To filter such pollutants, drains can be plugged, removed or replaced with perforated pipe/end plugs or water control structures (see Structure for Water Control - 587) to allow passage and filtration of drain water through the riparian forest root zone. Caution is advised that saturated conditions in the riparian and adjacent areas may limit existing land use and management.

Additional Criteria to Create or Improve Riparian Habitat and Provide a Source of Detritus and Large Woody Debris.

The width will be extended to meet the minimum habitat requirements of the wildlife or aquatic species of concern.

Establish plant communities that address the target aquatic and terrestrial wildlife and pollinator needs and have multiple values such as habitat, nutrient uptake and shading. The establishment of diverse native woody and herbaceous species will enhance wildlife and pollinator values.

Additional Criteria for Increasing Carbon Storage in Biomass and Soils

Maximize width and length of the riparian forest buffer.

Select plants that have higher rates of carbon sequestration in soils and plant biomass and are adapted to the site to assure strong health and vigor. Plant the appropriate stocking rate for the site.

CONSIDERATIONS

Tree and shrub species, which may be alternate hosts to undesirable pests, should be avoided. Species diversity should be considered to avoid loss of function due to species-specific pests.

Using seed and/or seedlings collected or propagated from multiple sources can increase genetic diversity.

Consider selecting species with tolerance to herbicide leakage from adjoining fields.

Allelopathic impacts of plants should be considered.

The location, layout and density of the buffer should complement natural features, and mimic natural riparian forests.

For sites where continued function of drains is desired, woody root penetration may eventually plug the underground structure. In these cases, a setback of woody vegetation planted over the drain maintained in herbaceous cover or using rigid, non-perforated pipe will minimize woody root penetration.

Maximize widths, lengths, and connectivity of riparian forest buffers.

The species and plant communities that attain biomass more quickly will sequester carbon/ faster. The rate of carbon sequestration is enhanced as riparian plants mature and soil organic matter increases.

PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

The riparian forest buffer will be inspected periodically and protected from adverse impacts such as excessive vehicular and pedestrian traffic, pest infestations, concentrated flows, pesticides, livestock or wildlife damage and fire.

Replacement of dead trees or shrubs and control of undesirable vegetative competition will be continued until the buffer is, or will progress to, a fully functional condition.

Any manipulation of species composition, stand structure and stocking by cutting or killing selected trees and understory vegetation shall sustain the intended purpose(s). Refer to the standard Forest Stand Improvement, 666.

Control or exclusion of livestock and harmful wildlife shall continue. Refer to the standards Prescribed Grazing, 528, and/or Access Control, 472, as applicable.

Fertilizers, pesticides and other chemicals used to maintain buffer function shall not impact water quality.

REFERENCES

Bentrup, Gary 2008. Conservation buffers: design guidelines for buffers, corridors, and greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station.

Exhibit 6

AGRANCHID	AW_NUM	RANCH_NAME	RANCH_CITY	IRRIGATED_ACRES	TAILWATER_ACRES	CROP_TYPE	ROWCROP1	ROWCROP2	ROWCROP3	SPECIFIC_CHEMICAL_USE	RANCH_FARM_TIER
20003134	AW0140	Branciforte Ridge Vineyard	Santa Cruz	2.24	0	VINEYARD					1
20012706	AW0142	Terry Binsaca Ranch - Location 07	Soledad	10	0	ROW	Squash	Pepper, Fruiting	Bean, Dried		1
20012703	AW0142	Schipper Ranch Location #10	Soledad	44	0	ROW	Peas	Carrot	Broccoli		1
20012707	AW0142	Vosti Ranch Location #12	Soledad	8	0	ROW	Broccoli	Cucumber	Pepper, Fruiting		1
20012708	AW0142	DeCarli Ranch	Soledad	19	0	ROW	Broccoli	Lettuce, Head	Peas		1
20012702	AW0142	Pura Ranch Location #11	Greenfield, CA	34.5	0	ROW	Lettuce, Head	Peas	Broccoli		1
20000484	AW0146	Homestead Olive Ranch	Templeton	2	0	ROW, ORCHARD	Corn, Human Con.	Walnut	Olive		1
20000777	AW0157	Yano Farms, Inc.	Carpinteria	8	0	NURSERY, ORCHARD	Avocado				1
20000774	AW0157	Yano Farms, Inc.	Carpinteria	4	0	NURSERY, ORCHARD	Avocado				1
20000780	AW0157	Yano Farms, Inc.	Carpinteria	1	0	NURSERY, ORCHARD	Avocado				1
20006900	AW0160	Ma Vigne Au Soleil	Templeton	8		VINEYARD					1
20001079	AW0163	Burnett Ranch	San Juan Bautista	40		ROW	Celery	Lettuce, Leaf	Pepper, Fruiting		1
20001081	AW0163	Flocken	San Juan Bautista	30		ROW, ORCHARD	Apple	Celery	Lettuce, Leaf		1
20001096	AW0163	Bozo/Fields	Watsonville	20	0	ROW	Broccoli	Cauliflower	Lettuce, Head		1
20001097	AW0163	Milladan	Watsonville	34	7	ROW	Broccoli	Celery	Cauliflower		1
20001094	AW0163	Madesko	Watsonville	0	0	ROW	Cauliflower	Celery	Lettuce, Head		1
20001092	AW0163	Vucovich	Watsonville	25		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		1
20001101	AW0163	Pajaro	Watsonville	54	54	ROW	Lettuce, Leaf	Lettuce, Head	Celery		1
20001100	AW0163	Marinovich	Watsonville	20	20	ROW	Lettuce, Leaf	Celery	Lettuce, Head		1
20001085	AW0163	Peterson	San Juan Bautista	40		ROW	Celery	Lettuce, Leaf			1
20001083	AW0163	Union Road	Hollister	6	0	ORCHARD	Apple				1
20008368	AW0163	Bernie Ranch	San Juan Bautista	26	26	ROW	Celery	Lettuce, Head	Lettuce, Leaf		1
20008173	AW0165	Good Plants	Arroyo Grande	1.3	0	GREENHOUSE					1
20001635	AW0165	Ball FloraPlant	Arroyo Grande	4.3	0	GREENHOUSE					1
20007529	AW0166	Quinn Vineyards East	San Miguel	113	0	VINEYARD					1
20007530	AW0166	Quinn Vineyards West	Paso Robles	44	0	VINEYARD					1
20006380	AW0167	Clos Pepe Vineyards	Lompoc	35	7	VINEYARD, ORCHARD	Grapes, Wine	Olive			1
20001496	AW0168	Big Basin Vineyards	Boulder Creek	10	0	VINEYARD					1
20007824	aw0172	San Antonio Valley Vineyards	Bradley	20	0	VINEYARD					1
20003252	AW0175	Old School House Vineyard	Templeton	17.8	0	VINEYARD					1
20003248	AW0175	Snow Vineyard	Paso Robles	14.24	0	VINEYARD					1
20003245	AW0175	Mustang Springs	Paso Robles	22.76	0	VINEYARD					1
20003251	AW0175	Mustard Creek Vineyard	Paso Robles	8.36	0	VINEYARD					1
20007199	AW0180	POS	Santa Maria	43	43	ROW	Strawberry				1
20003125	AW0182	Keyes Valley Ranch	san Miguel	325	0	ROW, VINEYARD	Barley	Grapes, Wine	Oat		1
20003657	AW0185	Sunview Shandon Ra 44 East	Shandon	123	0	VINEYARD					1
20003653	AW0185	Sunview Shandon Ra 44 west	Shandon	82	0	VINEYARD					1
20003639	AW0185	Sunview Shandon Ra 37	Shandon	209	0	VINEYARD					1
20003650	AW0185	Sunview Shandon Ra 48	Shandon	143	0	VINEYARD					1
20003642	AW0185	Sunview Shandon Ra 47	Shandon	143	0	VINEYARD					1
20005402	AW0189	Watsonville	Watsonville	20	12	NURSERY					1
20005380	AW0189	Salinas 1	Salinas	34	27	NURSERY, GREENHOUSE					1
20007137	AW0200	Swanton Pacific Ranch	Davenport	60	60	ROW	Apple				1
20004398	AW0201	Brand Flower Farms	Carpinteria	60	10	ROW, NURSERY, GREENHOUSE	Other				1
20004400	AW0201	Lilydale	Carpinteria	7	0	GREENHOUSE					1
20003308	AW0203	PR 18	Paso Robles	53.21		VINEYARD					1
20003303	AW0203	PR 16	Paso Robles	42.8		VINEYARD					1
20003305	AW0203	PR 17	San Miguel	73.74		VINEYARD					1
20003302	AW0203	PR 15	Paso Robles	109		VINEYARD					1
20003319	AW0203	GV 9	Greenfield	181.99		VINEYARD					1
20003318	AW0203	GV 8	Greenfield	101.16		VINEYARD					1
20003314	AW0203	GV 5	Greenfield	38.82		VINEYARD					1
20003312	AW0203	GV 3	Greenfield	55.35		VINEYARD					1
20003291	AW0203	PR 3 and PR 4	Paso Robles	120.75		VINEYARD					1
20003309	AW0203	PR 19	San Miguel	45.36		VINEYARD					1
20003294	AW0203	PR 6	Paso Robles	144.16		VINEYARD					1
20003292	AW0203	PR 5	Paso Robles	140.97		VINEYARD					1
20003316	AW0203	GV 6 and 7	Greenfield	141.84		VINEYARD					1
20003322	AW0203	GV 11	Greenfield	33		VINEYARD					1
20003320	AW0203	GV 10	Greenfield	34.6		VINEYARD					1
20003299	AW0203	PR 12	San Miguel	131.3		VINEYARD					1
20003297	AW0203	PR 10	Paso Robles	92.64		VINEYARD					1

Enrollment information in the Water Board's GeoTracker data management system as of Aug. 1, 2012.

20003296	AW0203	PR 9	Paso Robles	97.25		VINEYARD				1
20003290	AW0203	PR 2	Paso Robles	67.4		VINEYARD				1
20003289	AW0203	PR 1	Paso Robles	68.04		VINEYARD				1
20003301	AW0203	PR 14	Paso Robles	302.44		VINEYARD				1
20003313	AW0203	GV 4	Greenfield	96.08		VINEYARD				1
20003311	AW0203	GV 1 and 2	Greenfield	108.97		VINEYARD				1
20003300	AW0203	PR 13	Creston	168.5		VINEYARD				1
20003295	AW0203	PR 7	Paso Robles	70.79		VINEYARD				1
20003298	AW0203	PR 11	Paso Robles	57.45		VINEYARD				1
20001620	AW0208	Last Frontier Vineyards	Creston	35.5	0	VINEYARD				1
20000856	AW0214	Guerra Ranch	Morro Bay	18	0	ORCHARD	Avocado			1
20006320	AW0216	Lockwood Oaks Vineyard	Lockwood	83	0	VINEYARD				1
20001123	AW0220	Keisyn Vineyard	templeton	14.05	0	VINEYARD				1
20001129	AW0220	Pomar Junction Vineyard	Templeton	97	0	VINEYARD, ORCHARD				1
20001131	AW0220	Brohaugh Vineyard	Paso Robles	33	0	VINEYARD				1
20004680	AW0222	Foothill	Carpinteria	7	0	GREENHOUSE				1
20003374	AW0228	Andreoli Vineyards & Orchards	San Miguel	4	0	VINEYARD				1
20005202	AW0229	Windmill Nursery	Buellton	4	4	NURSERY, GREENHOUSE				1
20008108	AW0232	Green House Ranch	Salinas	43	43	ROW	Bean, Unspecified	Lettuce, Head	Lettuce, Leaf	1
20008104	AW0232	Long	Salinas	48	48	ROW	Lettuce, Leaf	Lettuce, Head	Bean, Unspecified	1
20001734	AW0232	Tarp	Salinas	36		ROW	Strawberry			1
20003217	AW0233	Firestone Vineyards	Los Olivos	325		VINEYARD				1
20003219	AW0233	Lincourt	Solvang	25		VINEYARD				1
20003476	AW0235	Moss Ridge Vineyard	Paso Robles	7.2	0	VINEYARD				1
20000879	AW0240	Still Waters Vineyards	Paso Robles	60	0	VINEYARD				1
20009362	AW0242	Home Ranch	Oceano	10	10	ROW	Broccoli	Cauliflower	Potato	1
20009363	AW0242	Dominion Ranch	Santa Maria	20	0	ROW	Broccoli			1
20000713	AW0243	Four Elements Organics	Atascadero	5	0	ORCHARD	Apple	Citrus	Pear	1
20000512	AW0245	Winfield Farm	Buellton	12		ROW, ORCHARD, GREENHOUSE	Corn, Human Con.	Tomato	Onion, Dry	1
20003767	AW0251	Hess Vineyard	Soledad	340	0	VINEYARD				1
20003769	AW0251	Deadmans Gulch Vineyard	san Ardo	63	0	VINEYARD				1
20003756	AW0251	Marks Vineyard	Greenfield	396	0	VINEYARD				1
20003770	AW0251	Vineyard Library #3	Soledad	55	0	VINEYARD				1
20003768	AW0251	RS Property I	Soledad	150	0	VINEYARD				1
20003766	AW0251	Vineyard Library #2	Soledad	162	0	VINEYARD				1
20003763	AW0251	Porter Smith I	Bradley	107	0	VINEYARD				1
20003761	AW0251	Smith and Lindley Vineyard	Soledad	340	0	VINEYARD				1
20003752	AW0251	Vineyard Library #1	Soledad	196	0	VINEYARD				1
20003760	AW0251	Porter Smith II	Bradley	97	0	VINEYARD				1
20003759	AW0251	RLS Vineyard	Greenfield	282	0	VINEYARD				1
20003758	AW0251	Cobblestone Vineyard	Greenfield	43	0	VINEYARD				1
20003757	AW0251	RS Property II	Greenfield	64	0	VINEYARD				1
20003751	AW0251	Paraiso Vineyards	soledad	254	0	VINEYARD				1
20003765	AW0251	Porter Smith I	Bradley	189	0	VINEYARD				1
20003754	AW0251	Vineyard Library #4	Greenfield	71	0	VINEYARD				1
20003762	AW0251	San Ardo Sue	San Ardo	30	0	VINEYARD				1
20000587	AW0252	Calzada Ridge Vineyard	Santa Ynez	0.5	0	VINEYARD				1
20003155	AW0253	Claxton Agro	Santa Ynez	42	0	VINEYARD				1
20001553	AW0257	Grimm Farm	Goleta	9	9	ORCHARD	Avocado			1
20002609	AW0265	Russell East South	Shandon	44	0	ROW	Carrot			1
20002607	AW0265	Russell trees	Shandon, CA	50	0	ORCHARD				1
20002608	AW0265	Russell West	Shandon	46	0	ROW	Carrot			1
20002611	AW0265	Sinton 1 South	Shandon	55	0	ROW	Carrot			1
20002414	AW0268	PRESTON FARMS	PASO ROBLES	26	0	VINEYARD				1
20007177	AW0271	Emerald Hills Vineyard	Paso Robles	20	0	VINEYARD				1
20007796	AW0272	linda coyle	goleta	7	7	ORCHARD				1
20007289	AW0273	Luv-a-Duck	Templeton	5.72	0	VINEYARD				1
20000600	AW0281	SVP Winery Vineyards	Shandon	100	0	VINEYARD	Grapes, Wine			1
20000795	AW0284	Ardillas	Nipomo	12	0	ROW	Strawberry	Strawberry	Strawberry	1
20007481	AW0286	Wafelbakker vineyard	Morgan Hill	0.5	0	VINEYARD				1
20003998	AW0292	LDC Ranch/Denier Farms	Goleta	68	136	ORCHARD	Avocado	Lemon		1
20007080	AW0294	Creek Lot	Carpinteria	0.5		ORCHARD	Avocado			1
20008582	AW0298	Galarneau Walnuts	Buellton	16	0	ORCHARD	Walnut			1

20004937	AW0298	Rancho La Vina/walnuts	Lompoc	152	0	ORCHARD	Walnut			1
20007191	AW0298	Rancho La Vina/grapes	Lompoc	35	0	VINEYARD	Grapes, Wine			1
20007190	AW0298	Rancho La Vina/hoops	Lompoc	24	0	ROW	Tomato	Squash, Summer	Peas	1
20005064	AW0301	Via Vega Vineyard	Paso Robles	15		VINEYARD				1
20002092	AW0302	Evenson Ranch	San Miguel	10	0	VINEYARD	Grapes, Wine			1
20000857	AW0305	O'Neill Vineyards	Paso Robles	157	157	VINEYARD	Grape			1
20000706	AW0310	Paraiso Ranch	Soledad	45	0	VINEYARD				1
20009602	AW0311	Arita Hills	Buellton	11.25	0	VINEYARD	Grapes, Wine	Grapes, Wine		1
20000677	AW0315	Rancho Rio Conejo	Cayucos	37	0	ORCHARD				1
20005165	AW0316	Monte & Cathy Lamb Vineyard	San Miguel	4.5	0	VINEYARD				1
20005156	AW0316	Estrella Valley Vineyard	San Miguel	36	0	VINEYARD				1
20005171	AW0316	Emerald hills Vineyard	Paso Robles	21	0	VINEYARD				1
20005152	AW0316	Brave Oak Vineyard, LLC	Paso Robles	78	0	VINEYARD				1
20001744	AW0324	Chesebrough Farm	Templeton	10	0	ROW	Corn, Human Con.	Pumpkin	Squash	1
20003494	AW0327	Salinas Transplant Company	Salinas	9.3		GREENHOUSE				1
20000785	AW0331	Jack R. Amon	Santa Ynez	5	0	NURSERY	Raspberry			1
20003239	AW0332	James Berry Vineyard	Paso Robles	50	0	VINEYARD				1
20007751	AW0334	San Juan Bautista	San Juan Bautista	300	300	ROW	Other			1
20003439	AW0335	Vogelzang Vineyard	Santa Ynez	80	0	VINEYARD				1
20001380	AW0338	Prestons' Vineyard	Templeton	3	3	VINEYARD				1
20002644	AW0342	Camp Six Ranch	San Miguel	5.25	0	VINEYARD	Grapes, Wine			1
20001702	AW0343	Alfred Fiscalini Ranch	Cambria	5	0	ORCHARD				1
20001705	AW0344	Wayne L. and Kathleen M. Gerhardt	Cambria	4.5	0	ORCHARD				1
20000902	AW0347	GH Holdings LP	San Miguel	69	0	VINEYARD				1
20000904	AW0347	Shale Oak Vineyard	Paso Robles	4.53	0	VINEYARD				1
20002242	AW0348	Fitzhugh Quarter Circle Flying W Ranch	Cambria	2	0	ORCHARD	Avocado	Citrus	Apple	1
20004031	AW0349	POMAR RIDGE OLIVE FARM	TEMPLETON	4	0	ORCHARD	Olive			1
20000884	AW0350	Fitzhugh Hill Ranch	Cambria	1	0	ORCHARD				1
20001523	AW0351	Van Wingerden Ranch 4444	Carpinteria	20		ORCHARD	Avocado	Other		1
20001530	AW0351	Live Oak	Nipomo	12		GREENHOUSE	Other			1
20001529	AW0351	Van Wingerden Ranch Nipomo 1	Nipomo	64		ORCHARD	Avocado			1
20007299	AW0352	John Bognuda Farms	Arroyo Grande	40	0	ROW	Oat			1
20001604	AW0352	PORTER RANCH CO LLC	ARROYO GRANDE	40	0	ROW	Oat			1
20001138	AW0353	Valhalla Vineyards	Paso Robles	14	0	VINEYARD				1
20007167	AW0354	2G Roses	Royal Oaks	6	6	GREENHOUSE				1
20002401	AW0355	Nona Vineyards	San Miguel	15	0	VINEYARD	Grapes, Wine			1
20002640	AW0356	Judith Starr	Paso Robles	34.5	0	VINEYARD				1
20003597	AW0357	Encino Grande Ranch	Cayucos	19	0	ORCHARD				1
20001517	AW0358	Hunt Ranch	Templeton	2	0	ORCHARD				1
20000661	AW0359	Del Giorgio Ranch	Carpinteria	23	0	ORCHARD	Avocado			1
20000641	AW0361	Twin Fawns Vineyard	San Miguel CA	52	0	VINEYARD				1
20007882	AW0364	Andy Poteete	San Simeon	15	0	ORCHARD	Avocado			1
20002924	AW0367	Kokopelli vineyards	paso robles	0	0	VINEYARD				1
20003847	AW0379	RANCH 03 (HUTCHERSON)	SANTA MARIA	0	0	ROW	Strawberry			1
20002645	AW0382	Kathryn Bell Limon Avocado Grove	Morro Bay	10	0	ORCHARD				1
20004880	AW0385	Clos LaChance Estate Vineyards	San Martin	91	29	VINEYARD				1
20008536	AW0385	Ukestad Vineyard	San Martin	1		VINEYARD				1
20004894	AW0385	Clos LaChance Cordevalle Estates Vineyards	San Martin	53	0	VINEYARD				1
20004555	AW0386	Chamisal Vineyards	San Luis Obispo	82	0	VINEYARD	Grapes, Wine			1
20000986	AW0387	Paradise Valley Vineyards	Morgan Hill, Ca	0.5	0	VINEYARD	Grapes, Wine			1
20003082	AW0398	Meeker Vineyards	San Miguel	110	0	VINEYARD				1
20003168	AW0399	Foletta Property	San Ardo	40		ORCHARD				1
20000971	AW0402	Bootjack ranch	Paso Robles	155	155	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20007633	AW0402	Heart Hill Vineyard	Paso Robles	46	46	VINEYARD	Grapes, Wine			1
20004718	AW0404	Betita Parcel	Arroyo Grande	4.9	0	ROW	Chinese Cabbage	Other		1
20004714	AW0404	Cecchetti Parcel	Arroyo Grande	17	0	ROW	Cabbage	Chinese Cabbage	Other	1
20004717	AW0404	Saari Parcel	Arroyo Grande	7.1	0	ROW	Chinese Cabbage	Other	Bean, Unspecified	1
20004715	AW0404	Kawaguchi Parcel	Arroyo Grande	8.7	1	ROW	Brussel Sprout	Bean, Unspecified	Other	1
20004719	AW0404	Reyes Parcel	Arroyo Grande	7	1	ROW	Chinese Cabbage	Brussel Sprout	Other	1
20004025	AW0405	MIKE JACKSON FARMS	CAYUCOS	40	0	ORCHARD	Avocado			1
20003837	AW0408	nojoqui falls	gaviota	35	0	ROW	Onion, Dry	Pepper, Fruiting	Parsley	1
20003730	AW0408	rhoads ave	santa barbara	6	0	ROW	Celery	Cucumber	Lettuce, Leaf	1
20003729	AW0408	st athanasius church	santa barbara	14	0	ROW	Celery	Cucumber	Lettuce, Leaf	1

20003717	AW0408	jeff james	goleta	1.5	0	ROW	Tomato	Pepper, Fruiting	Peas	1
20003823	AW0408	fred meyer	santa barbara	4	0	ROW	Celery	Cucumber	Lettuce, Leaf	1
20003830	AW0408	el cap	goleta	12	0	ROW	Peas	Tomato	Pepper, Fruiting	1
20003716	AW0408	la goleta	goleta	8	0	ROW	Cauliflower	Kale	Tomato	1
20003731	AW0408	#50	goleta	12	0	ROW	Celery	Lettuce, Leaf	Squash	1
20003727	AW0408	stan giorgi	santa barbara	12.5	0	ROW	Carrot	Cabbage	Kale	1
20003720	AW0408	720 ward drive	santa barbara	38	0	ROW	Carrot	Cabbage	Bean, Unspecified	1
20003833	AW0408	arrella	goleta	4	0	ROW	Tomato	Peas	Bean, Unspecified	1
20003905	AW0411	PJ Foley Ranching	Carpinteria	10	0	ORCHARD				1
20003908	AW0411	Bailard Boys Ranch formerly Ranch #2	Carpinteria	15	0	ORCHARD				1
20007711	AW0416	Same	Carpinteria, Ca	3	0	NURSERY, ORCHARD				1
20004230	AW0421	Singleton home	Hollister	2	0	ORCHARD	Walnut			1
20001901	AW0427	Patterson Ranch #2	Goleta	1.5		ORCHARD	Avocado			1
20001902	AW0427	Hollister Ranch #4	Goleta	64		ROW, ORCHARD	Lemon	Squash	Cucumber	1
20000800	AW0431	Asegra Ranch	Summerland	3	5	NURSERY				1
20007383	AW0432	Maximum Nursery Inc	Carpinteria	4.5	0	GREENHOUSE				1
20007382	AW0432	Maximum Nursery Inc	Carpinteria	12	0	ROW, ORCHARD	Avocado			1
20004561	AW0438	Ing Estates Vineyard	Lockwood	40	40	VINEYARD				1
20001066	AW0443	Clearwater	Nipomo	65	10	NURSERY				1
20000436	AW0445	Ackerman Acres	Nipomo	8	8	ROW, ORCHARD	Avocado	Lemon		1
20005192	AW0446	succulent gardens,inc.	castroville	2	2	NURSERY, GREENHOUSE				1
20004547	AW0447	KITAGAWA NURSERY, INC.	CARPINTERIA	8.5	0	NURSERY, ORCHARD, GREENHOUSE	Other	Avocado		1
20004700	AW0449	Serena Ranch	Carpinteria	10	10	ORCHARD	Avocado			1
20004693	AW0449	Hilltop Ranch	Carpinteria	10	10	ORCHARD	Avocado	Citrus		1
20007628	AW0458	Midnight Cellars, INC.	Paso Robles	28	0	VINEYARD				1
20004007	AW0460	San Carlos/Featherhill Ranch	Santa Barbara	110.85	0	ORCHARD	Avocado	Citrus		1
20000888	AW0461	Faith Vineyard	Los Olivos CA	6.5	0	VINEYARD				1
20005007	AW0468	Buttonwood Farm	Solvang	46	0	ROW, VINEYARD, ORCHARD	Peach	Grapes, Wine	Tomato	1
20000848	AW0472	Jones Ranch	Morro Bay	6	0	ORCHARD				1
20002181	AW0473	Alan Eto	Los Osos	14	0	ROW	Peas	Bean, Dried		1
20002656	AW0475	Reinhard Pistachios	Paso Robles	6	0	ORCHARD				1
20003159	AW0476	Pine Hawk Vineyards	San Miguel	57	0	VINEYARD				1
20000687	AW0478	Vistosa Orchard	Santa Barbara	1	1	ORCHARD	Avocado			1
20003800	AW0479	Plantel Nurseries, Inc.	Santa Maria	8.6	0	NURSERY, GREENHOUSE	Other			1
20003803	AW0479	Plantel Nurseries, Inc. Garey	Santa Maria	13.1	0	NURSERY, GREENHOUSE	Other			1
20003809	AW0479	Clark Ave.	Santa Maria	101.4	80	ROW, NURSERY, GREENHOUSE	Raspberry	Blackberry	Other	1
20005203	AW0481	Bourdet Ranch	Hollister	173		ROW	Tomato	Other		1
20005089	AW0481	Flynn Ranch	Hollister	41		ROW	Tomato	Lettuce, Leaf	Other	1
20005142	AW0481	Vosti Ranch	Hollister	49		ROW	Tomato	Lettuce, Leaf	Other	1
20005073	AW0481	DeBrito Ranch	Hollister	3		ORCHARD				1
20005109	AW0481	McCloskey Ranch	Hollister	119		ROW	Tomato	Squash	Other	1
20004994	AW0481	Brigantino Ranch	Hollister	25	0	ROW, ORCHARD	Tomato	Other	Squash	1
20005166	AW0481	Yuste Ranch	Hollister	26		ROW	Peas	Tomato	Other	1
20005017	AW0481	Bertuccio Orchard	Hollister	55		ORCHARD				1
20001299	AW0486	Shady Glenn Farms	Nipomo	0.5	0	ROW	Squash			1
20001500	AW0488	581 Foothill Road	Hollister	5.5	0	ORCHARD	Other			1
20001499	AW0488	100 Arroyo Seco	Hollister	4.9	0	ORCHARD	Other			1
20001491	AW0488	341 Arroyo Seco	Hollister	4.5	0	ORCHARD	Other			1
20001495	AW0488	140 Arroyo Seco	Hollister	3.6	0	ORCHARD	Other			1
20001488	AW0488	835 Foothill Road	Hollister	3.5	0	ORCHARD	Other			1
20001493	AW0488	61 Arroyo Seco	Hollister	4.6	0	ORCHARD	Other			1
20003615	AW0489	Home Ranch	Carmel Valley	1.5	0	ORCHARD	Olive			1
20005087	AW0490	Shinta Kawahara Company Incorporated	Watsonville	27	0	ROW	Strawberry			1
20004768	AW0491	Harvest Moon Vineyards	Gilroy	10		VINEYARD				1
20005281	AW0494	Vintage Organics, Inc	San Luis Obispo	65		ROW, ORCHARD	Artichoke	Other		1
20004279	AW0497	Susan Lyon	Cayucos	23.7	0	ORCHARD				1
20000928	AW0500	Brosseau Ranch	Soledad	36	0	VINEYARD				1
20004353	AW0501	Sun Coast Growers	Salinas	39	0	ROW, NURSERY, GREENHOUSE	Celery	Lettuce, Leaf	Broccoli	1
20004581	AW0507	Morro North	Morro Bay	11.6	0	ORCHARD				1
20005129	AW0509	Rancho Mora	Santa Barbara	10.8	0	ROW	Avocado			1
20003739	AW0513	Estrella Farms	San Miguel	18	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20004046	AW0514	Greenheart Farms Inc, Freitas Nursery	Guadalupe	4	0	NURSERY				1
20004041	AW0514	Greenheart Farms Inc, Arroyo Grande	Arroyo Grande	17.43	0	NURSERY, GREENHOUSE				1

20004081	AW0515	Ball Tagawa Growers	Arroy Grande	6	0	NURSERY, GREENHOUSE				1
20007835	AW0518	Central Coast Sod, Inc	Santa Maria	70	0	NURSERY				1
20007310	AW0519	Foothill Flowers	Carpinteria	10	0	NURSERY, ORCHARD	Avocado	Other		1
20005051	AW0520	Hicks Ranch	Salinas	28.3	0	ROW	Broccoli	Celery	Strawberry	1
20001271	AW0522	GGG Grove	Santa Barbara	1.9	0	ORCHARD	Avocado			1
20001147	AW0525	Labrador Canyon	Carpinteria	1.5		VINEYARD, ORCHARD	Avocado			1
20005120	AW0526	Held Ranch Cordoza Ranch	Cayucos	35	0	ORCHARD				1
20005116	AW0526	Held Ranch Cayucos Creek	Cayucos	70	0	ORCHARD				1
20007287	AW0531	Rose Story Farm	Carpinteria	15	0	ORCHARD	Avocado			1
20007752	AW0532	Tichenor Avocado	San Luis Obispo	26	0	ORCHARD				1
20003081	AW0534	Home Vineyard	Paso Robles	94.1	0	VINEYARD				1
20003080	AW0534	Villa Toscana Vineyard	Paso Robles	52.9	0	VINEYARD				1
20007707	AW0542	MacElvaine Ranch	Morro Bay	24	24	ORCHARD	Avocado			1
20000511	AW0548	Evans Ranch	Morro Bay	46	0	ROW, VINEYARD, ORCHARD	Pepper, Fruiting	Squash, Summer		1
20001310	AW0549	Erro Ranch	Cuyama	1269.39		ROW	Carrot	Bean, Unspecified	Barley	1
20001309	AW0549	Brash Ranch	Ventucopa	78.49		ROW	Carrot	Barley		1
20001313	AW0549	Hub Russell Ranch SLOC	New Cuyama	1356.28	0	ROW	Barley	Carrot	Bean, Unspecified	1
20001314	AW0549	Joe Russell Ranch	New Cuyama	905.6	40	ROW	Carrot	Other		1
20001315	AW0549	Serrano / Richards Ranch	Cuyama	119.68		ROW	Carrot			1
20001318	AW0549	Wegis Triangle E Ranch	Cuyama	97.02		ROW	Carrot			1
20001316	AW0549	Virgilio Ranch	Ozena	143		ROW	Carrot	Bean, Dried	Barley	1
20007766	AW0550	Peck-Clark-Gruenhagen Ranch 2	Shandon	0	0	ROW	Other			1
20007721	AW0550	Peck Ranch 1	Shandon	0	0	ROW	Other			1
20002591	AW0550	Rohnert	Hollister	30.7	30.7	ROW	Lettuce, Leaf	Mustard	Spinach	1
20002592	AW0550	Wright	Hollister	47.1	47.1	ROW	Lettuce, Leaf	Mustard	Spinach	1
20002590	AW0550	S. Pura	Hollister	29.4	29.4	ROW	Lettuce, Leaf	Mustard	Spinach	1
20011422	AW0550	Doud Ranch 12	King City	40	40	ROW	Broccoli			1
20003824	AW0551	DuPont	Watsonville	240	20	ROW	Brussel Sprout			1
20003821	AW0551	Delucchi	Watsonville	74	20	ROW	Brussel Sprout			1
20002658	AW0556	macfarms	Morro Bay	8	0	ORCHARD	Avocado			1
20001164	AW0559	Erro Ranch	Cuyama	363.9		ROW	Carrot	Barley		1
20001167	AW0559	Hub Russell Ranch SLOC	New Cuyama	2093.66	80	ROW	Carrot	Bean, Unspecified	Barley	1
20001226	AW0559	Serrano / Richards Ranch	Cuyama	307.19		ROW	Carrot	Barley		1
20001259	AW0559	Harvey Russell Ranch Continued	New Cuyama	0		ROW	Carrot			1
20001198	AW0559	Hub Russell Ranch SBC	New Cuyama	0		ROW	Carrot	Bean, Unspecified	Barley	1
20001236	AW0559	Tut Ranch	Cuyama	373.68		ROW	Carrot	Barley		1
20001201	AW0559	Harvey Russell Ranch	New Cuyama	1491.93		ROW	Carrot	Barley	Other	1
20005441	AW0561	Chateau Margene	Creston	5.5	5.5	VINEYARD	Grapes, Wine			1
20002965	AW0562	Sunset Hill Ranch Vineyard	San Miguel	3	0	VINEYARD	Grapes, Wine			1
20007814	AW0563	Robert King	CARPINTERIA	6	6	NURSERY				1
20007720	AW0570	Song's Flowers	Santa Maria	6	0	NURSERY				1
20000564	AW0571	Hidden Springs Tree Farm	atascadero	10	0	ORCHARD				1
20004244	AW0572	Bamboo Giant Nursery, Inc.	Aptos	17	0	NURSERY				1
20002926	AW0573	Paso del Sol	Paso Robles	4		VINEYARD				1
20006141	AW0577	Endow Nursery	Carpinteria	7	7	NURSERY, GREENHOUSE				1
20004996	AW0578	NAGAMINE	WATSONVILLE	7.5	0	GREENHOUSE				1
20003931	AW0586	Bell Tower Ranch	Morro Bay	3.4		ORCHARD				1
20007424	aw0592	Blackjack Ranch Vineyard	solvang	16	9	VINEYARD				1
20008532	aw0593	Jeff ELings	Santa Barbara	5	0	ORCHARD	Avocado			1
20003066	AW0599	Carhartt Vineyard	Solvang	9.63	0	VINEYARD	Grapes, Wine			1
20003413	AW0602	Los Alisos Ranch	Santa Barbara	65	0	ORCHARD	Avocado			1
20007161	AW0604	Royal Oaks Wineery	Santa Ynez	22		VINEYARD	Grapes, Wine			1
20001237	AW0608	Madaline Vineyard	Gilroy	4.5	0	VINEYARD				1
20007926	AW0608	Dos Ninas Vineyards	Gilroy	7	0	VINEYARD				1
20005001	AW0609	Steve Scheftic	Santa Barbara	3	0	ORCHARD	Avocado			1
20010722	AW0612	Dubost Ranch	paso Robles	5		VINEYARD, ORCHARD				1
20007221	AW0614	LOJACONO VINEYARD	TEMPLETON	40	0	VINEYARD				1
20004264	AW0616	Bosio FamilyPartnership & RDA-CoOwners	Santa Barbara	215	0	ORCHARD	Avocado			1
20001163	AW0622	Mac Brown Inc	Ventura	45	0	ORCHARD				1
20007883	AW0623	same	Cayucos	25	25	ROW	Squash	Peas		1
20001457	AW0624	Ranch #3-Main Yard	Gilroy	40	0	NURSERY	Collard			1
20007412	AW0628	DEBRILEY RANCH	Santa Barbara	7	7	ORCHARD	Avocado			1
20004701	AW0630	Cascade Ranch	Pescadero	100	100	ROW	Brussel Sprout	Peas	Pumpkin	1

Enrollment information in the Water Board's GeoTracker data management system as of Aug. 1, 2012.

20000792	AW0632	Bear Valley Vineyards	Parkfield	51	0	VINEYARD				1
20007411	AW0634	Sweet Ranch	Santa Margarita	6		ORCHARD				1
20004325	AW0635	Old Creek Ranch	Cayucos	30	0	ROW, ORCHARD	Avocado	Citrus		1
20009162	AW0637	Cal-Orchid, Inc.	santa barbara	2	0	GREENHOUSE	Other			1
20001545	AW0640	Central Coast Wilds	Santa Cruz	1	1	NURSERY				1
20008170	AW0641	Lazy F Vineyard	Lompoc	41	0	VINEYARD				1
20003696	AW0641	Rideau Vineyard	Solvang	13.5	0	VINEYARD				1
20003681	AW0641	Rio Vista Vineyard	Buellton	68	0	VINEYARD				1
20003684	AW0641	Tierra Alta Vineyard	Los Olivos	61	0	VINEYARD				1
20004012	AW0641	Estelle Vineyard	Santa Ynez	78	0	VINEYARD				1
20003693	AW0641	Morman's Vineyard	Lompoc	13	0	VINEYARD				1
20003701	AW0641	Stag Canyon Vineyard	Santa Ynez	4.5	0	VINEYARD				1
20003708	AW0641	Great Oaks Vineyard	Santa Ynez	35	0	ROW, VINEYARD	Pastureland			1
20004015	AW0641	Evans Vineyard	Santa Ynez	1.6	0	VINEYARD				1
20002971	AW0641	Vie Caprice	Santa Ynez	2.6	0	VINEYARD				1
20003685	AW0641	Fe Ciega Vineyard	Lompoc	11	0	VINEYARD				1
20002967	AW0641	La Barge Vineyard	Lompoc	12	0	VINEYARD				1
20003688	AW0641	Fox Family Vineyard	Santa Ynez	3	0	VINEYARD				1
20000665	AW0644	Edna Station	San Luis Obispo	1.25	0	ROW	Blueberry			1
20004873	AW0646	Maria Ygnacia Ranch	Santa Barbara	27	0	ORCHARD				1
20004117	AW0649	WAUGAMAN	WATSONVILLE	21.24		ROW	Raspberry			1
20004110	AW0649	CHURCH	WATSONVILLE	46.88		ROW	Raspberry			1
20004114	AW0649	DALTON 2	WATSONVILLE	56		ROW	Raspberry			1
20004096	AW0649	HILL	WATSONVILLE	6		ROW	Raspberry			1
20004047	AW0649	HOME	WATSONVILLE	27		ROW	Raspberry			1
20004104	AW0649	BRAYCOVICH	WATSONVILLE	38		ROW	Raspberry			1
20004109	AW0649	DALTON	WATSONVILLE	52		ROW	Raspberry			1
20004100	AW0649	KETT	WATSONVILLE	55		ROW	Raspberry			1
20004103	AW0649	BUCHWALD	WATSONVILLE	20		ROW	Raspberry			1
20004106	AW0649	PAVLEY	WATSONVILLE	20		ROW	Raspberry			1
20004112	AW0649	PLANT SCIENCES	WATSONVILLE	28		ROW	Raspberry			1
20004119	AW0649	CASSERLY	WATSONVILLE	31		ROW	Raspberry			1
20004120	AW0649	SILVA	WATSONVILLE	10		ROW	Raspberry			1
20004134	AW0649	RIDER-HOME	WATSONVILLE	27		ROW	Raspberry			1
20004132	AW0649	RIDER	WATSONVILLE	6		ROW	Raspberry			1
20004128	AW0649	SHIKUMA 1 & 2	WATSONVILLE	65		ROW	Raspberry			1
20004123	AW0649	CROWN	WATSONVILLE	19		ROW	Raspberry			1
20004141	AW0649	YAMAMOTO	WATSONVILLE	25.5		ROW	Raspberry			1
20004140	AW0649	YAMAMOTO	WATSONVILLE	5.25		ROW	Raspberry			1
20004095	AW0649	MORESCO	WATSONVILLE	30		ROW	Raspberry			1
20010362	AW0649	KETT2	WATSONVILLE	112.3		ROW	Raspberry			1
20004055	AW0649	SCURICH	WATSONVILLE	18		ROW	Raspberry			1
20000721	AW0651	Panziera	Salinas	500	0	VINEYARD, ORCHARD				1
20000724	AW0651	Binsacca	Soledad	270	0	VINEYARD, ORCHARD				1
20000725	AW0651	Las Alturas	Soledad	98	0	VINEYARD				1
20000716	AW0651	Clark & Telephone	Santa Maria, CA	148	0	VINEYARD				1
20000717	AW0651	Tunnel	Santa Maria	48	0	VINEYARD				1
20000720	AW0651	Onteveros	Santa Maria	90	0	VINEYARD				1
20004942	AW0654	Greenhouse Ranch	salinas	32	32	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	1
20004551	AW0655	Janet M Hope	Paso Robles	19	0	VINEYARD				1
20003461	AW0657	Wild Horse Vineyard	Templeton	43	20	VINEYARD	Grapes, Wine			1
20004091	AW0659	Ranchita Canyon Vineyard	San Miguel	74	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20003272	AW0660	Gerhard Schlecht	Los Gatos	2.5	0	VINEYARD				1
20001707	AW0662	R&E Ranch	Paso Robles	34	0	VINEYARD	Grapes, Wine			1
20003643	AW0663	Mitchella	Paso Robles	20	0	VINEYARD	Grapes, Wine			1
20004187	AW0670	Home Ranch	Santa Cruz	43.5	43.5	ROW	Brussel Sprout	Leek		1
20004174	AW0670	Petes Upper	Santa Cruz	23.7	23.7	ROW	Brussel Sprout	Leek		1
20005747	AW0673	Conlan Ranch	Salinas	35	15	ROW	Strawberry			1
20004753	AW0674	Hansen Vineyards	Templeton	20	0	VINEYARD				1
20002947	AW0675	EZ1 Vineyard	Creston	47.26	0	VINEYARD				1
20007434	AW0678	Van Wingerden Ranch / Color Spot	Carpinteria	8.5		ROW, GREENHOUSE	Other			1
20002789	AW0680	Figueroa Farms	Santa Ynez	23	0	ORCHARD	Olive			1
20002883	AW0681	Ranch 9	Salinas	91	0	ROW	Other			1

20012483	AW0681	Ranch 7a PERENNIAL	Gonzales	189.5	0	ORCHARD				1
20001689	AW0682	FOREST NURSERY PASO	PASO ROBLES	8	8	NURSERY				1
20001686	AW0682	FOREST NURSERY LOS OSOS	LOS OSOS	12	6	NURSERY				1
20008159	AW0684	Ranch 2	Goleta	56		ORCHARD	Avocado			1
20008154	AW0684	Ranch 1	Goleta	42		ORCHARD	Avocado			1
20008156	AW0684	Maui	Goleta	31		ORCHARD	Avocado			1
20008153	AW0684	Exxon	Goleta	4		ORCHARD	Avocado			1
20008155	AW0684	Rancho Tres Canadas	Goleta	168		ORCHARD	Avocado			1
20008160	AW0684	Veronica Spring Ranch	Santa Barbara	3.3		ORCHARD	Avocado			1
20008157	AW0684	La Paloma Ranch	Goleta	65	0	ORCHARD	Avocado			1
20000850	AW0686	Brohelle Vineyards	Paso Robles	17	0	VINEYARD				1
20002203	AW0687	windmill ranch	solvang	17	0	VINEYARD	Grapes, Wine			1
20011602	AW0689	sarah's vineyard	gilroy	12	12	VINEYARD				1
20002131	AW0691	Meadowlark Nursery	Hollister, CA	3		NURSERY				1
20003955	AW0693	Duncan Block	San Juan Bautista	25	0	ROW	Onion, Dry	Broccoli	Pepper, Fruiting	1
20003952	AW0693	Seminis Pacific Coast Breeding Station	San Juan Bautista	25	0	ROW	Lettuce, Head	Tomato	Pepper, Fruiting	1
20002662	AW0699	Duncan Ranch	San Juan Bautista	25	0	ROW	Chinese Cabbage	Parsley	Other	1
20002673	AW0699	Gubser Ranch	San Juan Bautista	18	0	ROW	Leek	Beet	Other	1
20002653	AW0699	Flint Ranch	San Juan Bautista	16	0	ROW	Leek			1
20013090	AW0699	Verissimo Ranch	San Juan Bautista	18.5	0	ROW	Lettuce, Leaf			1
20012603	AW0699	Buena Vista Ranch	Hollister	40	0	ORCHARD	Walnut			1
20012602	AW0699	Felice Ranch	San Juan Bautista	45.9	0	ROW	Other			1
20013089	AW0699	Goff Ranch	San Juan Bautista	18	0	ROW	Radish			1
20007189	Aw0702	Seiler Farms	Hollister	35	0	ORCHARD				1
20000737	AW0703	Sanchez Nursery	Hollister	0.75		GREENHOUSE				1
20003040	AW0707	Idyll Times Vineyard	Hollister	10		VINEYARD				1
20004713	AW0717	Buena Vista Ranch	Hollister	26		ORCHARD	Wheat			1
20004716	AW0717	Fairview	Hollister	25		ORCHARD	Bean, Dried			1
20007209	AW0720	Baehner Fournier Vineyards	santa ynez	0	0	VINEYARD				1
20007767	AW0722	HICKEY RANCH LP	CARPINTERIA	35	35	ORCHARD	Avocado			1
20007769	AW0722	WELLS RANCH	CARPINTERIA	8	8	ORCHARD	Avocado			1
20007808	AW0723	Home Ranch	Tres Pinos	18	0	ORCHARD				1
20000802	AW0725	Donati Family Vineyard	Paicines	46		VINEYARD				1
20001002	AW0726	C & P	Hollister	30	0	ORCHARD	Walnut			1
20001005	AW0726	Junction Ranch	Hollister	21	0	ORCHARD	Walnut			1
20001004	AW0726	Dunlap	Hollilster	8	0	ORCHARD	Walnut			1
20004553	AW0727	Lompa Farms	hollister	76	40	ROW	Walnut	Lemon		1
20001585	AW0729	William J Freitas	San Juan Bautista	6	0	ORCHARD	Walnut			1
20004599	AW0730	Speedling, Inc	Watsonville	20	0	NURSERY, GREENHOUSE	Tomato	Celery	Brussel Sprout	1
20008282	AW0742	Ritter Ranch	Hollister	2		VINEYARD				1
20000652	AW0744	Patrick Wirz	Hollister	82	0	VINEYARD, ORCHARD	Pastureland			1
20000789	AW0748	Ranch 2 and Ranch 2B	Hollister	5	0	VINEYARD, ORCHARD	Grape	Walnut		1
20007662	AW0749	Hayato Nursery	Salinas	4	0	NURSERY, GREENHOUSE	Other			1
20000710	AW0756	Johnson	Arroyo Grande	8	0	ORCHARD	Avocado			1
20003140	AW0758	Shrefler Ranch	Arroyo Grande	4.5		ORCHARD				1
20003613	AW0762	CE Farm	Paicines, CA	3	0	ORCHARD				1
20005124	AW0765	Old Bolsa	Gilroy	24	24	ROW	Onion, Dry	Tomato	Pepper, Fruiting	1
20004254	AW0766	Brisson Ranch	Hollister	0	0	ROW	Pastureland			1
20004252	AW0766	Casillas Home Ranch	Hollister	30	0	ROW, ORCHARD	Onion, Dry	Pepper, Fruiting	Pastureland	1
20003275	AW0767	Comstock Ranch	Hollister	5.55	0	ORCHARD	Other			1
20002890	AW0768	Mt. Harlan Vineyard	Hollister	80	0	VINEYARD	Grapes, Wine			1
20004879	AW0772	John Delwiche Ranch	Carpinteria	150	0	ORCHARD	Avocado			1
20008053	AW0776	Domingo Farms	Arroyo Grande	30		ROW	Beet	Spinach	Lettuce, Leaf	1
20001330	AW0777	Hog Canyon vineyard & Orchard	San Miguel	31	0	VINEYARD, ORCHARD				1
20004354	AW0778	Del Prado Cattle Co.	Morro Bay	15	0	ORCHARD				1
20002781	AW0780	Westigard Vineyards	Paso Robles	31		VINEYARD				1
20004811	AW0782	Pretty-Smith Vineyards & Winery	San Miguel	30	0	VINEYARD				1
20007384	AW0783	Calleri Vineyard	Tres Pinos	34	0	VINEYARD				1
20007371	AW0783	Siletto Vineyard	Tres Pinos	30	0	VINEYARD				1
20007377	AW0783	John Smith Vineyard	Hollister	40	0	VINEYARD				1
20007386	AW0783	Skow Vineyard	Tres Pinos	20	0	VINEYARD				1
20007381	AW0783	Wheeler Vineyard	Tres Pinos	35	0	VINEYARD				1
20001516	AW0784	Gimelli Vineyards	Hollister	294.5		VINEYARD				1

20007899	AW0785	haussler organic farms	templeton, CA	3	0	ORCHARD				1
20007927	AW0790	Mesa Pines Ranch	Arroyo Grande	4	0	ORCHARD				1
20008537	AW0794	Zruz-ess Avocado Ranch	morro bay	4.5	0	ROW	Avocado			1
20002676	AW0796	Wats	Watsonville	20		ROW	Other	Other	Other	1
20002681	AW0796	Roberts	Hollister, CA	50		ROW	Other	Other	Other	1
20002682	AW0796	Morris	San Juan Bautista	20		ROW	Other	Other	Other	1
20007447	AW0797	Boynton Ranch	Hollister	1	0	ORCHARD	Walnut			1
20007440	AW0797	Galvin/Delehanty Ranch	Hollister	58	0	ORCHARD	Walnut			1
20007445	AW0797	Pepper Tree Ranch	Hollister	30	0	ORCHARD	Walnut			1
20007442	AW0797	Hawkins/Frates Ranch	Hollister	30	0	ORCHARD	Walnut			1
20001044	AW0800	Sunnyslope Farm	Shandon	136	0	VINEYARD				1
20010763	AW0801	RANCH 6 PLOT 1 MESA RD.	NIPOMO	26	26	ROW	Strawberry			1
20010742	AW0801	ranch 4, plot 1 orchard rd., nipomo	nipomo	40	40	ROW	Strawberry			1
20006442	AW0801	RANCH 5 PLOT 2 GRACE LANE	Nipomo	3	3	ROW	Strawberry			1
20010762	AW0801	RANCH 5 PLOT 1 BETW. GRACE LANE&ORCHARD RD.	NIPOMO	21	21	ROW	Strawberry			1
20010764	AW0801	RANCH 7 PLOT ORCHARD RD.	NIPOMO	16	16	ROW	Strawberry			1
20005268	AW0802	sUNSET rIDGE vINEYARDS	paso robles	5	0	VINEYARD				1
20003068	AW0803	Terry Hoage Vineyards	Paso Robles	16		VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine	1
20004683	AW0805	Beck AG Operations Inc.	Creston	45	0	VINEYARD				1
20002860	AW0808	Vina de Leon	Paso Robles	34	0	VINEYARD				1
20000670	AW0809	Spellacy Farms	morro bay	6	0	ORCHARD				1
20001726	AW0810	EAST TEFFT STREET	NIPOMO	35		ORCHARD	Lemon	Avocado	Orange	1
20004164	AW0811	Fiscalini Ranch	Cambria	30	0	ROW	Peas			1
20004570	AW0813	Sylvester Ranch	San Luis Obispo	7		ROW	Cauliflower			1
20002601	AW0814	Gordon Bennett Family	Arroyo Grande	1.5	0	ORCHARD	Avocado			1
20005360	AW0817	Tonini Farm and Cattle Company	San Luis Obispo	140	0	ROW, ORCHARD	Bean, Unspecified	Peas	Pastureland	1
20000729	AW0819	Shoestring Winery and Vineyard llc	Solvang	35		VINEYARD				1
20003149	AW0820	Bar TJ/Bordonaro Vineyards	Paso Robles	78	0	ROW, VINEYARD	Pastureland			1
20001257	AW0823	Five Oaks Vineyard	Paso Robles	10	0	VINEYARD				1
20005113	AW0825	Phiferanch and Vineyard	Creston	94	0	VINEYARD	Grapes, Wine			1
20007431	AW0826	Harmony Farms	San miguel	38	0	VINEYARD	Grapes, Wine			1
20001266	AW0827	La Familia Ranch	San Luis Obispo	35	0	ROW, ORCHARD	Avocado	Pumpkin		1
20003596	AW0831	Sereno Vista Vineyards	Paso Robles	69.8	0	VINEYARD				1
20003513	AW0834	Frances James Vineyard	Paso Robles	12	12	VINEYARD				1
20004980	AW0835	Dana Powers House	nipomo	5.4	0	ORCHARD	Avocado			1
20004990	AW0835	Dana Powers House 2	nipomo	14	0	ORCHARD	Lemon			1
20001487	AW0837	Heart Stone Vineyard	Paso Robles	7	0	VINEYARD				1
20000985	AW0839	French Camp Vineyards	Santa Margarita	1219.82	1219.82	VINEYARD				1
20002649	AW0841	Alban Vineyards	Arroyo Grande	80		VINEYARD				1
20012522	AW0843	Avocados	Cayucos	10	10	ORCHARD				1
20004780	AW0843	Oranges	Cayucos	8	8	ORCHARD				1
20004781	AW0843	avocado-ken	Cayucos	2	2	ORCHARD				1
20002654	AW0847	Pacar Ranch	Santa Barbara	1.25		ORCHARD				1
20002267	AW0851	Rancho Tierra Rejada	Paso Robles	500		VINEYARD				1
20001441	AW0852	Lehnhoff Farm	Templeton, Ca	35	0	ROW	Oat			1
20001443	AW0854	McClean's Vineyard	Templeton	9	0	VINEYARD				1
20002756	AW0857	Gary Philbrick	Paso Robles	13	0	ORCHARD				1
20000650	AW0858	Kruse Vineyards	Templeton	40	0	VINEYARD				1
20001253	AW0861	Norman Vineyards	Paso Robles	20.1	40	VINEYARD				1
20004710	AW0862	Denner Family, LLC	Paso Robles	109	0	ROW, VINEYARD	Grapes, Wine			1
20007128	AW0864	Elston Family Farm	San Miguel	0.2	0	GREENHOUSE	Tomato	Cucumber		1
20008802	AW0864	Dennis and Gaylo Elston	San Miguel	0.2	0	GREENHOUSE				1
20000751	AW0865	Diamond JEM Vineyard	Paso Raobles	14	0	ROW, VINEYARD	Grapes, Wine			1
20005055	AW0866	Native Sons	Arroyo Grande	8	0	NURSERY		Other		1
20002223	AW0868	St. Peter of Alcantara Vineyards	Templeton	28	0	VINEYARD				1
20001142	AW0869	Larry Kandarian	Los Osos	33	0	ROW	Other	Other		1
20003329	AW0872	pops place farm	cambria	5	0	ORCHARD				1
20001960	AW0876	James Vineyard	Templeton	22	22	VINEYARD				1
20004992	AW0878	Rancho Encino Vineyard	Paso Robles	22	0	VINEYARD	Grape			1
20003411	AW0883	Tate Ranch	Nipomo	17.5		ORCHARD				1
20003223	AW0884	Lion Rock Ranch	Morro Bay	5		ORCHARD	Avocado			1
20007839	AW0887	Arciero Vineyards	Paso Robles	615	0	VINEYARD				1
20007837	AW0887	Arciero Farms	Shandon	186.7	0	VINEYARD, ORCHARD				1

20005143	AW0890	Hawk's Hill Ranch	Paso Robles	18	0	VINEYARD				1
20001381	AW0890	Catapult	Paso Robles	28	0	VINEYARD				1
20001434	AW0890	Hammond/Crossland Vineyard	Paso Robles	110	0	VINEYARD				1
20001445	AW0890	Messina Vineyard	Paso Robles	59	0	VINEYARD, ORCHARD				1
20001348	AW0890	Azcona Properties	Bradley	34	0	VINEYARD				1
20001447	AW0890	Paso de Record	San Miguel	36	0	VINEYARD				1
20001396	AW0890	Cripple Creek Vineyard	Paso Robles	42	0	VINEYARD				1
20001442	AW0890	Law Family Vineyard	Paso Robles	39	0	VINEYARD				1
20001477	AW0890	Wine Horizons Vineyard	Paso Robles	35	0	VINEYARD				1
20001453	AW0890	Plummer	Paso Robles	42	0	VINEYARD				1
20001437	AW0890	Las Collinas Vineyard	Paso Robles	31	0	VINEYARD				1
20002123	AW0890	PWK Farms	Paso Robles	7	0	VINEYARD				1
20002180	AW0890	Torgy's Vineyards	Paso Robles	30	0	VINEYARD				1
20001371	AW0890	Buena Vista Vineyard	Paso Robles	150	0	VINEYARD				1
20001429	AW0890	Hammond Vineyards Lp	Bradley	210	0	VINEYARD				1
20001459	AW0890	Vista Vineyard	San Miguel	257	0	VINEYARD				1
20001461	AW0890	Wellsona Vineyard	Paso Robles	68	0	VINEYARD				1
20001465	AW0890	Woodland Management Vineyard	Paso Robles	15	0	VINEYARD				1
20001450	AW0890	Patricia Diane Vineyard	Paso Robles	125	0	VINEYARD				1
20001464	AW0890	Paderewski Vineyard	Paso Robles	64	0	VINEYARD				1
20001407	AW0890	Crossland Vineyard	Paso Robles	71	0	VINEYARD				1
20002555	AW0892	HALCYON VINEYARDS	TEMPLETON	20	0	VINEYARD				1
20003373	AW0894	Rolling Hills Vineyard	San Miguel	90	0	VINEYARD				1
20003368	AW0894	Swisscollina	San Miguel	63	0	VINEYARD				1
20003376	AW0894	Eureka Ranchos Vineyard - Kopack	Templeton	22	0	VINEYARD				1
20003365	AW0894	Walter Crest Vineyard	Lockwood	38	0	VINEYARD				1
20004622	AW0895	Ted R. Cooper Ranch	Paso Robles	100	10	ROW, VINEYARD	Pastureland			1
20000637	AW0896	Vista Creek Vineyards	Paso Robles	50	0	VINEYARD	Grapes, Wine			1
20004999	AW0897	HOLLAND AMERICA FLOWERS	ARROYO GRANDE	56	0	GREENHOUSE				1
20000673	AW0898	Jeanine's Avocado Farm	morro bay	6.9	0	ORCHARD				1
20007919	AW0899	R.C. Manuel Farms	Morro Bay	19	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified	1
20007921	AW0899	R.C. Manuel Farms	Cayucos	20	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified	1
20007916	AW0899	R.C. Manuel Farm	Cayucos	6	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified	1
20007918	AW0899	R.C. Manuel Farms	Morro Bay	13	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified	1
20007920	AW0899	R.C. Manuel Farms	Morro Bay	12	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified	1
20001605	AW0900	J. Bond Vineyard	Paso Robles	3.68	3.68	VINEYARD	Grapes, Wine			1
20004297	AW0901	Bench Vineyard	Paso Robles	10.14		VINEYARD	Grapes, Wine			1
20004294	AW0901	3695 Mill Road	Paso Robles	17.7		VINEYARD	Apple	Grapes, Wine		1
20004300	AW0901	Terrace Vineyard	Paso Robles	65.31		VINEYARD	Grapes, Wine			1
20004234	AW0901	Home Ranch	Paso Robles	139.73	139.73	VINEYARD	Grapes, Wine			1
20001882	AW0902	Cougar Ridge Vineyards	Paso Robles	20	2	VINEYARD				1
20003321	AW0904	Cypress Hollow Ranch	Cayucos	10	0	ORCHARD	Avocado			1
20004014	AW0906	rn estate vineyard and winery	paso robles	3	0	VINEYARD				1
20001362	AW0908	Rodriguez Ranch	Arroyo Grande	12	0	ROW	Pepper, Fruiting	Brussel Sprout	Lettuce, Leaf	1
20001358	AW0908	Chamisal Ranch	San Luis Obispo	15	0	ROW	Pepper, Fruiting	Brussel Sprout	Lettuce, Leaf	1
20001356	AW0908	Corral Ranch	Arroyo Grande	21.19	0	ROW	Pepper, Fruiting	Brussel Sprout	Lettuce, Leaf	1
20001333	AW0908	Rankin Ranch	Arroyo Grande	8.37	0	ROW	Pepper, Fruiting	Lettuce, Leaf	Brussel Sprout	1
20001329	AW0908	Deleon Ranch	Arroyo Grande	22.26	0	ROW	Pepper, Fruiting	Brussel Sprout	Lettuce, Leaf	1
20001339	AW0908	Alisos Ranch	Arroyo Grande	46.7	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout	1
20001352	AW0908	Sargent Ranch	Arroyo Grande	2.9	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout	1
20001341	AW0908	Pennington Ranch	Arroyo Grande	41.64	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout	1
20001338	AW0908	Smith Ranch	Arroyo Grande	17.45	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout	1
20001326	AW0908	Goulart Ranch	Arroyo Grande	44.97	0	ROW	Pepper, Fruiting	Lettuce, Leaf	Brussel Sprout	1
20001319	AW0908	Donovan Ranch	Arroyo Grande	47.53	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout	1
20001324	AW0908	Sullivan Ranch	Arroyo Grande	42.72	0	ROW	Pepper, Fruiting	Brussel Sprout	Lettuce, Leaf	1
20001328	AW0908	Machado Ranch	Arroyo Grande	27.25	0	ROW	Pepper, Fruiting	Lettuce, Leaf	Brussel Sprout	1
20005126	AW0909	Gragg Canyon Ranch	San Luis Obispo	35	0	ORCHARD	Avocado			1
20000703	AW0911	FOOTHILL RANCH	NIPOMO	70	0	ORCHARD	Lemon			1
20002121	AW0913	Manuel Reis and Son	Los Osos	33	0	ROW	Pumpkin	Squash		1
20000831	AW0916	Rock Basin Vineyards	Santa Margarita	2	0	VINEYARD				1
20002950	AW0917	Crother Vineyard	Paso Robles	6		VINEYARD				1
20002700	AW0918	Carriage Vineyards	Templeton, CA 93465	33	33	VINEYARD, ORCHARD				1
20003199	AW0919	Graveyard Vineyards	San Miguel	13	13	VINEYARD	Grapes, Wine			1

Enrollment information in the Water Board's GeoTracker data management system as of Aug. 1, 2012.

20002144	AW0920	clay ranch	paso robles	37	37	VINEYARD				1
20000638	AW0921	Live Oak Vineyards	Paso Robles	65	0	VINEYARD				1
20001012	AW0922	Mather Ranch	Morro Bay	13	0	ORCHARD				1
20007372	AW0925	Windrose Farm	Paso Robles	27	0	ROW, NURSERY, ORCHARD	Apple	Leek	Squash	1
20002327	AW0929	LARRY JOHNSON AVACADOS	MORRO BAY	10	0	ORCHARD	Avocado			1
20004361	AW0930	JanKris Vineyard	Templeton	47.26	47.26	VINEYARD	Grapes, Wine			1
20005822	AW0934	Laetitia Vineyard	Arroyo Grande	625		VINEYARD				1
20004755	AW0935	Templeton Hills Vineyard	Templeton	78	0	VINEYARD				1
20002801	AW0936	Windward Vineyard	Paso Robles	15	0	VINEYARD				1
20007196	AW0937	DWS Vineyard	Paso Robles	62.53	0	VINEYARD	Grapes, Wine			1
20007206	AW0937	CIPCO - Lauras Vineyard	Paso Robles	273.08	0	VINEYARD	Grapes, Wine			1
20007202	AW0937	Derbyshire Farms	San Simeon	62.65	0	VINEYARD	Grapes, Wine			1
20008168	AW0938	same	Paso Robles	40	0	VINEYARD				1
20005227	AW0939	CAGLIERO RANCH	PASO ROBLES	200	0	VINEYARD	Oat			1
20001714	AW0944	Sommer Wholesale Nursery	Templeton	4.5	0	NURSERY				1
20003024	AW0946	Klucker's Colina Poca Vineyard	Paso Robles	50.88	0	VINEYARD				1
20002746	AW0947	Roadrunner Farm	Paso Robles	7	0	VINEYARD				1
20002927	AW0949	Chelle Mountain	Paso Robles	14		VINEYARD				1
20007635	AW0950	Dove Pond Vineyards	Templeton	20	0	VINEYARD	Grapes, Wine			1
20009144	AW0952	Mary Flavan/Flav-R-Mor Farm	Morro Bay	22	22	ORCHARD	Avocado			1
20003894	AW0953	Cooper Farms	Nipomo	7	0	ROW	Cauliflower			1
20004945	AW0954	Chabot Vineyard	Los Alamos	10	0	VINEYARD				1
20001280	AW0955	Larry Meek	San Luis Obispo	3.25	0	VINEYARD				1
20003622	AW0956	McGourty Vineyards LLC	Paso Robles	20	20	VINEYARD	Grapes, Wine			1
20004902	AW0957	caparone	paso robles	13	0	VINEYARD				1
20004338	AW0959	Crowther Ranch	Cambria	60	0	ORCHARD	Avocado			1
20000916	AW0960	Sauret Vineyards	Paso Robles	22	0	VINEYARD				1
20003021	AW0964	Luft Vineyard	Templeton	4	0	VINEYARD				1
20007524	AW0965	Nichols Vineyard	San MIguel	72.85	0	VINEYARD				1
20004740	AW0966	Casagrande Vineyards	San Miguel	249	249	VINEYARD				1
20004741	AW0966	Casagrande Vineyards	Paso Robles	40	40	VINEYARD				1
20002202	AW0968	Janes Ranch Vineyards, Inc.	Paso Robles	15	0	VINEYARD				1
20004989	AW0970	Rancho Cielo	Santa Barbara	225	0	ORCHARD	Avocado			1
20004940	AW0971	Ackerman Vineyards-Tower Oaks Vineyard	Paso Robles	38	0	VINEYARD				1
20007543	AW0974	McCall Farm	Cambria, CA	8	0	ORCHARD	Avocado	Citrus		1
20007502	aw0975	Villicana Vineyards	Paso Robles	11.25		VINEYARD				1
20008447	AW0976	Charan Springs Farm	Cambria	0	0	ROW, NURSERY, ORCHARD, GREENHOUSE	Lettuce, Head	Avocado		1
20003618	AW0977	Amarillas Farming Co., Inc.	Arroyo Grande	18	0	ORCHARD				1
20000981	AW0980	Garey Ranch Vineyard	Santa Maria	281	0	VINEYARD				1
20000976	AW0980	Premiere Coastal Vineyard	Sant Maria	459	0	VINEYARD				1
20001006	AW0980	Sierra Madre Farms	Santa Maria	168	0	VINEYARD				1
20000998	AW0980	Sierra Madre Holdings	Santa Maria	170	0	VINEYARD				1
20000990	AW0980	White Hawk Vineyard	Los Alamos	77	0	VINEYARD				1
20008164	AW0981	Chaves Ranch	Atascadero	2	2	ROW	Pastureland			1
20009224	AW0983	john dana	nipomo	40	0	ROW	Lettuce, Leaf			1
20001363	AW0983	180 acres	nipomo	160	0	ROW	Peas			1
20003457	AW0984	ranch 1/ Mahoney	Nipomo	37	37	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20003484	AW0984	ranch 4/ Machado	Nipomo	41	33	ROW	Cauliflower	Lettuce, Head	Celery	1
20002344	AW0986	Que Sera Syrah Vineyard	Paso Robles	5	2	VINEYARD				1
20000635	AW0987	none	arroyo Grande	1.5	0	ORCHARD				1
20009202	AW0988	Saucelito Canyon Vineyard	Arroyo Grande	3	0	VINEYARD				1
20004395	AW0989	E. Lopez Farms	Nipomo	30	0	ROW	Peas	Pepper, Fruiting	Squash	1
20003288	AW0990	Pacific Sun Growers, Inc.	Nipomo	2	0	GREENHOUSE				1
20004915	AW0994	Amaral Vineyards	Paso Robles	10	0	VINEYARD	Grapes, Wine			1
20003136	AW0995	Esther Rigoni Farm	Arroyo Grande	11	0	ROW	Bean, Unspecified	Artichoke	Pepper, Fruiting	1
20000596	AW1000	Kim Jones	Carpinteria	5	0	ORCHARD	Avocado			1
20000595	AW1000	Kim Jones	Carpinteria	5	0	ORCHARD	Avocado			1
20000597	AW1000	Kim Jones	Carpinteria	5	0	ORCHARD	Avocado			1
20001424	AW1001	3050 Foothill Ranch LLC	Carpinteria	20	0	ORCHARD	Avocado	Orange		1
20001402	AW1001	Bailard Avocado LLC	Carpinteria	16	0	ORCHARD	Avocado			1
20001404	AW1001	DR Citrus Co / Dude Ranch	Carpinteria	12	0	ORCHARD	Avocado			1
20001414	AW1001	October Avocados	Carpinteria	8	0	ORCHARD	Avocado			1
20001411	AW1001	Black Opal Ranch LLC	Carpinteria	8	0	ORCHARD	Avocado	Lemon		1

20001419	AW1001	Irish Trust	Carpinteria	4	0	ORCHARD	Avocado			1
20001422	AW1001	JTR Ranch	Carpinteria	9	0	ORCHARD	Lemon			1
20001374	AW1001	Bailard Citrus Co LLC	Carpinteria	48	0	ORCHARD	Avocado			1
20001408	AW1001	Stoney	Carpinteria	8	0	ORCHARD	Avocado			1
20004557	AW1002	Salinas	Salinas	3.5	0	NURSERY, GREENHOUSE				1
20004167	AW1006	Dos Cruces Ranch	Cambria	38	0	VINEYARD, ORCHARD	Avocado			1
20005008	AW1007	Calcareous VIneyard	Paso Robles	17.61	0	VINEYARD	Grape			1
20003710	AW1008	Okui Farms	Grover Beach	30	0	ROW	Strawberry			1
20000878	AW1009	Jail Flat Ranch	Creston	77	0	ROW	Oat	Barley		1
20003274	AW1011	Dixon Ranch Vineyard	San Luis Obispo	2.5	0	VINEYARD				1
20003441	AW1013	Filipe Ranch	Arroyo Grande	32	0	ORCHARD				1
20004927	AW1015	Urquhart Avacodo's	Morro Bay	10		ORCHARD				1
20003486	AW1016	Rancho de Voladores Vineyard, LLC	Paso Robles	30	0	ROW, VINEYARD	Grapes, Wine			1
20001145	AW1017	Dos Pasos Ranch	Cambria	29	0	ROW, ORCHARD	Pumpkin			1
20007281	AW1018	7th Heaven	Cayucos	15	0	ROW, VINEYARD, ORCHARD	Avocado	Raspberry	Grapes, Wine	1
20004983	AW1019	Malcolm Kingsley, Jr.	Cayucos	3	0	ORCHARD	Avocado			1
20000908	AW1021	Pretty Penny Vineyard	Paso Robles	20	0	VINEYARD				1
20000877	AW1024	Dragon Spring Farm	Cambria	19	0	ROW, ORCHARD	Avocado	Orange	Lemon	1
20002406	AW1025	battaglia ranch	paso robles	23.5	23.5	VINEYARD				1
20001018	AW1026	Wilson Ranches Inc./ Cripple Creek Vineyards	Templeton	85		VINEYARD				1
20003286	AW1027	Dunning Vineyards	Paso Robles	12		VINEYARD	Grapes, Wine			1
20000513	AW1028	Double H Avocado Ranch	Morro Bay	6.5	0	ORCHARD	Avocado			1
20000843	AW1029	MLM Farms, Laughing Goose Farm, and Rocking MC Ranch	San Luis Obispo, Ca 93401	13	0	ORCHARD	Citrus	Olive		1
20001340	AW1030	Bien Nacido	Santa Maria	950	0	VINEYARD, ORCHARD				1
20005092	AW1032	Linn's Fruit Bin	Cambria	8	8	ORCHARD, GREENHOUSE	Avocado	Blackberry	Tomato	1
20001003	AW1035	Mike Dusi	Templeton	90		VINEYARD				1
20001000	AW1035	Lago Farms 2	Paso Robles	33		VINEYARD				1
20000996	AW1035	Lago Farms 1	Paso Robles	30		VINEYARD				1
20003146	AW1036	Finley Family Farm	Templeton	2	2	NURSERY				1
20004327	AW1037	Nurses Pistachio Orchard	Paso Robles	6.25	0	ORCHARD	Pistachio			1
20000909	AW1040	B&E Vineyard	Paso Robles, CA	75	0	VINEYARD				1
20000645	AW1042	Star Farms	San Miguel	25	0	ROW	Oat			1
20004125	AW1043	Ranch #10 - Branin	Los Osos	40	20	ROW	Broccoli	Celery	Lettuce, Leaf	1
20003636	AW1044	Paul Madonna	Cayucos	25	0	ORCHARD				1
20007519	AW1046	Fralich Vineyard and Winery	Templeton	16	2	VINEYARD				1
20007132	AW1048	Morro Canyon Ranch	Morro Bay	30	0	ORCHARD	Avocado	Citrus		1
20004707	AW1050	Wixom Ranch	Morro Bay	19.61	0	ORCHARD	Avocado			1
20004794	AW1052	Righetti Ranch	San Luis Obispo	275	0	VINEYARD, ORCHARD	Avocado	Grapes, Wine		1
20001631	AW1053	JD Sazotti Ranch	Templeton	6	0	ROW, VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine	1
20002485	AW1056	Bella Collina	Paso Robles	8	0	VINEYARD, ORCHARD				1
20002757	AW1060	Silver Horse Winery	San Miguel, CA.	41	0	VINEYARD	Grapes, Wine			1
20004427	AW1062	Pipestone Vineyards	Paso Robles	7	7	VINEYARD				1
20003651	AW1063	Victor Cambero	Nipomo	9		ROW	Squash, Summer	Bean, Unspecified	Peas	1
20000936	AW1064	Donald & Elaine Witmer	Paso Robles, CA	14	0	ORCHARD	Pistachio			1
20010342	AW1067	CERVINI FARMS CALIFORNIA INC.	CARPINTERIA	8	0	GREENHOUSE	Cucumber			1
20008023	AW1069	Augusta B. Lord Trust Property	Carpinteria	12.5	0	ORCHARD	Avocado			1
20008024	AW1069	Laura B Lord Ranch	Carpinteria	3	0	ORCHARD	Avocado			1
20003675	AW1070	White Farms	Carpinteria	27		ORCHARD	Avocado			1
20001632	AW1071	The Falcone Family Vineyards	Paso Robles	8	0	VINEYARD	Grapes, Wine			1
20007427	AW1074	Ghost Ranch	Carpinteria	8	0	ORCHARD	Avocado			1
20003898	AW1075	Barnard Ranch	Carpinteria	22	22	ORCHARD				1
20007361	AW1076	Abe Nursery	Carpinteria	6	6	NURSERY				1
20006861	AW1079	Rancho Tres Gatitos	Carpinteria	8	0	ORCHARD				1
20002747	AW1079	Rancho Tres Gatitos Orchards	Carpinteria	8	8	ORCHARD	Other	Avocado		1
20002520	AW1082	Locatelli Vineyards	San Miguel	40	0	VINEYARD				1
20004428	AW1084	Ranch 2	Santa Maria	48	48	ROW	Broccoli			1
20000541	AW1086	Warren's Nursery Inc.- Buckskin	Los Osos	0.6	0	GREENHOUSE	Other	Other	Other	1
20000542	AW1086	Warren's Nursery Inc. - Clark	Los Osos	0.5	0	GREENHOUSE	Other	Other	Other	1
20007168	AW1088	birch-hill organics	atascadero	7	0	ORCHARD	Citrus			1
20004822	AW1089	4M vineyard	San Miguel, CA	9	0	VINEYARD	Grapes, Wine			1
20003892	AW1093	:Thomas Fogarty Vineyard South	Los Gatos	13.2	0	VINEYARD				1
20000872	AW1094	Olive Hill Farm	Santa Ynez	7.5	0	ORCHARD	Olive			1
20002652	AW1095	Elder Vineyard	Creston	12	0	VINEYARD				1

20000678	AW1096	Fair Haven Avocados	morro bay	8.3	0	ORCHARD				1
20001439	AW1097	Vist Grande Vineyard	San Miguel	205	0	VINEYARD				1
20001067	AW1097	Chalk Knoll Vineyard	San Ardo	328	0	VINEYARD				1
20003610	AW1098	pozo valley vineyards	santa margarita	30	0	VINEYARD				1
20005106	AW1102	Morro Creek Ranch LLP	Morro Bay	218	0	ORCHARD	Avocado			1
20002543	AW1103	Keyser Ranch	Morro Bay	5	0	ORCHARD	Avocado			1
20000667	AW1105	Field 2	Arroyo Grande	4		NURSERY	Other			1
20000668	AW1105	Field 1	Arroyo Grande	0.46		NURSERY	Other			1
20000669	AW1105	GB	Arroyo Grande	0.23		NURSERY	Other			1
20000508	AW1106	Lock Vineyard	Paso Robles	23	0	VINEYARD	Grapes, Wine			1
20000804	AW1109	Green Earth Landscape & Nursery	Carpinteria	4	4	NURSERY				1
20000807	AW1109	Green Earth Landscape & Nursery	Carpinteria	0.25	0	NURSERY				1
20002686	AW1110	Tuscali Olive Oil	Templeton	5	0	ORCHARD				1
20000892	AW1111	bassetti vineyards	cambria	19	0	VINEYARD, NURSERY, ORCHARD	Grapes, Wine	Olive		1
20000715	AW1114	Rosenberg Nut Farm, LLC	san miguel	133	160	ORCHARD	Walnut			1
20005112	AW1116	Kiler Canyon Vineyard	Paso Robles	25.5	0	ROW, VINEYARD	Grapes, Wine			1
20001729	AW1118	Stephen's Vineyard	Templton	1.5		VINEYARD				1
20001146	AW1120	August Ridge Vineyards	Creston	9	0	VINEYARD, ORCHARD				1
20007355	AW1123	Negranti Green Valley Ranch	Cambria	74		ORCHARD	Avocado	Lemon	Orange	1
20002923	AW1124	Erwin Farms & Nursery, Inc.	Arroyo Grande	40	0	ORCHARD	Avocado			1
20003304	AW1125	El Pomar Vineyards	Templeton	26	26	VINEYARD				1
20007185	AW1126	Radike Vineyard	Templeton	8.5	0	VINEYARD				1
20001480	AW1129	Eufloria Flowers	Nipomo	8	0	GREENHOUSE				1
20004225	AW1130	Lewis BIDDLE RANCH (701)	SAN LUIS OBISPO	3	3	ROW	Cabbage	Chinese Cabbage	Pepper, Fruiting	1
20004222	AW1130	Sweeney BIDDLE RANCH (801)	SAN LUIS OBISPO	22	22	ROW	Pepper, Fruiting	Brussel Sprout	Chinese Cabbage	1
20004224	AW1130	Maino BIDDLE RANCH (501)	SAN LUIS OBISPO	22	22	ROW	Brussel Sprout	Cabbage	Pepper, Fruiting	1
20004217	AW1130	lewis	sn Luis obispo	70	70	ROW	Brussel Sprout	Chinese Cabbage	Pepper, Fruiting	1
20004221	AW1130	Falstrom BIDDLE RANCH (101)	SAN LUIS OBISPO	24	24	ROW	Cabbage	Chinese Cabbage	Pepper, Fruiting	1
20004223	AW1130	Riley BIDDLE RANCH (401)	SAN LUIS OBISPO	22	22	ROW	Brussel Sprout	Chinese Cabbage	Pepper, Fruiting	1
20004218	AW1130	Lewis Biddle Ranch (901)	san luis Obispo	24	24	ROW	Chinese Cabbage	Brussel Sprout	Pepper, Fruiting	1
20001108	AW1132	French Ranch	Morro Bay	3	0	ORCHARD	Avocado			1
20004262	AW1135	None	Nipomo	6	0	GREENHOUSE				1
20003598	AW1136	Red Wing Ranch	Cambria	14	0	ROW, ORCHARD	Corn, Human Con.			1
20011162	AW1137	San Luis Obispo	San Luis Obispo	35.85	0	ROW	Broccoli	Chinese Cabbage	Celery	1
20011163	AW1137	San Luis Obispo	San Luis Obispo	35.85	0	ROW	Broccoli	Chinese Cabbage	Celery	1
20001126	AW1138	Swift Subtropicals/Bear Creek Ranch	Los Osos	12	0	ROW, ORCHARD	Other	Potato	Squash	1
20002980	AW1139	Apache Canyon Ranch	Maricopa	996	189	ROW	Oat			1
20008435	Aw1141	Salisbury Vineyards	Avila Beach	35	0	VINEYARD				1
20008436	Aw1141	Tia Linda Vineyard	Paso Robles	10	0	VINEYARD				1
20010882	AW1145	Ranch 57	Arroyo Grande	11.74	11.74	ROW	Chinese Cabbage	Lettuce, Leaf	Celery	1
20003278	AW1145	Ranch 27	Arroyo Grande	43	5	ROW, ORCHARD	Avocado	Chinese Cabbage	Lettuce, Leaf	1
20003283	AW1145	Ranch 37	Arroyo Grande	35	35	ROW	Lettuce, Leaf	Cabbage	Pepper, Fruiting	1
20003282	AW1145	Ranch 27	Arroyo Grande	7	7	ROW	Lettuce, Leaf	Cabbage	Pepper, Fruiting	1
20003281	AW1145	Ranch 27	Arroyo Grande	4.5	4.5	ROW	Pepper, Fruiting	Cabbage	Lettuce, Leaf	1
20013203	AW1145	Ranch 67	Arroyo Grande	18	0	ROW	Squash	Lettuce, Leaf	Chinese Cabbage	1
20003205	AW1145	Ranch 47	Arroyo Grande	37	37	ROW	Chinese Cabbage	Lettuce, Head	Parsley	1
20003280	AW1145	Ranch 27	Arroyo Grande	3	3	ROW	Cabbage	Lettuce, Leaf	Chinese Cabbage	1
20003668	AW1147	toro creek ranch	morro bay	50	0	ORCHARD	Avocado	Citrus		1
20001251	AW1149	Cal Seedling co.	arroyo grande	2.5	0	NURSERY, GREENHOUSE				1
20004315	AW1150	Ranch #6 - Lopes	San Luis Obispo	16	0	ROW	Pepper, Fruiting	Squash		1
20004318	AW1150	Ranch #7 - Mitchell	San Luis Obispo	24	0	ROW	Chinese Cabbage	Pepper, Fruiting		1
20004310	AW1150	Ranch #1 Plot 9 - Christensen and Ida Avila	San Luis Obispo	14	0	ROW	Pepper, Fruiting			1
20004311	AW1150	Ranch #2 - Cross Creek	San Luis Obispo	28	0	ROW	Pepper, Fruiting	Squash		1
20004320	AW1150	Ranch # 8 - Walter Christensen	San Luis Obispo	36	0	ROW	Chinese Cabbage	Squash, Summer	Pepper, Fruiting	1
20004337	AW1150	Ranch #16 - Gardner Ranch	San Luis Obispo	95	0	ROW	Peas	Bean, Unspecified	Wheat	1
20003181	AW1151	Vista de la Estrella Vineyards	San Miguel	70	0	VINEYARD	Grapes, Wine			1
20004798	AW1154	North Dana Foothill Ranch	Nipomo	44	0	ORCHARD	Avocado			1
20001217	AW1155	Olson Ranch	Soledad	576.97	0	VINEYARD				1
20001203	AW1155	Brildewood Vineyard	Santa Ynez	36.28	0	VINEYARD				1
20001170	AW1155	Sunnybrook Vineyards	Paso Robles	508	0	VINEYARD				1
20005178	AW1156	Estrella River Vineyard	Paso Robles, CA	251.43	0	ROW, VINEYARD	Blueberry			1
20005173	AW1156	Cross Canyon Vineyard	San Miguel, CA 93451	243	0	VINEYARD				1
20005184	AW1156	Rancho Real	Santa Maria, CA 93455	213	0	VINEYARD				1

20001245	AW1157	Eberle Winery	Paso Robles	38	0	VINEYARD				1
20001243	AW1157	Batdorf Vineyard	Paso Robles	106.5	0	VINEYARD				1
20001238	AW1157	Steinbeck Vineyards	Paso Robles	336.5	0	VINEYARD				1
20001241	AW1157	Mill Road Vineyards	Paso Robles	153	0	VINEYARD				1
20003826	AW1162	Rancho De Los Flores	Los Alamos	375	375	ROW	Other			1
20005302	AW1166	Ellwood Ranch Inc.	Goleta	151.5	151.5	ORCHARD				1
20003545	AW1170	Jardine Vineyard	Paso Robles	279.92		VINEYARD	Grapes, Wine			1
20003549	AW1170	Pleasant Valley Vineyard	San Miguel	64.16		VINEYARD	Grapes, Wine			1
20003550	AW1170	Aline's Vineyard	Paso Robles	157.7	0	VINEYARD	Grapes, Wine			1
20003547	AW1170	Creston Valley Vineyard	Creston	201.32		VINEYARD	Grapes, Wine			1
20003544	AW1170	Huerhuero Vineyard	Paso Robles	523.92		VINEYARD	Grapes, Wine			1
20005186	AW1171	Felice Valle Vineyards	Paso Robles	46	0	VINEYARD				1
20005217	AW1174	Brassica Nursery	Nipomo	4	0	GREENHOUSE				1
20007507	AW1175	VellaVacencia Vineyard	Paso Robles	5	0	ROW, VINEYARD	Grapes, Wine	Apple		1
20003444	AW1177	H&W Farms/Whitefield Lemon Orchard	Nipomo	85		ORCHARD				1
20004807	AW1180	Ron Tremper	Arroyo Grande	40		ORCHARD				1
20009982	AW1181	Krouse (6)	Arroyo Grande	33	10	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20010002	AW1181	Hollywood (66)	Arroyo Grande	23	7	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20009980	AW1181	Manderscheid (5)	Arroyo Grande	40	12	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20010024	AW1181	Taylor Trust (12)	Arroyo Grande	5	2	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20010025	AW1181	Taylor (11)	Arroyo Grande	18	5	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20007488	AW1182	Cirone Farms Morro Bay	Morro Bay	10	0	ORCHARD	Avocado	Citrus		1
20007942	AW1183	Ranch 5	santa maria	19	19	ROW	Broccoli	Celery	Cauliflower	1
20001216	AW1187	Menzies Ranch	Ventucopa	160	0	ROW	Carrot			1
20001219	AW1187	JRM Ranch	New Cuyama	160	0	ROW	Carrot			1
20001222	AW1187	Campbell Ranch	Ventucopa	250	0	ROW	Carrot			1
20000683	AW1193	East Valley Vineyards	Santa Ynez	2		VINEYARD	Grapes, Wine			1
20000881	AW1194	Hill Top Ranch	Lompoc	40	0	VINEYARD				1
20004805	AW1195	Ladera Farms	Santa Barbara	4	0	ORCHARD				1
20000806	AW1199	San Marcos Growers	Santa Barbara	21	21	NURSERY, GREENHOUSE				1
20002646	AW1202	Bernard Acquistapace/Pianta Bella Nursery	Carpinteria	4	0	NURSERY				1
20008303	AW1204	4	Lompoc	32	0	ROW	Lettuce, Head	Bean, Dried		1
20008316	AW1204	22	Lompoc	190	0	ROW	Bean, Dried			1
20008317	AW1204	23	Lompoc	130	0	ROW	Bean, Dried			1
20008302	AW1204	2	Lompoc	25	0	ROW	Bean, Dried			1
20008306	AW1204	9	Lompoc	30	0	ROW	Bean, Dried			1
20008329	AW1204	39	Lompoc	20	0	ROW	Bean, Dried	Cauliflower		1
20008326	AW1204	31	Buellton	30	0	ROW	Bean, Dried			1
20008325	AW1204	30	Buellton	37	0	ROW	Bean, Dried			1
20008308	AW1204	10	Lompoc	20	0	ROW	Bean, Dried			1
20002411	AW1205	2 Peas in a Pod Inc.	Arroyo Grande	2.5	0	ROW, ORCHARD	Blueberry	Raspberry	Blackberry	1
20007657	AW1206	UCSC Farm (CASFS)	Santa Cruz, CA	16	0	ROW, NURSERY, ORCHARD, GREENHOUSE	Apple	Broccoli	Onion, Dry	1
20003801	AW1207	Miramonte Farms & Nursery	San Juan Bautista, CA.	4		ROW	Cauliflower	Broccoli	Lettuce, Leaf	1
20000923	AW1209	Monaco's	Hollister	7	0	ORCHARD				1
20007829	aw1212	B & R Farms	Hollister	93	0	ORCHARD	Other	Other		1
20008882	AW1213	Carroll ranch 2	Hollister	35	0	ORCHARD	Walnut			1
20007828	aw1214	Home Ranch	Hollister	52	0	ORCHARD	Walnut			1
20007830	aw1214	Benevento Orchard	Hollister	29	0	ORCHARD	Walnut	Other		1
20007833	aw1214	Sanchez Ranch	Hollister	8	0	ORCHARD	Other			1
20001570	AW1215	Vista Verde Vineyards	Paicines CA, 95043	607.79	0	VINEYARD				1
20008546	AW1216	fair view	hollister	5	0	ROW	Squash			1
20002460	AW1216	Palm Tag Ranch	Hollister	15	0	ROW	Beet	Squash	Peas	1
20008542	AW1216	Cagney	San Juan Batista	17	0	ROW	Squash	Kale	Leek	1
20003611	AW1217	Kin Fai Chan Nursery	Hollister	7	0	GREENHOUSE				1
20000507	AW1219	DeLay Ranch	Ventura	20	0	ORCHARD	Avocado			1
20004729	AW1223	Ping Huang Cheng Nursery	Gilroy	1		NURSERY				1
20002403	AW1226	parcel # 830-04-044-00 Turturici Ranch	gilroy	2	0	ORCHARD	Apple	Other	Walnut	1
20007491	AW1229	Fukagawa Farm	Gilroy, California	22.69	5	ROW	Corn, Human Con.	Bean, Unspecified	Potato	1
20006625	AW1230	San Ysidro Vineyard	Gilroy	227	0	VINEYARD				1
20002780	AW1232	Lucy Chang Farm	Morgan Hill	15	0	NURSERY, GREENHOUSE				1
20003608	AW1234	Da Xiong Tan Nursery	Morgan Hill	4	0	GREENHOUSE	Cabbage	Chinese Cabbage	Cauliflower	1
20003020	AW1235	t&l flowers	gilroy	3	0	GREENHOUSE				1
20003808	AW1240	Jian Guang Liang Nursery	Gilroy	5	0	GREENHOUSE	Chinese Cabbage	Mustard	Spinach	1

20003574	AW1242	shun heung kwong	gilroy	5		NURSERY, GREENHOUSE	Chinese Cabbage			1
20001725	AW1243	Janong USA	San Martin	5.61	0	GREENHOUSE	Cabbage	Radish	Cucumber	1
20001923	AW1244	Mai Wu Less Nursery	Morgan Hill	2.5	0	ROW, GREENHOUSE	Chinese Cabbage			1
20003606	AW1245	SHING HOU MOK NURSERY	Morgan Hill	5	0	GREENHOUSE	Chinese Cabbage	Kale	Mustard	1
20004213	AW1246	Peter Chak Nursery	San Martin	2	0	GREENHOUSE				1
20001884	AW1253	EL RANCHO TAJIGUAS	goleta	350	350	ORCHARD	Avocado	Avocado	Avocado	1
20003586	AW1255	Rui Kuang Farm	San Martin	6		GREENHOUSE	Chinese Cabbage	Mustard	Spinach	1
20002677	AW1256	Condor Ridge	Goleta	13	0	ORCHARD	Citrus	Avocado	Other	1
20002678	AW1256	Antrim	Goleta	9	0	ORCHARD	Citrus	Avocado	Other	1
20002683	AW1256	Parsons Project	Goleta	4	0	ORCHARD	Citrus	Avocado	Other	1
20002680	AW1256	Justice	Goleta	8	0	ORCHARD	Citrus	Avocado	Other	1
20002230	AW1257	Lau's Nursery	San Martin	3	0	GREENHOUSE				1
20004016	AW1258	Joe Chen Nursery	Gilroy	1	1	GREENHOUSE				1
20004059	AW1259	stargate ranch llc	goleta	106	106	ORCHARD	Avocado	Lemon		1
20007605	AW1260	Yoi Foo Chun	San Martin	3	3	GREENHOUSE	Chinese Cabbage			1
20007391	AW1269	WY Chan Nursery	Gilroy	1	0	NURSERY, GREENHOUSE				1
20003784	AW1273	An Yang Chen Nursery	Morgan Hill	4		GREENHOUSE	Chinese Cabbage			1
20003565	AW1274	Kwong Nursery	Gilroy	5	0	NURSERY				1
20002240	AW1276	Mannstand Vineyard	Gilroy	15	0	VINEYARD	Grapes, Wine			1
20003723	AW1278	HUANG MEI HUAN	San Martin	3	0	GREENHOUSE	Chinese Cabbage	Celery	Cauliflower	1
20001921	AW1280	Bailey Farm	Gilroy	1	0	VINEYARD	Grapes, Wine			1
20007802	AW1282	Vanumanutagi Vineyard	Gilroy	13	200	VINEYARD				1
20007801	AW1282	Redwood Retreat Ranch	Gilroy	7	99	VINEYARD				1
20007844	AW1283	Liang's Nursery	gilroy	13		GREENHOUSE				1
20002094	AW1284	PAJARO GREENHOUSES	WATSONVILLE	8		GREENHOUSE				1
20002086	AW1284	KITAYAMA GREENHOUSE	WATSONVILLE	6		GREENHOUSE				1
20002084	AW1284	SWANTON PACIFIC RANCH	DAVENPORT	65		ROW	Other			1
20002083	AW1284	WILDER RANCH	SANTA CRUZ	120	0	ROW	Other			1
20002093	AW1284	FREEDOM GREENHOUSES	FREEDOM	7.5	0	GREENHOUSE				1
20009684	AW1285	Argyle Vineyard	King City	30	0	VINEYARD	Grapes, Wine			1
20007558	AW1288	Ernesto Wickenden Vineyard	Santa Maria	3	0	VINEYARD				1
20007559	AW1288	Tinaquaic Vineyard	Santa Maria	10	0	VINEYARD				1
20007556	AW1288	Williamson/Dore Vineyard	Santa Ynez	6.5	0	VINEYARD				1
20005179	AW1289	Ranch 5	Santa Maria	20	20	ROW	Broccoli	Barley		1
20005181	AW1289	Ranch 6	Santa Maria	30	30	ROW	Broccoli	Lettuce, Head	Barley	1
20005683	AW1292	Nuevo Rancho	Lompoc	36	0	VINEYARD				1
20003682	AW1296	Baldwin Ranch	Arroyo Grande	0.5		ORCHARD				1
20007223	AW1297	Santa Rita Hills Appelations Property LLC	lompoc	40	0	ROW	Bean, Unspecified			1
20007222	AW1297	TJ Hayes Ranch Incorporated	lompoc	70	0	ROW	Bean, Unspecified			1
20007224	AW1297	Robert Guerra	lompoc	90	0	ROW	Bean, Unspecified			1
20004019	AW1300	Dwight G. Vedder Co., dba. Vedder Ranch	Carpinteria	100	100	ROW	Avocado	Lemon	Citrus	1
20001518	AW1305	Greenhaven Orchard	Solvang	1.8		ORCHARD				1
20011402	AW1311	Twin Bridges	Gilroy	5	5	NURSERY				1
20011382	AW1311	Old Bolsa Rd	Gilroy	15	15	ROW	Other			1
20001927	AW1312	Solis winery, Inc	Gilroy	10	0	VINEYARD				1
20001932	AW1313	Fratelli ranch, LLC.	Gilroy	10	0	VINEYARD	Grapes, Wine			1
20001332	AW1316	VMA Ranch	Morgan Hill	14	0	ORCHARD				1
20001350	AW1316	Scott Farm	Morgan Hill	1	0	ORCHARD				1
20001359	AW1316	Bunyard Orchard	Morgan Hill	2.75	0	ORCHARD				1
20001367	AW1316	Wickson Orchard	Morgan Hill	1.25	0	ORCHARD				1
20001325	AW1316	Andy's Orchard	Morgan Hill	27.5	27.5	ORCHARD				1
20001361	AW1316	Hedrick Orchard	Morgan Hill	7	0	ORCHARD				1
20001346	AW1316	Nishikawa Ranch	Morgan Hill	2.25	0	ORCHARD				1
20001351	AW1316	Ludwick Ranch	Morgan Hill	1.75	0	ORCHARD				1
20003595	AW1321	Kirigin Cellars	Gilroy	41	0	VINEYARD	Other			1
20004490	AW1324	KAJIKO NUSERY,INC	Morgan Hill,CA 95037	38	0	ROW, GREENHOUSE	Other			1
20005860	AW1325	QUAN ZHONG ZHANG	GILROY	5	0	GREENHOUSE	Chinese Cabbage	Cauliflower	Celery	1
20008036	AW1326	Gilman Ranch	Gilroy	82	82	ROW	Tomato			1
20008029	AW1326	Bloomfield Ranch	Gilroy	190	190	ROW	Tomato			1
20008041	AW1326	Monterey Ranch	Gilroy	20	20	ROW	Tomato			1
20005323	AW1327	Hecker Pass	Gilroy	0	0	ROW	Wheat			1
20005342	AW1327	Masoni Ranch #2	Gilroy	15	0	ROW	Pepper, Fruiting			1
20005338	AW1327	Milias	Gilroy	27	0	ROW	Bean, Unspecified			1

20005326	AW1327	Home Ranch	Gilroy	63	0	ROW	Pepper, Fruiting			1
20005344	AW1327	Mesa Rd North	Gilroy	46	0	ROW	Pepper, Fruiting			1
20005339	AW1327	James Ranch	Gilroy	49	0	ROW	Pepper, Fruiting	Other	Other	1
20005340	AW1327	Masoni Ranch #1	Gilroy	39	0	ROW	Pepper, Fruiting			1
20004631	AW1330	Site 1	Gilroy	60	0	NURSERY				1
20007791	AW1331	xu hong huang	gilroy	3		GREENHOUSE	Chinese Cabbage	Mustard	Cabbage	1
20002581	AW1333	Mellow's Nursery and Farms	Morgan Hill	5	0	NURSERY, ORCHARD, GREENHOUSE	Pepper, Fruiting	Peach	Tomato	1
20002260	AW1337	A & M Farm	Morgan Hill CA 95037	8	0	ROW, GREENHOUSE	Chinese Cabbage	Broccoli	Spinach	1
20003525	AW1339	Emilio Guglielmo Winery Inc	Morgan Hill	45	0	VINEYARD				1
20007739	AW1340	Gera Harding	San Martin	15	0	ROW	Corn, Human Con.	Bean, Dried	Pepper, Fruiting	1
20007749	AW1340	DiNapoli	San Martin	16	0	ROW	Pepper, Fruiting	Bean, Dried	Tomato	1
20007743	AW1340	Llagas Ranch	san martin	46	0	ROW	Bean, Dried	Pepper, Fruiting	Corn, Human Con.	1
20007744	AW1340	Fitzgerlad &Santa Teresa behind Fruitstand	San Martin	15	0	ROW	Tomato	Corn, Human Con.	Pepper, Fruiting	1
20007729	AW1340	Younger	Gilroy	15	0	ROW	Bean, Dried	Cucumber	Corn, Human Con.	1
20007726	AW1340	Robba Ranch	San Martin	40	0	ROW	Cucumber			1
20007734	AW1340	LaBarbera Ranch	San Martin	6	0	ROW	Bean, Dried	Corn, Human Con.	Cucumber	1
20007727	AW1340	Gera Rucker	Gilroy	30	0	ROW	Bean, Dried	Corn, Human Con.	Pumpkin	1
20007724	AW1340	Martin Ranch	San Martin	30	0	ROW	Pepper, Fruiting	Corn, Human Con.		1
20007723	AW1340	Milar Ranch	San Martin	25	0	ROW	Corn, Human Con.			1
20007742	AW1340	San Martin & Colony	San Martin	20	0	ROW	Bean, Dried	Broccoli	Corn, Human Con.	1
20007164	AW1342	South Pacific Orchids, Inc	Gilroy	3	6.5	GREENHOUSE				1
20007162	AW1342	South Pacific Orchids, Inc	Gilroy	2.5	7.5	GREENHOUSE				1
20004566	AW1344	J and P Farm	Morgan HIll	30	0	ROW, ORCHARD	Pepper, Fruiting	Bean, Unspecified	Walnut	1
20002961	AW1350	GLUHAICH RANCH	Gilroy	59	0	ROW	Strawberry	Chinese Cabbage		1
20002962	AW1350	NO. 101 RANCH	Gilroy	46	0	ROW	Corn, Human Con.			1
20002948	AW1350	OLD STORE	Gilroy	29	0	ROW	Chinese Cabbage			1
20002940	AW1350	UESUGI RANCH	Gilroy	18	0	ROW	Corn, Human Con.			1
20002879	AW1350	BOGLE RANCH	Gilroy	29	0	ROW	Corn, Human Con.	Pepper, Fruiting		1
20002951	AW1350	PERRY RANCH	San Martin	12	0	ROW	Chinese Cabbage			1
20011083	AW1350	Luchessa Ave - Filice	Gilroy	51		ROW	Corn, Human Con.			1
20011082	AW1350	Marns Ranch	San Martin	45		ROW	Pepper, Fruiting	Pumpkin		1
20011067	AW1350	Nguyen - Las Animas Ranch	Gilroy	19		ROW	Pumpkin			1
20011065	AW1350	No. 101 - Blks 6A - 6E	Gilroy	28		ROW	Corn, Human Con.			1
20011062	AW1350	Olive Ranch	Morgan Hill	15.4		ROW	Corn, Human Con.	Pepper, Fruiting		1
20011063	AW1350	No. 101 - Blocks 1A & 1B	Gilroy	40		ROW	Chinese Cabbage			1
20003100	AW1351	Yutaka Fujita	Morgan Hill	5	0	ORCHARD	Other			1
20004564	AW1352	Carman's Nursery	Gilroy	1	1	NURSERY, GREENHOUSE				1
20012664	AW1353	Castroville	Castroville	12.5	0	GREENHOUSE	Cauliflower	Brussel Sprout	Celery	1
20001485	AW1353	Headstart Nursery	Gilroy	18	0	NURSERY	Cauliflower	Artichoke	Lettuce, Leaf	1
20008430	AW1357	BONITA RANCH	NIPOMO	40	40	ROW	Strawberry			1
20007105	AW1358	RAK Farm LLC	Solvang	18	18	ORCHARD	Walnut			1
20007122	AW1362	Myriad Flowers	Carpinteria	0	0	GREENHOUSE				1
20005207	AW1364	Rancho Encantado/Shea	Santa Ynez	65	0	ORCHARD	Walnut			1
20005205	AW1364	Rancho Encantado/Stangeland	Santa Ynez	60	0	ORCHARD	Walnut			1
20008169	aw1365	Aguajitos Ranch	goleta	38	38	ORCHARD	Avocado			1
20002134	AW1367	Mosby Winery	Buellton	22	0	VINEYARD				1
20002135	AW1367	Mosby Vineyad	Buellton	17	0	VINEYARD				1
20004928	AW1373	Castro Valley RD	GILROY CA	92		ORCHARD				1
20004939	AW1373	BOLSA RD	GILROY	20		ROW	Bean, Unspecified			1
20009184	AW1373	Godfrey Ranch	Gilroy CA	7		ORCHARD				1
20004922	AW1373	BORELLO FARMS	MORGAN HILL CA 95037	50		ORCHARD				1
20001452	AW1375	9 AC	Gilroy	0	0	ROW	Other			1
20001602	AW1378	Gilroy Ground Cover Nursery	Gilroy	0	0	GREENHOUSE				1
20007409	AW1379	Besson Vineyards Ranch 2	Gilroy	20	0	VINEYARD				1
20007408	AW1379	Besson Vineyards Ranch 1	Gilroy, CA	9	0	VINEYARD				1
20008509	AW1380	Bella Vista	carpinteria	3	0	ROW	Blueberry			1
20007140	AW1385	Varga Ranch	Goleta	14	0	ROW, ORCHARD	Avocado			1
20000516	AW1386	Cottonwood Canyon Vineyard	Santa Maria	56	0	ROW, VINEYARD	Grapes, Wine			1
20003121	AW1388	Hollandia Produce, LLC	Carpinteria	27	9	ORCHARD, GREENHOUSE	Avocado	Other	Lettuce, Head	1
20004126	AW1389	SMBF Battles	Santa Maria	40	40	ROW	Strawberry	Broccoli	Celery	1
20004122	AW1389	Battles	Santa Maria	30	30	ROW	Strawberry	Broccoli	Celery	1
20001370	AW1390	Home ranch and greenhouses	Guadalupe	17	17	ROW, GREENHOUSE	Other			1
20004239	AW1393	La Patera Rancho	Goleta	270	0	ORCHARD	Avocado	Lemon		1

20000941	AW1394	PECK/FLYNN RANCH	CARPINTERIA	46.64	46.64	ROW	Blueberry			1
20000734	AW1394	OTA RANCH	CARPINTERIA	18.14	18.14	ROW	Blueberry			1
20000791	AW1394	PARSONS RANCHES (Includes: Airport' Creek; Hill & Middle)	CARPINTERIA	30.01	30.01	ROW	Blueberry			1
20007754	AW1395	Bermuda Hills Ranch	Santa Barbara	17	0	ORCHARD	Avocado			1
20007183	AW1396	peter miller	santa barbara	35	35	ORCHARD	Avocado			1
20003048	AW1399	Hinnrichs vineyards	Solvang	4	0	VINEYARD	Grapes, Wine			1
20007422	AW1400	mormann vineyard	Lompoc	13	0	VINEYARD	Grapes, Wine			1
20001087	AW1407	Dusi Vineyards	Paso Robles	40		VINEYARD				1
20004009	AW1410	Mar Vista	Nipomo	5	5	VINEYARD, ORCHARD				1
20009643	AW1411	LoBue Orchards	Hollister	12		ORCHARD				1
20009644	AW1411	LoBue Orchards	Hollister	11		ORCHARD				1
20007510	AW1412	Orchard Rd	Hollister	27	0	ORCHARD				1
20007253	AW1413	Ranchita Oaks	San Miguel,Ca	5	0	VINEYARD	Grape			1
20007923	AW1413	Le Vigne Winery & Vineyards	Paso Robles,CA	25		VINEYARD				1
20007264	AW1413	Evenson Vineyards	Paso Robles,CA	11		VINEYARD	Grape			1
20007263	AW1413	Filippini Farmes	Paso Robles,CA	38		VINEYARD	Grape	Olive		1
20007257	AW1413	Bankston Vineyards	Paso Robles,CA	8	0	VINEYARD	Grape			1
20007259	AW1413	Hogue Vigneyards	Paso Robles,CA	9	0	VINEYARD	Grape			1
20007256	AW1413	Zoo to you	Paso Robles,CA	18		VINEYARD	Grape			1
20007261	AW1413	Estrella River Vineyards	San Miguel,Ca	30		VINEYARD	Grape			1
20008622	AW1414	Rancho San Fernando Rey	Santa Barbara	42	0	VINEYARD				1
20003828	AW1416	Rosendale Nursery	Watsonville	2.5	0	NURSERY				1
20003781	AW1418	Drummy Ranch	Goleta	8	0	ORCHARD	Avocado			1
20001230	AW1419	Los Alamos Ranch	Los Alamos	580	55	VINEYARD				1
20002232	AW1420	Dal Pozzo Ranch	Carpinteria	40		ORCHARD				1
20007644	AW1423	Ranch 9	LOMPOC	20.4	20.4	ROW	Lettuce, Head	Broccoli	Artichoke	1
20007642	AW1423	Ranch 8 - Henning	LOMPOC	24	24	ROW	Artichoke	Broccoli	Lettuce, Head	1
20003287	AW1428	Saveria Vineyard	Aptos	12	0	VINEYARD				1
20005122	AW1430	HEATHER POINT/CARTWRIGHT	LA SELVA BEACH	10	10	ROW	Other			1
20005133	AW1430	HEATHER POINT/HEATHERHILL,LLC	LA SELVA BEACH	15	15	ROW	Other			1
20005177	AW1430	BUENA VISTA/CNLLC	WATSONVILLE	11	11	NURSERY, GREENHOUSE	Other			1
20005194	AW1430	RANCHO ROAD RANCH	WATSONVILLE	15	15	ROW, NURSERY	Other			1
20005164	AW1430	SEAVIEW RANCH	WATSONVILLE	30.5	30.5	ROW, NURSERY, GREENHOUSE	Other			1
20005190	AW1430	BUENA VISTA/KAJIHARA	WATSONVILLE	8	8	ROW, NURSERY	Other			1
20005198	AW1430	ELKHORN ROAD RANCH	CASTROVILLE	4	4	GREENHOUSE	Other			1
20005139	AW1430	CREST DRIVE RANCH	WATSONVILLE	9	9	ROW, NURSERY, GREENHOUSE	Other			1
20005107	AW1430	HEATHER POINT/MCAFEE	LA SELVA BEACH	10	10	ROW	Other			1
20005204	AW1430	HEATHER POINT/NESTLINLLC	LA SELVA BEACH	2	2	ROW	Other			1
20008383	AW1432	Lupe	Watsonville	18	18	ROW	Strawberry			1
20005149	AW1433	Frumveller	Hollister	17	0	ROW	Lettuce, Leaf			1
20005105	AW1433	Minto	Watsonville	50	0	ORCHARD				1
20001623	AW1434	PSI Green Valley Ranch	Watsonville	15	4	ROW, GREENHOUSE	Strawberry	Raspberry	Blackberry	1
20005221	AW1435	martinelli	davenport	34	0	ROW	Brussel Sprout	Pumpkin	Artichoke	1
20005219	AW1435	dump ranch	santa cruz	17	0	ROW	Brussel Sprout	Pumpkin		1
20005222	AW1435	seaside	davenport	65	0	ROW	Brussel Sprout	Artichoke	Pumpkin	1
20012823	AW1437	Conlan Ranch	Castroville	46	46	ROW	Strawberry			1
20012822	AW1437	George Ranch	Watsonville	13	13	ROW, GREENHOUSE	Blackberry			1
20012782	AW1437	Peaceful Valley Ranch	Watsonville	14	14	ROW	Strawberry			1
20002328	AW1438	Terra Sole Nurseries, LLC	Watsonville	1	2	NURSERY, GREENHOUSE				1
20003584	AW1439	Deja View Farm & Vineyard	Corralitos	1	1	ROW, VINEYARD, ORCHARD, GREENHOUSE	Beet	Carrot	Squash	1
20001456	AW1440	Vernon E. Marian A. Varni	watsonville	39	0	ORCHARD	Apple			1
20007463	AW1447	Hoey Vineyard	Paso Robles	9	0	VINEYARD				1
20001054	AW1456	Sea Crest Nursery	Santa Barbara	10	0	NURSERY				1
20007765	AW1457	Nelson C Pinkham Ranch	Carpinteria	30		ORCHARD				1
20001122	AW1458	mcroberts farm	goleta	6	0	ORCHARD	Avocado			1
20001640	AW1459	Alondra De Los Prados	Santa Ynez	1		VINEYARD				1
20003139	AW1461	K. M. Nursery, Inc.	Carpinteria	5	0	NURSERY				1
20007588	AW1462	Cuatro Vientos Vineyard	Los Olivos	4	0	VINEYARD				1
20007169	AW1463	Lafond Vineyards Burning Creek	Buellton CA 93427	37	0	VINEYARD				1
20005117	AW1465	Bronson ranch	Watsonville,Ca.	38	38	ROW	Raspberry			1
20005099	AW1465	St.Calir Ranch	Watsonville,California	38	38	ROW	Raspberry			1
20005134	AW1465	MBA /Bunker Hill	Watsonville	46	46	ROW	Strawberry			1
20005125	AW1465	Teaspoon Ranch	Watsonville	39	39	ROW	Raspberry			1

20003591	AW1470	Kwong Nursery	Gilroy	3		GREENHOUSE	Chinese Cabbage	Mustard		1
20001519	AW1471	Chequera Vineyards	Paso Robles	18	0	VINEYARD				1
20005846	AW1472	Buena Vista Ranch	watsonville	13	0	ROW	Strawberry			1
20003330	AW1473	Biagini Vineyards	Aptos	12	0	VINEYARD				1
20003783	AW1477	Albright	Watsonville, CA	48	48	ROW	Lettuce, Leaf			1
20000585	AW1480	Pelio	Carmel Valley	15	0	VINEYARD				1
20000993	AW1483	Minami Greenhouse Inc	Salinas	5	0	GREENHOUSE				1
20004410	AW1486	ALISAL ORGANIC	SALINAS	47	0	ROW	Strawberry			1
20004409	AW1486	ALBA ORGANIC	SALINAS	19		ROW	Strawberry			1
20008409	AW1487	La Reina	Gonzales	61		VINEYARD				1
20008432	AW1487	River Road	Gonzales	215		VINEYARD				1
20005211	AW1489	Peckam Ranch	Watsonville	30	30	ROW	Raspberry			1
20005213	AW1489	Pavlovich Ranch	Watsonville	15	15	ROW	Raspberry			1
20005212	AW1489	Griffith Ranch	Watsonville	48	48	ROW	Blackberry			1
20005209	AW1489	Sherrod	Watsonville	18	10	ROW	Raspberry			1
20005110	AW1489	Home Ranch	Watsonville	58	58	ROW	Raspberry			1
20005210	AW1489	Carlton Ranch	Watsonville	35	35	ROW	Raspberry			1
20004450	AW1507	Peckham Rd Ranch	Watsonville	32	30	ROW	Strawberry			1
20003878	AW1509	Fujii Ranch	watsonville	20	0	ROW	Strawberry			1
20003871	AW1509	Koa Ranch	watsonville	24	24	ROW	Strawberry			1
20007925	AW1510		Watsonville			NURSERY				1
20003838	AW1510	Cavanaugh Color Nursery	Watsonville, Ca 95076	4	0	NURSERY				1
20002461	AW1511	Regan Vineyards	Watsonville	37	0	VINEYARD				1
20007571	AW1514	Shasta Ranch	Watsonville	47	0	ROW	Raspberry			1
20004867	AW1514	Garroutte Ranch	Watsonville	10	3	ROW	Blackberry			1
20004875	AW1514	Cooley Ranch	Watsonville	36	0	ROW	Blackberry	Raspberry		1
20004859	AW1514	Freedom Ranch	Freedom	8	0	ROW	Blackberry			1
20004865	AW1514	Wagner Ranch	Watsonville	20	0	ROW	Blackberry			1
20004853	AW1514	Corralitos Ranch	Corralitos	20	0	ROW	Blackberry			1
20007714	AW1515	Young Vineyard	Santa Ynez 93460	18	0	ROW, VINEYARD	Lettuce, Head	Squash	Bean, Unspecified	1
20001223	AW1518	Ranch 5	Santa Maria	33	33	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20001742	AW1520	County Of Santa Barbara	Goleta	470	0	ORCHARD	Avocado	Other		1
20007124	aw1521	Nishimura 3	Carpinteria	1		ORCHARD	Avocado			1
20011983	AW1523	Betteravia Investments - Harris Ranch (32 Vineyard)	Santa Maria	32	0	VINEYARD				1
20009923	AW1523	Okui (42)	Santa Maria	50	15	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20009975	AW1523	Koyama (75)	Santa Maria	45	14	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20001924	AW1525	Oak Valley Vineyard	Paso Robles	1		ROW, VINEYARD	Grapes, Wine			1
20007725	AW1525	Oak Valley Vineyard	Paso Robles	1	0	VINEYARD				1
20001151	AW1529	Pleasant Valley Vineyard	Aptos	2	0	VINEYARD				1
20001041	AW1532	Molino Creek Farm	Davenport	2	0	ROW	Peas	Squash, Summer	Other	1
20002569	AW1533	Nugent Ranch	Watsonville	96	96	ROW	Raspberry	Blackberry		1
20002570	AW1533	Tynan Ranch	Watsonville	38	38	ROW	Strawberry			1
20004341	AW1534	Siri Ranch	Watsonville	25	0	ROW	Strawberry			1
20004350	AW1534	Office Ranch	Watsonville	30	0	ROW	Strawberry			1
20004761	AW1536	Fraser Ranch	Watsonville	9	0	ORCHARD	Apple			1
20004759	AW1536	Home Ranch	Watsonville	21	0	ORCHARD	Apple			1
20004766	AW1536	Nagamine Ranch	Watsonville	6	0	ORCHARD	Apple			1
20003840	AW1537	Smith Gardens	Watsonville	15	15	NURSERY, GREENHOUSE				1
20004775	AW1539	Knego Ranch	Watsonville	33	0	ROW	Blackberry	Blueberry		1
20001539	AW1540	Andersen Vineyards	Felton	5	0	ROW, VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine	1
20003914	AW1543	Buena Vista Ranch	watsonville	42	30	ROW	Strawberry			1
20007649	AW1546	Hunter Hill	Soquel	5.5	5.5	VINEYARD				1
20004900	AW1547	Braycovich Site 4A	Watsonville	30.47	0	ROW	Raspberry			1
20004920	AW1547	Tsukiji Site 8A	Watsonville	45.13	0	ROW	Raspberry			1
20004889	AW1547	Holohan Site 1A	Watsonville	24.5	0	ROW	Blackberry			1
20004941	AW1547	Pista Site 12A	Watsonville	10.75	0	ROW	Blackberry			1
20004896	AW1547	Jerenich Site 7A	Watsonville	23.23	0	ROW	Blackberry			1
20002262	AW1548	Rancho Del Ciervo	Santa Barbara	470	0	ORCHARD	Avocado	Citrus		1
20001322	AW1548	University Exchange Corporation	Goleta	460.6	0	ORCHARD	Lemon	Avocado		1
20010303	AW1548	County of Santa Barbara / Rancho El Baron	Goleta	107	0	ORCHARD	Avocado	Avocado		1
20010302	AW1548	County of Santa Barbara / Rancho El Baron	Goleta							1
20004910	AW1550	Colendich Ranch	Watsonville	14	0	ROW	Strawberry	Raspberry		1
20003901	AW1551	JEFFERSON RANCH	MARINA	36	0	NURSERY				1

20000607	AW1553	Lelande Ranch	Ventura	31	0	ORCHARD	Avocado			1
20006482	AW1555	Perez Farms	watsonville	4	0	ROW	Bean, Unspecified	Tomato	Other	1
20003336	AW1556	Bassor	Watsonville	33	0	ROW	Raspberry			1
20003342	AW1556	Cassin	Watsonville	26.4	0	ROW	Blackberry	Raspberry		1
20003455	AW1556	Stolich	Watsonville	20	0	ROW	Raspberry			1
20003417	AW1556	Loveless	Watsonville	52.9	0	ROW	Raspberry			1
20003416	AW1556	Loveland	Watsonville	9.7	0	ROW	Blackberry			1
20003349	AW1556	Crossetti	Watsonville	109.9	0	ROW	Blackberry	Raspberry		1
20003356	AW1556	Freedom	Watsonville	40	0	ROW	Raspberry			1
20003447	AW1556	Murphy	Watsonville	26.1	0	ROW	Raspberry			1
20003445	AW1556	Mc Grath	Watsonville	31	0	ROW	Blueberry			1
20003335	AW1556	Banovac	Watsonville CA	14.3	0	ROW	Raspberry			1
20003483	AW1556	Tynan	Watsonville	41	0	ROW	Raspberry			1
20003456	AW1556	Riverside	Watsonville	11	0	ROW	Raspberry			1
20003458	AW1556	R and T Ranch	Watsonville	40	0	ROW	Raspberry			1
20003414	AW1556	Kitayama	Watsonville	46	0	ROW	Strawberry			1
20003485	AW1556	Kalich Ranch	Watsonville	43.3	0	ROW	Mustard			1
20003482	AW1556	Thompson	Watsonville	13.9	0	ROW	Strawberry		DIAZINON	1
20003471	AW1556	Sambrailo	Watsonville	32	0	ROW	Raspberry			1
20003477	AW1556	Shikuma	Watsonville	23	0	ROW	Raspberry			1
20003343	AW1556	Cassin Orchard	Watsonville	35	0	ROW	Raspberry			1
20003452	AW1556	Pavlovich	Watsonville	28.1	0	ROW	Raspberry			1
20003345	AW1556	Coward	Watsonville	50	0	ROW	Raspberry			1
20003340	AW1556	Butier	Watsonville	32.31	0	ROW	Raspberry			1
20003422	AW1556	Marinovich	Watsonville CA	32	0	ROW	Raspberry			1
20003429	AW1556	Mc Grath	Watsonville	30	0	ROW	Raspberry			1
20001503	AW1557	Rincon Del Mar Ranch	Carpinteria	154	10	ROW, ORCHARD	Other			1
20001501	AW1557	Valley View Orchard, Inc.	Carpinteria	5.5		ORCHARD				1
20001695	AW1558	Site 1 (6337)	Carpinteria	11	0	ROW, ORCHARD, GREENHOUSE	Avocado			1
20001698	AW1558	Site 2 (4494)	Carpinteria	2	0	ROW	Avocado			1
20001355	AW1559	Dierberg Drum Canyon Vineyard	Lompoc	60	0	VINEYARD				1
20001357	AW1559	Star Lane Vineyard	Santa Ynez	205.2	0	VINEYARD				1
20001349	AW1559	Dierberg Santa Maria	Santa maria	161.22	0	VINEYARD				1
20010424	AW1560	Enos Ranch 2	Santa Maria	6	3	ROW	Broccoli	Cauliflower	Spinach	1
20010423	AW1560	Santa Maria Cemetary Ranch 2	Santa Maria	17.73	8.8	ROW	Broccoli	Cauliflower	Spinach	1
20007500	AW1561	reliz ranch 5	greenfield	30	0	VINEYARD				1
20004932	AW1562	1850 Stallion Vineyard	Santa Ynez	15	0	VINEYARD				1
20003157	AW1563	Rancho Santa Rosa	Lompoc	230	0	VINEYARD				1
20003527	AW1564	Le Bon Climat	santa Maria	55	0	VINEYARD				1
20003531	AW1564	La Cuna	Los Alamos	10	0	VINEYARD, ORCHARD				1
20001337	AW1566	Mesa Verde Vineyards ,LLC	Santa Ynez	34	0	VINEYARD				1
20000435	AW1567	Longshot Minx Vineyards	Paso Robles	14	0	VINEYARD				1
20004572	AW1570	MONTEREY BAY NURSERY, INC.	ROYAL OAKS	30	0	NURSERY				1
20002820	AW1571	HOME RANCH #1	GONZALES	38.4	0	ROW	Broccoli	Lettuce, Leaf	Cauliflower	1
20002822	AW1571	CARR RANCH	GONZALES	45.8	0	ROW	Lettuce, Leaf	Cauliflower	Celery	1
20004304	AW1574	Nipomo	Nipomo	3	0	GREENHOUSE				1
20003647	AW1583	Newell Vineyards	Lockwood	17	0	VINEYARD	Grapes, Wine			1
20007852	AW1585	Rancho Sin Frenos	Carmel Valley	15	0	VINEYARD				1
20001008	AW1586	Heller Estate	Carmel Valley	107	107	VINEYARD	Grapes, Wine			1
20004779	AW1588	Rio Seco Vineyard & Winery	Paso Robles	30	0	VINEYARD				1
20001161	AW1589	Red Cedar Vineyards	Shandon	1727	0	VINEYARD				1
20002655	AW1590	TCR	Watsonville	9.5	0	ROW	Strawberry			1
20000790	AW1592	Erwin Vineyard	Los Gatos	3	0	VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine	1
20003893	AW1594	Rose/Cowles Berry Farm	Watsonville	7.82	0	ROW	Blackberry			1
20003873	AW1594	Cowles Ranch #2/Cowles Berry Farm	Watsonville	25.84	0	ROW	Blackberry			1
20003866	AW1594	Cowles Ranch #1/Cowles Berry Farm	Watsonville	5.92	0	ROW	Blackberry			1
20003882	AW1594	Ollason Ranch/Cowles Berry Farm	Watsonville	9.75	0	ROW	Blackberry			1
20012104	AW1596	DSA	Aromas	10	0	ROW	Raspberry			1
20012107	AW1596	Shultz	CA	30.3	0	ROW	Strawberry			1
20012106	AW1596	Ryan	Salinas	31.6	0	ROW	Strawberry			1
20012108	AW1596	Speigel	Salinas	34.6	0	ROW	Strawberry			1
20003638	AW1596	Hillcrown	Aromas	32	64	ROW	Raspberry	Strawberry		1
20012105	AW1596	Loveland	Aromas	86.31	0	ROW	Raspberry	Blackberry		1

20012102	AW1596	Hillcrown	Aromas Ca	24.03	0	ROW	Strawberry	Raspberry		1
20007173	AW1597	REGO FARM	Watsonville	8.5	0	ORCHARD	Avocado	Lemon		1
20005081	AW1601	Casserly	Watsonville	11	0	ROW	Blackberry			1
20001149	AW1603	Ste Philippe Vineyard	Soledad	289.62	0	VINEYARD				1
20001189	AW1603	Ste Nicholas Vineyard	Soledad	171.05	0	VINEYARD				1
20001155	AW1603	Doctor's Vineyard	Soledad	242.77	0	VINEYARD				1
20001153	AW1603	Lone Oak Vineyard	Soledad	146.39	0	VINEYARD				1
20001156	AW1603	Smith & Hook Vineyards	Soledad	277.24	0	VINEYARD, ORCHARD				1
20006421	AW1609	Floradale Ranch	Lompoc	35	0	ROW	Other			1
20001641	AW1610	R. E. Hall Carpinteria, Inc	Carpinteria	52	0	ORCHARD	Avocado			1
20004209	AW1613	LITTLE RANCH	MOSS LANDING	39	1	ROW	Strawberry			1
20009062	AW1613	Kajihara Ranch	Watsonville	46	0	ROW	Strawberry			1
20004200	AW1613	WELSH RANCH	MOSS LANDING	9.5	0	ROW	Strawberry			1
20004203	AW1613	GRACIA RANCH	ROYAL OAKS	35	1	ROW	Strawberry			1
20004216	AW1614	SHEAHY RANCH	WATSONVILLE	47	0	ROW	Strawberry			1
20004215	AW1614	VASQUEZ RANCH	WATSONVILLE	40	0	ROW	Strawberry			1
20003969	AW1616	ROCHA FARMS	WATSONVILLE	41	0.25	ROW	Strawberry			1
20002643	AW1620	NURSERY	Santa Maria	2	2	NURSERY				1
20008550	AW1622	Chap Foster (The Farm)	Salinas	28		ROW	Strawberry	Pumpkin	Corn, Human Con.	1
20003371	AW1632	Mozzini Ranch	King City	74.5	0	VINEYARD				1
20003367	AW1632	Amaral Ranch	King City	186	0	VINEYARD				1
20003375	AW1632	Herbert Ranch	King City	194	0	VINEYARD				1
20003361	AW1632	Wilson Ranch	San Lucas	612	0	VINEYARD				1
20003372	AW1632	Rocky Ranch	Greenfield	97	0	VINEYARD				1
20004659	AW1641	SIP	Salinas	2.6	0	ROW	Lettuce, Leaf			1
20004656	AW1641	Sullivan(Jerry Ramirez)-Vierra	Salinas	24.4	24.4	ROW	Lettuce, Head	Lettuce, Leaf		1
20008407	AW1641	T&A/Naturipe-Fuji-Molera	Salinas	46.1	0	ROW	Strawberry			1
20007896	AW1643	Rider	Watsonville	13	0	ROW	Blackberry	Blueberry		1
20008526	AW1645	Conley Ranch	Salins	39	0	ROW	Strawberry			1
20008406	AW1645	Toro Ranch	Salinas	17.6	0	ROW	Strawberry			1
20008524	AW1645	Weaver Ranch	Salinas	47.1	47.1	ROW	Strawberry			1
20004363	AW1645	Tjerrild Ranch	Salinas	48	48	ROW	Lettuce, Head	Lettuce, Leaf		1
20005029	AW1646	Amaral Ranch	Castroville	12	0	ROW	Strawberry	Blueberry	Barley	1
20004951	AW1646	Meridian Ranch	Castroville	8	8	ROW	Strawberry	Barley	Other	1
20004712	AW1648	Arroyo Seco Canyon Vineyard	Greenfield	71	71	VINEYARD				1
20004738	AW1649	Skillicorn Berries	Watsonville	5.5	0	ROW	Blackberry	Apple		1
20007884	AW1650	idem	Moss Landing	3	0	NURSERY				1
20007873	AW1652	RIDER	WATSONVILLE	33	23	ROW	Blackberry	Blueberry		1
20007858	AW1652	MCGRATH	WATSONVILLE	92	92	ROW	Raspberry	Blackberry		1
20007819	Aw1653	Brinan Ranch	San Ardo	43.6	0	ROW	Lettuce, Head	Carrot	Cucumber	1
20001567	AW1655	Home Ranch	Watsonville	20	40	ROW	Strawberry			1
20001468	AW1656	Lemoravo Ranch	Soledad	98	0	VINEYARD, ORCHARD				1
20001472	AW1656	Highlands Ranch	Soledad	180	0	VINEYARD, ORCHARD				1
20001471	AW1656	Berti Ranch	Soledad	69	0	ORCHARD				1
20001469	AW1656	Fairview Road Ranch	Soledad	245	0	VINEYARD, ORCHARD				1
20001470	AW1656	Escolle Ranch	Soledad	283.5	0	VINEYARD, ORCHARD				1
20001467	AW1656	Old Oak Ranch	Soledad	191	0	ORCHARD				1
20003692	AW1659	Hilltop Ranch	Moss Landing	3		GREENHOUSE				1
20007566	AW1660	Sargenti Ranch	CHUALAR	30	0	VINEYARD	Grapes, Wine			1
20007532	AW1660	CORRAL DE TIERRA	SALINAS	7	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20004455	AW1661	Clark	Soledad	1165.93		VINEYARD				1
20004466	AW1661	Panorama	Soledad	415.95		VINEYARD				1
20004506	AW1661	PDM	Gonzales	284.89		VINEYARD				1
20004516	AW1661	Rincon	Gonzales	223.23		VINEYARD				1
20004515	AW1661	Porter	Gonzales	254.14		VINEYARD				1
20004503	AW1661	Hacienda	Soledad	386.09		VINEYARD				1
20004328	AW1661	Mission Peak	Los Alamos	199.22		VINEYARD	Grapes, Wine			1
20004324	AW1661	Geoffrey Cellars	Los Alamos	199.38		VINEYARD	Grapes, Wine			1
20004331	AW1661	Byron	Santa Maria	382.61	0	VINEYARD				1
20004510	AW1661	Valley View	Gonzales	110.48		VINEYARD				1
20004336	AW1661	Barham Vineyard	Los Alamos	499.93		VINEYARD	Grapes, Wine			1
20004497	AW1661	Rancho Tierra	Soledad	283.55		VINEYARD				1
20004508	AW1661	Jensen	Gonzales	142.85		VINEYARD				1

20004334	AW1661	Sainz	Los Alamos	125.5		VINEYARD	Grapes, Wine			1
20004326	AW1661	Cambria Estate	Santa Maria	1284.11	0	VINEYARD				1
20004330	AW1661	Mission Trails	Los Alamos	480.13		VINEYARD	Grapes, Wine			1
20004333	AW1661	Neely	Los Alamos	105.62		VINEYARD	Grapes, Wine			1
20000570	AW1662	Salinas Valley Nursery	Salinas	3	0	GREENHOUSE	Turnip	Daikon		1
20003202	AW1664	Moranda Ranch	Soledad	40	0	ROW	Broccoli	Lettuce, Leaf		1
20004060	AW1665	F6	watsonville	4	0	ROW, GREENHOUSE	Other	Other	Other	1
20004042	AW1665	F2	san juan bautista, ca	10	0	ROW	Other	Other	Other	1
20004058	AW1665	F7	gilroy	30	0	ROW	Other	Other	Other	1
20004049	AW1665	F4	watsonville	15	0	ROW	Other	Other	Other	1
20004054	AW1665	F5	watsonville	5	0	ROW, GREENHOUSE	Other	Other	Other	1
20004044	AW1665	F3	watsonville	1	0	ROW	Other	Other	Other	1
20007219	AW1673	MILLER BROTHERS FARMING	San Miguel	170	0	VINEYARD				1
20003324	AW1674	Zabala Vineyards	Soledad	679	0	VINEYARD	Grape			1
20003724	AW1675	Central Avenue Vineyard	King City	463	0	VINEYARD				1
20004280	AW1679	ALTMAN PLANTS #6	SALINAS CA.	9	9	NURSERY, GREENHOUSE				1
20004243	AW1679	ALTMAN PLANTS RANCH #`1	SALINAS CA	19	0	NURSERY, GREENHOUSE				1
20004246	AW1679	ALTMAN PLANTS #2	SALINAS CA	20	0	NURSERY, GREENHOUSE				1
20004287	AW1679	ALTMAN PLANTS #5	SALINAS CA.	19	0	NURSERY, GREENHOUSE				1
20004261	AW1679	ALTMAN PLANTS #4	SALINAS CA	20	0	NURSERY, GREENHOUSE				1
20003542	AW1680	Vigna Del Cielo Azzuro	Soledad	7.4	0	VINEYARD				1
20003541	AW1680	Morgantini Vineyard	Paso Robles	40	0	VINEYARD				1
20003538	AW1680	Panziera Brothers Vineyard	Soledad	20	0	VINEYARD				1
20001035	AW1680	Morgantini 3	Paso Robles	63	0	VINEYARD				1
20004437	AW1684	Color Spot Yard 3 - Monterey Rose	Salinas	27	7	NURSERY, GREENHOUSE				1
20004435	AW1684	Color Spot Yard 2 - Ninomiya	Salinas	20	20	NURSERY, GREENHOUSE				1
20000962	AW1693	John D Rarig Ranch	Cayucos	18	18	ORCHARD	Avocado			1
20007537	AW1695	Anthony Freitas Farms	San Juan Bautista	20	0	ORCHARD				1
20001010	AW1698	Jorge's Farm	Watsonville	30	0	NURSERY				1
20003355	AW1702	Ron Anderson	Goleta	4	0	ORCHARD	Avocado			1
20007857	AW1712	Di Gangi Vineyards	Carmel Valley	10	0	VINEYARD				1
20002840	AW1715	El Capitan Ranch/ Indian Valley Ranch	Goleta	3		ORCHARD				1
20000739	AW1716	Buena Vista	Watsonville, Ca 95076	9	0	ROW	Strawberry			1
20000743	AW1716	Tada Ranch	Watsonville	12	0	ROW	Strawberry			1
20000742	AW1716	Casserly Ranch	Watsonville, Ca	5	0	ROW	Strawberry			1
20003949	AW1721	Ponce Produce	watsonville	9.5	1.5	ROW	Blackberry			1
20005176	AW1722	West Bay 101N	Santa Maria	118	0	ROW	Other			1
20012002	AW1722	White Hills - West Ranch #50	Orcutt	91.9	91.9	ROW	Other			1
20008569	AW1722	Bien Nacido Ranch 2012	Garey	50.5	0	ROW	Other			1
20005078	AW1722	Gladaway Warehouse	Santa Maria	2	0	ROW	Other			1
20012022	AW1722	Bradley North Ranch 2012	Santa Maria	146		ROW	Other	Peas		1
20008571	AW1722	Bradley South Ranch 2012	Santa Maria	209	0	ROW	Other			1
20012003	AW1722	White Hills East Ranch #51	Orcutt	109.4	109.4	ROW	Other			1
20005148	AW1723	Ross Orchard	Lompoc	10	0	ORCHARD	Walnut			1
20003870	AW1724	Davis Family Ranch	Summerland	7	0	ORCHARD				1
20003877	AW1724	Grant Ranch	Carpinteria	10	0	ORCHARD				1
20003842	AW1724	William Kimsey	Santa Barbara	19	0	ORCHARD				1
20003856	AW1724	Daniel Rosenbaum	Santa Barbara	15	0	ORCHARD				1
20003864	AW1724	Gerald Cigliano	Summerland	10	0	ORCHARD				1
20003133	AW1725	Taylor Ranch	Nipomo	8	8	ROW	Avocado			1
20000832	AW1728	Sonshine Ranch	Goleta	4.5	4.5	ORCHARD	Avocado			1
20005174	AW1730	Ranch 3	greenfield	338	0	VINEYARD				1
20007550	AW1731	Condor Ridge Ranch/Bloomingdale	Goleta	30	30	ORCHARD				1
20005420	AW1732	Cedar Lane Vineyard	Soledad	55		VINEYARD				1
20004384	AW1733	Miller Merritt Trust Carpinteria	Carpinteria	11.25	0	ORCHARD				1
20001186	AW1735	02 Carrari	Los Alamos	98		VINEYARD	Grapes, Wine			1
20001194	AW1735	03 Los Alamos	Los Alamos	80		VINEYARD	Grapes, Wine			1
20001169	AW1735	01 Valley View	Solvang	39		VINEYARD	Grapes, Wine			1
20001209	AW1735	08 Calzada	Santa Ynez	3		VINEYARD	Grapes, Wine			1
20000890	AW1736	JK Vineyard	solvang	3.5		VINEYARD				1
20003160	AW1737	BUTERA	Goleta	125	0	ORCHARD	Avocado	Lemon		1
20003772	AW1738	Rancho Vinedo	Santa Maria	63	0	ROW, VINEYARD	Oat	Pastureland		1
20003105	AW1740	Nursery - Ranch	Santa Barbara	14	0	NURSERY				1

20003104	AW1740	Nursery	Santa Barbara	16	0	NURSERY				1
20000768	AW1743	Ranch 2	Lompoc	13		ROW	Bean, Unspecified			1
20000770	AW1743	Ranch 1	Lompoc	39		ROW	Bean, Unspecified			1
20000775	AW1743	Ranch 4	Lompoc	80		ROW	Bean, Unspecified			1
20000776	AW1743	Ranch 5	Lompoc	40		ROW	Bean, Dried			1
20005643	AW1746	the poor farm	greenfield	12	0	ROW, VINEYARD, ORCHARD	Broccoli	Lettuce, Head	Strawberry	1
20004087	AW1749	Harvey Vineyards	Bradley	28	0	VINEYARD	Grapes, Wine			1
20002130	AW1753	Unknown	Salinas	5.5	0	GREENHOUSE				1
20000951	AW1758	Vazquez Ranch	Goleta	175		ORCHARD	Avocado	Lemon		1
20000950	AW1758	Jones Ranch	Santa Barbara	11		ORCHARD	Avocado			1
20000947	AW1758	San Jose Ranch	Santa Barbara	18		ORCHARD	Avocado			1
20000955	AW1758	Wells Ranch	Nipomo	54		ORCHARD	Avocado			1
20000954	AW1758	Stephens Ranch	Goleta	20		ORCHARD	Avocado			1
20000945	AW1758	Winchester Ranch	Goleta	340		ORCHARD	Avocado	Lemon		1
20000953	AW1758	Tom Apostol	Goleta	7		ORCHARD	Avocado			1
20000952	AW1758	Miller Ranch	Goleta	9		ORCHARD	Avocado			1
20003047	AW1759	Doud 2	Greenfield	137.2	0	VINEYARD				1
20003043	AW1759	Reliz	Greenfield	11.3	0	VINEYARD				1
20003041	AW1759	Riva	Greenfield	530	0	VINEYARD				1
20003042	AW1759	Doud 1	Greenfield	93.1	0	VINEYARD				1
20000566	AW1760	Santa Fe Ranch	Salinas	7	7	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	1
20003659	AW1761	Ferrasci Ranch	Salinas	31.4	0	ROW	Lettuce, Head	Cauliflower	Spinach	1
20002970	AW1761	Diac Ranch	Salinas	44.4	0	ROW	Lettuce, Head	Cauliflower	Spinach	1
20004090	AW1765	Ranch 4	Santa Maria	41	41	ROW	Broccoli	Lettuce, Head	Cauliflower	1
20004077	AW1765	Ranch 12	Guadalupe	12	12	ROW	Broccoli	Lettuce, Head	Celery	1
20004666	AW1767	Rio Mesa Farms	Watsonville	15	15	ROW	Strawberry			1
20004665	AW1767	Rocha Ranch Airport West	Watsonville	15	15	ROW	Strawberry			1
20004667	AW1767	Rio Mesa Farms	Watsonville	10	10	ROW	Strawberry			1
20000969	AW1780	VOSTI HIGASHI	CHUALAR	45	0	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf	1
20007521	AW1783	A Duda & Sons Seed Mill	Salinas	2	2	NURSERY, GREENHOUSE				1
20006685	AW1786	SIlverado Sweetwater Vineyards	King City	903	0	VINEYARD				1
20006689	AW1786	Wildhorse Vineyard LLC	King City	164	0	VINEYARD				1
20006686	AW1786	Ventana Property Holdings - Ventana Vineyard	Soledad	289.5	0	VINEYARD				1
20006684	AW1786	Sunrise Vineyards	Gonzales	490	0	VINEYARD				1
20006642	AW1786	Kimberly Vineyards	Greenfield	81	0	VINEYARD				1
20010823	AW1786	Brayden's Vineyard	Soledad	35	0	VINEYARD				1
20010822	AW1786	Rick's Vineyard	King City	230	0	VINEYARD				1
20006582	AW1786	Airport Vineyard	Greenfield	94.5	0	VINEYARD				1
20006580	AW1786	Alta Loma Vineyard	Greenfield	250	0	VINEYARD				1
20006540	AW1786	San Saba Vineyards	Soledad	67.75	0	VINEYARD				1
20006621	AW1786	Casa Grande Vineyard	Gonzales	461.14	0	VINEYARD				1
20006581	AW1786	Arroyo Loma Vineyards	Greenfield	980	0	VINEYARD				1
20006644	AW1786	Loma Pacific Vineyards	Greenfield	164	0	VINEYARD				1
20006688	AW1786	Victoria Vineyards	Greenfield	77.7	0	VINEYARD				1
20006640	AW1786	Kristy Vineyard	Greenfield	137	0	VINEYARD				1
20006623	AW1786	Escolle Road Vineyard	Gonzales	125	0	VINEYARD				1
20006647	AW1786	Marsino Vineyard	Greenfield	136	0	VINEYARD				1
20006622	AW1786	Carmel Highlands	Gonzales	186	0	VINEYARD				1
20006680	AW1786	Mission Ranch Vineyard LLC	Soledad	241	0	VINEYARD				1
20006643	AW1786	Los Ositos Vineyard	Greenfield	414	0	VINEYARD				1
20006583	AW1786	Monroe Canyon Vineyard	Greenfield	76.3	0	VINEYARD				1
20006626	AW1786	Garcia Ranch Vineyard	Gonzales	260	0	VINEYARD				1
20006645	AW1786	Lago Vineyard	Greenfield	100	0	VINEYARD				1
20006681	AW1786	McIntyre Vineyards	Gonzales	61.4	0	VINEYARD				1
20006682	AW1786	Rancho Solo Vineyards	Soledad	138	0	VINEYARD				1
20000442	AW1792	san marcos creek vineyards	paso robles	42	42	VINEYARD	Grapes, Wine			1
20001019	AW1796	Sierra Mar	Soledad	38	0	VINEYARD	Grapes, Wine			1
20005502	AW1799	Chula Vina Vineyard	Chualar	12	0	VINEYARD				1
20000983	AW1802	Boekenoogen Vineyard Santa lucia Highlands	Soledad	90		VINEYARD	Grapes, Wine			1
20000984	AW1802	Boekenoogen Vineyard Bell Ranch	Carmel Valley	15		VINEYARD	Grapes, Wine			1
20008239	AW1805	FUJI MOLERA	CASTOVILLE	45.4	45.4	ROW	Strawberry			1
20008244	AW1805	OLD STAGE RANCH	SALINAS	40	40	ROW	Oat			1
20003997	AW1810	Sun Coast Growers	Salians	20.2	0	ROW	Celery	Broccoli	Lettuce, Leaf	1

20004061	AW1810	Garcia Ranch	Salinas	37.4	0	ROW	Celery	Broccoli		1
20007331	AW1814	Ranch 7	Santa Cruz	67	67	ROW	Brussel Sprout			1
20005723	AW1815	14th & Walnut Ave	Greenfield	25.5	0	ROW	Cabbage	Broccoli	Lettuce, Head	1
20003665	AW1816	San Bernabe Vineyard	King City Ca.	5600	0	ROW, VINEYARD	Carrot	Potato	Tomato	1
20007461	AW1819	Thwaits	Watsonville	10	0.5	ROW	Lettuce, Leaf			1
20007562	AW1820	Silva Vineyard	Greenfield	75	75	VINEYARD				1
20007561	AW1820	Hillside Vineyard	Gonzales	200	0	VINEYARD				1
20007554	AW1820	Bella Vita	Greenfield	236	0	VINEYARD				1
20007505	AW1822	Larner Ranch	Solvang	35	0	VINEYARD				1
20004345	AW1823	Cunha Ranch	Salinas	45	45	ROW	Broccoli	Lettuce, Head		1
20001621	AW1823	Spence Ranch Fudenna	Salinas	29.1	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	1
20004723	AW1824	Old Stage Greenhouse	Salinas	5	0	GREENHOUSE				1
20004722	AW1824	Green Valley Floral	Salinas	10	0	GREENHOUSE				1
20004785	AW1828	Black Diamond Ranch/Marin's Vineyard	Lockwood	5	0	VINEYARD				1
20003501	AW1835	33 SCURICH ROAD	WATSONVILLE	8.5	3	ORCHARD	Apple			1
20003481	AW1835	360 CARLTON	WATSONVILLE	8	2	ROW	Raspberry			1
20003470	AW1835	133 SCURICH ROAD	WATSONVILLE	18	3	ROW, ORCHARD	Blackberry	Strawberry	Apple	1
20003813	AW1835	29 Scurich	Watsonville	7	0	ORCHARD				1
20003464	AW1835	55 PECKHAM	WATSONVILLE	8	2	ORCHARD	Apple			1
20003975	AW1840	M. Tashiro Nursery, Inc.	Salinas	7	0	GREENHOUSE				1
20001098	AW1841	Maloy residence	Santa Barbara	0.5	0	ORCHARD	Avocado			1
20005103	AW1842	Gainey Ranch	Santa Ynez, CA 93460	380	0	ROW	Squash	Pumpkin		1
20001575	AW1843	RANCHO ALDEA ANTIGUA, LLC	CARPINTERIA	17	17	ORCHARD				1
20000686	AW1844	Forbidden Fruit Orchards, Inc.	Lompoc	14	0	VINEYARD, ORCHARD	Blueberry	Grapes, Wine	Avocado	1
20001682	AW1845	James A. Brown	Goleta	1		ORCHARD				1
20004520	AW1847	Loma Verde Vineyard	Santa Maria	219	0	VINEYARD				1
20004541	AW1847	El Camino Vineyard	Los Alamos	358		VINEYARD				1
20004512	AW1847	Los Alamos Vineyard	Los Alamos	460	0	VINEYARD				1
20001860	AW1849	6060 La Goleta LLC.	Goleta	26	0	ORCHARD				1
20001527	AW1851	Home Ranch	Watsonville	15		ORCHARD				1
20001528	AW1851	KP	Watsonville	10.1		ORCHARD				1
20004881	AW1854	RANCH 3	NIPOMO	140	0	ORCHARD				1
20003904	AW1855	Joullian Vineyards	Carmel Valley	40	0	VINEYARD	Grapes, Wine			1
20005023	AW1863	Canyon Creek Ranch	Morro Bay	4	3	ORCHARD	Avocado	Pastureland		1
20004743	AW1870	Plant Horizons	Royal Oaks	2	0	NURSERY, GREENHOUSE				1
20007127	AW1871	Cathedral Oaks Village Association	Santa Barbara	0.7	0.7	ORCHARD	Avocado			1
20001573	AW1875	Hector Organic Farm - ALBA	salinas	4.6	4.6	ROW	Strawberry	Cucumber	Tomato	1
20011584	AW1877	Desante	Castroville	257.3	128.6	ROW	Artichoke	Brussel Sprout		1
20011586	AW1877	Sella - Tottino	Castroville	307.5	78	ROW	Artichoke			1
20011583	AW1877	Molera - North	Castroville	379.8	196.3	ROW	Artichoke			1
20011564	AW1877	Giannini	Salinas	277.7	60.2	ROW	Artichoke			1
20011570	AW1877	San Jon - Potter	Salinas	36.9	12.1	ROW	Lettuce, Head			1
20011572	AW1877	M. Hill - Tottino	Castroville	268.6	134.3	ROW	Artichoke			1
20011567	AW1877	Q&B	Salinas	138.5	27.7	ROW	Artichoke			1
20011569	AW1877	San Jon - Barlogio	Salinas	112.6	31.6	ROW	Artichoke			1
20011574	AW1877	M. Hill - Massa	Castroville	172.2	116.5	ROW	Artichoke			1
20011542	AW1877	Nielsen - South	Salinas	218.9	61.4	ROW	Artichoke			1
20001660	AW1879	Margaret's Vineyard	Lockwood	14		VINEYARD				1
20001051	AW1882	Salvador Lazaro	santa ynez	16	0	ROW	Squash, Summer			1
20005328	AW1884	Alegria Ranches	Goleta	33	0	ORCHARD				1
20008162	AW1885	Tom Moyer Farm	santa barbara	3	0	ORCHARD	Avocado			1
20000862	AW1888	OK Avocado Ranch	Nipomo	8	8	ORCHARD	Avocado			1
20008562	AW1891	Harney Ranch	Watsonville	27	27	ROW	Chinese Cabbage	Leek	Parsley	1
20008567	AW1891	Lima Ranch	La Selva	16	16	ROW	Squash	Chinese Cabbage	Endive	1
20008565	AW1891	Storm ranch	Watsonville	40	40	ROW	Broccoli	Cauliflower	Lettuce, Leaf	1
20008561	AW1891	Freedom Ranch	Watsonville	30	30	ROW	Celery	Collard	Lettuce, Leaf	1
20008563	AW1891	Home Ranch	Watsonville	21	21	ROW	Beet	Radish	Rutabega	1
20008566	AW1891	Capurro Ranch	Moss Landing	27	27	ROW	Beet	Kale	Spinach	1
20004588	AW1891	Ramer Ranch	Watsonville	36	36	ROW	Squash, Summer	Bean, Unspecified	Leek	1
20004471	AW1891	Amesti Ranch	Watsonville	28	28	ROW	Lettuce, Head	Leek	Peas	1
20004509	AW1891	Kett Ranch	Watsonville	6	6	ROW	Carrot	Collard	Lettuce, Head	1
20004511	AW1891	Kitayama Ranch	Watsonville	80	80	ROW	Rutabega	Radish	Carrot	1
20004607	AW1891	Rosa Ranch	Watsonville	9	9	ROW	Lettuce, Leaf	Bean, Unspecified	Spinach	1

20004644	AW1891	Packard Ranch	Moss Landing	44	44	ROW	Broccoli	Cauliflower	Lettuce, Leaf	1
20004651	AW1891	Ranch 1A	Watsonville	6	6	ORCHARD				1
20004481	AW1891	Braycovich Ranch	Watsonville	35	35	ROW	Beet	Cabbage	Kale	1
20004563	AW1891	Monterey Bay Academy aka, Academia, aka MBA	Watsonville	47	24	ROW	Lettuce, Leaf	Kale	Collard	1
20004653	AW1891	Ranch 2A	Watsonville	8	8	ORCHARD				1
20004467	AW1891	Airport Ranch	Watsonville	20	20	ROW	Cabbage	Lettuce, Head	Chinese Cabbage	1
20005780	AW1893	1	watsonville	0.75	0	ROW, NURSERY	Other			1
20000690	AW1904	G and J Orchards	Hollister	32		ORCHARD				1
20011362	AW1907	Chalone	Soledad	320	0	VINEYARD				1
20005480	AW1908	Aspen Enterprises	Watsonville	8	0	NURSERY, GREENHOUSE				1
20003697	AW1909	Bedding Plants Plus, Inc.	Carpinteria	12	0	NURSERY, GREENHOUSE				1
20007307	AW1910	Jones Vineyard	Hollister	4	0	VINEYARD				1
20005346	AW1911	Wheelock Road ,Watsonville,ca.	Watsonville	3.5	0	NURSERY				1
20002567	AW1912	Whale Rock Ranch	Cayucos	40		ORCHARD				1
20002753	AW1913	OLEA FARM	TEMPLETON	3	0	ORCHARD				1
20008034	AW1914	Horace Lee Hillard Walnut Orchard	Hollister	4	0	ORCHARD	Wheat			1
20003027	AW1915	Terra Ventosa Vineyard	King City	2115	0	VINEYARD	Grapes, Wine			1
20003026	AW1915	Pine Creek Ranch	San Ardo	1264	0	VINEYARD	Grapes, Wine			1
20003451	AW1915	Keyes Canyon Ranches	San Miguel	630	0	VINEYARD	Grapes, Wine			1
20007646	AW1916	Overley Growers	Nipomo	1	0	ROW, NURSERY, GREENHOUSE	Tomato			1
20005046	AW1918	Premium Pistachio LLC	Paso Robles	26	0	ORCHARD	Pistachio			1
20002869	AW1923	F&T Vineyard	Shandon	298.9	0	VINEYARD				1
20002929	AW1924	Cerro Prieto Vineyard	Paso Robles	17		VINEYARD				1
20004232	AW1930	Blossom Hill Nursery	watsonville	3		NURSERY				1
20002830	AW1932	Boneso Home Vineyard	San Miguel	8	0	VINEYARD				1
20002826	AW1932	Cole Creek Vineyard	Templeton	32	0	VINEYARD				1
20002871	AW1934	Rancho Tecolote	Goleta	20	20	ROW, ORCHARD	Avocado			1
20004389	AW1936	Mann Ranch	Watsonville	24	24	ROW	Lettuce, Leaf			1
20004387	AW1936	Beilby Ranch	Watsonville	41	41	ROW	Blackberry	Raspberry	Strawberry	1
20004399	AW1936	Riverside Ranch	Watsonville	37	37	ROW	Strawberry	Raspberry		1
20000594	AW1937	ANGEL VINEYARDS	ARROYO GRANDE	2	0	VINEYARD				1
20007574	Aw1939	Sanctuary Vineyards	Greenfield Ca.	184.7	184.7	VINEYARD	Grapes, Wine			1
20003621	AW1943	Four Sisters Ranch	San Miguel	145	0	VINEYARD				1
20001883	AW1945	Lucy M. Walsh	San Martin	17	0	ORCHARD	Walnut			1
20009442	AW1950	Redwing Vineyards	Gilroy	2	2	VINEYARD				1
20003625	AW1953	Oak Creek Vineyard	Paso Robles	38	0	VINEYARD	Grapes, Wine			1
20001716	AW1958	Old Crumudgeon Vineyard	Lockwood	4.9		VINEYARD				1
20004762	AW1961	Brisas Costeras	Ventura	18	18	ORCHARD	Avocado			1
20004765	AW1961	Rancho Mariposa	Ventura	4	4	ORCHARD				1
20004767	AW1961	Faith Lutheran Church	Carpinteria	1	1	ORCHARD				1
20005086	AW1962	Asbell Orchids	Arroyo Grande	0.5	0	GREENHOUSE				1
20001090	AW1964	Forestieri	Morgan Hill	10	10	ORCHARD	Other			1
20004709	AW1967	Moss Lane Estates	Templeton	11	0	VINEYARD				1
20007282	AW1972	Vincent Castello	Hollister	41	0	ORCHARD				1
20003151	AW1973	same	Santa Barbara	2.5	0	ORCHARD	Avocado			1
20001021	AW1975	Spitzley Farm/Boulder Ridge Vineyard	Cambria, CA 93428	5		VINEYARD, ORCHARD	Grapes, Wine	Avocado		1
20007020	AW1978	McFarland	Goleta	1	0	ORCHARD	Avocado			1
20003215	AW1979	Ahlgren Vineyard	Boulder Creek	1	0	VINEYARD	Grapes, Wine			1
20003103	AW1981	Gilroy Young Plants	Gilroy	30	0	GREENHOUSE				1
20000510	AW1988	Haslett Thomsen Property	Cuyama Valley	23	0	VINEYARD				1
20003560	AW1991	Mt. Green Nursery, Inc.	San Martin	1.5	0	GREENHOUSE				1
20003240	AW1994	Susich Vineyard	Santa Ynez	3.7		VINEYARD				1
20004204	AW1995	Uyeda Farm	Watsonville	29	0	ROW	Strawberry			1
20000988	AW1996	Casa Nuez Macadamias	Gaviota	1.39		ORCHARD				1
20008040	AW1999	home	goleta	3	3	ORCHARD	Avocado			1
20002928	AW2006	Shadow Canyon Vineyard	Paso Robles	11		VINEYARD				1
20005404	AW2009	Rancho de las Noches	Goleta	3	0	ORCHARD	Avocado			1
20007855	AW2012	Rosenberg Family Ranch	San Ardo	366		ROW, ORCHARD	Walnut			1
20003323	AW2014	Ritz Brunello	Santa Barbara	1	0	ORCHARD	Avocado	Citrus		1
20009023	AW2016	Rancho 2	Watsonville	4	4	ROW	Strawberry	Raspberry		1
20009022	AW2016	Rancho 1	Watsonville	5	5	ROW	Strawberry	Raspberry		1
20000745	AW2017	Curtiss Kennon	Holiister	30		ORCHARD	Walnut			1
20000648	AW2019	Schechter Vineyards	Atascadero Ca.	8	0	ROW, VINEYARD	Grapes, Wine			1

20004725	AW2032	JUSTIN Vineyards and Winery	Paso Robles	279.6	0	VINEYARD				1
20000905	AW2034	Sunbelt Vineyard	San Miguel	337	0	VINEYARD				1
20002200	AW2036	EM JAG C Corp	Santa Barbara	68	68	ORCHARD				1
20007834	AW2052	ROSEWATER VINEYARD	Creston, CA	17		ROW, VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine	1
20000598	AW2053	Fletcher Vineyard	Templeton	3	0	VINEYARD				1
20002410	AW2056	Orr Ranch	Santa Barbara	1	0	ORCHARD				1
20003797	AW3003	Ranch 4	Greenfield	16		ROW	Bean, Unspecified	Peas		1
20000640	AW3009	Windy Hill Vineyard	Paso Robles	22	0	VINEYARD				1
20001014	AW3010	Hidden Valley Vineyard	Templeton	14	0	VINEYARD	Grapes, Wine			1
20001511	AW3011	Alisos Vineyard	Los Alamos	42	0	VINEYARD				1
20000844	AW3012	RANCHO SANTA RAYLENE	Nipomo	35	0	ORCHARD	Avocado			1
20007924	AW3013	United Genetics Seeds	Hollister	2.5	2.5	ROW, GREENHOUSE	Tomato	Pepper, Fruiting	Cucumber	1
20001288	AW3014	Tom Moller's Vineyard, sometimes called Moller Vineyard	Gilroy	15	0	VINEYARD				1
20007503	AW3015	RANCH 1	LOMPOC	22	0	ROW, NURSERY	Other			1
20011503	AW3016	Freitas Ranch	San Juan Bautista	10	0	ROW	Lettuce, Head			1
20000712	AW3016	Lavagnino Ranch	San Juan Bautista	11	0	ROW	Lettuce, Head			1
20011502	AW3016	Lavagnino Ranch	San Juan Bautista	39	0	ROW	Pepper, Fruiting	Lettuce, Head		1
20007423	AW3017	HIGH JACK RANCH	MARICOPIA	120	0	ROW	Other			1
20003967	AW3019	GRUL RANCH	WATSONVILLE	6	0	ORCHARD	Apple			1
20002708	AW3021	pezzini farms	castroville	44.5	44.5	ROW	Artichoke			1
20002969	AW3023	Henry George/ Layous	King City	145	0	ROW	Bean, Dried			1
20002968	AW3023	San Bernabe Vineyard	King City	1121	0	ROW	Potato	Bean, Dried	Carrot	1
20001212	AW3023	Rosenberg Family Ranch, LLC	San Ardo	575	0	ROW	Bean, Dried	Carrot	Potato	1
20002465	AW3024	same	Montecito	5	0	ORCHARD	Avocado			1
20004882	AW3025	Third Loop Partners	Nipomo	100	0	ORCHARD				1
20002828	AW3036	Whitney Ranch	Carpinteria	7	7	ROW	Blueberry	Avocado	Citrus	1
20001525	AW3038	Partridge Leigh Vineyard	Paso Robles	4		VINEYARD				1
20001531	AW3039	DW Ranch	Ventura	7	0	ORCHARD				1
20007867	AW3040	San Brenarbe	King City	180	0	ROW	Tomato	Pumpkin		1
20000876	AW3043	Exotic African Flora LLC.	Castroville	30	30	NURSERY				1
20002269	AW3044	Creekside Apple Ranch	Solvang	5	0	ORCHARD				1
20000676	AW3046	Two Dog Farm/Orchard Field	Davenport	2		ROW	Lettuce, Leaf	Squash, Summer	Cabbage	1
20002001	AW3047	Marsalisis Organics	Watsonville	13	0	ORCHARD				1
20002896	AW3048	Galante Vineyards	Carmel Valley	23.9		VINEYARD				1
20001537	AW3049	Mahl Ranch Co.	Ventura	32	0	ORCHARD				1
20007144	AW3052	same	CArpinteria	9	6	ORCHARD	Avocado			1
20001546	AW3053	RANCHO PINI RD	WATSONVILLE	6.5	605	ROW	Strawberry	Strawberry	Strawberry	1
20001547	AW3053	RANCHO MAHER	WATSONVILLE	12	12	ROW	Strawberry	Raspberry	Blackberry	1
20001542	AW3053	RANCHO LA CUCUNA	CASTOVILLE	9	9	ROW	Strawberry	Strawberry	Strawberry	1
20003208	AW3054	The Ranch at Cripple Creek	Paso Robles	13	0	ORCHARD	Olive			1
20007290	AW3055	Sanfilippo Ranch, LLC	Watsonville	24		ROW	Apple			1
20001144	AW3055	Sanfilippo Ranch	Watsonville	24		ROW, ORCHARD	Apple			1
20001060	AW3056	same	Santa Barbara	4.2	0	ORCHARD	Citrus	Avocado		1
20002106	AW3058	Warren Church	Royal Oaks	1.5	0	ORCHARD				1
20003614	AW3060	Tognazzini Ranch	Cayucos	34	34	ORCHARD	Avocado			1
20000662	AW3061	Messori Ranch	Ventura	40	0	ORCHARD				1
20007809	AW3062	Rancho Bernat	Los Olivos	4	0	VINEYARD				1
20007560	AW3064	Crist Home	Carmel Valley	0.6	0	ROW, VINEYARD	Grapes, Wine			1
20003222	AW3065	Bright Spring Ranch	Carpinteria	4	0	NURSERY, ORCHARD	Apple	Peach	Bean, Unspecified	1
20007245	AW3066	Foothill Nursery	Carpinteria	7	7	NURSERY				1
20004416	AW3068	OBERTELLOS NURSERY	WATSONVILLE	7.46		GREENHOUSE				1
20002740	AW3069	vance villa vineyard	hollister	3	0	VINEYARD	Grapes, Wine			1
20004744	AW3070	Casa Blanca Vineyards	Los Olivos	66	0	VINEYARD				1
20007172	AW3071	Joughin Ranch	Santa Ynez	8		VINEYARD				1
20007251	AW3074	MICHAUD VINEYARD	SOLEDAD	28.5	0	VINEYARD				1
20002204	AW3077	Chateau Plaisant	Prunedale	0.5	0	VINEYARD	Grapes, Wine			1
20001267	AW3078	schoch family trust	santa barbara	3	3	ORCHARD	Citrus			1
20002578	AW3079	Sunset Nursery	Watsonville	1	1	NURSERY				1
20000689	AW3080	Webster Vineyard	paso robles	16.5	0	VINEYARD				1
20001563	AW3081	Larry Philip	Goleta	6	6	ORCHARD	Avocado			1
20001140	AW3082	Wennerstrom Family Trust	Goleta	3		ORCHARD				1
20007102	AW3084	Weathering Heights	Ventura	80	0	ORCHARD	Avocado	Lemon		1
20002404	AW3085	Meyr Ranch	Carpinteria	10	10	ORCHARD	Avocado			1

20001068	AW3089	GEORIS VINEYARD	CARMEL VALLEY	16	16	VINEYARD				1
20001608	AW3092	Van Brocklin Berries	salinas	1	0	VINEYARD	Blackberry			1
20002943	AW3094	Prunedale Road	Gilroy	16.3		ORCHARD				1
20001980	AW3095	Toro Canyon Nursery, Inc	Carpinteria	12	0	NURSERY				1
20009662	AW3096	Nelson Family Vineyard	Los Gatos	9	0	VINEYARD	Grapes, Wine			1
20002939	AW3099	Flint Road	Hollister	8		ORCHARD				1
20002938	AW3099	Olympia Orchard	San Juan Bautista	25.45		ORCHARD				1
20002974	AW3100	Oak Creek Apple Ranch	SAn Miguel	56	0	VINEYARD, ORCHARD				1
20002945	AW3104	Home Ranch	San Juan Bautista	62		ORCHARD				1
20002946	AW3104	Kesner Ranch	San Juan Bautista	5		ORCHARD				1
20000757	AW3108	Mike Pulido	Hollister	4		ORCHARD	Walnut			1
20004961	AW3112	Mesa Del Sol Vineyards	Greenfield	7	0	VINEYARD				1
20000744	AW3115	Island View Nursery Incorporated	carpinteria	5.5	0	NURSERY, GREENHOUSE				1
20001800	AW3116	Chandler Ranch	Creston	10.12	0	ROW	Olive	Pistachio		1
20002508	AW3117	Estancia De Los Olivos	Solvang	10		ORCHARD	Olive			1
20002222	AW3119	Sakaue Nursery	Watsonville	1	0.25	GREENHOUSE				1
20004456	AW3120	AJB Vineyards	Paso Robles	9	0	VINEYARD	Grapes, Wine			1
20007604	AW3122	Valencia Creek Farm	Aptos	10	0	ORCHARD				1
20001697	AW3123	Fairview Gardens	Goleta	12		ROW, ORCHARD	Lettuce, Leaf	Bean, Unspecified	Carrot	1
20000569	AW3127	CJ Ranch	Carpinteria	7		ORCHARD	Avocado			1
20000823	AW3128	Sunspot	Watsonville	20	0	NURSERY				1
20000820	AW3128	Suncrest and Sunwest	Watsonville	42	0	NURSERY				1
20007294	AW3130	Doce Robles Winery & Vineyard	Paso Robles	30		VINEYARD				1
20007332	AW3131	SHELDON ORCHARD	GOLETA	4		ORCHARD	Lemon	Orange		1
20002760	AW3132	San Antonio Valley Olive Ranch	Bradley	0	0	ORCHARD	Olive			1
20001533	AW3133	Sunnynoll Christie Vineyard	aptos	24	0	ROW, VINEYARD	Grape			1
20007595	AW3134	Regalado Berry Farm	Watsonville	10	10	ROW	Blackberry	Raspberry		1
20006361	AW3136	Dusty Acres	Carpinteria, Ca 93013	2	0	ORCHARD	Avocado			1
20001109	AW3138	Greensward / New Natives LLC	Aptos	0.27		GREENHOUSE	Peas			1
20001717	AW3139	Soquel Vineyards	Soquel	2.5	0	VINEYARD				1
20007267	AW3140	David Bruce Winery Estate Vineyard	Los Gatos	14.83	0	VINEYARD	Grapes, Wine			1
20007485	AW3141	Jardini Vineyard	Salinas	7	5	VINEYARD				1
20007262	AW3142	Bailard Ranch	Carpinteria	2	0	ORCHARD	Avocado			1
20003771	AW3144	Vititech Vineyards	Creston	150	150	VINEYARD				1
20002759	AW3145	H-A Orchard	Goleta	3	0	ORCHARD	Lemon			1
20003860	AW3147	Johnson Family Vineyard	Los Olivos	2.75	2.75	VINEYARD	Grapes, Wine			1
20000685	AW3151	Apple Creek Ranch	Lompoc	9		ROW	Bean, Unspecified			1
20001073	AW3154	Caroline's Vineyard	Paso Robles	15	0	VINEYARD				1
20001965	AW3156	Miyashita Nursery Inc.	Watsonville	2.8	0	GREENHOUSE	Tomato			1
20002464	AW3158	DeVilbiss Ranch	Santa Barbara, Ca. 93105	3		ORCHARD	Avocado			1
20002559	AW3160	Kessler-Haak Vineyard (formerly Ovation Vineyard)	Lompoc	30	0	VINEYARD				1
20007843	AW3162	Allen Ranch	Chualar	28	0	ROW, VINEYARD	Grapes, Wine			1
20004782	AW3163	Falcon Nest Vineyard and Winery	Paso Robles	53.25	0	ROW, VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20005801	AW3164	Rancho Serape	castroville	6	0	ROW	Strawberry	Squash		1
20005800	AW3164	Sombrero Ranch	castroville	10	0	ROW	Strawberry	Raspberry	Squash	1
20002579	AW3165	Mayer Avocado Ranch	Montecito	3		ORCHARD				1
20007493	aw3166	E&E FARMS	watsonville	11		ROW	Blackberry	Blackberry	Blackberry	1
20007476	AW3168	Pepperhill Ranch	Goleta	3.5	0	ORCHARD	Lemon	Orange		1
20007578	AW3169	Oak Savanna Vineyard	Los Olivos	25	0	VINEYARD	Grapes, Wine			1
20003428	AW3170	McCord	Hollister	14	0	ORCHARD				1
20000599	AW3175	Castle Coastal	Greenfield	125	0	ROW, VINEYARD	Grapes, Wine			1
20007390	AW3177	Quiroz Vineyard	san miguel	4.8	0	VINEYARD				1
20007364	AW3178	El Rancho de Juan Fiesta	Greenfield, Ca. 93927	6	0	VINEYARD				1
20002810	AW3179	Gene Haselhofer	Watsonville	15	0	ORCHARD	Apple			1
20004501	AW3182	Domani Vineyards	Los Gatos	0.46	0	VINEYARD	Grapes, Wine			1
20001418	AW3183	Luna Matta Ranch	Paso Robles	33.5	0	VINEYARD, ORCHARD				1
20000801	AW3184	Ada's Vineyard	Paso Robles	8	0	VINEYARD				1
20003358	AW3185	Sakaue Nursery	Watsonville	1		GREENHOUSE				1
20008982	AW3186	Ignacio Farm	hollister	5	0	ORCHARD	Walnut			1
20003593	AW3187	Ranch 1	Los Alamos	34	0	ROW	Peas	Squash	Pepper, Fruiting	1
20003594	AW3187	Ranch 2	Los Alamos	25	0	ROW	Peas	Squash	Pepper, Fruiting	1
20007393	AW3190	Norman's Nursery Inc	Carpinteria	14	1	NURSERY				1
20001479	AW3191	Landmark Ranch Properties	Carpinteria	10	0	ORCHARD	Avocado			1

20001478	AW3191	Landmark Ranch Properties	Carpinteria	28	0	ORCHARD	Avocado			1
20007143	AW3192	Miramar Ranch	santa BArbara	7.5	0	ORCHARD	Citrus			1
20001593	AW3194	3C Ranch LLC	Salinas	364	0	ROW	Strawberry	Artichoke	Lettuce, Head	1
20007508	AW3196	DAVIS FAMILY LLC	WATSONVILLE	9	0	ORCHARD	Apple	Avocado		1
20007506	AW3196	DAVIS FAMILY LLC	WATSONVILLE	10	0	ORCHARD	Apple			1
20000841	AW3198	DEBUSK VINYARDS	PASO ROBLES	8		VINEYARD				1
20002806	AW3199	Foxdale Farm	Templeton	3.5	3.5	ORCHARD				1
20000773	AW3200	suncoast organic farm	hollister	6	6	VINEYARD, ORCHARD				1
20007472	AW3202	Chisan Orchids Nursery, Inc.	Los Alamos	28	0	GREENHOUSE				1
20007590	AW3205	Hannaniah West Farms	Gilroy	7		ORCHARD	Other			1
20007514	AW3210	Morro Bay Ranch Lt.	Morro Bay	30	0	ROW	Pepper, Fruiting	Bean, Unspecified	Peas	1
20003147	AW3211	Hidden Valley	Royal Oaks	5	0	NURSERY, ORCHARD				1
20008413	AW3212	Casserly	Watsonville	10	10	ROW	Strawberry	Leek	Cucumber	1
20008417	AW3212	Green Valley	Watsonville	12	12	ROW, ORCHARD	Cabbage	Apple	Lettuce, Leaf	1
20008410	AW3212	Hecker Pass	Watsonville	2	1	ROW	Squash, Summer	Potato	Broccoli	1
20008416	AW3212	Green Valley	Watsonville	15	10	ORCHARD	Apple	Raspberry	Onion, Green	1
20008414	AW3212	Litchfield	Watsonville	6	2	ROW, ORCHARD	Pepper, Fruiting	Tomato	Pear	1
20008411	AW3212	Pioneer Ranch	Watsonville	14	2	ROW	Bean, Unspecified	Beet	Kale	1
20002220	AW3216	James Wilkins	Creston	114	0	VINEYARD	Grapes, Wine			1
20007186	AW3218	Sanders Nursery	Carpinteria	2		NURSERY, GREENHOUSE				1
20000966	AW3220	Wind Dance Farm	San Luis Obispo	5	0	ORCHARD	Avocado	Olive		1
20013064	AW3221	Suncoast Nursery	Carpinteria	1.5	0	GREENHOUSE	Other			1
20003198	AW3222	Aver Family Vineyards	Gilroy	5.25	0	VINEYARD				1
20000779	AW3225	102 Hollister Ranch	Gaviota	2.5	0	NURSERY				1
20007831	AW3226	PREVEDELLI FARMS	WATSONVILLE	69	0	ORCHARD	Apple	Bean, Unspecified	Blackberry	1
20012023	AW3227	Nipomo Ranch	Nipomo	79	0	ORCHARD	Lemon	Avocado		1
20003605	AW3229	PESSAGNO WINERY	Salinas	2	2	VINEYARD				1
20001460	AW3231	Babcock Vineyards	Lompoc	95	0	VINEYARD	Grapes, Wine			1
20001462	AW3231	Yardi Vineyard	Lompoc	20	0	VINEYARD	Grapes, Wine			1
20005880	AW3235	Rancho Vierra	salinas	10	0	ROW	Strawberry	Squash	Tomato	1
20003722	AW3240	Arioto-Bosio Partnership	Greenfield	378.02		VINEYARD				1
20008022	AW3242	La Panza Ranch	Santa Margarita	767	0	VINEYARD				1
20005644	AW3245	Mccloskey carp	Carpinteria	28	0	ORCHARD				1
20008043	AW3245	Mccloskey nursery	Goleta	6	0	ORCHARD, GREENHOUSE	Avocado		Other	1
20004801	AW3248	Daylily West	Arroyo Grande	0.12	0	NURSERY				1
20007870	AW3249	Sleepy Hollow B (Sleepy Hollow South)	Salinas	212	0	VINEYARD				1
20007877	AW3249	Diamond T Vineyards	Carmel Valley	17	0	VINEYARD				1
20007876	AW3249	Del Mar Vineyards	gonzales	224		VINEYARD				1
20007853	AW3249	River Road (Sleepy Hollow North)	SALINAS	113	0	VINEYARD				1
20007864	AW3249	Sleepy Hollow A (Sleepy Hollow-West)	Salinas	189	0	VINEYARD				1
20004173	AW3252	Jack Creek Farms	Templeton	6	0	ROW, ORCHARD	Apple	Tomato	Pumpkin	1
20008065	AW3253	Western Nursery	Solvang	3	3	NURSERY				1
20001508	AW3255	Wild Coyote Winery	Paso Robles	10	0	VINEYARD	Grape			1
20000845	AW3261	F & F FARMS	Arroyo Grande	35	0	ORCHARD	Avocado			1
20001305	AW3265	C-Bar Vineyards	San Luis Obispo	2.5	0	VINEYARD				1
20008103	AW3268	Briarwood Vineyards	Templeton	32		VINEYARD				1
20007799	AW3269	Frankel Vineyard / Paso Pistachio	Paso Robles	145	0	VINEYARD, ORCHARD	Grapes, Wine	Pistachio		1
20005334	AW3271	School Ranch	Greenfield	37	0	ROW	Lettuce, Head	Carrot	Cauliflower	1
20005350	AW3273	Cypress	Gonzales	209	0	VINEYARD				1
20005352	AW3273	Raymond	Gonzales	288	0	VINEYARD				1
20005358	AW3273	Vigna Monte Nero	Gonzales	167	0	VINEYARD				1
20005357	AW3273	Bayly	Paicines	122	0	VINEYARD				1
20005349	AW3273	Hahn	Chualar	49	0	VINEYARD				1
20005353	AW3273	Home Ranch 100	Gonzales	9	0	VINEYARD				1
20005351	AW3273	Santa Lucia	Gonzales	199		VINEYARD				1
20005356	AW3273	Cienega Rd	Paicines	156	0	VINEYARD				1
20005347	AW3273	Chualar Ranch	Chualar	912	0	VINEYARD				1
20005348	AW3273	Sharpe	Gonzales	31	0	VINEYARD				1
20005354	AW3273	Redding	Greenfield	31	0	VINEYARD				1
20005355	AW3273	Avila	San Ardo	179	0	VINEYARD				1
20004918	AW3275	Ranch 7	Santa Maria	46	0	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20000460	AW3276	Sardis Hickam Jr & Martha A Hickam	Cambria CA 93428	7	0	ROW, ORCHARD	Avocado			1
20008158	AW3277	DB Partners	Santa Barbara	39	41	ORCHARD	Avocado	Citrus		1

20010102	aw3278	Stenner Creek Ranch	San Luis Obispo	4	4	ORCHARD				1
20007750	aw3281	Varian Ranch	Arroyo Grande	80	0	ORCHARD	Avocado	Citrus		1
20007894	AW3282	Fred Hayes & Son	Lompoc	220	0	ROW	Bean, Unspecified	Wheat	Other	1
20002933	AW3283	Summit	Paso Robles	40		VINEYARD				1
20002936	AW3283	Glenrose	Paso Robles	8		VINEYARD				1
20002934	AW3283	Ridgeline	Paso Robles	3		VINEYARD				1
20007795	AW3284	Manzanita Nursery	Solvang	2	2	NURSERY				1
20002706	AW3285	waters blueberries	santa margarita	18	0	ROW	Blueberry			1
20000545	AW3287	Home Ranch	Greenfield	2.5	0	VINEYARD				1
20010283	AW3289	windfall farms	Paso Robles	50	50	ROW	Pastureland			1
20004818	AW3291	Spanish Springs LLC	Pismo Beach	95	32	VINEYARD				1
20004168	AW3293	Seven Quails Vineyards	Paso Robles, CA 93446	4	0	ROW, VINEYARD	Grapes, Wine			1
20000930	AW3297	Lotani Farms	Paso Robles	17	0	VINEYARD, ORCHARD				1
20001510	AW3299	Barr Creekside Vineyard, LLC	Paso Robles	50	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20004734	AW3300	Spencer Vineyard	Paso Robles	4	0	VINEYARD				1
20004696	AW3302	ALBA	salinas	6	6	ROW	Strawberry	Raspberry	Tomato	1
20004835	AW3305	Snowden Vineyard	San Miguel	48	0	VINEYARD				1
20004839	AW3305	Westside Ranch	Paso Robles	55	0	VINEYARD				1
20004831	AW3305	Smoots Oak Shadow Vineyard	Paso Robles	36	0	VINEYARD				1
20004823	AW3305	Hidden Valley Vineyard	Templeton	15.5	0	VINEYARD				1
20011022	AW3305	Hammersky Vineyards	Paso Robles	23	0	VINEYARD	Grapes, Wine			1
20005038	AW3306	La Casa De Maria	Santa Barbara	7	7	ROW, ORCHARD	Broccoli	Tomato	Lettuce, Leaf	1
20009804	aw3307	Coyote Moon Vineyard	Paso Robles	31	0	VINEYARD	Grapes, Wine			1
20004978	AW3310	Christopher Joyce Vineyard	Paso Robles	8.5	0	VINEYARD				1
20004275	AW3311	Burbank Ranch in Templeton	Templeton	43.1	0	ROW, VINEYARD	Grapes, Wine			1
20000765	AW3314	ARC VINEYARDS	SANTA MARIA	72.7	0	VINEYARD				1
20003029	AW3316	KelNik Vineyards	Templeton	12	0	VINEYARD				1
20003492	AW3317	Creekside Farms	Greenfield	12		ROW	Other			1
20003814	AW3318	FAIRVIEW RANCH	HOLLISTER	21	0	ORCHARD	Apple	Walnut		1
20003782	AW3318	DUNCAN	san juan bautista	15	0	ORCHARD	Apple	Walnut		1
20003802	AW3318	RANCHO SAN JUAN - shop	san juan bautista	34	0	ORCHARD	Apple			1
20003787	AW3318	HOME RANCH	san juan bautista	21	0	ORCHARD	Apple	Walnut		1
20003804	AW3318	RANCHO SAN JUAN-lucy brown/duncan	san juan bautista	10	0	ORCHARD	Apple			1
20003798	AW3318	MORRISON	san juan bautista	15	0	ORCHARD	Apple			1
20003449	AW3320	41 vineyard	Shandon	187	0	VINEYARD				1
20003453	AW3320	Home Ranch	Shandon	302	0	VINEYARD				1
20003446	AW3320	Sin Falta	Shandon	165	0	VINEYARD				1
20003259	AW3322	Daou Mountain Vineyard	Paso Robles	44	0	VINEYARD				1
20003262	AW3322	Daou Home Vineyard	Paso Robles	4.3	0	VINEYARD				1
20000517	AW3323	Ranch 1 Plot 1	Arroyo Grande	0.3	0.3	VINEYARD				1
20003227	AW3326	Zotovich Family Vineyard	Lompoc	36	0	VINEYARD				1
20003226	AW3327	Kellner Vineyard/ Cent Anni	Los Olivos	4.5	0	VINEYARD				1
20008182	AW3328	Rancho Fortunato	Paso Robles	63	0	VINEYARD				1
20000629	AW3328	Los Robles Ranch	Paso Robles	95.5	0	VINEYARD				1
20003230	AW3330	Kimsey Vineyard	Solvang	25	0	VINEYARD				1
20003229	AW3332	John Sebastiano Vineyard	Lompoc	151	0	VINEYARD				1
20001302	AW3334	LUCERO FARMS / HOLLISTER	HOLLISTER	707.8	0	ROW	Tomato	Wheat		1
20003517	AW3337	Tanner Berry	Castroville	27	0	ROW	Strawberry			1
20004691	AW3338	Ranch 3E	Santa Maria	42	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20004418	AW3338	Ranch 20 E	Santa Maria	8	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20004413	AW3338	Ranch 6 N	Guadalupe	47	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20004417	AW3338	Ranch 20 N	Santa Maria	5	0	ROW	Cauliflower	Broccoli	Celery	1
20004687	AW3338	Ranch 3 W	Santa Maria	25	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20004702	AW3338	Ranch 4M	Santa Maria	21	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20004415	AW3338	Ranch 20 S	Santa Maria	6	0	ROW	Lettuce, Head	Broccoli	Cauliflower	1
20000755	AW3339	Holman Ranch LLC	Carmel Valley , Ca	19	5.88	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20001125	AW3341	San Andreas	Watsonville	23.16	0	NURSERY, GREENHOUSE				1
20012302	AW3343	Pulido Farms	Hollister	4	0	ORCHARD	Other			1
20001132	AW3344	Alta Cresta Orchard	Paso Robles	5	5	ORCHARD				1
20003377	AW3345	Larner Vineyard	Solvang	35	0	VINEYARD				1
20003177	AW3346	Martian Vineyard	los Alamos	25	0	VINEYARD				1
20003179	AW3347	Jorian Hill	Solvang	7.25	0	VINEYARD				1
20003174	AW3348	Fess Parker Rodneys	Los Olivos	116	0	VINEYARD				1

20001880	AW3349	648 Vetter	Arroyo Grande	0.75	0	ROW	Other			1
20004600	AW3353	Firehouse Vineyard	Paso Robles	138	55	VINEYARD				1
20004583	AW3353	Branch Hill Vineyard	Paso Robles	151	30	VINEYARD				1
20002080	AW3354	Fernandez Farms	Watsonville	9	9	ROW	Strawberry			1
20003774	AW3401	Anthan He Farm	Gilroy	2		GREENHOUSE	Chinese Cabbage			1
20005823	AW3402	Santa BArbara Highlands Vineyard	Ventucopa	747		VINEYARD				1
20004037	AW3404	Bella Monte Vineyards	Paso Robles	9	0	VINEYARD	Grapes, Wine			1
20006040	AW3405	Bernal Greenhouse Main Ranch	salinas	4	4	GREENHOUSE	Other			1
20003145	AW3407	Blankenship Ranch	creston	1	0	VINEYARD				1
20005840	AW3409	Boise Family Ranch	Gaviota	2	0	ORCHARD				1
20003069	AW3410	Ranch #1	San Miguel	6		VINEYARD				1
20004305	AW3411	Brady Vineyard	San Miguel	17.94		VINEYARD	Grapes, Wine			1
20004358	AW3412	Buffalo Chip Vineyard	Paso Robles, CA. 93446	10	0	VINEYARD				1
20002925	AW3417	Creston Ridge Farms	Paso Robles	13	0	VINEYARD				1
20006740	AW3418	Charles Morse	Carpinteria	10		ORCHARD				1
20005841	AW3419	Cinco Hermanos Ranch	Gaviota, CA 93117	5	0	ORCHARD				1
20002942	AW3420	Edward Sellers Vineyard	Paso Robles	17.17	0	VINEYARD				1
20006120	AW3421	Coghlan Vineyard	Santa Ynez	18.05	0	VINEYARD				1
20004614	AW3422	CRESTON HILLS VINEYARD	PASO ROBLES	5	0	VINEYARD				1
20005004	AW3423	PASO WESTSIDE VINEYARDS	PASO ROBLES	29	0	VINEYARD				1
20004998	AW3423	HOG CANYON VINEYARDS	SAN MIGUEL	110	0	VINEYARD				1
20008364	AW3423	RAINBOW VINEYARD	SAN MIGUEL	25	0	VINEYARD				1
20004974	AW3423	CRESTON VINEYARDS	PASO ROBLES	100	0	VINEYARD				1
20005033	AW3423	SAN MIGUEL VINEYARDS	SAN MIGUEL	40	0	VINEYARD				1
20005028	AW3423	CROSS CANYON VINEYARDS	SAN MIGUEL	40	0	VINEYARD				1
20005010	AW3423	ARROYO GRANDE VINEYARDS	ARROYO GRANDE	224	0	VINEYARD				1
20005262	AW3423	KICK ON VINEYARDS	LOS ALAMOS	56	0	VINEYARD				1
20003165	AW3424	Dohmeyer Vineyard	Solvang	8	0	VINEYARD				1
20002930	AW3425	Star View Acres	Paso Robles	7	0	VINEYARD				1
20003028	AW3426	Dry Creek Ranch Vineyard	Paso Robles	14	0	VINEYARD				1
20004268	AW3428	Martella Ranch	salinas	50	50	ROW	Strawberry			1
20002745	AW3429	Erden & Kann	Morro bay	17	0	ORCHARD	Avocado			1
20004606	AW3430	Goodell Vineyard	Paso Robles	55	55	VINEYARD				1
20005403	AW3431	Floricultura Pacific	Salinas	10	0	GREENHOUSE				1
20008420	AW3432	Hedberg Ranch	Salinas	60	0	ROW	Strawberry	Blackberry	Raspberry	1
20004463	AW3432	Bruscia Ranch	Watsonville	16	0	ROW	Blackberry			1
20004458	AW3432	Tynnan Ranch	Watsonville	29	0	ROW	Blackberry			1
20004479	AW3432	Williams Ranch	Salinas	9	3.5	ROW	Strawberry			1
20011722	AW3432	USDA Test Plot	Salinas	6		ROW	Strawberry			1
20004476	AW3432	Miller Ranch	Salinas	12	0	ROW	Strawberry			1
20004478	AW3432	Davis Ranch	Salinas	12	0	ROW	Strawberry			1
20002363	AW3435	mahony ranch	templeton	28	0	VINEYARD	Grapes, Wine			1
20004024	AW3438	Hearst Ranch	San Simeon	6	0	ORCHARD	Avocado			1
20004071	AW3439	Jack Ranch	Cholame	141	0	ORCHARD	Other			1
20004737	AW3440	Heublein Ranch	Cayucos, CA 93430	7	0	ROW, ORCHARD	Avocado	Orange	Grapes, Wine	1
20004908	AW3441	Bunn/Emery Ranch	Salinas	48	0	ROW	Strawberry			1
20003386	AW3443	HOLLISTER RANCH WALNUT 2A	HOLLISTER	47.57	0	ROW	Tomato			1
20003348	AW3443	Hollister ranch Walnut 1A, 1B, 1C & 1D, 156 1HW1, 1HW2, 1HW3	Hollister	268.02	0	ROW	Tomato			1
20007229	AW3444	wilson twin oaks vineyard	templeton	25	0	VINEYARD				1
20007231	AW3444	twin oaks vineyard	templeton	25	0	VINEYARD				1
20007350	AW3444	old ford vineyard	paso robles	9	0	VINEYARD				1
20002707	AW3444	jett lease	san miguel	40	0	VINEYARD				1
20009862	AW3444	vanderberry vineyards	San Miguel	50	0	VINEYARD				1
20003022	AW3445	K C Vineyard	paso robles	13	0	VINEYARD				1
20003678	AW3446	Kelsey See Canyon ranch	San Luis Obispo	3		VINEYARD				1
20003674	AW3446	Kelsey Creston Ranch	Creston	4		VINEYARD				1
20003721	AW3448	La Estancia Vineyard	Gonzales	250	0	VINEYARD				1
20002819	AW3450	Leon Chen Vineyard	Paso Robles	15	0	VINEYARD				1
20006100	AW3452	Lindley Vineyard	Lompoc	6.58	0	VINEYARD				1
20005114	AW3453	Lindquist Ranch and Vineyards	Paso Robles	63	0	VINEYARD				1
20005170	AW3454	Lynne B. Schmitz	San Miguel	10	0	ROW	Onion, Dry			1
20002866	AW3455	Martarita Vineyard	Santa Margarita	767.43	0	VINEYARD				1
20004236	AW3456	McCahon Floral	Watsonville	20		NURSERY, GREENHOUSE				1

20003728	AW3457	Strawberry	Watsonville	5	0	ROW, GREENHOUSE	Other			1
20003726	AW3457	Campagna	Royal Oaks	12	0	ROW, GREENHOUSE	Other	Other	Other	1
20002861	AW3458	Mesa Grande Nursery	Arroyo Grande	1.88	0	NURSERY				1
20002246	AW3459	Willow Creek	Cayucos	12	12	ROW	Peas	Pepper, Fruiting		1
20004034	AW3460	Nick Rhodehamel	Carpinteria	2	0	ORCHARD				1
20004786	AW3461	Olivas de Oro	Creston	100	0	ORCHARD	Olive			1
20003083	AW3462	Paso Ono Vineyard	Paso Robles	30	0	VINEYARD				1
20001629	AW3463	Pear Valley	San Miguel	26.5	26.5	VINEYARD				1
20001628	AW3463	Union Road	Paso Robles	58.09	58.09	VINEYARD				1
20004017	AW3464	Peter Capone	Santa Barbara	7	0	ORCHARD				1
20000874	AW3465	Q Ranch	San Luis Obispo	17	0	ORCHARD	Avocado	Orange		1
20003511	AW3466	QI FA NURSERY	SAN MARTIN	2	0	ROW, GREENHOUSE	Chinese Cabbage	Peas	Lettuce, Leaf	1
20006701	AW3467	Beckwith Vineyards	Paso Robles	16.99	0	VINEYARD				1
20006700	AW3467	RHR	Paso Robles	63	0	VINEYARD				1
20006340	AW3468	Parcelas Principales	Salinas	5.5		ROW	Strawberry	Tomato	Squash, Summer	1
20004790	AW3469	Rivenrock Gardens	Nipomo	0.1		ROW	Other			1
20003469	AW3470	Rock Hollow Vineyard	Solvang	14	0	VINEYARD				1
20005741	AW3471	Roro Farms	watsonville	25	2	ROW	Strawberry	Apple		1
20008570	AW3472	Damm	Hollister	11.3	0	ROW	Blackberry			1
20002873	AW3473	San Juan Vineyard	Shandon	437.4	0	VINEYARD				1
20007405	AW3475	Griffith	Watsonville	11.64	11.64	ROW	Blackberry			1
20005844	AW3476	Sea-Bar Nursery	Gaviota, CA	43	0	NURSERY	Apple			1
20002603	AW3477	Shadow Run Vineyard and Winery	Creston	3.5	0	VINEYARD				1
20003264	AW3478	Sharp's Hill Vineyard	Paso Robles	20.79	0	VINEYARD				1
20002808	AW3480	Catherine's Vineyard	Paso Robles	101.74	0	VINEYARD				1
20009542	AW3483	R bar R Ranch	Watsonville	5	5	VINEYARD				1
20002812	AW3484	Steve & Barbara Erden	Morro Bay	17	0	ORCHARD	Avocado			1
20004245	AW3485	Mc Gowan Ranch	Watsonville	31	31	ROW	Strawberry			1
20004248	AW3485	Mc Gowan Ranch	Watsonville	31	31	ROW	Strawberry			1
20011742	AW3485	Travers Ranch	Watsonville	45	45	ROW	Strawberry			1
20001174	AW3487	Taylorchards	Ventura	128	0	ORCHARD	Avocado	Lemon		1
20005147	AW3488	Camatta Hills Vineyard	Creston	393	0	VINEYARD				1
20005169	AW3488	Meridian Home Vineyard	Paso Robles	572	0	VINEYARD				1
20005225	AW3489	Twin Palms Ranch	Atascadero	10	0	VINEYARD, ORCHARD				1
20005740	AW3490	Morimoto Ranch 1	Salinas	40	0	ROW	Strawberry			1
20005742	AW3490	Encinal Ranch	Salinas	35		ROW	Strawberry			1
20002623	AW3491	Vista Lucia Farms	San Miguel	4	0	ROW, ORCHARD	Olive			1
20003269	AW3492	VZZ	Paso Robles	45.79	0	VINEYARD				1
20004872	AW3493	Wade Rhoades	Cambria	50	0	ROW	Oat	Pastureland	Peas	1
20003479	AW3494	Kingsley Vineyard	Solvang	19	0	VINEYARD				1
20003791	AW3495	Ranch 3	Nipomo	45	0	ROW	Strawberry			1
20003555	AW3496	Wei Liang	Gilroy	5	0	GREENHOUSE				1
20006481	AW3497	Wenzlau Vineyard	Lompoc	12	0	VINEYARD				1
20005006	AW3498	Quinta Del Mar Ranch	nipomo	20	0	VINEYARD				1
20003273	AW3499	Windrock Estates Vineyard	Templeton	1.5	0	ROW, VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20004579	AW3500	Wittstrom Vineyard	Paso Robles	42	0	VINEYARD				1
20003193	AW3502	ranchK3/ Runnels	Nipomo	42.9	42.9	ROW	Broccoli	Cauliflower	Lettuce, Head	1
20003188	AW3502	ranch K1	Nipomo	11.3	0	ROW	Broccoli			1
20004441	AW3504	Pinnacles Vineyard	Soledad	1171	0	VINEYARD	Grapes, Wine			1
20004433	AW3504	Bianchi Vineyard	Soledad	750	0	VINEYARD	Grapes, Wine			1
20004449	AW3504	Gabilan Vineyard	Soledad	375	0	VINEYARD	Grapes, Wine			1
20004436	AW3504	Stonewall Vineyard	Gonzales	86	0	VINEYARD	Grapes, Wine			1
20001433	AW3505	Whale Rock, Cobble Creek, Stone's Throw,et al	Templeton	789	0	VINEYARD				1
20006980	AW3506	Shandon Hills VIneyard	Shandon	623	0	VINEYARD				1
20006981	AW3507	Red Hills VIneyard	Creston	260	0	VINEYARD				1
20005861	AW3509	HAO DA FARM	GILROY	5	0	GREENHOUSE				1
20000958	AW3511	KMJ, Assoc.	Hollister	32	0	ROW, VINEYARD	Barley	Pastureland		1
20007517	AW3512	Twist Ranch	Creston	30	0	VINEYARD				1
20007516	AW3512	Big De Farms	Paso Robles	115.9		VINEYARD				1
20007525	AW3513	Big Red Vineyard	Paso Robles	53.29		VINEYARD				1
20007895	AW3514	Aromas Ranch	Aromas	15	15	ROW	Raspberry	Strawberry		1
20007897	AW3514	Porter Ranch	Watsonville	14	0	ROW	Raspberry			1
20013362	AW3515	Aromas Ranch	Aromas	15	15	ROW	Strawberry			1

20008057	AW3517	2 horse vineyard	santa Margarita	5	0	VINEYARD	Grapes, Wine			1
20007703	AW3518	Amivida Vineyard	Santa Margarita	4.5	4.5	ROW, VINEYARD	Grapes, Wine			1
20007790	AW3521	Casa Milagro	Morro Bay	7	0	ORCHARD	Avocado			1
20008004	AW3523	6	Santa Maria	6	0	ROW	Strawberry			1
20008042	AW3525	E&J Gallo	San Luis Obispo	44.2	0	VINEYARD				1
20011822	AW3526	Stowel Rd Ranch	Santa Maria	31	31	ROW	Strawberry			1
20011842	AW3526	La Mula	Santa maria	32	32	ROW	Strawberry			1
20007291	AW3527	Fishman Farm	cayucos							1
20007875	AW3528	Casserly	Wastonville	7	7	NURSERY				1
20008262	AW3530	Heritage Farms	Salinas	4		ROW	Broccoli			1
20007740	AW3532	Moreno	Los Olivos, CA 93441	40	0	ROW	Squash	Pepper, Fruiting		1
20008533	AW3533	Jian Hui Cao	Gilroy	10	0	ROW, GREENHOUSE	Chinese Cabbage			1
20007866	AW3534	Tonini Ranch	San Luis Obispo	46		ROW	Peas			1
20008510	AW3535	Karman Kwong Nursery	San Martin	2	0	GREENHOUSE				1
20007902	AW3542	Surfkist Farm	Morro Bay	18	18	ORCHARD				1
20008002	AW3543	PMR Vineyards	Templeton	34		VINEYARD				1
20007501	AW3546	La Paloma Ranch	Goleta	0.5	0	NURSERY				1
20007600	AW3547	Shoemaker Vineyard	San Miguel	12	0	VINEYARD	Grape			1
20008044	AW3548	Speizer Family Farm	San Luis Obispo	18.02	0	VINEYARD				1
20007659	AW3549	Summerset Ranch	Templeton	2	0	ORCHARD				1
20007872	AW3550	Tackitt Family Vineyards	San Miguel	3	0	ROW, VINEYARD	Grapes, Wine			1
20007811	AW3551	Robins Roost	Watsonville	3.5	3.5	ORCHARD	Apple			1
20007568	AW3553	Manns	Watsonville	32	0	ROW	Blackberry			1
20007817	AW3555	Longo Farm	Gilroy	8		GREENHOUSE	Spinach	Chinese Cabbage	Celery	1
20009302	AW3556	Tangs Farm	San Martin	3		ROW	Chinese Cabbage			1
20009082	AW3557	Rancho Guacamole	Goleta	360	0	ORCHARD	Avocado	Lemon		1
20008822	AW3560	Clark Valley Organic Farm	Los Osos,	5	0	GREENHOUSE	Strawberry	Broccoli	Corn, Human Con.	1
20008742	AW3561	eagle ridge vineyard	san miguel	50	0	VINEYARD				1
20009322	AW3563	Zhen Zhoo Wang	Morgan Hill	2.5		ROW	Other			1
20007906	AW3566	Mumper	Creston	7	7	ROW	Onion, Dry			1
20007901	AW3566	DLP Ag Partnership	Creston	21	15	ROW	Onion, Dry			1
20007996	AW3566	Smith	Creston	4	4	ROW	Onion, Dry			1
20010502	AW3567	CLARK RANCH	SANTA MARIA	76	76	ROW	Blackberry	Raspberry	Other	1
20009682	AW3569	Farming Nuts LLC	Hollister	35	0	ORCHARD	Walnut			1
20010523	AW3571	Gartner Orchard	Hollister	4.6	0	ORCHARD	Other			1
20010682	AW3572	St. Eva Hill Vineyard	San Miguel	8	0	VINEYARD				1
20009882	AW3577	Dawn Ranch	Nipomo	18	12	ROW	Blueberry	Raspberry	Blackberry	1
20010825	AW3579	Cypress Vineyard	Chualar	281	0	VINEYARD				1
20010828	AW3579	Avila Vineyard	San Ardo	180	0	VINEYARD				1
20010827	AW3579	Redding Vineyard	Greenfield	36	0	VINEYARD				1
20010826	AW3579	Santa Lucia Vineyard	Chualar	221	0	VINEYARD				1
20010824	AW3579	Danny's Vineyard	Chualar	330	0	VINEYARD				1
20011122	AW3580	Bassi Ranch	Avila Beach	30	0	VINEYARD				1
20011343	AW3581	Tefft St	Nipomo	35	0	ORCHARD	Citrus	Avocado		1
20011342	AW3581	Haggerty Way	Nipomo	60	0	ORCHARD	Avocado	Citrus		1
20012082	AW3584	Fly	Watsonville	19	0	ROW	Strawberry			1
20012086	AW3584	Tarp	Salinas	25.78	0	ROW	Strawberry			1
20012083	AW3584	Higaki	Watsonville	23.86	0	ROW	Strawberry			1
20011802	AW3585	Rancho Oso Cazador	Santa Barbara	20		ORCHARD				1
20012625	AW3586	San Miguel Olive Farm	San Miguel	10	10	ROW, ORCHARD	Olive			1
20012345	AW3587	Casa Pau Hana Olive Farm, LLC	Paso Robles	5		ORCHARD				1
20012362	AW3588	Rancho Rendezvous Farms	Paso Robles	3.75	3.75	ROW, ORCHARD	Olive			1
20012482	AW3589	George Goodall	Santa Barbara	1.2	1.2	ORCHARD	Avocado			1
20012322	AW3590	Kitehawk Farm	Atascadero	3.4	3.4	ORCHARD				1
20012282	AW3592	Boyd	santa maria	35	35	ROW	Strawberry			1
20011765	AW3594	Pierini Vineyard	Paso Robles	12	2	VINEYARD				1
20012123	AW3595	Rancho Boa Vista	Solvang	10	0	VINEYARD				1
20012122	AW3596	Grimm Vineyard	Santa Ynez	13	0	VINEYARD				1
20012109	AW3597	Summerwood Vineyards	Paso Robles	36	0	VINEYARD				1
20012025	AW3599	Mirabella Vineyard	Los Olivos	6.75	0	VINEYARD				1
20012024	AW3600	Camp 4	Santa Ynez	260	0	VINEYARD				1
20011902	AW3602	Sunshine Floral Inc.	Carpinteria	4	4	GREENHOUSE	Other			1
20011702	AW3606	J. MACHADO RANCH	SANTA MARIA	3.12	0	VINEYARD				1

20012842	AW3608	Reifers Family Vineyard	Templton	4	0	VINEYARD				1
20012802	AW3609	Beruli Vineyards	Paso Robles	7	0	VINEYARD				1
20012762	AW3611	Plum Orchard Lane Vineyard	Templeton	12.1	0	VINEYARD	Grapes, Wine			1
20013087	AW3612	Branch Mill Organic Farm	Arroyo Grande	6	0	ROW, ORCHARD, GREENHOUSE	Bean, Unspecified	Squash	Corn, Human Con.	1
20012242	AW3613	MJ Fronty	San Miguel	22	0	VINEYARD				1
20012705	AW3614	Hoyt Family Vineyard	Paso Robles	5	0	VINEYARD				1
20012704	AW3615	Creston Cripple Creek LLC.	Paso Robles	7	0	VINEYARD				1
20012626	AW3616	Alegre Vineyard	Paso Robles	9.5	0	VINEYARD				1
20012862	AW3617	Putnam Ranch	Morro Bay	3.9	3.9	ORCHARD	Avocado			1
20012942	AW3618	Santa Ynez Valley Farms LLC	Buellton	44	44	ROW, ORCHARD	Corn, Human Con.	Other	Other	1
20013044	AW3620	Home Ranch	Salinas	28.83	0	ROW	Strawberry			1
20013043	AW3620	Davis	Salinas	20.26	20.26	ROW	Strawberry			1
20013046	AW3621	Davis	Salinas	15.86	15.86	ROW	Strawberry			1
20013302	AW3623	Oak Pass Vineyard	Paso Robles	13	0	VINEYARD	Grapes, Wine			1
20012642	AW3625	Olivers Twist Vineyard	Templton	21	0	VINEYARD				1
20000741	AW3634	Almond Hill Vineyard	Paso Robles	7.5	0	VINEYARD				1
20003515	AW4501	Aubaine Vineyard	Nipomo	13	0	VINEYARD				1
20000788	AW4502	kick on vineyard	los alamos	110	0	VINEYARD				1
20001190	AW4504	Diamond AG Vineyards	Paso Robles, CA.	18	0	VINEYARD	Grapes, Wine			1
20001184	AW4505	Gelfand Vineyards	Paso Robles	10	0	VINEYARD	Grapes, Wine			1
20004742	AW4506	Vista Del Paso Vineyards	Paso Robles	8	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20003741	AW4507	Algunas Dias Vineyards	San Miguel	22.5	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20001148	AW4508	Cuevas Vineyards	San Miguel, CA.	41	0	VINEYARD	Grapes, Wine			1
20007497	AW4509	Counsel Oaks	san miguel	2.7	0	ORCHARD	Olive			1
20002503	AW4512	Judd Ranch	San Miguel	32	0	VINEYARD	Grapes, Wine			1
20001150	AW4513	Pleasant Ridge Vineyards	San Miguel, CA	57	0	VINEYARD	Grapes, Wine			1
20000938	AW4514	OSO LIBRE RANCH & VINEYARD	Paso Robles	17	0	VINEYARD				1
20003332	AW4515	Loma Linda Vineyards LLC	Paso Robles	19	0	VINEYARD	Grapes, Wine			1
20001566	AW4516	Simpson Vineyards	Paso Robles	11	0	VINEYARD	Grapes, Wine			1
20001498	AW4517	Wine-Bush Vineyards	Paso Robles	20	0	VINEYARD	Grapes, Wine			1
20001284	AW4518	Sundance Hills Vineyards	Paso Robles	12	0	VINEYARD	Grapes, Wine			1
20003333	AW4519	Clark Ranch	Shandon	12.5	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20002364	AW4522	DeHaesleer Vineyard	Templeton	4	0	VINEYARD				1
20002413	AW4523	Spring Creek Vineyard	Templeton	26	0	VINEYARD				1
20007709	AW4527	Kiler Grove Winegrowers	Paso Robles	10	0	VINEYARD	Grape			1
20008056	AW4529	Creston Hills Vineyard	Creston	9	9	VINEYARD				1
20002921	AW4530	Inangeo Vineyard	Templeton	10.2		VINEYARD				1
20002137	AW4532	Andersen Vineyard	Templeton	8	0	VINEYARD				1
20007160	AW4533	Irick Vineyard	Paso Robles	5.2	0	VINEYARD				1
20001644	AW4534	Verlander Vineyard	Atascadero	5	0	VINEYARD				1
20003196	AW4535	ELLIOT LEWICKI RANCH & VINEYARD	PASO ROBLES	8	0	VINEYARD				1
20002320	AW4536	Laraneta Vineyard	Templeton	16.5	0	VINEYARD, ORCHARD				1
20002362	AW4537	Holly Hock Vineyard	Templeton	8	0	VINEYARD				1
20000465	AW4539	Melange du Rhone Vineyard	Templeton	10.5	0	VINEYARD				1
20000646	AW4541	Dawson Creek Vineyard	Templeton	7.4	0	VINEYARD	Grapes, Wine			1
20002365	AW4542	GreMark Vineyard	Paso Robles	9	0	VINEYARD				1
20006280	AW4544	Beato Vineyard	Templeton	8	0	VINEYARD				1
20003900	AW4545	Strawridge Vineyard	Creston	13.75		VINEYARD				1
20003979	AW4546	Rancho Picacho	Arroyo Grande	32		ORCHARD	Avocado			1
20003972	AW4547	Mahoney Bros., Inc - Ranch #7	Santa Maria	34	0	ROW, ORCHARD	Blueberry	Avocado	Broccoli	1
20007815	AW4548	SOLANA FARMS	San Miguel	26	0	VINEYARD, ORCHARD	Grapes, Wine	Olive		1
20004746	AW4549	Indian Valley Vineyards #2	San Miguel	22.5	0	VINEYARD	Grapes, Wine			1
20001274	AW4550	Pianetta Vineyards	San Miguel	30	0	VINEYARD	Grapes, Wine			1
20001473	AW4551	Vallino/Radogna Vineyards	Paso Robles	10	0	VINEYARD	Grapes, Wine			1
20001165	AW4556	Joseph Vineyard Estates	Bradley	430	0	VINEYARD				1
20004349	AW4557	Steiner Creek Vineyard	Cambria	21.5	0	VINEYARD, ORCHARD				1
20004591	AW4557	Rim Rock Vineyard	Nipomo	5.5	0	VINEYARD				1
20003306	AW4559	Deer Park Vineyard	Aptos	15	0	VINEYARD				1
20003315	AW4560	Alfaro Family Vineyard	Corralitos	25	0	VINEYARD				1
20004423	AW4561	Ranch #8 - Mehlschau	San Luis Obispo	26	0	ROW	Tomato	Squash, Summer	Pepper, Fruiting	1
20004421	AW4561	Ranch #5 - Tank Farm	San Luis Obispo	60	0	ROW	Wheat	Oat		1
20002908	AW4564	Curtis Winery	Los Olivos	108	0	VINEYARD				1
20001039	AW4566	Bello Ranch/ Talley Farms	Arroyo Grande	54	54	ORCHARD				1

20001027	AW4566	Pennington Ranch/ Talley Farms	Arroyo Grande	14	0	ORCHARD				1
20001025	AW4566	Adobe Ranch/ Talley Farms	Arroyo Grande	82	13	VINEYARD				1
20001040	AW4566	Biddle Ranch/ Talley Farms	Arroyo Grande	16	0	ORCHARD				1
20001047	AW4566	Finney Ranch/ Talley Farms	San Luis Obispo	63	20	VINEYARD				1
20001032	AW4566	Donovan/ Talley Farms	Arroyo Grande	29	5	VINEYARD				1
20001049	AW4566	Neal Springs Vineyard/ Talley Farms	Templeton	32	0	VINEYARD				1
20002832	AW4568	Dino Boneso Vineyard	Paso Robles	74	0	VINEYARD				1
20004278	AW4571	Caliza Vineyard / Anderson Road	Paso Robles	18	0	ROW, VINEYARD	Grapes, Wine			1
20003231	AW4573	Thompson	Los Alamos	45	0	VINEYARD				1
20003232	AW4574	MBK @ Jonata	Solvang	82	0	VINEYARD				1
20003233	AW4574	MBK @ S & B	Lompoc	26	0	VINEYARD				1
20003224	AW4575	Rancho Las Hermanas	Lompoc	212	0	VINEYARD				1
20003225	AW4575	Firestone LP @ RLH	Lompoc	43	0	VINEYARD				1
20003184	AW4576	Gainey Main	Santa Ynez	98	0	VINEYARD				1
20003185	AW4576	Gainey Evan Ranch	Buellton	53	0	VINEYARD				1
20003186	AW4576	Gainey Ezperanza	Lompoc	50	0	VINEYARD				1
20003178	AW4577	Honea Vineyard	Solvang	19	0	VINEYARD				1
20003169	AW4578	Magail Vineyard	Los Olivos	1.5	0	VINEYARD				1
20003173	AW4579	Stolpman Vineyard	Solvang	153	0	VINEYARD				1
20003172	AW4584	Three Creek	Santa Ynez	27	0	VINEYARD				1
20003339	AW4587	Hilliard Bruce Vineyard	lompoc	21	0	VINEYARD				1
20003247	AW4588	S & B Vineyard	lompoc	108	0	VINEYARD				1
20003236	AW4591	Grassini Family Vineyard	Santa Ynez	34	0	VINEYARD				1
20003347	AW4592	Ampelos Cellars Vineyard	lompoc	25	0	VINEYARD				1
20003350	AW4593	Fiddlesticks Vineyard	lompoc	97	0	VINEYARD				1
20003437	AW4594	Evergreen Arabians	Los Olivos	51	0	VINEYARD				1
20003379	AW4596	Rancho Colina North	Solvang	4	0	VINEYARD				1
20003378	AW4596	Rusack Vineyard	Solvang	18	0	VINEYARD				1
20003435	AW4597	Harrison Clarke	Solvang	12	0	VINEYARD				1
20003182	AW4598	Jack McGinley/Westerly	Santa Ynez	82	0	VINEYARD				1
20003431	AW4599	Watch Hill Vineyard	Los Alamos	20	0	VINEYARD				1
20000786	AW4602	ROBLAR VINEYARD	SANT YNEZ	16	0	VINEYARD				1
20000761	AW4603	RIVERBENCH VINEYARD	SANTA MARIA	344.06	0	VINEYARD				1
20000787	AW4604	WHITE HILLS	SANTA MARIA	1883	0	VINEYARD, ORCHARD				1
20008902	AW4604	RANCHO LOS ALAMOS	LOS ALAMOS	300	0	VINEYARD				1
20004396	AW4605	North Canyon Vineyard	Santa Maria	930.7	0	VINEYARD				1
20004388	AW4606	Cat Canyon Vineyard	Los Alamos	801.5	0	VINEYARD				1
20001426	AW4607	McCoy Creek Vineyards	Gonzales	962	0	VINEYARD				1
20008124	AW4607	West Pinnicales Vineyard	Soledad	55		VINEYARD				1
20008122	AW4607	Cotta Ranch	Creston	225.2		VINEYARD				1
20010542	AW4608	SANTA MARIA WAY RANCH	SANTA MARIA	55		ROW	Blueberry			1
20011963	AW4608	BULL CANYON RANCH	Santa Maria	65	0	ROW	Raspberry			1
20011965	AW4608	SUEY BOWL	Santa Maria	83	0	ROW	Raspberry			1
20009723	AW4608	TRAVIS RANCH	Santa Maria	20	0	ROW	Raspberry			1
20009742	AW4608	TOGNAZZINI RANCH	SANTA MARIA	35	0	ROW	Raspberry			1
20009762	AW4608	HUTCHERSON RANCH	SANTA MARIA	7	0	ROW	Strawberry			1
20001224	AW4609	Upper Binsacca	Soledad	40	0	ROW	Broccoli	Lettuce, Leaf	Celery	1
20001234	AW4609	Costa Brothers Roddick Ranch	Soledad	5.09	0	VINEYARD				1
20004748	AW4611	Rancho Caballo (RC)	Arroyo Grande	15	0	ROW	Strawberry	Blueberry	Blackberry	1
20003359	AW4612	Cass Vineyard	Paso Robles	146	146	VINEYARD				1
20003633	AW4613	Hilltop Ranch	Paso Robles	137	137	VINEYARD				1
20003634	AW4614	Belli Acres	Paso Robles	24		VINEYARD				1
20003740	AW4616	San Cayetano / Waugaman Ranch	Watsonville	46	0	ROW	Strawberry			1
20004549	AW4617	Carroll Ranch	San Luis Obispo	19.4	0	VINEYARD				1
20004545	AW4617	Fred Righetti Ranch	San Luis Obispo	74.01	0	VINEYARD				1
20004546	AW4617	Braun Ranch	San Luis Obispo	17.5	0	VINEYARD				1
20004540	AW4617	Roger Righetti Ranch	San Luis Obispo	59.2	0	VINEYARD				1
20004580	AW4618	Jack Ranch	San Luis Obispo	142.9	0	VINEYARD				1
20004576	AW4618	Odyssey/Thurlestone Vineyard	San Luis Obispo	77.2	0	VINEYARD				1
20004430	AW4619	Paragon Vineyards	San Luis Obispo	771.2	0	VINEYARD				1
20004608	AW4623	John Silva Vineyard	San Luis Obispo	22.1	0	VINEYARD				1
20004615	AW4625	San Floriano Vineyard	San Luis Obispo	2	0	VINEYARD				1
20004613	AW4625	Donati Vineyard	San Luis Obispo	2.1	0	VINEYARD				1

20004380	AW4627	Wheelock Ranch	Watsonville	15		ROW	Strawberry	Raspberry	Blackberry		1
20004378	AW4627	Pioneer Ranch	Watsonville	18		ROW	Strawberry	Raspberry	Blackberry		1
20006241	AW4628	Villa San Juliette	San Miguel	132	0	VINEYARD					1
20004993	AW4629	Shikuma	Watsonville	24	0	ROW	Blackberry				1
20007823	AW4629	Meridian	Castroville	38		ROW	Strawberry				1
20004972	AW4629	Meridian	Castroville	100	0	ROW	Blackberry	Raspberry			1
20010642	AW5001	New Ranch 2	San Luis Obispo	0	0	VINEYARD					1
20010322	AW5001	Regional Water Board	San Luis Obispo	0		VINEYARD					1
20010122	AW5001	New Ranch	San Luis Obispo	10	20	VINEYARD					1
20002618	AW0142	Metz Ranch - Location #9	Soledad	63	0	ROW	Broccoli	Carrot	Cucumber		2
20002612	AW0142	Jim Guidotti Ranch - Location #3	Soledad	166	0	ROW	Lettuce, Head	Broccoli	Peas		2
20002616	AW0142	Lanini Ranch - Location #8	Soledad	115	0	ROW	Lettuce, Head	Broccoli	Peas		2
20002606	AW0142	Elmer Guidotti Ranch - Location #1	Soledad	117	0	ROW	Lettuce, Head	Broccoli	Peas		2
20002613	AW0142	Martin Clark Ranch - Location #5	Soledad	63	43	ROW, VINEYARD	Lettuce, Head	Broccoli	Bean, Dried		2
20002614	AW0142	Zani Ranch - Location #6	Soledad	159	0	ROW	Lettuce, Leaf	Broccoli	Peas		2
20002610	AW0142	Henry Guidotti Ranch - Location #2	Soledad	273	0	ROW, VINEYARD	Broccoli	Peas	Lettuce, Head		2
20001078	AW0163	Home Ranch	San Juan Bautista	105		ROW	Celery	Apple	Lettuce, Head		2
20001093	AW0163	Kennedy	Watsonville	0	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20001077	AW0163	Porter	Watsonville	97	0	ROW	Cauliflower	Lettuce, Head	Broccoli		2
20001091	AW0163	Struve	Watsonville	64	0	ROW	Lettuce, Head	Broccoli	Celery		2
20001089	AW0163	Wilder	Watsonville	0	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20001088	AW0163	McGowan	Watsonville	114	60	ROW	Broccoli	Lettuce, Head	Celery		2
20001102	AW0163	Porter/Pajaro	Watsonville	173	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20001099	AW0163	DelPiero	Watsonville	38	0	ROW	Lettuce, Leaf	Lettuce, Head	Cauliflower		2
20001082	AW0163	Resetar	San Juan Bautista	90	45	ROW	Celery	Lettuce, Leaf	Pepper, Fruiting		2
20007195	AW0180	Donovan	Santa Maria	165	165	ROW	Strawberry				2
20007197	AW0180	Airport Ranch	Orcutt	140	140	ROW	Strawberry				2
20007203	AW0180	Dominion Ranch	Santa Maria	135	135	ROW	Strawberry				2
20007200	AW0180	Stowell Ranch	Santa Maria	114	114	ROW	Strawberry				2
20007205	AW0180	White Hills	Orcutt	74	74	ROW	Strawberry				2
20007207	AW0180	Priesker Ranch	Santa Maria	25	25	ROW	Strawberry				2
20007204	AW0180	Ray Rd, Ranch	Santa Maria	55	55	ROW	Strawberry				2
20007194	AW0180	John Ranch	Santa Maria	200	200	ROW	Strawberry				2
20007201	AW0180	Rosemary Ranch	Santa Maria	358	358	ROW	Strawberry	Carrot			2
20007637	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 02	SANTA MARIA	74	70	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007650	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 07	SANTA MARIA	54	54	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007655	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 13	SANTA MARIA	73	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007651	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 08	SANTA MARIA	27	27	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007647	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 06/16	SANTA MARIA	120	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007645	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 05	SANTA MARIA	38	38	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007656	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 14	SANTA MARIA	110	110	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007641	AW0187	INNOVATIVE PRODUCE, INC./ RANCH 03	SANTA MARIA	123	123	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007652	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 09	SANTA MARIA	134	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007627	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 01	SANTA MARIA	131	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007643	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 04	SANTA MARIA	177	177	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20007654	AW0187	INNOVATIVE PRODUCE, INC. / RANCH 12	SANTA MARIA	99	99	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20005401	AW0189	Salinas 2	Salinas	20	16	NURSERY, GREENHOUSE					2
20002868	AW0198	Villa Pacifica Ranch	Cayucos	46	0	ORCHARD	Avocado	Citrus		CHLORPYRIFOS	2
20004402	AW0201	Happe Flowers	Carpinteria	8	0	GREENHOUSE					2
20001930	AW0204	Home Ranch	Salinas	118	0	ROW	Lettuce, Head	Broccoli	Peas	DIAZINON, CHLORPYRIFOS	2
20001929	AW0204	Walters Ranch	Salinas	177.2	0	ROW	Lettuce, Head	Broccoli	Peas	DIAZINON, CHLORPYRIFOS	2
20001931	AW0204	Bardin Ranch	Salinas	172.3	84.3	ROW	Lettuce, Head	Broccoli	Peas	DIAZINON, CHLORPYRIFOS	2
20001926	AW0204	Waters Ranch	Salinas	94.9	0	ROW	Broccoli	Lettuce, Head	Peas	DIAZINON, CHLORPYRIFOS	2
20007284	AW0219	Takii Home	Salinas	13.7	13.7	ROW, GREENHOUSE	Other				2
20002750	AW0221	Giacomazzi	Greenfield	72	0	ROW	Lettuce, Head	Bean, Dried	Tomato	CHLORPYRIFOS	2
20002752	AW0221	Bingaman	Greenfield	262	0	ROW	Bean, Dried	Lettuce, Head	Tomato	CHLORPYRIFOS	2
20002749	AW0221	Zanetta	Greenfield	117.5	0	ROW	Lettuce, Head	Bean, Dried	Tomato	CHLORPYRIFOS	2
20002748	AW0221	Pasque	Greenfield	184	0	ROW	Lettuce, Head	Bean, Dried	Tomato	CHLORPYRIFOS	2
20002751	AW0221	Cox	Greenfield	107.67	0	ROW	Bean, Dried	Lettuce, Head	Tomato	CHLORPYRIFOS	2
20004678	AW0222	Via Real	Carpinteria	6	0	GREENHOUSE					2
20000979	AW0232	Pista Ranch	Salinas	43	43	ROW	Strawberry				2
20008107	AW0232	Dayton	Salinas	213	213	ROW	Bean, Unspecified	Strawberry	Lettuce, Leaf		2
20001733	AW0232	Yuki	Salinas	107	107	ROW	Bean, Unspecified	Lettuce, Head	Lettuce, Leaf		2

20001732	AW0232	Lucky Strike	salinas	54		ROW	Bean, Unspecified	Lettuce, Head	Lettuce, Leaf		2
20001731	AW0232	Kondo-Lee	Salinas	206	0	ROW	Lettuce, Head	Lettuce, Leaf	Bean, Unspecified		2
20001730	AW0232	Green Valley	Salinas	49	49	ROW	Lettuce, Head	Lettuce, Leaf	Bean, Unspecified		2
20007188	AW0234	Goodfield Ranch	Carpinteria	2	0	ORCHARD	Avocado				2
20012382	AW0236	MSF R-5	Santa Maria	167	142.5	ROW	Broccoli				2
20011462	AW0236	MSF R-21	Nipomo	51	0	ROW	Strawberry				2
20007625	AW0236	MSF R-12	Santa Maria	210	0	ROW	Broccoli	Strawberry			2
20003912	AW0236	MSF R-8	Santa Maria	140	0	ROW, NURSERY	Broccoli	Strawberry			2
20011282	AW0236	MSF R-30	Nipomo	70.6	0	ROW	Strawberry				2
20003883	AW0236	MSF R-4	Santa Maria	134.5	0	ROW	Broccoli				2
20003924	AW0236	MSF R-10	Santa Maria	193	193	ROW	Broccoli				2
20008722	AW0244	Johannes Flowers	Carpinteria	47		ORCHARD					2
20004567	AW0244	international floral	carpinteria	26	0	GREENHOUSE				DIAZINON, CHLORPYRIFOS	2
20003556	AW0249	Peter Eugene and Nancy Lou Mehlschau Family Trust	Nipomo	189	0	ORCHARD	Lemon	Avocado		CHLORPYRIFOS	2
20004682	AW0261	FB Ranch 11	Nipomo	325.32	325.32	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20004684	AW0261	FB Ranch 9	Guadalupe	75.74	75.74	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004675	AW0261	FB Ranch #1	Nipomo	394.58	394.58	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20001534	AW0262	Canyon Ranch	Shandon	370	0	ROW, VINEYARD	Onion, Dry	Tomato	Carrot		2
20000794	AW0284	Tomatillo	Nipomo	18	0	ROW	Strawberry	Strawberry	Strawberry	CHLORPYRIFOS	2
20000799	AW0284	Bonita	Nipomo	24		ROW	Strawberry	Strawberry	Strawberry	CHLORPYRIFOS	2
20000798	AW0284	Iglesia	Nipomo	12		ROW	Strawberry	Strawberry	Strawberry	CHLORPYRIFOS	2
20000797	AW0284	Palmo #1	Nipomo	12	0	ROW	Strawberry	Strawberry	Strawberry	CHLORPYRIFOS	2
20000796	AW0284	Palma#2	Nipomo	11.5	0	ROW	Strawberry	Strawberry	Strawberry	CHLORPYRIFOS	2
20007192	AW0298	Rancho La Vina/leased organic	Lompoc	35	0	ROW	Tomato	Peas	Squash, Summer		2
20007193	AW0298	Rancho La Vina/leased conventional	Lompoc	86	0	ROW	Bean, Dried				2
20004844	AW0300	F & G VINEYARD	SOLEDAD	200	0	VINEYARD	Mustard				2
20000702	AW0310	Pura Ranch	Gonzales	171.8	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20000704	AW0310	Breschini	Gonzales	194.4	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20000705	AW0310	Pedrazzi	Gonzales	148.1	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20007594	AW0321	Coslett Ranch	Goleta	20	20	ORCHARD	Avocado			DIAZINON	2
20000682	AW0329	same	Hollister	69	0	ROW	Corn, Human Con.	Onion, Dry	Pepper, Fruiting		2
20001526	AW0351	Van Wingerden Ranch Baba 2	Carpinteria	18		ORCHARD, GREENHOUSE	Avocado	Other			2
20001524	AW0351	Van Wingerden Ranch KM	Carpinteria	7		GREENHOUSE					2
20000882	AW0362	Stanley Park Ranch Inc	Carpinteria	35	0	ORCHARD	Avocado				2
20004285	AW0370	Ruffoni Ranch	Santa maria	105	105	ROW	Strawberry				2
20001379	AW0378	Orcutt	Salinas	177.5		ROW	Lettuce, Head	Broccoli	Celery		2
20001269	AW0378	Hardin Ranch	Salinas	243.4	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON	2
20001239	AW0378	Bungard Ranch	Salinas	239.2	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON	2
20001229	AW0378	Spreckles Ranch	Spreckles Blvd	193.5	0	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON	2
20001264	AW0378	Teraji	Salinas	15	0	ROW	Lettuce, Head	Broccoli	Cauliflower	DIAZINON	2
20001263	AW0378	Rianda Ranch	Salinas	15	0	ROW	Lettuce, Head	Broccoli	Celery	DIAZINON	2
20001248	AW0378	Brazil	Salinas	8	0	ROW	Lettuce, Head	Broccoli	Celery	DIAZINON	2
20001258	AW0378	Hunter Ranch	Salinas	67.2	0	ROW	Lettuce, Head	Celery	Cauliflower	DIAZINON	2
20003930	AW0379	RANCH 19 (SINCLAIR)	SANTA MARIA	39.3	39.3	ROW	Broccoli	Cauliflower	Lettuce, Leaf	CHLORPYRIFOS	2
20003913	AW0379	RANCH 14 (GULARTE)	SANTA MARIA	126.85	126.85	ROW	Broccoli	Cauliflower	Lettuce, Leaf	CHLORPYRIFOS	2
20003933	AW0379	RANCH 20 (TOGNAZZINI)	SANTA MARIA	141.45	141.45	ROW	Broccoli	Cauliflower	Raspberry	CHLORPYRIFOS	2
20003884	AW0379	RANCH 09 (LEE)	SANTA MARIA	60.5	44	ROW	Broccoli	Cauliflower	Celery	CHLORPYRIFOS	2
20003921	AW0379	RANCH 16 (GRACIA)	SANTA MARIA	0	0	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20003907	AW0379	RANCH 12 (TRAVIS)	SANTA MARIA	59.15	59.15	ROW	Broccoli	Cauliflower	Raspberry	CHLORPYRIFOS	2
20003887	AW0379	RANCH 11 (GOODWIN)	SANTA MARIA	156.84	136.84	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20003879	AW0379	RANCH 08 (ELMERS)	SANTA MARIA	146.37	0	ROW	Cauliflower	Lettuce, Head	Lettuce, Leaf	CHLORPYRIFOS	2
20003852	AW0379	RANCH 04 (TRIGUERIO)	SANTA MARIA	220.4	220.4	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20003845	AW0379	RANCH 02 (ENOS BUSS)	SANTA MARIA	184.22	184.22	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20003919	AW0379	RANCH 15 (SILVA)	SANTA MARIA	82.42	82.42	ROW	Cauliflower	Lettuce, Leaf	Spinach	CHLORPYRIFOS	2
20011105	AW0379	RANCH 06 (COYOTE)	SANTA MARIA	120	120	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20011102	AW0379	RANCH 17 (WINEMAN)	SANTA MARIA	120	75	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20011103	AW0379	RANCH 26 (BOSTER)	SANTA MARIA	58	58	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20011104	AW0379	RANCH 25 (MAIN STREET)	SANTA MARIA	61.5	61.5	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	2
20011682	AW0379	RANCH 01 (HOMEPLACE)	SANTA MARIA	216.84	216.84	ROW	Broccoli	Cauliflower	Spinach		2
20008535	AW0385	Christopher Vineyard	Morgan Hill	1.4	0	VINEYARD					2
20002542	AW0395	Ernie Oliver Ranch	Arroyo Grande	38		ROW	Cabbage	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002546	AW0395	Fuchiwaki Ranch	Arroyo Grande	22		ROW	Celery	Cabbage	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002553	AW0395	Passion Ranch	Arroyo Grande	54		ROW	Broccoli	Celery	Cabbage	DIAZINON, CHLORPYRIFOS	2

20002547	AW0395	Hilo's Ranch	Arroyo Grande	1.5		ROW	Broccoli	Cabbage	Celery	DIAZINON, CHLORPYRIFOS	2
20002545	AW0395	Bello Ranch	Arroyo Grande	16.5		ROW	Broccoli	Celery	Cabbage	DIAZINON	2
20002552	AW0395	Rutiz Ranch	Arroyo Grande	11		ROW	Celery	Broccoli	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20002551	AW0395	Van Velson	Arroyo Grande	5.2		ROW	Broccoli	Cabbage	Celery	DIAZINON, CHLORPYRIFOS	2
20002549	AW0395	Switch Ranch	Arroyo Grande	2.7		ROW	Broccoli	Celery	Cabbage	DIAZINON, CHLORPYRIFOS	2
20002548	AW0395	Hilo Chandler Ranch	Arroyo Grande	6		ROW	Broccoli	Lettuce, Leaf	Cabbage	DIAZINON, CHLORPYRIFOS	2
20002561	AW0395	Silvera Ranch	Arroyo Grande	25		ROW	Broccoli	Celery	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002558	AW0395	Phelan Ranch	Arroyo Grande	34		ROW	Broccoli	Celery	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20002550	AW0395	Oliver Ranch	Arroyo Grande	32		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002544	AW0395	Mari's Ranch	Arroyo Grande	12		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002540	AW0395	Home Ranch	Arroyo Grande	40		ROW	Broccoli	Lettuce, Head	Cabbage	DIAZINON, CHLORPYRIFOS	2
20002541	AW0395	Charlies Ranch	Arroyo Grande	23		ROW	Celery	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20007139	AW0396	Yoshi Takahashi	Carpinteria	4	0	ORCHARD					2
20002270	AW0397	Rancho San Simeon LLC	Cambria	12	0	ROW	Peas				2
20003171	AW0399	Grey Ranch	Shandon	90	0	ROW	Lettuce, Leaf	Other			2
20000502	AW0400	Wolff Vineyards	San Luis Obispo	55	0	VINEYARD	Grapes, Wine				2
20002624	AW0407	RANCH #7	SANTA MARIA	100	100	ROW	Strawberry				2
20002622	AW0407	RANCH #2	SANTA MARIA	175	175	ROW	Strawberry				2
20007712	AW0416	Via Real Flowers	Carpinteria, Ca	4		NURSERY					2
20004830	AW0426	Orchids Royale	Carpinteria	30	0	ORCHARD, GREENHOUSE	Avocado	Other			2
20001903	AW0427	Glen Annie Ranch #1	Goleta	78		ORCHARD	Avocado	Lemon			2
20004689	AW0449	Canyon Ranch	Carpinteria	44	44	ORCHARD	Avocado	Citrus			2
20002420	AW0459	Winehiill ranch and Vineyard	Paso Robles	27	0	VINEYARD				DIAZINON, CHLORPYRIFOS	2
20004284	AW0471	Smith	Salinas	139.2	139.2	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004269	AW0471	Moffit	Salinas	141.4	141.4	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004265	AW0471	Bondesen	Salinas	88.8	88.8	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004155	AW0471	Harden	Salinas	62.7	62.7	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004289	AW0471	Struby	Salinas	85.7	85.7	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004156	AW0471	Juanita	Salinas	248	164	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004277	AW0471	Mortensen	Salinas	85.4	85.4	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004072	AW0471	Violini	Salinas	130.9	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004306	AW0471	W & S	Salinas	107.3	107.3	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004282	AW0471	Musante	Salinas	96.8	85.8	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20005005	AW0481	Botelho Ranch	Hollister	120		ROW	Lettuce, Leaf	Tomato	Parsley		2
20005119	AW0481	Santa Ana Ranch	Hollister	101.5		ROW	Tomato	Lettuce, Leaf	Other		2
20004979	AW0481	Borelli Ranch	Hollister	180	0	ROW	Tomato	Lettuce, Leaf	Other		2
20005097	AW0481	Lomanto Ranch	Hollister	92		ROW	Onion, Dry	Tomato	Other		2
20005153	AW0481	Weatherly Ranch	Hollister	20		ROW	Tomato	Lettuce, Leaf	Other		2
20005191	AW0481	Fehlman Ranch	Hollister	300		ROW	Tomato	Onion, Dry	Other		2
20005215	AW0499	Duncan	salinas	162	30	ROW	Strawberry				2
20003250	AW0504	BARCELLOS	SALINAS	145	145	ROW	Broccoli	Lettuce, Leaf	Spinach	CHLORPYRIFOS	2
20003246	AW0504	SILACCI	SALINAS	311	311	ROW	Broccoli	Lettuce, Leaf	Strawberry	CHLORPYRIFOS	2
20003254	AW0504	BRAZIL	SALINAS	316.45	316.45	ROW	Broccoli	Lettuce, Leaf	Strawberry	CHLORPYRIFOS	2
20003255	AW0504	OLD STAGE	SALINAS	76	76	ROW	Strawberry	Lettuce, Leaf			2
20003256	AW0504	OLD STAGE	SALINAS	65	65	ROW	Strawberry	Lettuce, Leaf			2
20001565	AW0508	Kuramura Nursery	Salinas	3.38	0	NURSERY					2
20007798	AW0544	Westland Floral Compnay, Inc.	Carpinteria	59	0	NURSERY, ORCHARD, GREENHOUSE	Avocado	Other		CHLORPYRIFOS	2
20010462	AW0547	CRANFORD RANCH	SALINAS	34.2	34.2	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20010482	AW0547	MARTELLA HOME RANCH	SALINAS	86.1	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20010483	AW0547	MARTELLA BORDGES RANCH	SALINAS	148.3	148.3	ROW	Lettuce, Head	Cauliflower	Broccoli		2
20007123	AW0547	VIERRA RCH	SALINAS	100.3	100.3	ROW	Cauliflower	Broccoli	Lettuce, Head		2
20008423	AW0550	Boronda Ranch 15	Salinas	43.7	43.7	ROW	Strawberry				2
20002583	AW0550	Cranford	Hollister	40	40	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002582	AW0550	Halperin	Hollister	170.7	170.7	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002594	AW0550	ByPass	Hollister	144.2	144.2	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002589	AW0550	Herbert	Hollister	202.7	202.7	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002588	AW0550	Coke	Hollister	153.75	153.75	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002597	AW0550	McCloskey	Hollister	182.2	182.2	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002585	AW0550	Home	Gilroy	174.4	174.4	ROW	Lettuce, Leaf	Mustard	Spinach		2
20002587	AW0550	Sabbatini	Hollister	180	180	ROW	Other	Other	Other		2
20012902	AW0550	Spanish Flats	Paicines	66.9	66.9	ROW	Lettuce, Leaf	Broccoli	Cauliflower		2
20008444	AW0550	Duflock Ranch 5	San Ardo	242.5	242.5	ROW	Lettuce, Leaf	Broccoli	Lettuce, Head		2
20008438	AW0550	Swale Ranch 13	Chualar	152.2	152.2	ROW	Beet	Broccoli	Kale		2

Enrollment information in the Water Board's GeoTracker data management system as of Aug. 1, 2012.

20008424	AW0550	Hansen Ranch 6	Chualar	61.4	61.4	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20008443	AW0550	Turri-Swale Ranch 8	Chualar	203.5	203.5	ROW	Beet	Broccoli	Lettuce, Head		2
20008006	AW0550	Echenique Ranch 4	San Lucas	440	440	ROW	Broccoli	Lettuce, Leaf	Spinach		2
20008426	AW0550	Romie Ranch 9	Chualar	62.5	62.5	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20001242	AW0559	Zanchi Ranch	New Cuyama	400.79		ROW	Carrot	Broccoli	Lettuce, Leaf		2
20008922	AW0568	Dart Farms	Carpinteria	2	2	ORCHARD	Avocado				2
20009562	AW0600	Tomasini Ranch	Soledad	72.5	0	ROW	Broccoli	Bean, Dried	Carrot		2
20009563	AW0600	River Ranch	Soledad	133	0	ROW	Broccoli	Bean, Dried	Carrot		2
20001458	AW0624	Site #2 Goldsmith	Gilroy	6	0	NURSERY					2
20004982	AW0626	Santa Barbara Orchid Estate	Santa Barbara	1.8	0	NURSERY, GREENHOUSE				CHLORPYRIFOS	2
20004010	AW0641	La Barge Vineyard	Lompoc	5	0	VINEYARD					2
20004111	AW0649	ENVAR	WATSONVILLE	37		ROW	Raspberry				2
20004135	AW0649	RADIN	AROMAS	55		ROW	Raspberry				2
20004038	AW0649	FLATS	WATSONVILLE	52		ROW	Raspberry				2
20004944	AW0654	Dayton Ranch	salinas	210	210	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20004177	AW0670	Ocean Cliff	Santa Cruz	164	164	ROW	Brussel Sprout	Leek			2
20004181	AW0670	Bargiacchi Ranch	Santa Cruz	73.25	73.25	ROW	Brussel Sprout	Leek			2
20006180	AW0678	B & H Flowers, Inc.	Carpinteria	20	0	ROW, GREENHOUSE	Other				2
20006200	AW0678	Paradise Ranch	Carpinteria	50		ORCHARD	Avocado				2
20004776	AW0679	Springfield Nursery Inc.	Moss Landing	5	5	NURSERY					2
20012502	AW0681	7a ANNUAL	Gonzales	370.8	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012506	AW0681	Ranch 26 North	King City	258.7	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20013062	AW0681	Ranch 11 West	Salinas	193.9	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	CHLORPYRIFOS	2
20013063	AW0681	Ranch 11 East	Salinas	369.4	0	ROW	Broccoli			CHLORPYRIFOS	2
20012443	AW0681	Ranch 7 South	Gonzales	371.6	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012504	AW0681	Zabala 10	Soledad	350.6	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012423	AW0681	Ranch 4 South	Gonzales	129.4	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012444	AW0681	Ranch 7 North	Gonzales	264.8	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012465	AW0681	Ranch 22	Salinas	342	108	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002895	AW0681	Ranch 18	Gonzales	326	0	ROW	Broccoli	Lettuce, Leaf	Other	DIAZINON, CHLORPYRIFOS	2
20002907	AW0681	Ranch 27	King City	455	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002872	AW0681	Ranch 2	Salinas	164	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002875	AW0681	Ranch 3	Salinas	150	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002877	AW0681	Ranch 5	Salinas	215	78	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002878	AW0681	Ranch 6	Salinas	454	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002881	AW0681	Ranch 8	Gonzales	438	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002888	AW0681	Ranch 14	Salinas	370	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002893	AW0681	Ranch 17	Salinas	451	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002899	AW0681	Ranch 21	Salinas	185	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002897	AW0681	Ranch 19	Castoville	177	125	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002902	AW0681	Ranch 24	Soledad	291	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012464	AW0681	Bunn	Salinas	318	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012462	AW0681	Fontes 12	Salinas	71.4	71.4	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012463	AW0681	DeSerpa 12	Salinas	50.2	50.2	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20013065	AW0681	Ranch 25 West	King City	357.9	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	CHLORPYRIFOS	2
20012422	AW0681	Ranch 1 South	Salinas	438.5	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20012424	AW0681	Vosti 4	Gonzales	91.3	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003023	AW0692	San Juan Ranch	San Juan Bautista	60	60	ROW, ORCHARD	Leek	Cucumber	Celery		2
20003025	AW0692	Santa Ana Ranch	Hollister	184	184	ROW, ORCHARD	Onion, Dry	Pepper, Fruiting	Squash		2
20004220	AW0695	RANCHO GAVILAN	HOLLISTER-GILROY	429	429	ROW	Bean, Unspecified	Tomato	Onion, Dry		2
20002661	AW0699	Bixby-Fink-Pereira Ranch	San Juan Bautista	86	0	ROW	Kale	Parsley	Other		2
20002657	AW0699	O'Donnell Ranch	San Juan Bautista	51	13	ROW	Beet	Kale	Other		2
20002665	AW0699	Silva Ranch	San Juan Bautista	121	0	ROW	Spinach	Lettuce, Leaf	Other		2
20002669	AW0699	Shrine Ranch	Chualar	424	0	ROW	Leek	Lettuce, Head	Other		2
20002659	AW0699	Prescott Ranch	San Juan Bautista	15	13	ROW	Pumpkin	Lettuce, Leaf			2
20013086	AW0699	Candlen Ranch	San Juan Bautista	85.3	0	ROW	Lettuce, Leaf				2
20013088	AW0699	Freitas Ranch	San Juan Bautista	161.4	0	ROW	Lettuce, Leaf				2
20003649	AW0704	Aromas Nursery	Aromas	5	0	NURSERY					2
20007483	AW0705	Filice Home Ranch	Hollister	341	0	ROW	Lettuce, Leaf	Spinach	Pepper, Fruiting		2
20007682	AW0705	Dassel	Hollister	91	0	ROW	Tomato	Celery	Pepper, Fruiting		2
20007786	AW0705	Villa	Hollister	66	0	ORCHARD	Other			DIAZINON	2
20007577	AW0705	Rossi/Dabo	Hollister	274	0	ROW	Celery	Wheat	Pepper, Fruiting		2
20007544	AW0705	Northeast Hollister Ranch	Hollister	457	0	ROW	Spinach	Wheat	Celery		2

20007774	AW0705	NYLAND	San Juan Bautista	269	101	ROW	Lettuce, Leaf	Spinach	Tomato		2
20001023	AW0705	NISHITA RANCH	SAN JUAN BAUTISTA CA	116	49	ROW	Tomato	Lettuce, Leaf	Pepper, Fruiting		2
20003053	AW0706	Ranch 3 - Yuki Ranch	Chualar	131	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003052	AW0706	Ranch 1 - Broome Ranch Organic (Lots 44-45)	Chualar	23	0	ROW	Lettuce, Leaf	Spinach			2
20003063	AW0706	Ranch 11 - Los Coches (Silverlake)	Soledad	223	20	ROW	Broccoli	Lettuce, Leaf		DIAZINON, CHLORPYRIFOS	2
20007836	AW0708	SUNSTONE VINEYARDS & WINERY, INC	SANTA YNEZ	28	0	VINEYARD	Grapes, Wine				2
20000824	AW0712	Hambey Ranch	Salinas	23	23	ROW	Artichoke				2
20000825	AW0712	Rodgers Ranch	Salinas	7	5	ROW	Pumpkin	Squash	Corn, Human Con.		2
20000826	AW0712	Home Ranch	Salinas	202	180	ROW	Broccoli	Lettuce, Leaf	Artichoke		2
20007457	AW0712	Russell Ranch	Salinas	92	92	ROW	Broccoli	Lettuce, Leaf			2
20004065	AW0713	Clark	Greenfield	159	50	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004043	AW0713	Hess Ranch	Salinas	96	96	ROW	Lettuce, Head	Lettuce, Leaf	Strawberry		2
20004052	AW0713	Schween Ranch	Salinas	85	85	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20004063	AW0713	Borchard	Chualar	145	30	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004070	AW0713	Rodgers	Salinas	116	69.8	ROW	Cauliflower	Lettuce, Head	Strawberry		2
20004068	AW0713	Handley	Greenfield	97	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004069	AW0713	Yuki	Chualar	267	26	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004048	AW0713	Pasco Ranch	Salinas	389.8	20	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004022	AW0713	Gabilan Ranch	Salinas	205	205	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf		2
20004036	AW0713	Esperanza Ranch	Salinas	124	124	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf		2
20004056	AW0713	Whalebone	Salinas	128	91.5	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004064	AW0713	Phillips	Greenfield	128	115	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20001594	AW0714	Dudgeon Ranch	Soledad	57.8	0	ROW	Lettuce, Leaf	Broccoli	Cauliflower		2
20007240	aw0716	Dunne Ranch	Hollister	400	400	VINEYARD	Grapes, Wine			CHLORPYRIFOS	2
20001001	AW0726	O.M.	Hollister	2.5	0	ORCHARD	Walnut			CHLORPYRIFOS	2
20001007	AW0726	Bowden	Hollister	13	0	ORCHARD	Walnut				2
20000991	AW0726	Nancett	Hollister	7	0	ORCHARD	Walnut			CHLORPYRIFOS	2
20000999	AW0726	Home Ranch	Hollister	2.5	0	ORCHARD	Walnut			CHLORPYRIFOS	2
20000997	AW0726	Picetti	Hollister	10	0	ORCHARD	Other			CHLORPYRIFOS	2
20001688	AW0728	Nong Woo Seed America, Inc.	San Juan Bautista	30	0	ROW, GREENHOUSE	Pepper, Fruiting	Broccoli			2
20001760	AW0733	Bill Jurveich	Hollister	20	0	ORCHARD				DIAZINON	2
20007575	AW0734	Al Bonturi	Hollister	28.02	0	ORCHARD	Walnut			CHLORPYRIFOS	2
20004832	AW0738	Lucy Brown Lane	San Juan Bautista	65	65	ROW, GREENHOUSE	Lettuce, Head	Pepper, Fruiting	Onion, Green	DIAZINON	2
20005136	AW0755	Halter Ranch Vineyard	Paso Robles	250	0	VINEYARD	Leek				2
20002462	AW0757	pasquini ranch	san luis obispo	13.5	0	ROW	Peas	Squash	Tomato		2
20002463	AW0757	crowle ranch	san luis obispo	6.5	0	ROW	Bean, Dried	Squash	Tomato		2
20002229	AW0757	lowe ranch	san luis obispo	17	0	ROW	Bean, Dried	Squash			2
20007163	AW0760	Main Bolsa	Hollister	115	0	ORCHARD				DIAZINON	2
20007146	AW0760	Briggs/Bolsa Road	Hollister	101	0	ORCHARD				DIAZINON	2
20002510	AW0763	Scagliotti Farms	Hollister	81		ROW	Lettuce, Leaf	Broccoli	Onion, Dry		2
20005104	AW0765	Young	Hollister	75	60	ROW	Onion, Dry	Tomato	Pepper, Fruiting		2
20005175	AW0765	Yang	Hollister	215	100	ROW	Spinach	Lettuce, Leaf	Mustard		2
20012284	AW0765	Yuki	Hollister	118	50	ROW	Pepper, Fruiting	Wheat			2
20005144	AW0765	Lico	Hollister	90	90	ROW	Onion, Dry	Tomato	Pepper, Fruiting		2
20005079	AW0765	Machado	Gilroy	57	57	ROW	Pepper, Fruiting	Lettuce, Head	Tomato		2
20005161	AW0765	Zanger	Hollister	154	30	ORCHARD				DIAZINON	2
20004271	AW0766	Foster Ranch	Hollister	250	0	ROW	Tomato	Onion, Dry	Pepper, Fruiting		2
20004274	AW0766	Brookhollow Ranch	Hollister	120	0	ROW	Lettuce, Leaf				2
20004260	AW0766	Santa Ana Ranch	Hollister	200	0	ROW	Onion, Dry	Pepper, Fruiting	Tomato		2
20002088	AW0769	Silva Farms	Gilroy	128	128	ROW	Oat	Pepper, Fruiting			2
20008174	AW0775	Nakamura Ranch	Moss landing	30	30	ROW	Strawberry	Lettuce, Head			2
20003629	AW0775	Capurro Home Ranch	Moss Landing, CA	284	284	ROW	Strawberry	Lettuce, Head			2
20003630	AW0775	Nielson Ranch	Moss Landing, CA	81	81	ROW	Lettuce, Head	Strawberry			2
20007370	AW0783	Cienega Vineyard	Hollister	24	0	VINEYARD					2
20004752	AW0789	Rohnert	HOLLISTER	443	190	ROW	Tomato	Wheat	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20004751	AW0789	Resetar	HOLLISTER	148	0	ROW	Tomato			DIAZINON	2
20004750	AW0789	Bolsa	HOLLISTER	107	0	ROW	Collard	Onion, Dry	Tomato	DIAZINON, CHLORPYRIFOS	2
20004988	AW0795	Pietra Santa Winery	Hollister	155		ROW, VINEYARD, ORCHARD	Grapes, Wine	Olive		DIAZINON, CHLORPYRIFOS	2
20002671	AW0796	SJBG	San Juan Bautista	25		ROW	Other	Other	Other		2
20002674	AW0796	Mac	San Juan Bautista	100		ROW	Other	Other	Other		2
20007437	AW0797	Caravella Ranch	Hollister	70	0	ROW	Pepper, Fruiting				2
20010782	AW0801	RANCH 10 PLOT 1 ORCHARD ROAD`	NIPOMO	60	60	ROW	Broccoli				2
20004493	AW0813	Turri Ranch, Parcel 3	San Luis Obispo	50	0	ROW	Peas	Cauliflower	Other	CHLORPYRIFOS	2

20004554	AW0813	Turri Ranch Parcel 1 & 2	San Luis Obispo	120	0	ROW	Peas	Chinese Cabbage	Other	CHLORPYRIFOS	2
20008025	aw0818	Clevenger Ranch Vineyard	Paso Robles	80		ROW, VINEYARD	Grapes, Wine			CHLORPYRIFOS	2
20003516	AW0824	Galbraith Ranch	San Miguel	94		ROW	Oat	Wheat	Barley	CHLORPYRIFOS	2
20007042	aw0829	1700 glen annie rd	goleta	5	0	ORCHARD					2
20003384	AW0832	1040 N. Thompson	Nipomo	14	0	GREENHOUSE					2
20001588	AW0853	Chadmark Farms	Paso Robles	27	0	ROW, VINEYARD, ORCHARD	Corn, Human Con.	Squash, Summer		DIAZINON	2
20003110	AW0855	Brown Monterey Road Ranch	Paso Robles	7	0	ROW	Onion, Dry	Oat	Other		2
20002020	AW0863	Douglas Bathe	Arroyo Grande	9	0	ORCHARD				CHLORPYRIFOS	2
20002687	AW0871	Cross Creek Ranch	San Luis Obispo	95	0	ORCHARD	Lemon	Citrus		CHLORPYRIFOS	2
20007499	AW0877	Los Padres Orchid Company	Carpinteria	0.75	0.75	NURSERY, GREENHOUSE					2
20001685	AW0881	Arroyo Grande Research Station	Arroyo Grande	16	0	ROW, GREENHOUSE	Broccoli			DIAZINON, CHLORPYRIFOS	2
20000580	AW0885	George Dana	Nipomo, CA	47	0	ORCHARD				CHLORPYRIFOS	2
20002122	AW0890	Parrish Vineyards	Creston	52	0	ROW, VINEYARD	Grapes, Wine	Onion, Dry			2
20007917	AW0899	R.C. Manuel Farms	Morro Bay	4	0	ROW	Pepper, Fruiting	Squash	Bean, Unspecified		2
20001327	AW0908	Gisler Ranch	Arroyo Grande	109.99	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout		2
20001317	AW0908	Biddle Ranch	Arroyo Grande	114.06	0	ROW	Pepper, Fruiting	Lettuce, Leaf	Brussel Sprout		2
20001321	AW0908	Hatano Ranch	Arroyo Grande	25.85	11	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout		2
20001336	AW0908	Finney Ranch	Arroyo Grande	50.46	50.46	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout		2
20001320	AW0908	Adobe Ranch	Arroyo Grande	86.72	8.27	ROW	Brussel Sprout	Pepper, Fruiting	Lettuce, Leaf		2
20001323	AW0908	Bello Ranch	Arroyo Grande	55.28	0	ROW	Lettuce, Leaf	Pepper, Fruiting	Brussel Sprout		2
20005580	AW0932	Williams Farm	San Luis Obispo	9	0	NURSERY					2
20000858	AW0942	Fitz-Gerald Ranch	Nipomo	43.5	0	ORCHARD					2
20001353	AW0983	high school ranch	nipomo	80	0	ROW	Peas				2
20009223	AW0983	church	nipomo	30	0	ROW	Peas				2
20003480	AW0984	ranch 3/ Fox	Nipomo	85.5	85.5	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003488	AW0984	ranch 5/ Sunnybrook	Nipomo	55	25	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20003499	AW0984	ranch 8/ Tognazzini	Guadalupe	104.5	104.5	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003506	AW0984	ranch 11/Todos Santos	Los Alomos	139.2	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003493	AW0984	ranch 6/Riverside	Nipomo	72.6	56.9	ROW	Cauliflower	Lettuce, Leaf			2
20003467	AW0984	ranch 2/ Mendoza	Nipomo	60	60	ROW	Cauliflower	Lettuce, Head	Celery		2
20003507	AW0984	ranch 12/ Arrellaanes north	Orcutt	124.7	124.7	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20003508	AW0984	ranch 14/ Arrellanes south	Orcutt	123	123	ROW	Broccoli	Lettuce, Head			2
20003504	AW0984	ranch 9/ Laguna	Nipomo	165.7	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003505	AW0984	ranch 10/ Silva	Santa Maria	124	112	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003497	AW0984	ranch 7/ Johnson	Nipomo	170.4	131.7	ROW	Broccoli	Cauliflower	Lettuce, Leaf		2
20003442	AW0998	River Edge Farms / Ranch # 6	Santa maria	75	0	ROW	Strawberry				2
20007983	AW0998	River Edge Farms/ Ranch #4	santa maria	79	0	ROW	Strawberry				2
20003438	AW0998	River Edge Farms/ Ranch # 5	Santa maria	168	110	ROW	Broccoli	Cauliflower	Celery		2
20003440	AW0998	River Edge Farms/ Ranch # 1	Santa Maria	155	155	ROW	Broccoli	Cauliflower	Squash		2
20001428	AW1001	RDH Esperanza	Carpinteria	55	0	ORCHARD	Avocado				2
20001417	AW1001	Cate Ranch	Carpinteria	16	0	ORCHARD	Avocado				2
20001406	AW1001	La Rosa De Castilla	Carpinteria	10	0	ORCHARD	Avocado				2
20004492	AW1002	Santa Maria	Nipomo	6.1	0	NURSERY					2
20003719	AW1008	Okui farms Ranch 2	Nipomo	180	0	ROW	Broccoli	Lettuce, Head	Chinese Cabbage		2
20004883	AW1014	Clearwater Color Nursery	Los Osos	4.5	0	NURSERY				CHLORPYRIFOS	2
20003666	AW1022	C&M Nursery	Nipomo	21	0	NURSERY, GREENHOUSE	Avocado	Citrus			2
20002226	AW1041	MARGETT VINEYARDS	PASO ROBLES	37	0	VINEYARD	Grapes, Wine			DIAZINON, CHLORPYRIFOS	2
20004092	AW1043	Ranch #14 - Plot 07	Los Osos	30		ROW	Broccoli	Lettuce, Leaf	Chinese Cabbage		2
20004131	AW1043	Ranch #11 - AB Turri Company	Los Osos	63	45	ROW	Broccoli	Celery	Lettuce, Leaf		2
20004116	AW1043	Ranch #4,5,6,7, and 8 - Highland Ranches / Warden	Los Osos	152	0	ROW	Broccoli	Chinese Cabbage	Lettuce, Leaf		2
20004108	AW1043	Ranch #2 and #14 - Eto Ranch	Los Osos	124	35	ROW	Broccoli	Chinese Cabbage	Lettuce, Leaf		2
20004102	AW1043	Ranch #1 - Dohi Ranch	Arroyo Grande	55	55	ROW	Broccoli	Chinese Cabbage	Lettuce, Leaf		2
20003703	AW1054	Halcyon	Arroyo Grande	28	0	ROW	Broccoli	Carrot	Strawberry		2
20002409	AW1055	2 Peas in a Pod	Arroyo Grande	8	0	ROW	Broccoli	Cauliflower	Peas		2
20007385	AW1072	Guggia Farms	Santa Maria	391.2	391.2	ROW	Broccoli			CHLORPYRIFOS	2
20004442	AW1084	Ranch 4	Nipomo	60	40	ROW	Broccoli				2
20004425	AW1084	Ranch 1	Santa Maria	50	50	ROW	Broccoli				2
20004444	AW1084	Ranch 5	Nipomo	72	60	ROW	Broccoli				2
20004451	AW1084	Ranch 9	Nipomo	50	0	ROW	Broccoli				2
20004434	AW1084	Ranch 3	Santa Maria	90	90	ROW	Broccoli				2
20004438	AW1084	Ranch 6	Santa Maria	140	75	ROW	Broccoli				2
20000836	AW1085	Ranch 2	Arroyo Grande	9	9	ROW	Chinese Cabbage	Endive	Kale		2
20000837	AW1085	Ranch 3	Arroyo Grande	41.5	41.5	ROW	Chinese Cabbage	Endive	Kale		2

20000835	AW1085	Ranch 1	Arroyo Grande	9	9	ROW	Chinese Cabbage	Endive	Kale		2
20000840	AW1085	Ranch 6	Los Osos	48	48	ROW	Chinese Cabbage	Endive	Kale		2
20000838	AW1085	Ranch 4	Arroyo Grande	25	25	ROW	Chinese Cabbage	Endive	Kale		2
20000839	AW1085	Ranch 5	Arroyo Grande	27	27	ROW	Chinese Cabbage	Endive	Kale		2
20004488	AW1099	Windy Creek Ranch	San Luis Obispo	2.5	0	GREENHOUSE					2
20000561	AW1112	Bartleson Ranch	Arroyo grande	247.1	0	ORCHARD					2
20001308	AW1115	Mills Farms Ranch #4	Nipomo	124	0	ROW	Broccoli				2
20001304	AW1115	Mills Farms Ranch #1	Nipomo	119	66	ROW	Broccoli				2
20001306	AW1115	Mills Farms Ranch #2	Nipomo	106	106	ROW	Broccoli				2
20004661	AW1119	Highland Ranch	San Luis Obispo	45	0	ROW	Squash, Summer	Cauliflower			2
20012582	AW1130	Dalido Ranch	san Luis Obispo	100	100	ROW	Lettuce, Head	Pepper, Fruiting	Chinese Cabbage		2
20003981	AW1137	Morro Bay	Morro Bay	135	0	ROW	Chinese Cabbage	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20003973	AW1137	Huausna	Arroyo Grande	92	0	ROW	Chinese Cabbage	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20003966	AW1137	Arroyo Grande	Arroyo Grande	87	0	ROW	Chinese Cabbage	Lettuce, Leaf	Strawberry	DIAZINON, CHLORPYRIFOS	2
20011202	AW1137	San Luis Obispo	San Luis Obispo	26	0	ROW	Broccoli	Chinese Cabbage	Lettuce, Leaf		2
20003204	AW1145	Ranch 17	Arroyo Grande	122	122	ROW	Chinese Cabbage	Spinach	Lettuce, Head		2
20003276	AW1145	Ranch 27	Arroyo Grande	166	166	ROW	Chinese Cabbage	Lettuce, Leaf	Cabbage		2
20003201	AW1145	Ranch 07	Arroyo Grande	150	0	ROW	Broccoli	Celery	Lettuce, Head		2
20007474	AW1146	Ibarra Farms	arroyo grande	20	0	ROW	Lettuce, Head	Cauliflower	Cabbage		2
20004313	AW1150	Ranch #4 - Greengate	San Luis Obispo	60	0	ROW	Broccoli	Chinese Cabbage	Pepper, Fruiting		2
20004329	AW1150	Ranch #13 - Maino, Bunnell, City of San Luis Obispo	San Luis Obispo	70	0	ROW	Chinese Cabbage	Pepper, Fruiting	Tomato		2
20004307	AW1150	Ranch #1 - Christensen	San Luis Obispo	142	0	ROW	Pepper, Fruiting	Lettuce, Leaf	Chinese Cabbage		2
20004312	AW1150	Ranch #3 - Lindsey	San Luis Obispo	50	0	ROW	Pepper, Fruiting	Chinese Cabbage	Squash		2
20004316	AW1152	Meissner Farm	san luis obispo	10	0	ROW	Tomato	Squash	Lettuce, Leaf	DIAZINON	2
20004797	AW1154	Lompoc Ranch	Lompoc	150	0	ROW	Lettuce, Head	Broccoli			2
20004802	AW1154	Los Berros Ranch	Arroyo Grande	14	0	ORCHARD	Avocado				2
20007865	AW1159	Ranch 6	Guadalupe	193	193	ROW	Strawberry				2
20007860	AW1159	Ranch 4	guadalupe	146	146	ROW	Strawberry				2
20007868	AW1159	Ranch 8	Guadalupe	103	103	ROW	Strawberry				2
20005003	AW1164	Horton 1	Carpinteria	34	34	ORCHARD	Avocado				2
20005063	AW1164	Zanier Ranch	Carpinteria	21	21	ORCHARD	Avocado				2
20005056	AW1164	Gillie Orchards, LLC (used to be Thor)	Carpinteria	16	16	ORCHARD	Avocado				2
20002602	AW1167	Spring Harvest Berry	Santa Maria	130		ROW	Strawberry				2
20010023	AW1181	Phelan/Taylor (1,2,3)	Oceano	289	87	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009983	AW1181	Franklin (8)	Arroyo Grande	60	18	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009984	AW1181	Waller (9)	Arroyo Grande	59	18	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009986	AW1181	E&M (10)	Arroyo Grande	56	17	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010022	AW1181	Taylor/Siva (7)	Arroyo Grande	58	17	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20007943	AW1183	Ranch 3	santa maria	81	81	ROW	Artichoke	Broccoli	Cauliflower		2
20003669	AW1183	Ranch 2	Guadalupe	92.35	92.35	ROW	Broccoli				2
20003676	AW1183	Ranch 4	Arroyo Grande	70.25	70.25	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003672	AW1183	Ranch 8	guadalupe	85	85	ROW	Broccoli				2
20003667	AW1183	Ranch 1	Guadalupe	52	52	ROW	Broccoli	Lettuce, Head			2
20007321	AW1188	Valley Flowers	Carpinteria	22	12	ROW, GREENHOUSE	Other	Other	Other		2
20002402	AW1189	santa ynez gardens inc.	santa ynez	5.19	5.19	NURSERY				CHLORPYRIFOS	2
20002280	AW1190	Caswell Ranch	Goleta	27	27	NURSERY, ORCHARD					2
20004247	AW1192	Edalatpour Ranch	Buellton	40	0	ROW, ORCHARD	Artichoke				2
20004342	AW1198	Pennycook	Salinas	117	117	ROW	Strawberry				2
20010603	AW1198	Maretti Minetti Ranch	Guadalupe	120	120	ROW	Strawberry				2
20010602	AW1198	Desanti Ranch	Salinas	100	100	ROW	Strawberry				2
20010605	AW1198	Airport Ranch	Santa Maria	446	446	ROW	Strawberry	Bean, Unspecified	Squash		2
20010802	AW1198	Buckley Ranch	Guadalupe	105	105	ROW	Strawberry				2
20010604	AW1198	Agro Jal - Tres Rios Ranch	Santa Maria	178	178	ROW	Strawberry				2
20008330	AW1204	43	Buellton	147	0	ROW	Bean, Dried	Broccoli			2
20008313	AW1204	14	Lompoc	125	0	ROW	Bean, Dried	Broccoli			2
20008314	AW1204	19	Lompoc	30	0	ROW	Broccoli				2
20008322	AW1204	28	Lompoc	102	0	ROW	Bean, Dried	Lettuce, Head			2
20008320	AW1204	26	Lompoc	90	0	ROW	Bean, Dried	Broccoli			2
20008321	AW1204	27	Lompoc	151	0	ROW	Lettuce, Head	Broccoli			2
20008304	AW1204	6	Buellton	158	0	ROW	Broccoli	Bean, Dried			2
20008324	AW1204	29	Lompoc	125	0	ROW	Bean, Dried	Broccoli			2
20008312	AW1204	13	Lompoc	88	0	ROW	Broccoli	Cauliflower			2
20008311	AW1204	12	Lompoc	135	0	ROW	Lettuce, Head	Bean, Dried			2

20011242	AW1204	44	Lompoc	115	0	ROW	Broccoli	Bean, Dried			2
20008327	AW1204	36	Lompoc	56	0	ROW	Bean, Dried	Broccoli			2
20008318	AW1204	24	Lompoc	66	0	ROW	Broccoli	Cauliflower			2
20008319	AW1204	25	Lompoc	136	0	ROW	Bean, Dried	Broccoli			2
20008305	AW1204	8	Buellton	150	0	ROW	Bean, Dried	Broccoli			2
20008309	AW1204	11	Lompoc	76	0	ROW	Broccoli	Lettuce, Head			2
20008310	AW1204	11-B	Lompoc	96	0	ROW	Bean, Dried	Broccoli	Lettuce, Head		2
20008315	AW1204	20	Lompoc	56	0	ROW	Broccoli				2
20005520	AW1208	R&G Land and Cattle Co.	Paicines	10	0	ORCHARD					2
20003218	AW1210	Lavagnino Ranches	SAN JUAN BAUTISTA	109	89	ROW, NURSERY	Onion, Dry	Tomato	Pumpkin		2
20008541	AW1216	Breen	San juan Batuista	10	10	ROW	Squash	Kale	Peas		2
20008544	AW1216	union	hollister	65	0	ROW	Leek	Squash	Kale		2
20007962	AW1225	Battaglia Ranch	San Martin	20	0	NURSERY					2
20003589	AW1231	Sonny LO Nursery	Gilroy	3		GREENHOUSE	Chinese Cabbage	Mustard			2
20003609	AW1233	Keith Lo Nursery	Gilroy	3	0	GREENHOUSE	Chinese Cabbage				2
20003862	AW1237	Del Monte-Furlong	Gilroy	60	0	ROW, GREENHOUSE	Bean, Dried	Peas	Pepper, Fruiting		2
20003590	AW1247	Han Qiang Kuang Nursery	San Martin	4		GREENHOUSE	Chinese Cabbage	Mustard	Spinach		2
20003113	AW1248	John Wu Nursery	Gilroy	4.5	0	NURSERY	Chinese Cabbage	Other			2
20001740	AW1250	Ranch 25 - Pata	Lompoc	90	90	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON	2
20001741	AW1250	Ranch 26 - Mission	Lompoc	164	164	ROW	Broccoli	Cabbage	Cauliflower	DIAZINON	2
20001738	AW1250	Ranch 19 - Pettit	Lompoc	131	131	ROW	Cabbage	Cauliflower	Broccoli	DIAZINON	2
20001737	AW1250	Ranch 8 - Facer	Lompoc	74	74	ROW	Cabbage	Cauliflower	Broccoli	DIAZINON	2
20001699	AW1250	Santa Rosa Ranch	Lompoc	109.8	173	ROW	Lettuce, Head	Broccoli	Cabbage	DIAZINON	2
20001696	AW1250	Home Ranch	Lompoc	68	77.14	ROW	Lettuce, Head	Cabbage	Cauliflower	DIAZINON	2
20001743	AW1250	Ranch 27 - Sobhani	Lompoc	40	40	ROW	Lettuce, Head	Broccoli	Cabbage	DIAZINON	2
20001723	AW1250	Ranch 18 Reynolds	Lompoc	18	18	ROW	Lettuce, Head	Spinach	Cabbage	DIAZINON	2
20001722	AW1250	Ranch 15 Sloan	Lompoc	56	56	ROW	Lettuce, Head	Celery	Spinach	DIAZINON	2
20001703	AW1250	Linneman Ranch 06	Lompoc	54.8	59	ROW	Lettuce, Head	Spinach	Cauliflower	DIAZINON	2
20001721	AW1250	Ranch 14 Signorelli	Lompoc	88	88	ROW	Lettuce, Head	Celery	Cabbage	DIAZINON	2
20001718	AW1250	Ranch 12 Marx	Lompoc	57	57	ROW	Lettuce, Head	Celery	Cabbage	DIAZINON	2
20001706	AW1250	Ranch 9 Turri	Lompoc	93	93	ROW	Lettuce, Head	Celery	Cabbage	DIAZINON	2
20001687	AW1250	Apache 21	Lompoc	205.5	205.5	ROW	Lettuce, Head	Cabbage	Broccoli	DIAZINON	2
20001715	AW1250	Ranch10 Apache	Lompoc	78	81	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON	2
20001719	AW1250	Ranch 13 Alexander	Lompoc	8	11	ROW	Lettuce, Head	Spinach	Celery	DIAZINON	2
20004011	AW1258	Joe Chen Nursery	Gilroy	2	2	NURSERY					2
20003050	AW1261	Embarcadero Ranch	Goleta	415	0	ORCHARD	Avocado	Lemon		CHLORPYRIFOS	2
20003612	AW1263	Meng Fong Lo Nursery	Gilroy	1	0	NURSERY, GREENHOUSE				DIAZINON	2
20000583	AW1265	Gularte Orchards	Hollister	54	0	ORCHARD					2
20003566	AW1270	Shun Yu Kuang	San Martin	10	0	NURSERY					2
20003539	AW1275	Moon Wei Tom Nursery	Gilroy	3.5	0	GREENHOUSE				DIAZINON	2
20003683	AW1281	Aira Ranch	Gilroy	17.7	0	ORCHARD				DIAZINON	2
20003948	AW1286	Mauracher Ranch Corporation	Carpinteria	42		ORCHARD	Avocado				2
20005185	AW1289	Ranch 7	Guadalupe	125	125	ROW	Lettuce, Head	Broccoli	Strawberry		2
20005151	AW1289	Ranch 2	Santa Maria	28	28	ROW	Broccoli	Lettuce, Head	Strawberry		2
20005172	AW1289	Ranch 4	Santa Maria	52	52	ROW	Broccoli	Lettuce, Head	Strawberry		2
20008575	AW1289	Ranch 12	Santa Maria	175	175	ROW	Broccoli	Lettuce, Head			2
20005123	AW1289	Ranch 1	Santa Maria	95	95	ROW	Broccoli	Lettuce, Head	Strawberry		2
20005206	AW1289	Ranch 11	Guadalupe	70	70	ROW	Strawberry				2
20005154	AW1289	Ranch 3	Santa Maria	80	80	ROW	Broccoli	Lettuce, Head			2
20005193	AW1289	Ranch 8	Guadalupe	112	112	ROW	Lettuce, Head	Strawberry	Broccoli		2
20009972	AW1290	Jorge Contreras Farming	Santa Maria	80	80	ROW	Strawberry			CHLORPYRIFOS	2
20007583	AW1291	Herrera Farming Inc.	Nipomo	111	111	ROW	Strawberry			CHLORPYRIFOS	2
20008437	AW1293	BLOSSER RANCH	SANTA MARIA	52	52	ROW	Strawberry				2
20007747	AW1302	VEGGIE-FLORA NURSERY	Buellton	74	0	ROW	Broccoli	Pepper, Fruiting	Cabbage		2
20004404	AW1304	Li Fong Farm	Gilroy	20		ROW	Chinese Cabbage			DIAZINON	2
20009484	AW1307	Home Ranch	San Martin	249	249	ROW	Pepper, Fruiting	Bean, Unspecified	Squash		2
20009483	AW1307	Center Ranch	Gilroy	95	95	ROW	Pepper, Fruiting	Squash	Bean, Unspecified		2
20009486	AW1307	Pacheco Ranch	gilroy	110	110	ROW	Bean, Unspecified	Pepper, Fruiting	Squash		2
20009485	AW1307	Airport Ranch	Hollister	200	200	ROW	Pepper, Fruiting	Bean, Unspecified	Squash		2
20003398	AW1310	Safari Harvesting & Farming	Santa Maria	182	0	ROW	Strawberry				2
20001484	AW1311	Goldsmith	Gilroy	22	3	ROW, GREENHOUSE	Other			CHLORPYRIFOS	2
20003994	AW1318	Siu Man Chiu's Nursery	san martin	4	0	GREENHOUSE	Chinese Cabbage				2
20003742	AW1320	Wen de Li	Gilroy	4	0	GREENHOUSE					2

20008032	AW1326	Furlong Ranch	Gilroy	205	205	ROW	Onion, Dry	Tomato	Other		2
20008039	AW1326	Maida Ranch	Gilroy	30	30	ROW	Tomato				2
20008045	AW1326	Norton Ranch	Gilroy	93	93	ROW	Pepper, Fruiting				2
20005331	AW1327	Sportspark	Gilroy	0	0	ROW	Wheat				2
20005321	AW1327	Hoey Ranch	Gilroy	15	0	ROW	Squash				2
20005320	AW1327	Bella Creek Ranch	Gilroy	48	0	ROW	Pepper, Fruiting	Wheat			2
20005335	AW1327	Mesa Rd South	Gilroy	48	0	ROW	Bean, Unspecified				2
20004590	AW1330	Lemos Ranch	Gilroy	54	54	ROW	Pepper, Fruiting				2
20004634	AW1330	Site 2	Gilroy	60	1	NURSERY					2
20007738	AW1340	101 Ranch	Gilroy	129	0	ROW	Bean, Dried	Corn, Human Con.	Pepper, Fruiting		2
20007733	AW1340	Kessler Ranch	San Martin	15	0	ROW	Corn, Human Con.	Pepper, Fruiting			2
20007730	AW1340	Lau Ranch	San Martin	15	0	ROW	Bean, Dried	Corn, Human Con.	Pepper, Fruiting		2
20007741	AW1340	Leavesley Ranch	Gilroy	65	0	ROW	Bean, Dried	Tomato	Pepper, Fruiting		2
20007736	AW1340	Perino	Gilroy	27	0	ROW	Corn, Human Con.	Bean, Dried	Pepper, Fruiting		2
20007722	AW1340	Marns Ranch	San Martin	72	0	ROW	Corn, Human Con.	Pepper, Fruiting	Bean, Dried		2
20007528	AW1343	East Site	Gilroy	112.2	1.21	ROW, NURSERY, GREENHOUSE	Lettuce, Head	Pepper, Fruiting	Corn, Human Con.	CHLORPYRIFOS	2
20007664	AW1343	South Site	Gilroy	0.16	0.16	GREENHOUSE			Lettuce, Head	CHLORPYRIFOS	2
20003635	AW1346	rong zhen liang	gilroy	3		GREENHOUSE	Chinese Cabbage				2
20008064	AW1349	Godfrey Ranch	Gilroy	10	0	NURSERY, ORCHARD	Citrus	Other		DIAZINON	2
20008063	AW1349	New Avenue	Gilroy	4	0	NURSERY	Citrus			DIAZINON	2
20002964	AW1350	SO. 101 RANCH	Gilroy	34	0	ROW	Bean, Dried				2
20002937	AW1350	BUENA VISTA RANCH	Gilroy	18	0	ROW	Pumpkin				2
20011084	AW1350	Old 101 Ranch - PP	San Martin	6.2		ROW	Pepper, Fruiting	Bean, Dried			2
20012883	AW1353	Salinas/Potter rd.	Salinas	5	0	NURSERY	Cauliflower	Brussel Sprout	Celery		2
20001512	AW1353	San Juan	San Juan Bautista	2	0	NURSERY, GREENHOUSE	Cauliflower	Artichoke	Lettuce, Leaf		2
20001514	AW1353	Four Seasons	Salinas	4	0	NURSERY, GREENHOUSE	Artichoke	Cauliflower	Celery		2
20007373	AW1354	Sherrie	Gilroy	2.5	0	ROW	Tomato				2
20008434	AW1357	BLOSSER RANCH	SANTA MARIA	52	52	ROW	Strawberry				2
20008431	AW1357	RIVER RANCH	SANTA MARIA	60	60	ROW	Strawberry				2
20007803	AW1361	DUTRA RANCH	SISQUOC	87	0	ROW	Strawberry	Pepper, Fruiting		DIAZINON	2
20004960	AW1363	DESTINY FARMS RANCH 3	SANTA MARIA	266.67	266.67	ROW	Broccoli	Cauliflower	Celery	CHLORPYRIFOS	2
20004845	AW1363	Destiny Farms	Los Alamos	60	60	ROW	Broccoli	Pepper, Fruiting	Cauliflower	CHLORPYRIFOS	2
20004970	AW1363	DESTINY FARMS RANCH 5	SANTA MARIA	50	50	ROW	Broccoli			CHLORPYRIFOS	2
20004973	AW1363	DESTINY FARMS RANCH 6	SANTA MARIA	67	67	ROW	Broccoli			CHLORPYRIFOS	2
20004975	AW1363	DESTINY FARMS RANCH 7	LOS ALAMOS	385	385	ROW	Broccoli	Cauliflower	Cabbage	CHLORPYRIFOS	2
20004966	AW1363	DESTINY FARMS RANCH 4	SANTA MARIA	75	75	ROW	Broccoli			CHLORPYRIFOS	2
20004954	AW1363	DESTINY FARMS RANCH 2	SANTA MARIA	42.8	42.8	ROW	Broccoli			CHLORPYRIFOS	2
20004946	AW1373	1330 BUENA VISTA	GILROY	64		ROW	Pepper, Fruiting				2
20004953	AW1373	5 COHANSEY	GILROY	38		ROW	Pepper, Fruiting				2
20001451	AW1375	Home	Gilroy	5	0	ORCHARD	Walnut			DIAZINON	2
20003249	AW1377	Hann	Morgan Hill	15	0	ORCHARD					2
20003237	AW1377	Marfia	Morgan Hill	14	0	ORCHARD					2
20003244	AW1377	Fisher	Morgan Hill	9	0	ORCHARD					2
20004133	AW1389	Marti	Santa Maria	75	75	ROW	Strawberry	Broccoli	Spinach		2
20003331	AW1391	Nojoqui Creek Farms	Gaviota	78	0	ROW, ORCHARD	Pepper, Fruiting	Squash	Cabbage		2
20004965	AW1409	Rancho Guadalupe,LLC	Santa Maria	241	241	ROW, NURSERY	Broccoli	Lettuce, Head	Celery		2
20005094	AW1409	Rancho Guadalupe,LLC	Nipomo	99	99	ROW	Broccoli	Lettuce, Head	Celery		2
20005076	AW1409	Rancho Guadalupe,LLC	Santa Maria	185	185	ROW	Broccoli	Lettuce, Head	Celery		2
20005013	AW1409	Rancho Guadalupe,LLC	Santa Maria	206	206	ROW	Broccoli	Lettuce, Head	Celery		2
20005041	AW1409	Rancho Guadalupe,LLC	Santa Maria	251	251	ROW	Broccoli	Lettuce, Head	Celery		2
20005019	AW1409	Rancho Guadalupe,LLC	Santa Maria	74	74	ROW	Broccoli	Lettuce, Head	Celery		2
20005069	AW1409	Rancho Guadalupe,LLC	Santa Maria	208	208	ROW	Broccoli	Lettuce, Head	Celery		2
20005025	AW1409	Rancho Guadalupe,LLC	Santa Maria	138	138	ROW	Broccoli	Lettuce, Head	Celery		2
20005035	AW1409	Rancho Guadalupe,LLC	Santa Maria	94	94	ROW	Broccoli	Lettuce, Head	Celery		2
20005060	AW1409	Rancho Guadalupe,LLC	Santa Maria	201	201	ROW	Broccoli	Lettuce, Head	Celery		2
20001568	AW1415	Phelps and Huff	Carpinteria	70	0	ORCHARD	Avocado				2
20007708	AW1422	Shepard Inn Ranch	Carpinteria	18.5	18.5	ROW, ORCHARD	Avocado	Avocado			2
20007640	AW1423	Ranch 7 - Buckman	LOMPOC	68.3	68.3	ROW	Artichoke	Broccoli	Lettuce, Head		2
20007622	AW1423	Ranch 1	LOMPOC	388.93	436.49	ROW	Broccoli	Artichoke	Lettuce, Head		2
20007623	AW1423	Ranch 2	LOMPOC	279.06	487.17	ROW	Broccoli	Lettuce, Head	Brussel Sprout		2
20007638	AW1423	Ranch 6 - OCD	LOMPOC	87.45	87.45	ROW	Broccoli	Artichoke	Lettuce, Head		2
20007636	AW1423	Ranch 5 - Bondietti	LOMPOC	76.43	76.43	ROW	Broccoli	Lettuce, Head	Brussel Sprout		2
20007631	AW1423	Ranch 4 - Stella	LOMPOC	156.3	156.3	ROW	Broccoli	Artichoke	Lettuce, Head		2

20007626	AW1423	Ranch 3 - Puma	LOMPOC	108.06	108.06	ROW	Broccoli	Artichoke	Brussel Sprout		2
20007789	AW1424	Muzzi Ranch	Pescadero	140	40	ROW	Brussel Sprout	Leek			2
20004107	AW1425	Ano Nuevo Flower Growers Inc	pescadero	70	0	ROW	Pumpkin	Leek		CHLORPYRIFOS	2
20003381	AW1427	yaozhi huang nursery	gilroy	4	0	GREENHOUSE					2
20005100	AW1432	sunset	watsonville, ca	66	66	ROW	Strawberry				2
20005075	AW1433	Banovac	Watsonville	26	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004933	AW1433	Enemark	Moss Landing	49	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004985	AW1433	Travers Cassin	Aromas	104	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004976	AW1433	Murphy	Aromas	128	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005021	AW1433	Wait	Watsonville	51	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005095	AW1433	Kazuka	Watsonville	18	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005052	AW1433	Kelly Thompson	Watsonville	427	0	ROW	Lettuce, Head	Lettuce, Leaf	Strawberry	DIAZINON	2
20005111	AW1433	Overfelt	Hollister	470	0	ROW	Lettuce, Leaf	Spinach		DIAZINON	2
20005048	AW1433	Yamamoto	Watsonville	13	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004924	AW1433	Chamberlain	Moss Landing	68	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005031	AW1433	Redman	Watsonville	100	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005039	AW1433	Kuhlitz	Watsonville	100	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005065	AW1433	Crowley	Watsonville	45	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005135	AW1433	Gomes	Hollister	109	0	ROW	Lettuce, Leaf	Spinach		DIAZINON	2
20004967	AW1433	Balich	Watsonville	102	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005121	AW1433	Nutting	Hollister	120	0	ROW	Lettuce, Leaf			DIAZINON	2
20004943	AW1433	Struve ML	Moss Landing	56	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004938	AW1433	Fegnolio	Moss Landing	22	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005157	AW1433	Granite Rock	Hollister	12	0	ROW	Lettuce, Leaf	Spinach		DIAZINON	2
20005162	AW1433	Gumtree	Hollister	25	0	ROW	Tomato			DIAZINON	2
20004905	AW1433	Jensen	Moss Landing	50	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004949	AW1433	Giberson	Moss Landing	84	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005084	AW1433	Zupan	Watsonville	14	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005014	AW1433	Struve	Watsonville	149	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005127	AW1433	Armanino	San Juan Bautista	300	28	ROW	Lettuce, Leaf	Spinach		DIAZINON	2
20005002	AW1433	Ring	Watsonville	28	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004995	AW1433	Silliman	Watsonville	150	0	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20005218	AW1435	home ranch	santa cruz	191	5	ROW	Brussel Sprout	Leek	Pumpkin		2
20013095	AW1437	Bobeda Ranch	Watsonville	3	3	ROW	Blackberry				2
20012824	AW1437	Hirano Ranch	Watsonville	16	16	ROW	Strawberry				2
20003460	AW1445	Triangle E Farms	Maricopa	383	0	ROW	Onion, Dry	Oat			2
20001058	AW1446	California Tropics	Carpinteria	24	0	ORCHARD					2
20004771	AW1452	Main Street Ranch	Santa Maria	95	95	ROW	Strawberry				2
20005214	AW1452	Rio Mesa Berry Farms	Santa Maria	127	127	ROW	Broccoli				2
20000709	AW1454	valleyheart gardens	santa barbara	4	0	NURSERY				DIAZINON, CHLORPYRIFOS	2
20007170	AW1463	Lafond Vineyards	buellton CA 93427	75		VINEYARD					2
20005140	AW1465	West Coast Ranch	Watsonville	140	140	ROW	Strawberry				2
20005146	AW1465	Jensen Rd. Ranch	Watsonville,Ca.	139	139	ROW	Strawberry				2
20005167	AW1465	Panziera Ranch	Salinas	60	60	ROW	Strawberry				2
20005132	AW1465	Holly/Grass Ranch	Watsonville,Ca.	106	106	ROW	Strawberry				2
20005163	AW1465	Ferrasci Ranch	Salinas	165	165	ROW	Strawberry				2
20005155	AW1465	Beach Ranch	Watsonville	92	92	ROW	Strawberry				2
20001227	AW1467	KB Main	Watsonville	55	5	NURSERY, GREENHOUSE					2
20005845	AW1472	102 Lee Road	watsonville	20	12	ROW	Strawberry				2
20004074	AW1477	Sargent #2	Gilroy,CA	156.1	156.1	ROW	Lettuce, Leaf			DIAZINON	2
20004021	AW1477	Thompson	Watsonville, CA	50.5	50.5	ROW	Lettuce, Head			DIAZINON	2
20003835	AW1477	Molera #1 Ranch G	Castroville, CA	63.8	63.8	ROW	Lettuce, Head			DIAZINON	2
20003844	AW1477	Gordon	Watsonville, CA	44.5	44.5	ROW	Lettuce, Head			DIAZINON	2
20003932	AW1477	O'Connell	Watsonville, CA	121.5	121.5	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20003938	AW1477	Sheehy	Watsonville, CA	127.6	127.6	ROW	Lettuce, Head	Cabbage		DIAZINON	2
20003899	AW1477	Jensen	Watsonville, CA	22.5	22.5	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004078	AW1477	Sargent	Gilroy,CA	144	144	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20004079	AW1477	Sargent Add'l	Gilroy, CA	160.6	160.6	ROW	Lettuce, Head	Lettuce, Leaf	Parsley	DIAZINON	2
20003935	AW1477	Riverside	Watsonville, CA	66.4	66.4	ROW	Lettuce, Head	Lettuce, Leaf			2
20004018	AW1477	Stolich	Watsonville, CA	49.1	49.1	ROW	Lettuce, Head			DIAZINON	2
20004075	AW1477	Sargent #2 - Add'l	Gilroy, CA	141.8	141.8	ROW	Lettuce, Leaf			DIAZINON	2
20004076	AW1477	Sargent #2 Add'l	Gilroy,CA	82.7	82.7	ROW	Lettuce, Leaf				2
20004080	AW1477	Sargent Add'l	Gilroy, CA	170.6	170.6	ROW	Lettuce, Head	Lettuce, Leaf	Cabbage	DIAZINON	2

20004098	AW1477	San Juan	San Juan Bautista, CA	44	44	ROW	Lettuce, Leaf			DIAZINON	2
20003795	AW1477	Breen	Hollister /ca	279	279	ROW	Lettuce, Head	Celery	Lettuce, Leaf	DIAZINON	2
20003836	AW1477	Molera #2 Ranch F	Castroville, CA	129.7	129.7	ROW	Lettuce, Head				2
20003825	AW1477	DSA	Watsonville, CA	35.7	35.7	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	2
20003820	AW1477	Curtis	Watsonville, CA	66.5	66.5	ROW	Cabbage	Lettuce, Head		DIAZINON	2
20004050	AW1477	Prescott	San Juan Bautista, CA	61.3	61.3	ROW	Parsley	Lettuce, Leaf		DIAZINON	2
20003881	AW1477	Crossetti	Watsonville, CA	59.2	59.2	ROW	Lettuce, Head			DIAZINON	2
20004082	AW1477	Sargent Add'l	Gilroy,CA	17.4	17.4	ROW	Lettuce, Head			DIAZINON	2
20004496	AW1478	Ranch 17	Lompoc	95	95	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004459	AW1478	Ranch 10	Lompoc	94.5	94.5	ROW	Artichoke	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004457	AW1478	Ranch 9	Lompoc	51	51	ROW	Broccoli	Cauliflower	Celery	DIAZINON, CHLORPYRIFOS	2
20004426	AW1478	Ranch 4	Lompoc	72	72	ROW	Celery	Lettuce, Head	Broccoli	DIAZINON, CHLORPYRIFOS	2
20004499	AW1478	Ranch 18	Lompoc	37	37	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004480	AW1478	Ranch 14	Lompoc	57	57	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004623	AW1478	Ranch 25	Lompoc	38	38	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004487	AW1478	Ranch 15	Lompoc	105	105	ROW	Artichoke	Broccoli	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004475	AW1478	Ranch 13	Lompoc	26	26	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004620	AW1478	Ranch 24	Lompoc	37.1	37.1	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20004584	AW1478	Ranch 22	Lompoc	36	0	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20004542	AW1478	Ranch 21	Lompoc	64	64	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20004420	AW1478	Ranch 2	Lompoc	141	141	ROW	Broccoli	Cauliflower	Celery	DIAZINON, CHLORPYRIFOS	2
20004445	AW1478	Ranch 7	Lompoc	60	60	ROW	Cauliflower	Celery	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004619	AW1478	Ranch 23	Lompoc	113	113	ROW	Artichoke	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004439	AW1478	Ranch 5	Lompoc	75	75	ROW	Lettuce, Head	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20004443	AW1478	Ranch 6	Lompoc	140	140	ROW	Broccoli	Cauliflower	Celery	DIAZINON, CHLORPYRIFOS	2
20004464	AW1478	Ranch 11	Lompoc	33.5	33.5	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004465	AW1478	Ranch 12	Lompoc	47	47	ROW	Cauliflower	Celery	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004489	AW1478	Ranch 16	Lompoc	115	115	ROW, NURSERY	Lettuce, Head	Cauliflower	Celery	DIAZINON, CHLORPYRIFOS	2
20004519	AW1478	Ranch 20	Lompoc	33	33	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004422	AW1478	Ranch 3	Lompoc	103.5	103.5	ROW	Cauliflower	Celery	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004453	AW1478	Ranch 8	Lompoc	68.1	68.1	ROW	Celery	Lettuce, Head	Artichoke	DIAZINON, CHLORPYRIFOS	2
20004628	AW1478	Ranch 28	Lompoc	78	78	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20004419	AW1478	Ranch 1	Lompoc	109	109	ROW	Artichoke	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20002679	AW1484	Pura & Delminico Ranch 1	Greenfield	156	0	ROW	Lettuce, Head	Broccoli	Celery	DIAZINON, CHLORPYRIFOS	2
20002684	AW1484	Pura & Delminico Ranch 2	Greenfield	128	0	ROW	Lettuce, Head	Broccoli	Celery	DIAZINON, CHLORPYRIFOS	2
20005070	AW1485	MILTON	SOLEDAD	64	0	ROW	Broccoli	Lettuce, Leaf	Peas		2
20005093	AW1485	BINSACCA	SOLEDAD	63.5	0	ROW	Broccoli	Lettuce, Leaf	Peas		2
20004152	AW1486	ALISAL RANCH	SALINAS	98	2	ROW	Strawberry				2
20008237	AW1486	Ballin Ranch	Salinas	112	1	ROW	Strawberry				2
20004151	AW1486	SUGAR LOAF RANCH	SALINAS	168	2	ROW	Strawberry				2
20004411	AW1486	SUGARLOAF CANYON	SALINAS	70		ROW	Strawberry				2
20004147	AW1486	UCHADA HOME RANCH	SALINAS	240	0	ROW	Strawberry				2
20008574	AW1489	Cassin Ranch	Watsonville	85	85	ROW	Raspberry				2
20009002	AW1490	Dolan Ranch	Moss Landing	14		ROW	Strawberry	Tomato			2
20009222	AW1492	Gambetta Ranch	Salinas	127	127	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20004912	AW1492	Spence Ranch	Salinas	304.5	304.5	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004850	AW1492	Mortensen Ranch	Salinas	237.1	17.4	ROW	Lettuce, Leaf	Peas	Broccoli		2
20005049	AW1492	Pedrazzi Ranch	Salinas	275.9		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004986	AW1492	Martella Ranch	Salinas	93.2		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20005012	AW1492	Lanini Ranch	Salinas	78.4		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004968	AW1492	Silva Ranch	Salinas	110.7		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004931	AW1492	Chular Ranch	salinas	349.1		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20005030	AW1492	Alsop Ranch	Salinas	47.9		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20004833	AW1492	Abeloe Ranch	Salinas	125.6		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004829	AW1492	Davis Ranch	Salinas	271.4		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20004819	AW1492	Garlinger Ranch	Salinas	302.1	0	ROW	Lettuce, Leaf	Peas	Broccoli		2
20004824	AW1492	Watson Ranch	Salinas	211.6	211.6	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20003815	AW1494	Home	Salinas	76.6	0	ROW	Strawberry	Broccoli	Lettuce, Leaf		2
20003818	AW1494	Spreckels	Salinas	378.4	0	ROW	Strawberry	Lettuce, Leaf	Lettuce, Head		2
20003816	AW1494	Toro	Salinas	57	8	ROW	Broccoli	Strawberry	Lettuce, Head		2
20003810	AW1494	Jacks	Salinas	465.8	0	ROW	Lettuce, Head	Strawberry	Broccoli		2
20003957	AW1494	Selva	Gonzales	88.5	0	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf		2
20003958	AW1494	Hilltop Ferini	Salinas	3	0	ROW	Pumpkin	Corn, Human Con.			2

20003939	AW1494	Cooper	Salinas	197.9	194.3	ROW	Lettuce, Head	Lettuce, Leaf	Strawberry		2
20003916	AW1494	Airport	Salinas	390.6	75.9	ROW	Strawberry	Lettuce, Leaf	Lettuce, Head		2
20003960	AW1494	Nashua	Salinas	81.8	0	ROW	Lettuce, Head	Broccoli	Strawberry		2
20003867	AW1494	Omo	Gonzales	150.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20003934	AW1494	Storm	Salinas	123	31.2	ROW	Lettuce, Head	Lettuce, Leaf	Strawberry		2
20003927	AW1494	Norton	Salinas	373.1	46.8	ROW	Broccoli	Lettuce, Leaf	Cauliflower		2
20000625	AW1496	GALLAGHER	San Ardo	183.3	0	ROW	Cabbage	Spinach	Pepper, Fruiting		2
20000606	AW1496	SAN LUCAS VINEYARD	KING CITY	843.9	0	VINEYARD					2
20000612	AW1496	Foletta	KING CITY	73	0	ROW	Lettuce, Leaf	Spinach			2
20000613	AW1496	Ferrini	San Ardo	180.43	0	ROW	Lettuce, Leaf	Spinach	Onion, Dry		2
20000601	AW1496	SAN LUCAS ROW CROP	KING CITY	2103.2	0	ROW	Lettuce, Head	Spinach	Cabbage		2
20000619	AW1496	BRESCHINI	KING CITY	74.8	0	ROW	Spinach	Cabbage	Lettuce, Head		2
20000621	AW1496	CHERRY	San Ardo	165.7	0	ROW	Spinach				2
20000623	AW1496	GLAU	San Ardo	105.7	0	ROW	Lettuce, Leaf	Spinach	Other		2
20000624	AW1496	LOMBARDI	San Ardo	225.2	0	ROW	Spinach	Cabbage	Lettuce, Leaf		2
20000628	AW1496	TOGNETTI	SAN LUCAS	191.8	0	ROW	Broccoli	Cabbage	Spinach		2
20000615	AW1496	Culver/Rainbow	KING CITY	744	0	ROW	Lettuce, Leaf	Spinach	Cabbage		2
20000618	AW1496	DUDLEY-GRIMES	KING CITY	92	0	ROW	Spinach	Lettuce, Leaf			2
20000617	AW1496	Lynch	KING CITY	234.6	0	ROW	Spinach	Lettuce, Leaf	Pepper, Fruiting		2
20003896	AW1499	Sherwood Ranch	Salinas	38.7	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003917	AW1499	Mothershed Ranch	Salinas	140.5	70.1	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003780	AW1499	Chappel Ranch	Salinas	59.4	59.4	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003819	AW1499	Home Ranch	Salinas	25.7	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003812	AW1499	Koue Ranch	Salinas	93.5	93.5	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003778	AW1499	Hitchcock Ranch	Salinas	169.2	169.2	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20003793	AW1499	Reservation Ranch	Salinas	94.3	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003888	AW1499	Juhler Ranch	Saliinas	102.4	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003903	AW1499	Davis Ranch	Salinas	264	214.6	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20007608	AW1505	Arnaudo Ranch	Watsonville	3		ORCHARD	Apple			DIAZINON	2
20002786	AW1505	Hillview Farm	Watsonvilee	3	3	ROW, ORCHARD	Apple	Pear		DIAZINON	2
20001177	AW1508	Spring Valley Wholesale Nursery	La Selva Beach	5	5	NURSERY				CHLORPYRIFOS	2
20003876	AW1509	Mine Ranch	watsonville	79	0	ROW	Strawberry				2
20002791	AW1513	1A	Soquel	4	4	NURSERY					2
20002796	AW1513	2A	Soquel	3	3	NURSERY					2
20004870	AW1514	Kane Ranch	Watsonville	58	0	ROW	Strawberry				2
20004836	AW1514	Holohan Ranch	Watsonville	125	0	ROW	Blackberry	Raspberry			2
20004877	AW1514	Legend Ranch	Aromas	59	0	ROW	Raspberry				2
20004589	AW1516	Kono & Sons, Inc.	Carpinteria	16	0	ORCHARD, GREENHOUSE	Avocado	Other		DIAZINON, CHLORPYRIFOS	2
20001220	AW1518	Ranch 3	Santa Maria	122	72	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20001218	AW1518	Ranch 2	Santa Maria	75	75	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20001215	AW1518	Ranch 1	Santa Maria	95	95	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20007125	aw1521	Nishimura 2	Carpinteria	28		ORCHARD	Avocado				2
20010046	AW1523	Betteravia Properties (8,11,14,65)	Santa Maria	445	134	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010044	AW1523	LeRoy (10)	Santa Maria	336	101	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010962	AW1523	Ferrari Family Trust (58,74)	Santa Maria	159	48	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010047	AW1523	Betteravia Properties (21)	Santa Maria	139	42	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009974	AW1523	Grubstake (71,76)	Santa Maria	184	55	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009942	AW1523	Ferini Ranches (6,7)	Santa Maria	237	71	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009964	AW1523	Acquistapace (30)	Santa Maria	299	90	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004460	AW1523	Canada (44,45)	Santa Maria	192	58	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009922	AW1523	Pezzoni (4,5)	Santa Maria	171	51	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004574	AW1523	Tomooka (43,47,48,49)	Santa Maria	392	118	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009962	AW1523	Laine/Wortley (9)	Santa Maria	146	44	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009963	AW1523	Franklin (12,61)	Santa Maria	149	45	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009967	AW1523	Waller (20)	Santa Maria	121	36	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009969	AW1523	Moretti (15)	Santa Maria	431	129	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009966	AW1523	Ardantz (25,51)	Santa Maria	312	94	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009976	AW1523	Silva/Simas (72)	Santa Maria	104	31	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20009973	AW1523	Tognazzini (16,73)	Santa Maria	254	76	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010042	AW1523	LeRoy (56,67,60)	Guadalupe	454	136	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010048	AW1523	Betteravia Investments (17,46)	Santa Maria	156	47	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010043	AW1523	LeRoy (77)	Santa Maria	75	23	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20008547	AW1524	Mock, Marcella	Gilroy	215	0	ROW	Corn, Human Con.	Lettuce, Leaf	Tomato		2

20005261	AW1524	Nagareda	Gilroy	51	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20008482	AW1524	Mandellie, Gubser	Gilroy	82	0	ROW	Pepper, Fruiting	Corn, Human Con.	Tomato		2
20008551	AW1524	Las Animas, Yamanie	Gilroy	53	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20008539	AW1524	Dunlap	Gilroy	105	0	ROW	Corn, Human Con.	Lettuce, Leaf	Tomato		2
20005301	AW1524	Vineyard	Gilroy	293	20	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20005264	AW1524	Kishimura	Gilroy	155	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20005300	AW1524	Tripple F	Gilroy	160	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20008545	AW1524	Untite, Nakasima, Belleza	Gilroy	154	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20008540	AW1524	Keavney, Noll	Gilroy	350	0	ROW	Corn, Human Con.	Lettuce, Leaf	Pepper, Fruiting		2
20005260	AW1524	Crossroads	gilroy	70	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		2
20005700	AW1527	Swanton Berry Farms	Davenport	97	10	ROW	Broccoli	Strawberry	Blackberry		2
20005761	AW1528	Israel Zepeda Farms	Watsonville	28	0	ROW	Strawberry				2
20004351	AW1534	Buena Vista Ranch	Watsonville	162	0	ROW	Strawberry				2
20004339	AW1534	Springfield	Moss Landing	138	0	ROW	Strawberry				2
20004346	AW1534	Pasto Ranch	Watsonville	140	0	ROW	Strawberry				2
20004763	AW1536	Corralitos Ranch	Watsonville	24	0	ORCHARD	Apple				2
20009142	AW1541	Clark	Watsonville	12	0	ROW	Squash	Tomato	Bean, Unspecified		2
20003920	AW1543	Corralitos Ranch	watsonville	26	0	ROW	Strawberry				2
20000852	AW1545	Gold Rush Nursery	Soquel	0.25	0	NURSERY					2
20004934	AW1547	Varni Site 11A	Watsonville	18	0	ROW	Blackberry				2
20004956	AW1547	Murphy Hill Site 01	Aromas	87.57	0	ROW	Raspberry	Blackberry			2
20004926	AW1547	Radin Site 6A	Watsonville	18.66	0	ROW	Blackberry				2
20004897	AW1550	Borina Home Ranch	Watsonville	110.25	0	ROW	Strawberry	Lettuce, Head			2
20004901	AW1550	Grimmer Ranch	Watsonville	88	88	ROW	Strawberry	Lettuce, Leaf			2
20004854	AW1550	Dunbarton Ranch	Aromas	40	40	ROW	Strawberry				2
20004903	AW1550	North Wiley	Watsonville	25	25	ROW	Blackberry				2
20004890	AW1550	Corey Road Ranch	Aromas	8.5	8.5	ROW	Raspberry				2
20013002	AW1551	BUENA VISTA RANCH	WATSONVILLE, CA	22.85	0	NURSERY				CHLORPYRIFOS	2
20013022	AW1551	GIACOMAZZI RANCH	PRUNEDALE, CA	107	0	NURSERY				CHLORPYRIFOS	2
20003875	AW1551	RANCHO SAN JUAN	SALINAS	22	0	NURSERY				CHLORPYRIFOS	2
20003655	AW1551	DOLAN RANCH	MOSS LANDING	40	0	NURSERY				CHLORPYRIFOS	2
20003673	AW1551	LEWIS RANCH	PRUNEDALE	40.5		NURSERY				CHLORPYRIFOS	2
20003664	AW1551	GULLO RANCH	WATSONVILLE	40		NURSERY				CHLORPYRIFOS	2
20003677	AW1551	MANRESA RANCH	WATSONVILLE	23.7	0	NURSERY				CHLORPYRIFOS	2
20003910	AW1551	SUNRISE RANCH	MOSS LANDING	2.5	0	NURSERY				CHLORPYRIFOS	2
20003857	AW1551	PVWMA RANCH	WATSONVILLE	5	0	NURSERY				CHLORPYRIFOS	2
20003843	AW1551	MONTEREY BAY ACADEMY RANCH	WATSONVILLE	34.5	0	NURSERY				CHLORPYRIFOS	2
20003660	AW1551	GULARTE RANCH	SALINAS	110	0	NURSERY				CHLORPYRIFOS	2
20003626	AW1551	JETBERG	WATSONVILLE	128.4	0	NURSERY				CHLORPYRIFOS	2
20003817	AW1552	DeBernardi Bros.	Santa Maria	207	20	ROW	Broccoli	Lettuce, Head	Strawberry		2
20003463	AW1556	Rancho Santa Maria	Watsonville	165	0	ROW	Blackberry	Blueberry	Strawberry		2
20003351	AW1556	Cox	Watsonville	33.9	0	ROW	Strawberry			DIAZINON	2
20003352	AW1556	Curtis	Watsonville	40	0	ROW	Blackberry	Strawberry		DIAZINON	2
20003341	AW1556	Cassidy	Aromas	70.9	0	ROW	Strawberry	Raspberry			2
20003454	AW1556	Redman	Watsonville	20	0	ROW	Strawberry				2
20003475	AW1556	Sheehy	Watsonville	19.01	0	ROW	Strawberry			DIAZINON	2
20003462	AW1556	San Juan Oaks	San Juan Bautista	98.4	0	ROW	Blackberry	Raspberry	Blueberry		2
20003519	AW1556	Enemark	Watsonville	25	0	ROW	Strawberry			DIAZINON	2
20003357	AW1556	Gordon	Watsonville	17.4	0	ROW	Strawberry			DIAZINON	2
20003400	AW1556	Jensen	Watsonville	46.8	0	ROW	Strawberry			DIAZINON	2
20003401	AW1556	Colendich	Watsonville	46	0	ROW	Strawberry			DIAZINON	2
20003424	AW1556	Matthews	Aromas	17.8	0	ROW	Raspberry				2
20003364	AW1556	Hackman	Aromas	74.74	0	ROW	Raspberry	Strawberry			2
20003450	AW1556	Overfelt	San Juan Bautista	86	0	ROW	Blackberry	Raspberry			2
20003337	AW1556	Bird	Watsonville CA	37.3	0	ROW	Raspberry				2
20003426	AW1556	Matulich	Watsonville	92.1	0	ROW	Strawberry				2
20003393	AW1556	Harney	Watsonville	24	0	ROW	Strawberry			DIAZINON	2
20003395	AW1556	Hoyts	Watsonville	6	0	ROW	Raspberry				2
20000978	AW1560	Enos Ranch 4	Santa Maria	90	45	ROW	Broccoli	Spinach			2
20010428	AW1560	Billy Colli Ranch	Santa Maria	160	0	ROW	Broccoli				2
20010422	AW1560	Gold Coast Farms Ranch 1	Santa Maria	120	60	ROW	Broccoli	Spinach	Mustard		2
20010426	AW1560	Gold Coast Farms Ranch 5	Santa Maria	156	0	ROW, VINEYARD	Broccoli	Grapes, Wine			2
20007494	AW1561	reed ranch 9	greenfield	173	0	ROW	Celery	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2

20007496	AW1561	Gianolini ranch 12	greenfield	266	0	ROW	Carrot	Broccoli	Lettuce, Head		2
20007345	AW1561	bassetti ranch 3	greenfield	248	0	ROW	Carrot	Broccoli	Celery	DIAZINON, CHLORPYRIFOS	2
20007498	AW1561	bravo ranch 15	greenfield	97	0	ROW	Celery	Lettuce, Head	Broccoli	CHLORPYRIFOS	2
20007326	AW1561	hiserman ranch 1	greenfield	190	0	ROW	Lettuce, Head	Broccoli	Carrot	DIAZINON, CHLORPYRIFOS	2
20007348	AW1561	morinini ranch 6	greenfield	115	0	ROW	Carrot	Broccoli	Spinach	DIAZINON, CHLORPYRIFOS	2
20007351	AW1561	dolan ranch 7	greenfield	188	0	ROW	Lettuce, Head	Lettuce, Leaf	Celery	DIAZINON, CHLORPYRIFOS	2
20007344	AW1561	aurignac ranch 2	greenfield	98	0	ROW	Lettuce, Leaf	Broccoli	Spinach	DIAZINON, CHLORPYRIFOS	2
20007346	AW1561	orradre ranch 4	greenfield	441	0	ROW	Bean, Unspecified	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20007354	AW1561	bassetti ranch 8	greenfield	44	0	ROW	Celery	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003263	AW1568	RANCH 15	NIPOMO	75.9	98.8	ROW	Broccoli	Strawberry	Lettuce, Head		2
20002818	AW1571	HIBINO RANCH #11	Gonzales	85.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower	DIAZINON	2
20002804	AW1571	Foletta Ranch 4	GONZALES	73.7	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON	2
20002805	AW1571	Nunes Ranch #6	GONZALES	131.6	0	ROW	Lettuce, Leaf	Broccoli	Celery		2
20002802	AW1571	RANCH 2 (FRIEDRICH)	GONZALES	117.8	0	ROW	Broccoli	Lettuce, Leaf	Cauliflower		2
20002794	AW1571	JOHNSEN RANCH	KING CITY	100	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON	2
20002825	AW1571	IKEDA RANCH	GONZALES	97.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower	DIAZINON	2
20002824	AW1571	RIANDA RANCH	GONZALES	137.5	0	ROW	Carrot	Cauliflower	Broccoli	DIAZINON	2
20002823	AW1571	SOMMERS RANCH	GONZALES	109	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20009782	AW1571	REDDING RANCH	GREENFIELD	228.8		ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20002827	AW1571	CICARDINI RANCH	KING CITY	159.3	0	ROW	Lettuce, Leaf	Lettuce, Head	Cauliflower		2
20002797	AW1571	SOLARI RANCH	KING CITY	100	0	ROW	Broccoli	Celery	Onion, Green	DIAZINON	2
20002795	AW1571	FOLETTA RANCH	KING CITY	248	0	ROW	Cauliflower	Broccoli	Lettuce, Head	DIAZINON	2
20002817	AW1571	Doud Ranch #10	Gonzales	464.1	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON	2
20002831	AW1571	YUKI RANCH	GONZALES	133.2	0	ROW	Other			DIAZINON	2
20002803	AW1571	CORDA RANCH 3	GONZALES	89.2	0	ROW	Cauliflower	Lettuce, Head	Broccoli	DIAZINON	2
20002807	AW1571	LANINI RANCH #8	GONZALES	269.9	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON	2
20000700	AW1579	Paradise Christmas Tree Farm	Morgan Hill	4	0	ORCHARD	Other				2
20005306	AW1595	Abeloe	salinas	180	0	ROW	Strawberry				2
20005308	AW1595	Settrini Ranch	salinas	180	180	ROW	Strawberry				2
20005307	AW1595	Marci Ranch	salinas	70	70	ROW	Strawberry				2
20005305	AW1595	Sala Ranch	salinas	200	200	ROW	Strawberry				2
20005304	AW1595	Blanco Ranch	salinas	180	0	ROW	Strawberry				2
20012103	AW1596	Blanco	Salinas	34.2	0	ROW	Strawberry				2
20003648	AW1596	Loveland	Aromas	95	106	ROW	Raspberry	Strawberry	Blackberry		2
20003656	AW1596	Ryan Ranch	Salinas	69.7	69.7	ROW	Strawberry				2
20003658	AW1596	Schultz Ranch	Salinas	91.6	183.2	ROW	Strawberry				2
20008062	AW1602	Faurot ranch LLC	Watsonville	80		ROW	Lettuce, Leaf	Carrot	Radish		2
20003911	AW1604	Alamo Farming / Ranch #5	Santa Maria	52	52	ROW	Broccoli	Cauliflower	Bean, Dried		2
20003889	AW1604	Alamo Farming / Ranch #1	Santa Maria	150	150	ROW	Celery	Cauliflower	Broccoli		2
20003906	AW1604	Alamo Farming / Ranch #4	Santa Maria	54	54	ROW	Broccoli	Cauliflower	Bean, Dried		2
20003918	AW1604	Alamo Farming / Ranch #7	Santa Maria	151	151	ROW	Broccoli	Cauliflower	Bean, Dried		2
20003925	AW1604	Alamo Farming / Ranch #9	Santa Maria	90	90	ROW	Strawberry	Broccoli	Cauliflower		2
20004210	AW1613	SPRING FIELD RANCH	MOSS LANDING	16		ROW	Strawberry				2
20004207	AW1613	GALVAN RANCH	MOSS LANDING	51	0	ROW	Strawberry				2
20004212	AW1613	MANRESA RANCH	SANTA CRUZ	100	2	ROW	Strawberry				2
20004214	AW1614	AZEVEDO RANCH	WATSONVILLE	26	0	ROW	Strawberry				2
20003645	AW1617	Spreckles	Salinas	40	0	ROW	Strawberry			DIAZINON	2
20002625	AW1620	Sinton Ranch	Santa Maria	170	170	ROW	Broccoli	Celery			2
20002642	AW1620	SBR Ranch	Santa Maria	50	50	ROW	Broccoli				2
20002641	AW1620	SISQUOC RANCH	GAREY	250	250	ROW	Broccoli	Celery			2
20008543	AW1622	Boronda	Salinas	74		ROW	Cauliflower	Lettuce, Leaf	Celery		2
20003130	AW1627	Tarp and Neubert Ranch - West	Salinas	61.1	0	ROW	Blueberry	Broccoli	Strawberry		2
20003128	AW1627	Madalora	Salinas	104	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20003129	AW1627	Tarp and Neubert Ranch - East	Salinas	62.2	0	ROW	Strawberry	Broccoli			2
20003122	AW1627	Tamagni Ranch	Salinas	151	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20003126	AW1627	Machado	Salinas	88	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20003127	AW1627	Teraji Ranch	Salinas	37	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20001095	AW1628	Fabretti & Dedini	Greenfield	300	0	ROW	Broccoli	Celery	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20000771	AW1629	Nevins Ranch 6	Greenfield	175	0	ROW	Lettuce, Leaf	Broccoli	Celery		2
20000766	AW1629	Norman Ranch 4	Greenfield	180	0	ROW	Lettuce, Leaf	Spinach	Celery	DIAZINON	2
20000762	AW1629	Eldon Pura Ranch 3	Greenfield	175.6	0	ROW	Lettuce, Leaf	Spinach	Celery	DIAZINON	2
20000758	AW1629	Pura Home Ranch 1	Greenfield	218.5	0	ROW	Celery	Lettuce, Leaf	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20000767	AW1629	Pura Ranch 5	Greenfield	107	0	ROW	Lettuce, Leaf	Spinach	Bean, Dried	DIAZINON, CHLORPYRIFOS	2

20004159	AW1631	Mission	Soledad	285	30	ROW	Lettuce, Head	Lettuce, Leaf	Celery		2
20004157	AW1631	Torroni	Soledad	65	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20004153	AW1631	Jacks	Soledad	120	20	ROW	Bean, Dried	Lettuce, Head	Lettuce, Leaf		2
20000855	AW1633	Home Ranch	Salinas	195	195	ROW	Lettuce, Leaf	Broccoli	Lettuce, Head		2
20007539	AW1634	Allen Gill	King City	314	314	ROW	Lettuce, Head	Broccoli	Spinach		2
20007535	AW1634	Wimer Ranch	Chualar	125	0	ROW	Lettuce, Leaf	Lettuce, Head	Broccoli		2
20007533	AW1634	Bardin Ranch	Salinas	128	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20007534	AW1634	Moore Ranch	Gonzales	263	0	ROW	Spinach	Broccoli	Cauliflower		2
20007536	AW1634	Shrine Ranch	Chualar	375	0	ROW	Cauliflower	Lettuce, Head	Spinach		2
20007538	AW1634	Salanco Ranch	King City	204	204	ROW	Broccoli	Lettuce, Leaf	Spinach		2
20007540	AW1634	Herbert Ranch	King City	301	150	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20004377	AW1637	Broome 3	Chualar	180.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004375	AW1637	Broome 2	Chualar	341.7	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004370	AW1637	Violini Ranch	Salinas	47.1	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004366	AW1637	Home Ranch	Salinas	191.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20008404	AW1641	Rossi-T&A Wing	Chualar	420.8	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004578	AW1641	T&A-Bardin	Salinas	232.2	187.4	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004612	AW1641	T&A-Daugherty	Salinas	92.8	92.8	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004616	AW1641	T&A-Dave McFadden	Salinas	279.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004630	AW1641	T&A-Porter Top	Salinas	74.6	67.5	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004633	AW1641	T&A-Stirling	Salinas	39.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004636	AW1641	Rossi-Hunter	Salinas	75.4	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004641	AW1641	Sullivan-Bardin	Salinas	142	124.4	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004660	AW1641	Natividad Nursery	Salinas	2	0	NURSERY					2
20004639	AW1641	Rossi-Storm	Salinas	115.5	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004640	AW1641	Sullivan-Admiral	Salinas	77.5	77.5	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004657	AW1641	Sullivan(Jerry Ramirez)-Wynne	Salinas	50.7	50.7	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004629	AW1641	T&A-Porter Bottom	Salinas	67.1	0	ROW	Lettuce, Leaf	Broccoli	Cauliflower	CHLORPYRIFOS	2
20004654	AW1641	Sullivan-Pomeroy	Salinas	73	56.3	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004617	AW1641	T&A-Foster	Salinas	96.1	96.1	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004610	AW1641	T&A-Black	Salinas	98.3	98.3	ROW	Lettuce, Head	Strawberry	Broccoli	CHLORPYRIFOS	2
20004627	AW1641	T&A-Nissen	Salinas	124.3	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004635	AW1641	Rossi-Harris	Salinas	160.8	59.1	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004624	AW1641	T&A-Knight	Salinas	171.6	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20008408	AW1641	T&A/WellPict-Fuji-Molera	Salinas	51.8	12.4	ROW	Strawberry				2
20008403	AW1641	Sullivan(Jerry Ramirez)-Simon	Salinas	59.5	57	ROW	Lettuce, Head	Lettuce, Leaf			2
20008405	AW1641	Rossi-Massa Wing	Chualar	280.9	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	2
20004084	AW1642	Callahan	Gonzales	250	0	ROW	Broccoli	Bean, Dried	Lettuce, Leaf		2
20004359	AW1645	Gularte	Salinas	295.3	43.3	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20004362	AW1645	Cummings Ranch	Salinas	379.6	130.4	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20008528	AW1645	West Davis	Salinas	102.4	102.4	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20010242	AW1645	Rancho Guadalupe #10	Santa Maria	122	0	ROW	Strawberry				2
20008323	AW1645	Admiral Ranch	Salinas	73	0	ROW	Strawberry				2
20008307	AW1645	Duncan	Salinas	228	127.1	ROW	Lettuce, Head	Strawberry			2
20004355	AW1645	Davis Ranch	Salinas	411.2	330.1	ROW	Strawberry	Lettuce, Head	Lettuce, Leaf		2
20002600	AW1647	Fujii2-10	Watsonville	96.6	96.6	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002605	AW1647	Molera2	Salinas	150.7	150.7	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002604	AW1647	Molera1	Salinas	264.3	264.3	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002572	AW1651	Tognetti	King City	79	0	ROW	Celery	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20002562	AW1651	D. Petit	King City	209	0	ROW	Lettuce, Leaf	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20002565	AW1651	Crinklaw	King City	227.9	0	ROW	Celery	Lettuce, Leaf	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20002554	AW1651	Bacciarini Home	King City	106.6	0	ROW	Lettuce, Head	Broccoli	Celery	DIAZINON, CHLORPYRIFOS	2
20002560	AW1651	Bacciarini East	King City	113.4	0	ROW	Lettuce, Head	Broccoli	Spinach	DIAZINON, CHLORPYRIFOS	2
20002564	AW1651	J. Petit	King City	374.2	0	ROW	Celery	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20002568	AW1651	Lesnini	King City	124	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	2
20002571	AW1651	Martella	King City	175.1	0	ROW	Celery	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20002573	AW1651	Layous	King City	248.6	0	ROW	Lettuce, Leaf	Broccoli	Celery	DIAZINON, CHLORPYRIFOS	2
20002575	AW1651	Wilson West	King City	163.9	0	ROW	Lettuce, Leaf	Spinach	Kale	DIAZINON, CHLORPYRIFOS	2
20007818	Aw1653	Twissleman Ranch	San lucas	171.6	0	ROW	Lettuce, Head	Carrot	Cucumber		2
20004847	AW1654	Blanco Ranch	Salinas	97	65	ROW	Celery	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20005842	AW1657	Righello Ranch	Castroville	15	0	ROW	Strawberry			DIAZINON	2
20007526	AW1660	Sargenti/Ryan	Chualar	60	0	ROW, VINEYARD	Lettuce, Leaf	Broccoli	Grapes, Wine		2
20007527	AW1660	SILACCI	GONZALES	42	0	ROW	Lettuce, Leaf	Broccoli			2

20007288	AW1660	Tanimura Ranch	King City	120	0	ROW	Lettuce, Leaf	Broccoli	Celery	DIAZINON	2
20003200	AW1664	Silveria Home Ranch	Soledad	106	0	ROW	Broccoli	Lettuce, Leaf			2
20004029	AW1665	F1	watsonville	33	0	ROW	Other	Other	Other		2
20005561	AW1669	Home Ranch	Soledad	4	0	ROW	Broccoli	Lettuce, Leaf	Cauliflower	CHLORPYRIFOS	2
20004796	AW1670	Ashcraft Ranch	Watsonville	87	0	ROW	Strawberry				2
20004793	AW1672	Alexander / Borchard	Salinas	65	0	ROW	Strawberry				2
20004256	AW1679	ALTMAN PLANTS #3	SALINAS CA	10	10	GREENHOUSE					2
20003532	AW1680	Johnson Ranch	Soledad	130	0	ROW	Carrot	Broccoli	Lettuce, Head		2
20003537	AW1680	Morgantini Ranch	Soledad	320	0	ROW	Lettuce, Head	Cabbage	Carrot		2
20003530	AW1680	Los Coches	Soledad	172	0	ROW	Cabbage	Carrot	Broccoli		2
20003534	AW1680	Zabala Ranch	Soledad	363	120	ROW	Cabbage	Broccoli	Lettuce, Head		2
20003526	AW1680	Home Ranch	Soledad	220	60	ROW	Lettuce, Head	Broccoli	Cabbage		2
20003533	AW1680	Albertoni Ranch	Soledad	195	75	ROW	Broccoli	Cabbage	Lettuce, Head		2
20001403	AW1681	R34 / Pueblo	Greenfield	82.78	0	ROW	Lettuce, Head	Broccoli			2
20001392	AW1681	R22 / Baja Viento	Greenfield	166.03	0	ROW, VINEYARD	Broccoli	Onion, Dry	Pepper, Fruiting	CHLORPYRIFOS	2
20001395	AW1681	R31 / Central	Greenfield	232.69	0	VINEYARD				CHLORPYRIFOS	2
20001354	AW1681	R1 / Riverview	soledad	194.37	0	VINEYARD				CHLORPYRIFOS	2
20007794	AW1681	R33/Elm	Greenfield	53.11	0	VINEYARD				CHLORPYRIFOS	2
20001384	AW1681	R50 / san Lucas	san Lucas	831.72	0	VINEYARD				CHLORPYRIFOS	2
20001387	AW1681	R21 / Viento	Greenfield	208.14	0	VINEYARD				CHLORPYRIFOS	2
20001410	AW1681	H1 H2 H3 / Hames Valley	Bradley	942.2	942.2	VINEYARD				CHLORPYRIFOS	2
20001377	AW1681	R10 / Scheid	Greenfield	339.04	0	VINEYARD				CHLORPYRIFOS	2
20001398	AW1681	R32 / Hacienda	Greenfield	117.68	0	VINEYARD				CHLORPYRIFOS	2
20001405	AW1681	R35 / El Camino	Greenfield	44.65	0	ROW, VINEYARD	Broccoli	Onion, Green		CHLORPYRIFOS	2
20011442	AW1683	FREW RANCH	KING CITY	170.4	0	ROW	Broccoli	Peas	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20009522	AW1683	HOMEN RANCH	KING CITY	345.2	0	ROW	Lettuce, Leaf	Peas	Broccoli	DIAZINON, CHLORPYRIFOS	2
20001372	AW1683	Tunnel Ranch	Greenfield	219.6	0	ROW	Broccoli	Peas	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20001375	AW1683	Alves Ranch	Soledad	85	0	ROW	Onion, Dry	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20001390	AW1683	Oshita Ranch	Soledad	307.9	0	ROW	Peas	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20009502	AW1683	TUNNEL RANCH ORGANIC	GREENFIELD	37.9	0	ROW	Broccoli	Peas			2
20001382	AW1683	McCoy Ranch	Soledad	59.5	0	ROW	Broccoli	Tomato	Carrot	DIAZINON, CHLORPYRIFOS	2
20001399	AW1683	Piearcy Ranch Organic	Chualar	54.5	0	ROW	Broccoli	Peas			2
20001409	AW1683	Short Ranch	Chualar	143.5	113.5	ROW	Lettuce, Leaf	Broccoli	Peas	DIAZINON, CHLORPYRIFOS	2
20004432	AW1684	Color Spot Yard 1	Salinas	61	52	NURSERY, GREENHOUSE					2
20001463	AW1685	CENTRAL COAST GREENHOUSE	SALINAS	4	0	GREENHOUSE					2
20004235	AW1686	Eagle Organics / Hollenstien Ranch	Salinas	140	140	ROW	Strawberry				2
20009242	AW1688	CAPPURRO RANCH	MOSS LANDING	70	0	ROW	Strawberry				2
20007244	AW1689	Martin Brothers Ranch	Royal Oaks	23	10	ROW	Strawberry				2
20004477	AW1691	Live Oak Bazzi Family Ranch	Buellton	50		ROW	Squash	Pepper, Fruiting	Cucumber		2
20009722	AW1692	Alvarado Ranch	Aromas	14	14	ROW	Other			DIAZINON	2
20005760	AW1696	Rodgers Ranch	moss landing	114	0	ROW	Strawberry				2
20005762	AW1696	Minhoto Ranch	moss landing	126	0	ROW	Strawberry				2
20004189	AW1700	Herschbach	Soledad, CA	125	125	ROW	Carrot	Broccoli	Lettuce, Leaf	CHLORPYRIFOS	2
20004185	AW1700	Alarid Home Ranch	Soledad	193	193	ROW, VINEYARD, ORCHARD	Lettuce, Head	Broccoli	Lettuce, Leaf	CHLORPYRIFOS	2
20004180	AW1700	Bassetti Ranch	Salinas, CA	47	40	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	CHLORPYRIFOS	2
20004705	AW1703	RDC	Salinas	80	80	ROW, ORCHARD	Broccoli	Strawberry	Tomato		2
20004706	AW1703	Triple M	Las Lomas	24	24	ROW	Strawberry	Squash, Summer	Broccoli		2
20008662	AW1708	ALEX CAMANY FARMS/HARNEY RANCH	SALINAS	132	0	ROW	Lettuce, Head	Celery	Broccoli	CHLORPYRIFOS	2
20004178	AW1709	Breschini	Salinas	179.23	30	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004198	AW1709	Frassetto	Salinas	35.8	0	ROW	Lettuce, Head	Cauliflower	Broccoli		2
20008332	AW1709	Salmina	Salinas	132.2		ROW	Lettuce, Head	Cauliflower	Broccoli		2
20004192	AW1709	Hurley	Salinas	75	0	ROW	Artichoke				2
20004197	AW1709	Borges	Salinas	65.5	46.8	ROW	Lettuce, Head	Strawberry	Cauliflower		2
20004205	AW1709	King	Castroville	245.2	245.2	ROW	Artichoke				2
20004206	AW1709	Martin	Castroville	71.3	21	ROW	Artichoke	Cauliflower	Lettuce, Head		2
20004211	AW1709	Armstrong	Castroville	138.1	74	ROW	Artichoke	Strawberry			2
20004169	AW1709	Spreckles	Salinas	387.2	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004201	AW1709	Antique	Castroville	79.53	0	ROW	Artichoke	Lettuce, Head	Cauliflower		2
20004202	AW1709	Vessey	Castroville	194.1	194.1	ROW	Artichoke	Lettuce, Head	Cauliflower		2
20004208	AW1709	Ocean	Castroville	185	80	ROW	Artichoke	Lettuce, Head	Cauliflower		2
20004172	AW1709	Salinas	Salinas	104.8	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004183	AW1709	Blanco	Salinas	50	47.6	ROW	Lettuce, Head	Cauliflower	Broccoli		2
20004186	AW1709	Luis	Salinas	81	81	ROW	Lettuce, Head	Cauliflower	Broccoli		2

20004795	AW1711	D'Arrigo Ranch #22	Salinas	120	0	ROW	Strawberry			2
20004288	AW1714	Nixon/Wilson	Salinas	257	173	ROW	Broccoli	Lettuce, Head	Chicory	2
20004266	AW1714	A.W. Johnson & Son Farming	Salinas	176	104	ROW	Broccoli	Lettuce, Head	Chicory	2
20004291	AW1714	A.W. Johnson & Son Farming	Salinas	144	120	ROW	Broccoli	Lettuce, Head	Chicory	2
20010162	AW1717	Byington Estate Vineyard	Los Gatos	8	0	ROW, VINEYARD	Grapes, Wine			2
20005130	AW1722	Sanders Ranch	Santa Maria	9.5	0	ROW	Other			2
20005115	AW1723	Home Ranch	Lompoc	100	70	ROW, ORCHARD	Bean, Dried	Broccoli	Walnut	2
20005137	AW1723	Harris	Lompoc	75	60	ROW	Broccoli	Bean, Unspecified	Lettuce, Head	2
20005131	AW1723	McHenry	Lompoc	110	90	ROW, VINEYARD, ORCHARD	Bean, Dried	Broccoli	Walnut	2
20011789	AW1726	BRAGA Moranda Ranch	Soledad	72.8	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011784	AW1726	BRAGA Gularte Ranch	Soledad	320	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011782	AW1726	Bassetti Ranch	Soledad	99.6	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head	2
20011790	AW1726	BRAGA Ryan Ranch	Chualar	71.1	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20004272	AW1726	Dole	Soledad	293	0	ROW	Lettuce, Leaf	Cauliflower	Broccoli	2
20011783	AW1726	BRAGA Eade Ranch	San Ardo	417	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011785	AW1726	BRAGA Home Ranch	Soledad	243	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head	2
20011787	AW1726	BRAGA Latassa Ranch	Soledad	357.6	236	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011791	AW1726	BRAGA Sargenti Ranch	Chualar	246.6	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011786	AW1726	BRAGA Kelly Ranch	Greenfield	282	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20011788	AW1726	BRAGA Martin Ranch	Greenfield	220	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	2
20004385	AW1733	Miller Merritt Trust Santa Rosa Road	Buellton	42	0	ROW	Tomato			2
20001204	AW1735	06 Goodchild	Sisquoc	72		VINEYARD	Grapes, Wine	Other	DIAZINON, CHLORPYRIFOS	2
20001199	AW1735	05 San Felicia/Ron's	Los Alamos	25		VINEYARD	Grapes, Wine		DIAZINON, CHLORPYRIFOS	2
20001197	AW1735	04 Don Miguel	Los Alamos	66		VINEYARD	Grapes, Wine		DIAZINON, CHLORPYRIFOS	2
20007230	AW1741	Castile, Richard S	Carpinteria	18	18	ORCHARD	Avocado			2
20000434	AW1741	Richard S Castile	Carpinteria	18	18	ORCHARD	Avocado			2
20000772	AW1743	Ranch 3	Lompoc	39		ROW	Bean, Unspecified			2
20003990	AW1747	Giudici Ranch	San Lucas	173	173	ROW	Lettuce, Leaf	Carrot	Spinach	2
20003987	AW1747	Home Ranch	Greenfield	218	0	ROW	Lettuce, Leaf	Spinach	Broccoli	2
20003988	AW1747	Zilioli	San Lucas	64	0	ROW	Carrot	Bean, Dried	Broccoli	2
20008552	AW1748	Butler Short Ranch	Soledad	136	0	ROW	Carrot	Broccoli	Lettuce, Head	2
20004293	AW1748	Freyer Ranch	Soledad	152.75	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS 2
20004296	AW1748	Firestone Ranch	Salinas	119.1	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS 2
20004298	AW1748	Ferrini Ranch	Salinas	122.1	0	ROW, VINEYARD	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS 2
20004303	AW1748	Felipe	Salinas	52	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS 2
20008549	AW1748	Manzoni Ranch	Soledad	143	0	ROW, VINEYARD	Carrot	Broccoli	Lettuce, Head	2
20000763	AW1751	FREW RANCH	Greenfield	158	0	ROW	Broccoli	Lettuce, Leaf	Bean, Dried	DIAZINON, CHLORPYRIFOS 2
20000781	AW1751	HOME RANCH	Greenfield	102	0	ROW	Peas	Broccoli	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS 2
20000784	AW1751	Salinas Land Company II	King City	260	226	ROW	Broccoli	Spinach	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS 2
20000769	AW1751	KENNER RANCH	Greenfield	310	0	ROW	Lettuce, Leaf	Onion, Dry	Broccoli	DIAZINON, CHLORPYRIFOS 2
20000778	AW1751	PURA RANCH 8	Greenfield	46	0	ROW	Carrot	Broccoli	Bean, Dried	DIAZINON, CHLORPYRIFOS 2
20000783	AW1751	GREENFIELD RANCH	Greenfield	108.5	0	ROW	Lettuce, Leaf	Carrot	Broccoli	DIAZINON, CHLORPYRIFOS 2
20007181	AW1754	spence ranch	salinas	235.8		ROW	Lettuce, Head	Cauliflower		2
20003831	AW1755	Clausen Ranch	San Ardo	117	0	ROW	Bean, Dried	Carrot	Onion, Dry	2
20007215	AW1756	Heess Ranch	Salinas	200	150	ROW	Lettuce, Head	Broccoli	Peas	2
20004136	AW1757	Martin Ranch	Castroville	68.5	0	ROW	Brussel Sprout	Artichoke		DIAZINON, CHLORPYRIFOS 2
20004130	AW1757	Lyons Ranch	Castroville	171	0	ROW	Brussel Sprout	Artichoke		DIAZINON, CHLORPYRIFOS 2
20004124	AW1757	Condor Ranch	Castroville	247.3	247.3	ROW	Brussel Sprout	Artichoke		DIAZINON, CHLORPYRIFOS 2
20000957	AW1758	Home Ranch	Nipomo	190		ORCHARD	Lemon	Avocado		2
20000956	AW1758	Wiliams	Nipomo	65		ORCHARD	Lemon			2
20000949	AW1758	Stinehart Ranch	Goleta	45		ORCHARD	Lemon	Avocado		2
20003644	AW1761	Blanco Ranch	Salinas	92.9	92.9	ROW	Lettuce, Head	Cauliflower	Lettuce, Leaf	2
20003646	AW1761	Boccardo Ranch	Castroville	134	0	ROW	Lettuce, Leaf	Spinach	Artichoke	2
20002894	AW1761	Morisoli Ranch	Gonzales	128.4	0	ROW	Lettuce, Head	Spinach	Cauliflower	2
20002966	AW1761	Petersen Ranch	Salinas	377.4	74.5	ROW	Lettuce, Head	Spinach	Cauliflower	2
20002975	AW1761	North Martin Ranch	Salinas	76.5	0	ROW	Artichoke			2
20002973	AW1761	Old Stage Ranch	Chualar	91	40	ROW	Lettuce, Head	Broccoli	Spinach	2
20002963	AW1761	Jack Chin	SAlinas	70.1	0	ROW	Lettuce, Head	Broccoli	Celery	2
20002892	AW1761	Martin Ranch	Salinas	411.7	0	ROW	Lettuce, Head	Artichoke	Spinach	2
20003654	AW1761	Boronda Ranch	Salinas	205.7	0	ROW	Artichoke	Lettuce, Leaf	Spinach	2
20003640	AW1761	Backus Ranch	Salinas	82.8	0	ROW	Lettuce, Leaf	Spinach	Cauliflower	2
20003661	AW1761	Hunter Lane Ranch	Salinas	325.8	0	ROW	Lettuce, Head	Artichoke	Cauliflower	2
20003691	AW1761	Jacop Ranch	Salinas	81.6	0	ROW	Lettuce, Head	Cauliflower	Artichoke	2

20003700	AW1761	Midway Ranch	Salinas	142	80	ROW	Lettuce, Head	Cauliflower	Artichoke		2
20003705	AW1761	Molera Ranch	Castroville	412.2	412	ROW	Lettuce, Head	Artichoke	Spinach		2
20003652	AW1761	Boggiatto Ranch	Castroville	221.1	87	ROW	Lettuce, Leaf	Cauliflower	Artichoke		2
20003712	AW1761	Twin Bridges Ranch	Castroville	76.1	52	ROW	Lettuce, Head	Artichoke	Cauliflower		2
20003637	AW1761	Agostini Ranch	Salinas	95.6	0	ROW	Lettuce, Head	Lettuce, Leaf	Spinach		2
20003694	AW1761	Lauritson Ranch	Salinas	173.5	40	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		2
20003709	AW1761	Pieri Ranch	Castroville	103.5	0	ROW	Lettuce, Leaf	Cauliflower	Spinach		2
20004005	AW1764	JACKS AND HANSEN RANCH	SALINAS	225	225	ROW	Strawberry				2
20004086	AW1765	Ranch 15	Guadalupe	200	200	ROW	Broccoli	Lettuce, Head	Celery		2
20004083	AW1765	Ranch 11	Guadalupe	121	121	ROW	Broccoli	Celery			2
20004101	AW1765	Ranch 14	Santa Maria	87	87	ROW	Cauliflower	Broccoli	Lettuce, Head		2
20004099	AW1765	Ranch 8	santa maria	80	80	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20004085	AW1765	Ranch 5	Guadalupe	260	260	ROW	Broccoli	Cauliflower	Celery		2
20004094	AW1765	Ranch 7	Santa Maria	66	66	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20004093	AW1765	Ranch 2	Santa Maria	87	87	ROW, NURSERY	Broccoli	Lettuce, Head	Cauliflower		2
20004097	AW1765	Ranch 9	Santa Maria	80	80	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004088	AW1765	Ranch 1	Santa Maria	82.5	82.5	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20004089	AW1765	Ranch 3	Santa Maria	147	147	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20003580	AW1767	Crosetti Ranch	Watsonville	59	118	ROW	Strawberry				2
20003699	AW1770	Home	Salinas	415.1	0	ROW	Lettuce, Head	Cauliflower	Broccoli	DIAZINON, CHLORPYRIFOS	2
20003706	AW1770	Secondo Ranch 2	Salinas	160.7	0	ROW	Lettuce, Head	Cauliflower	Broccoli	DIAZINON, CHLORPYRIFOS	2
20007293	AW1771	6425 Casitas Pass Road	Carpinteria	38	0	ORCHARD	Avocado				2
20003049	AW1774	USDA Agricultural Research Service	Salinas	144	0	ROW	Strawberry	Lettuce, Leaf	Broccoli		2
20007832	AW1776	Durley, Mclanahan, Ainscough Lease	Santa Maria	127.83	127.83	ROW	Lettuce, Leaf	Carrot	Cabbage		2
20005047	AW1776	Ranch #2	Santa Maria,	186.28	186.28	ROW	Lettuce, Leaf				2
20005160	AW1776	Ranch #5	Santa Maria	92.93	0	ROW	Lettuce, Leaf				2
20005138	AW1776	Preisker Estate	Santa Maria	403.91	403.91	ROW	Lettuce, Leaf	Carrot	Cabbage		2
20005200	AW1776	Ranch #64	Los Alamos	61	61	ROW	Lettuce, Leaf				2
20005187	AW1776	Ranch #6	Santa Maria	57	57	ROW	Lettuce, Leaf	Squash			2
20001070	AW1777	Voelker Ranch	Greenfield	232	0	ROW, NURSERY	Broccoli	Onion, Dry			2
20001074	AW1777	Mathias Ranch	Solodad	190	0	ROW, NURSERY	Broccoli	Carrot	Tomato		2
20000967	AW1780	SPIEGL HIGASHI	SALINAS	126.7	126.7	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20006220	AW1780	WEAVER	CASTROVILLE	222.7	222.7	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf		2
20000972	AW1780	BROOME HIGASHI	CHUALAR	141.7	0	ROW	Lettuce, Head	Onion, Green	Lettuce, Leaf		2
20000974	AW1780	BLANCO HIGASHI	SALINAS	135.6	135.6	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20000975	AW1780	NASHUA HIGASHI	SALINAS	64.5	64.5	ROW	Strawberry	Onion, Green	Lettuce, Head		2
20000977	AW1780	SILACCI HIGASHI	SALINAS	89.2	89.2	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20000548	AW1780	Daley Higashi Ranch WIDA 3 27A002509	Chualar	123	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20013322	AW1780	Conley	Castroville	149.67	149.67	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20011142	AW1780	BAILEY	CASTROVILLE	138	138	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20000973	AW1780	HOME CARR LAKE	SALINAS	162.3	162.3	ROW	Broccoli	Celery	Onion, Green		2
20007356	AW1781	PEREZ FARMS	WATSONVILLE	17		ROW	Blueberry	Raspberry	Strawberry		2
20007376	AW1788	Triple A Avocados	Carpinteria	7	0	ORCHARD	Avocado				2
20000518	AW1793	Meyers	King City	420.3	0	ROW	Cauliflower	Cabbage	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20000523	AW1793	Turri	King City	174.1	0	ROW	Lettuce, Leaf	Lettuce, Head	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20000522	AW1793	Pozzi North	King City	140.4	0	ROW	Cauliflower	Carrot	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20000521	AW1793	Pozzi South	King City	167.2	0	ROW	Cabbage	Cauliflower	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20000520	AW1793	Lombardi	King City	164.8	0	ROW	Cauliflower	Cabbage	Onion, Dry	DIAZINON, CHLORPYRIFOS	2
20000519	AW1793	Johnson	King City	456.3	0	ROW	Cabbage	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20000528	AW1793	Reynolds	King City	498	0	ROW	Lettuce, Leaf	Onion, Dry	Pepper, Fruiting	DIAZINON, CHLORPYRIFOS	2
20000526	AW1793	Lower (West) Doud	King City	452.5	0	ROW	Celery	Spinach	Broccoli	DIAZINON, CHLORPYRIFOS	2
20000515	AW1793	DaRosa	King City	377.3	0	ROW	Cauliflower	Cabbage	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20000524	AW1793	Gill	King City	159	0	ROW	Cabbage	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20001046	AW1796	Soberanes	Soledad	39.17		VINEYARD					2
20001043	AW1796	Gary's Vineyard	Soledad	51.7		VINEYARD					2
20001017	AW1796	Rosella's Vineyard (previously knows as Gonzales Hill Ranch)	Soledad	77.4	0	VINEYARD, ORCHARD	Grapes, Wine	Lemon			2
20008762	AW1804	Porto-LCS	Gonzales	226.45	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20000883	AW1804	Blair-Sciaroni	Soledad	139.7	0	ROW	Lettuce, Head	Broccoli	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20013342	AW1804	Vaughn Ranch	Salinas	100.2	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004184	AW1804	Sciaroni	Soledad	139.7	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004193	AW1804	McDougall Ranch	Salinas	73	11.5	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004188	AW1804	Morisoli and Salmina Ranches	Soledad	299	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004190	AW1804	Doud Ranch	Soledad	326	54	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2

20004182	AW1804	Home and Sargenti Ranches	Gonzales	342	45	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004175	AW1804	Blair and Handley Ranches	Soledad	477	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20008243	AW1805	COOPER	SALINAS	81.7	81.7	ROW	Strawberry				2
20008227	AW1805	VIERRA	SALINAS	61.1	61.1	ROW	Strawberry				2
20008224	AW1805	FISCALLINI	SALINAS	158.7	158.7	ROW	Strawberry	Lettuce, Head	Broccoli		2
20008238	AW1805	MERRILL MOLERA	CASTOVILLE	117	117	ROW	Strawberry				2
20008242	AW1805	BAILLIE	CASTROVILLE	63.3	63.3	ROW	Strawberry				2
20008223	AW1805	NISSEN	SALINAS	84	84	ROW	Strawberry				2
20008234	AW1805	SCHOOL HOUSE	SALINAS	55	55	ROW	Strawberry				2
20008225	AW1805	SIMON	SALINAS	59.5	59.5	ROW	Strawberry				2
20008235	AW1805	BALESTRA	SALINAS	68	68	ROW	Strawberry	Cauliflower			2
20008241	AW1805	SALINAS HILLTOP	PAJARO	54	54	ROW	Strawberry				2
20008229	AW1805	BORONDA	SALINAS	71.3	71.3	ROW	Strawberry				2
20001166	AW1807	Abrams Ranch	Salinas	223.1	50.2	ROW	Broccoli	Cabbage	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001162	AW1807	Brun Ranch	Salinas	142.8	0	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001154	AW1807	Hunter Lane	Salinas	109.2	0	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001183	AW1807	Jensen Ranch	Salinas	438	438	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004057	AW1810	Silva Home Ranch	Salinas	58.8	0	ROW	Celery	Broccoli	Lettuce, Leaf		2
20004067	AW1810	Zabala Ranch	Salinas	86.83	44.33	ROW	Celery	Broccoli	Lettuce, Leaf		2
20007333	AW1814	Ranch 2	Santa Cruz	104	104	ROW	Brussel Sprout			CHLORPYRIFOS	2
20007312	AW1814	Ranch 6	Moss Landing	243	160	ROW	Lettuce, Head	Brussel Sprout	Strawberry		2
20007311	AW1814	Ranch 1	Moss Landing	130	40	ROW	Brussel Sprout	Lettuce, Head	Strawberry	DIAZINON	2
20007317	AW1814	Lyons Ranch	Castroville	91	91	ROW	Broccoli	Brussel Sprout	Strawberry	CHLORPYRIFOS	2
20007314	AW1814	Springfield Home Ranch	Moss Landing	112.4	112.4	ROW	Lettuce, Head	Brussel Sprout	Spinach	DIAZINON	2
20007325	AW1814	Ranch 3	Moss Landing	137	137	ROW	Lettuce, Head	Brussel Sprout	Strawberry		2
20007323	AW1814	Ranch 1 Dominic's	Moss Landing	35	35	ROW	Brussel Sprout	Lettuce, Head	Strawberry	DIAZINON	2
20007328	AW1814	Dolan Road	Moss Landing	215	100	ROW	Brussel Sprout	Strawberry			2
20007334	AW1814	Ranch 8	Santa Cruz	71	71	ROW	Artichoke	Brussel Sprout		CHLORPYRIFOS	2
20007313	AW1814	Ranch 5	Moss Landing	210.5	105	ROW	Lettuce, Head	Brussel Sprout	Strawberry	DIAZINON	2
20007322	AW1814	Miranda	Moss Landing	32	32	ROW	Lettuce, Head	Spinach	Brussel Sprout	DIAZINON	2
20007327	AW1814	Moresco	Moss Landing	60	60	ROW	Lettuce, Head	Brussel Sprout	Strawberry		2
20005722	AW1815	Scattini Ranch	Greenfield	90	0	ROW	Broccoli	Cabbage	Lettuce, Head		2
20003546	AW1817	Park	Salinas	28	28	ROW	Artichoke				2
20003496	AW1817	Alisal	Salinas	101.7	0	ROW	Celery	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003540	AW1817	Whitman	San Ardo	400	106	ROW	Carrot	Onion, Dry	Bean, Dried	DIAZINON, CHLORPYRIFOS	2
20003487	AW1817	Jimmy Lyons	Salinas	175	90.5	ROW	Cauliflower	Broccoli	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003498	AW1817	Armstrong	Salinas	49.8	49.8	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20008572	AW1817	Hurley	Castroville	80	80	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20003548	AW1817	Ricca	Salinas	53	53	ROW	Lettuce, Leaf	Cauliflower	Broccoli	DIAZINON, CHLORPYRIFOS	2
20013182	AW1817	Alexander/Borchard	Salinas	100	37.2	ROW	Other	Lettuce, Head	Broccoli		2
20003524	AW1817	Marvin	Salinas	72	72	ROW	Artichoke				2
20003502	AW1817	Home	Salinas	216.9	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003500	AW1817	Brandt	San Ardo	161	161	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20003518	AW1817	Conlan	Salinas	185	185	ROW	Artichoke	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20007464	AW1819	Hayes	Watsonville	100	15	ROW	Lettuce, Leaf	Mustard			2
20007451	AW1819	Bloomfield	Gilroy	271.6	50	ROW	Endive	Chinese Cabbage	Lettuce, Head	DIAZINON	2
20007446	AW1819	Merrill	King City	436.8	65	ROW	Broccoli	Celery	Lettuce, Head	DIAZINON	2
20007453	AW1819	Young	Gilroy	266.1	50	ROW	Spinach	Lettuce, Head	Mustard	DIAZINON	2
20007439	AW1819	Clement	King City	269.7	15	ROW	Chinese Cabbage	Endive	Broccoli	DIAZINON	2
20007436	AW1819	Home	Gonzales	360.1	16	ROW	Spinach	Broccoli	Cauliflower		2
20007443	AW1819	Coastal	King City	494.3	15	ROW	Celery	Lettuce, Head	Spinach	DIAZINON	2
20011484	AW1819	Las Colinas Ranch 3	San Lucas	219.03	1	ROW	Celery	Lettuce, Leaf	Mustard		2
20011922	AW1819	Santa Ana	Hollister	159.76	0.5	ROW	Broccoli	Cauliflower	Lettuce, Leaf		2
20011483	AW1819	Las Colinas Ranch 2	San Lucas	417.79	1	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20011485	AW1819	Las Colinas Ranch 4	San Lucas	300.79	1	ROW	Carrot	Lettuce, Head	Lettuce, Leaf		2
20011942	AW1819	Lightning Tree	Hollister	369.33	1.5	ROW	Lettuce, Leaf	Mustard	Spinach		2
20011482	AW1819	Las Colinas Ranch 1	San Lucas	464.02	1.5	ROW	Lettuce, Leaf	Mustard	Spinach		2
20007444	AW1819	Meyer	King City	66	2	ROW	Lettuce, Leaf	Spinach	Mustard		2
20007459	AW1819	Brown	Watsonville	63.6	2	ROW	Broccoli	Spinach	Lettuce, Leaf	DIAZINON	2
20007564	AW1820	Silva Farms Ranch 8	King City	290	0	ROW	Lettuce, Head	Broccoli	Spinach		2
20007563	AW1820	Home Ranch	Gonzales	90	90	VINEYARD, ORCHARD					2
20010582	AW1821	Balich	Watsonville	62	0	ROW	Strawberry	Strawberry			2
20001613	AW1823	Garlinger Ranch 171	Salinas	163.6	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2

20001619	AW1823	Corey Ranch Los Viboras	Salinas	190.5	52.8	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20001612	AW1823	Chualar Ranch	Salinas	208.1	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20001610	AW1823	Home Ranch GFLP	Salinas	138.3	138.3	ROW	Broccoli	Lettuce, Head			2
20001617	AW1823	Fennel Ranch	Salinas	68.6	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20001615	AW1823	McPherson Ranch	Salinas	273.4	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20013048	AW1823	Mortensen Ranch South	Salinas	309.4	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20013091	AW1823	San Bernardo Ranch South	San Ardo	442.9	0	ROW	Lettuce, Leaf	Lettuce, Head	Spinach		2
20008556	AW1823	Cummings Ranch	Salinas	94.7	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20008555	AW1823	Corey Ranch Marihart	Salinas	2	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20008553	AW1823	Garlinger Ranch Front	Salinas	440.4	15.3	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20008559	AW1823	Home Ranch Christensen	Salinas	103	103	ROW	Broccoli	Lettuce, Head			2
20008558	AW1823	Spence Ranch Azevedo	Salinas	101.6	65.2	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20008557	AW1823	Spence Ranch Migotti	Salinas	94.2	47.1	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20008554	AW1823	Corey Ranch Midnight Sun	Salinas	365.2	30.2	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20004952	AW1827	Borba Farms	Aromas	20	0	ROW	Tomato	Pepper, Fruiting	Squash, Summer		2
20003478	AW1835	306 CARLTON	WATSONVILLE	18	18	ROW, ORCHARD	Blackberry	Lemon		DIAZINON	2
20003503	AW1835	371 CARLTON ROAD	WATSONVILLE	3	3	ROW	Blackberry			DIAZINON	2
20004604	AW1848	Evening Star Orchard	Goleta	8		ORCHARD	Avocado	Orange			2
20005442	AW1850	Cooper/Wineman	Santa Maria	58		ROW	Strawberry				2
20004874	AW1854	RANCH 2	LOMPOC	234	0	ROW	Broccoli	Bean, Dried	Lettuce, Head		2
20003773	AW1865	Soap Lake Ranch	Hollister	372		ROW	Lettuce, Leaf	Spinach			2
20007460	AW1869	Rincon Creek Farm	Carpinteria	1.5	0	ORCHARD	Avocado				2
20011585	AW1877	Sella - Dubach	Castroville	88.6	44.2	ROW	Lettuce, Head	Lettuce, Leaf	Spinach		2
20011582	AW1877	Molera - Preston	Castroville	202.7	202.7	ROW	Artichoke	Broccoli	Lettuce, Head		2
20002109	AW1877	Beach	Watsonville	259.8	259.8	ROW	Artichoke	Celery			2
20002102	AW1877	Bertelli	Castroville	170.2	170.2	ROW	Lettuce, Head	Lettuce, Leaf	Spinach		2
20002105	AW1877	Haymore	Salinas	168	168	ROW	Artichoke	Lettuce, Leaf	Broccoli		2
20011587	AW1877	Blackie	Castroville	229.2	57.3	ROW	Artichoke	Brussel Sprout	Broccoli		2
20011563	AW1877	Tottino	Salinas	97.8	97.8	ROW	Artichoke	Broccoli	Lettuce, Head		2
20011571	AW1877	San Jon - Martins	Salinas	123.3	41.1	ROW	Artichoke	Broccoli			2
20011568	AW1877	San Jon - Scilacci	Salinas	105.7	21.1	ROW	Artichoke	Broccoli	Lettuce, Leaf		2
20011566	AW1877	Espinosa	Salinas	124.9	45.6	ROW	Artichoke	Lettuce, Head	Broccoli		2
20011565	AW1877	Gularte	Salinas	317.8	97.2	ROW	Artichoke	Broccoli			2
20011562	AW1877	Nielsen - North	Castroville	192.4	146.7	ROW	Artichoke	Broccoli	Lettuce, Head		2
20011575	AW1877	M. Hill - S. Bellone	Castroville	235	117.5	ROW	Artichoke				2
20000842	AW1878	Viva Farms, Nipomo	Nipomo	4	4	NURSERY, GREENHOUSE				DIAZINON, CHLORPYRIFOS	2
20008564	AW1891	Cassidy Ranch	Aromas	67	67	ROW	Broccoli	Cauliflower	Lettuce, Leaf		2
20004495	AW1891	Delfino	Watsonville	73	73	ROW	Broccoli	Cauliflower	Lettuce, Leaf		2
20004485	AW1891	Cosmes Ranch	Watsonville	4	4	ROW	Squash, Summer	Celery	Leek		2
20004601	AW1891	Ring Ranch	Watsonville	29	29	ROW	Broccoli	Cauliflower	Cabbage		2
20004646	AW1891	St. Francis Ranch	Watsonville	9	9	ROW	Carrot	Radish	Spinach		2
20004649	AW1891	Seascape Ranch	La Selva Beach	63	63	ROW	Broccoli	Cauliflower	Lettuce, Leaf		2
20004562	AW1891	Matulich Ranch	Watsonville	170	170	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004568	AW1891	Murphy Ranch	Watsonville	66	66	ROW	Broccoli	Cauliflower	Spinach		2
20004609	AW1891	Santa Maria Ranch	Watsonville	73	73	ROW	Lettuce, Leaf	Kale	Endive		2
20004521	AW1891	Lewis Ranch	Pajaro	27	27	ROW	Collard	Chinese Cabbage	Celery		2
20004518	AW1891	Lakeview Ranch	Watsonville	54	54	ROW	Beet	Lettuce, Head	Parsley		2
20004592	AW1891	Redman Ranch	Watsonville	41	41	ROW	Bean, Unspecified	Kale	Leek		2
20004514	AW1891	Kuso Ranch	Watsonville	16	16	ROW	Carrot	Radish	Parsley		2
20004517	AW1891	Lake Ranch	Watsonville	100	100	ROW	Peas	Squash, Summer	Lettuce, Leaf		2
20005781	AW1893	2	Las Lomas	1	0	ROW	Other				2
20007810	AW1894	H & K Berry Farm	Watsonvile	66	66	ROW	Strawberry				2
20004292	AW1900	J. H. Farms	New Cuyama, CA 93254	150	0	ROW	Other	Chinese Cabbage	Radish	DIAZINON	2
20001515	AW1901	Rainbow Bridge Ranch	Carpinteria	6	0	NURSERY					2
20004812	AW1902	Teixeira Ranch 15	Nipomo	404	404	ROW	Strawberry			CHLORPYRIFOS	2
20004814	AW1902	Teixeira Ranch 17	Guadalupe	202	202	ROW	Strawberry	Broccoli	Lettuce, Head	CHLORPYRIFOS	2
20004820	AW1902	Skillicorn Ranch	Watsonville	60	60	ROW	Strawberry			CHLORPYRIFOS	2
20001416	AW1919	Suey Ranch	Santa Maria	230	230	ROW	Endive				2
20002815	AW1927	Bruzzone Family Vineyards	Scotts Valley	7	0	VINEYARD	Grapes, Wine				2
20004394	AW1936	Hudson Ranch	Watsonville	39	39	ROW	Other				2
20004393	AW1936	Wesco Ranch	Watsonville	61	61	ROW	Strawberry				2
20004391	AW1936	Skillicorn 1-5	Watsonville	91	91	ROW	Other	Strawberry			2
20004390	AW1936	Wiley Ranch	Watsonville	41	41	ROW	Strawberry				2

Enrollment information in the Water Board's GeoTracker data management system as of Aug. 1, 2012.

20004401	AW1936	Cassin Ranch	Watsonville	71	71	ROW	Broccoli				2
20007871	AW1941	YI RANCH	NEW CUYAMA	497	0	ROW	Carrot	Onion, Dry	Potato		2
20004228	AW1942	CAMPINOTTI	Pescadero	189		ROW	Brussel Sprout	Leek	Other		2
20002596	AW1944	Dorcich Farms	Gilroy	45	0	VINEYARD					2
20002322	AW1946	Bay Laurel Nursery	Scotts Valley	3		NURSERY					2
20007454	AW1948	Fuji Lane Ranch	Salinas	16.29	0	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	2
20007455	AW1948	Promesa Ranch	Nipomo	12.93	0	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	2
20007452	AW1948	Pajaro Valley Ranch	Watsonville	18.92	0	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	2
20007450	AW1948	Encinal 2	Salinas	10.66	0	NURSERY, GREENHOUSE	Broccoli	Tomato			2
20007441	AW1948	Espinosa Ranch	Salinas	30.35	30.35	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	2
20007458	AW1948	Thompson Ranch	Nipomo	3.5	0	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	2
20004791	AW1960	Brown Ranch	Aromas	96	0	ROW	Blackberry	Raspberry			2
20004760	AW1961	Chismahoo Piece	Ventura	10	10	ORCHARD					2
20004758	AW1961	Stanley Park	Ventura	7	7	ORCHARD					2
20004754	AW1961	Greentree Farm	Carpinteria	14	14	ORCHARD				CHLORPYRIFOS	2
20004764	AW1961	C&S 6 acres	Carpinteria	6	6	ORCHARD					2
20004756	AW1961	Folk's Piece	Carpinteria	5	5	ORCHARD					2
20003841	AW1969	Angelo P. Granaroli, Inc.	Carpinteria	21		ORCHARD					2
20000681	AW1976	Moran Nursery	Watsonville	2.5	2.5	NURSERY					2
20007184	AW1984	Bottiani	Goleta	55	0	ORCHARD	Lemon	Avocado		CHLORPYRIFOS	2
20007296	AW1990	The Stepladder Ranch	Cambria	45	0	ORCHARD	Avocado				2
20001618	AW1993	Nipomo	Nipomo	53	0	GREENHOUSE					2
20004483	AW2008	BARNARD RANCH	VE NTURA	13	0	ORCHARD	Avocado				2
20004548	AW2015	Uvas Creek Vineyards	Morgan Hill	8.5		VINEYARD					2
20004233	AW2020	Bardin	Salinas	118.8	0	ROW	Strawberry				2
20000464	AW2033	salvatore schettino	carpinteria	4.95		ORCHARD					2
20004792	AW2043	D'Arrigo Ranch #1	Spreckles	85	0	ROW	Strawberry				2
20007389	aw2046	denice farms [ben,s]	hollister	45	45	ORCHARD				DIAZINON	2
20007378	aw2046	abk	gilroy	90	90	ORCHARD				DIAZINON	2
20007387	aw2046	denice home ranch [al's]	hollister	28	28	ORCHARD				DIAZINON	2
20001540	AW3001	Kirkpatrick Orchard	Watsonville	54	54	ORCHARD	Apple			DIAZINON, CHLORPYRIFOS	2
20001541	AW3001	Amesti Orchard	Watsonville	157	0	ORCHARD				DIAZINON, CHLORPYRIFOS	2
20003794	AW3003	Ranch 3	Soledad	280		ROW	Broccoli	Lettuce, Leaf	Carrot	CHLORPYRIFOS	2
20003788	AW3003	Ranch 1	Greenfield	234		ROW	Broccoli	Lettuce, Leaf	Carrot		2
20008245	AW3008	Alfredo Pedroza	Gilroy	5	0	ROW	Cucumber				2
20000711	AW3016	Yamanishi Ranch	San Juan Bautista	37	0	ROW	Pepper, Fruiting	Lettuce, Head			2
20003971	AW3019	SANS RANCH	WATSONVILLE	2	0	ORCHARD	Apple				2
20003968	AW3019	HOME RANCH	WATSONVILLE	40	0	ORCHARD	Apple				2
20003963	AW3019	BURLAND RANCH	WATSONVILLE	14	0	ORCHARD	Apple				2
20002906	AW3020	Telephone Ranch	Santa Maria	80	1	ROW	Strawberry				2
20002867	AW3027	Amaral Ranches	San Lucas	200	200	ROW	Cabbage	Lettuce, Head	Broccoli		2
20006400	AW3029	Whiteside	Watsonville	40	40	ORCHARD				DIAZINON	2
20001971	AW3031	Guadalupe Ranch	Chualar CA	440	440	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20001933	AW3037	Zivanovich Ranch	watsonville	30.97	30.97	ORCHARD	Apple			DIAZINON	2
20001544	AW3053	RANCHO TARPEY	WATSONVILLE	7	7	ROW	Strawberry	Raspberry	Blackberry		2
20012922	AW3053	RANCHO SAN JUAN	AROMAS	6	6	ROW	Artichoke	Broccoli	Cauliflower		2
20007171	AW3057	Church Avocados	Carpinteria	0.5	0	ROW, ORCHARD	Avocado				2
20004474	AW3067	Soquel Nursery Growers, Inc.	Soquel	9	0	NURSERY, GREENHOUSE					2
20002227	AW3093	no ranch or farm name	Carpinteria	6	0	ORCHARD					2
20002941	AW3094	San Felipe Ranch	Gilroy	95		ORCHARD					2
20007665	AW3113	Jimenez Nursery	Carpinteria	12		NURSERY					2
20004800	AW3118	R.G. Thomsen Jr.	Soquel	2	0	NURSERY					2
20007893	AW3121	Sunbelt Ranch	San Juan Bautista	8	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON	2
20010082	AW3137	josef Meyr	Ventura , County	5	5	ORCHARD	Avocado	Citrus			2
20007639	AW3146	Garden Haven Nursery	Soquel	10	10	NURSERY, GREENHOUSE					2
20000931	AW3148	California Pajarosa	Watsonville	17	0	ROW, GREENHOUSE	Other			DIAZINON	2
20001562	AW3150	Home Ranch	Watsonville	20	0	ORCHARD					2
20001455	AW3155	Delk Ranch	Carpinteria	18	0	ORCHARD					2
20001720	AW3171	Lionello Orchids, Inc.	Carpinteria	2		GREENHOUSE				DIAZINON	2
20000871	AW3188	La Casita Ranch	Carpinteria, CA 93013	3.6	0	ORCHARD	Avocado				2
20007394	AW3190	Norman's Nursery Inc	Carpinteria	9	1	NURSERY					2
20003564	AW3197	Teixeira Ranch 2	Nipomo, CA	168	15	ROW	Strawberry	Lettuce, Head	Broccoli		2
20008163	AW3197	Teixeira Ranch 16	Guadalupe, CA	79.5	79.5	ROW	Strawberry				2

20003567	AW3197	Teixeira Ranch 7	Guadalupe	214	214	ROW	Lettuce, Head	Broccoli	Strawberry		2
20003569	AW3197	Teixeira Ranch 19	Guadalupe, CA	220	220	ROW	Strawberry	Lettuce, Head	Broccoli		2
20003571	AW3197	Teixeira Ranch 5	Guadalupe, CA	89	89	ROW	Broccoli	Lettuce, Head	Strawberry		2
20008842	AW3207	Evans Orchard	Hollister	4.5	0	ORCHARD				CHLORPYRIFOS	2
20007512	AW3210	Tony Daoiran	san luis obispo	13	0	ROW	Tomato	Carrot	Beet		2
20007366	AW3214	Robert M Swanson	Hollister	110	0	ROW, ORCHARD	Onion, Dry	Pumpkin	Squash		2
20004749	AW3217	Apricot Ranch	Gilroy	8	0	ORCHARD					2
20004913	AW3228	Garner Ranch	Soledad	5	0	ROW	Broccoli	Bean, Dried	Lettuce, Head		2
20012142	AW3232	Avila Valley Barn	San Luis Obispo	80		ROW, ORCHARD	Blackberry				2
20000563	AW3239	Sycamore Creek Vineyards & Winery	Morgan Hill	2.5	9	VINEYARD	Grapes, Wine				2
20004461	AW3254	Leonardini - River Ranch	Castroville	59	59	ROW	Strawberry				2
20000992	AW3259	Robert & Alice Swaim	Nipomo, CA 93444	9	0	ORCHARD				CHLORPYRIFOS	2
20009842	AW3264	Winchester Canyon Farms	Goleta	80		ROW	Beet	Tomato	Peas		2
20005118	AW3270	Ranch 4	Santa Maria	140	140	ROW	Lettuce, Head	Broccoli			2
20005336	AW3271	Vanoli Ranch	Greenfield	160	0	ROW	Lettuce, Leaf	Broccoli	Cauliflower		2
20005337	AW3271	Redding	Greenfield	229	0	ROW	Lettuce, Head	Carrot	Cauliflower		2
20005330	AW3271	Tavernetti Ranch	Gonzales	186	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20005325	AW3271	Turri	Chualar	432	0	ROW	Lettuce, Head	Broccoli	Carrot		2
20005333	AW3271	Pueblo Ranch	Greenfield	66	0	ROW	Cauliflower	Broccoli	Lettuce, Leaf		2
20005332	AW3271	Central Ranch	Greenfield	62	0	ROW	Carrot	Lettuce, Leaf	Broccoli		2
20005341	AW3271	Blomquist Ranch	Gonzales	198	0	ROW	Lettuce, Head	Cauliflower	Carrot		2
20005327	AW3271	Barrett	Gonzales	114	0	ROW	Lettuce, Leaf	Broccoli	Cauliflower		2
20005322	AW3271	Home Ranch 100	Gonzales	57	0	ROW	Lettuce, Head	Broccoli	Carrot		2
20005324	AW3271	Hartnell	Salinas	112	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20005329	AW3271	Sharpe	Gonzales	158	0	ROW	Broccoli	Carrot	Lettuce, Leaf		2
20005540	AW3272	A ST/RANCHO GUADALUPE	SANTA MARIA	126	126	ROW	Strawberry				2
20004827	AW3275	Ranch 1	SLO county	133	0	ROW, VINEYARD	Broccoli	Cauliflower			2
20005054	AW3275	Ranch 16	Nipomo	86	0	ROW	Celery	Broccoli	Lettuce, Head		2
20004955	AW3275	Ranch 10	Santa Maria	106	0	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20004864	AW3275	Ranch 2	Santa Maria	201	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20005016	AW3275	Ranch 14	Guadalupe	190	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20004895	AW3275	Ranch 4	Orcutt	138	0	ROW	Broccoli				2
20004898	AW3275	Ranch 5	Garry	327	0	ROW	Broccoli	Lettuce, Head	Celery		2
20004921	AW3275	Ranch 8	Santa Maria	137	0	ROW	Broccoli	Strawberry			2
20004947	AW3275	Ranch 9	Santa Maria	261	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20005040	AW3275	Ranch 15	Santa Maria	120	0	ROW	Strawberry	Cauliflower	Broccoli		2
20004907	AW3275	Ranch 6	Santa Maria	81	0	ROW	Broccoli	Strawberry	Cauliflower		2
20004977	AW3275	Ranch 12	Santa Maria	58	0	ROW	Cauliflower	Broccoli	Strawberry		2
20004876	AW3275	Ranch 3	Santa Maria	56	0	ROW	Celery	Lettuce, Head	Broccoli		2
20010282	AW3289	La Panza ranch	Creston	80	35	ROW, VINEYARD	Pepper, Fruiting				2
20005024	AW3301	Catlin Ranch	Carpinteria	24	24	ORCHARD	Avocado				2
20006300	AW3309	Catarino Chavez	santa maria	9	0	ROW	Strawberry	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001513	AW3313	Santa Cruz Olive Tree Nursery, Inc.	Watsonville	4	1.83	VINEYARD, NURSERY, ORCHARD	Olive				2
20003799	AW3318	18 acres RANCHO SAN JUAN -CORNER LUCY BROWN/SAN JUSTO	san juan bautista	18	0	ORCHARD	Apple				2
20003108	AW3335	McLellan Botanicals	Aromas CA 95004	155	123	ROW, NURSERY, ORCHARD, GREENHOUSE	Strawberry				2
20004676	AW3338	Ranch 1	Santa Maria	71	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004679	AW3338	Ranch 2	Santa Maria	268	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004692	AW3338	Ranch 3M	Santa Maria	69	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004699	AW3338	Ranch 4N	Santa Maria	76	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004697	AW3338	Ranch 4S	Santa Maria	123	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004412	AW3338	Ranch 5	Santa Maria	70	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004414	AW3338	Ranch 6S	Guadalupe	99	0	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004703	AW3342	Rodgers Ranch	Salinas	105	105	ROW	Strawberry				2
20004704	AW3342	Hambey Ranch	Salinas	70	70	ROW	Strawberry				2
20004698	AW3342	Strobel Ranch	Salinas	235	235	ROW	Strawberry				2
20003419	AW3400	Heess Ranch	Salinas	200	150	ROW	Lettuce, Leaf	Broccoli	Peas		2
20004686	AW3403	Ranch 4	Orcutt	102.78	102.78	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20004685	AW3403	BP Ranch 2 & 5	Orcutt	317.45	317.45	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20005940	AW3408	Bob Kuang Nursery	San Martin	3	0	GREENHOUSE					2
20004688	AW3414	Ranch 3	Guadalupe	90.98	90.98	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20012542	AW3414	Ranch 7	Santa Maria	131.2	131.2	ROW	Broccoli				2
20004522	AW3415	South Wiley Ranch	Watsonville	27.5	27.5	ROW	Strawberry	Lettuce, Head			2
20004129	AW3427	Ed Clark	Carpinteria	7	0	ORCHARD					2

20004267	AW3428	Bengard Gambetta #2 Ranch	Salinas	43	43	ROW	Strawberry				2
20004482	AW3432	Zabala Ranch	Salinas	7	0	ROW	Blackberry				2
20004486	AW3432	Bungard Ranch	Salinas	37.5	0	ROW	Raspberry				2
20004470	AW3432	Lauritzen Ranch	salinas	55.4	0	ROW	Strawberry				2
20005208	AW3434	gary's farm	gilroy	4	0	GREENHOUSE					2
20004893	AW3441	Higaki Ranch	Watsonville	50	0	ROW	Strawberry				2
20004904	AW3441	Pedrazzi	Salinas	54	0	ROW	Strawberry				2
20003369	AW3443	HOLLISTER WALNUT RANCH SITE 2A	HOLLISTER	37.25	0	ROW	Tomato				2
20006480	AW3447	La Encantada	Lompoc	100	0	VINEYARD					2
20006080	AW3449	Lakeside Nursery	Salinas	10	10	NURSERY, GREENHOUSE					2
20004826	AW3451	Life's a Choke	San Luis Obispo	10		ROW	Other				2
20003561	AW3472	Overfelt	San Juan Bautista	20	0	ROW	Blackberry				2
20004343	AW3474	Airport	Salinas	63	0	ROW	Strawberry			DIAZINON	2
20007482	AW3474	Airport	Salinas	63	63	ROW	Strawberry			DIAZINON	2
20007403	AW3475	Mann	Watsonville	19.62	19	ROW	Strawberry			DIAZINON	2
20013102	AW3475	Jacks/Home	Salinas	76.12		ROW	Strawberry				2
20003284	AW3479	Sher J Wong Farm	Gilroy	5		GREENHOUSE	Chinese Cabbage	Other			2
20002133	AW3481	Silva Ranch LOVR LLC	Los Osos	20	0	ROW	Peas	Pepper, Fruiting			2
20005980	AW3482	Slo Creek Farms	San Luis Obispo	32	0	ROW, ORCHARD	Pumpkin				2
20004241	AW3485	Wilkinson Ranch	Watsonville	52	52	ROW	Blackberry	Raspberry			2
20003353	AW3486	Sweeney Vineyard	lompoc	4.5	0	VINEYARD					2
20003786	AW3495	Ranch 2	Nipomo	66	0	ROW	Strawberry				2
20008442	AW3495	Ranch 5	Nipomo	18	0	ROW	Strawberry				2
20008441	AW3495	Ranch 1	Nipomo	34	0	ROW	Strawberry				2
20004309	AW3501	Skilicorn Ranch	Watsonville	50	24	ROW	Strawberry				2
20003190	AW3502	ranch K2/ Jackson	Nipomo	210	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20012162	AW3502	ranch K4	Santa Maria	180	180	ROW	Broccoli	Peas	Cauliflower		2
20003986	AW3503	Tognetti	King City	182	40	ROW	Lettuce, Head	Spinach	Onion, Dry	CHLORPYRIFOS	2
20005043	AW3508	Ranch 12	Guadalupe	112	112	ROW	Strawberry				2
20005036	AW3508	Ranch 10	Santa Maria	125	125	ROW	Strawberry				2
20005027	AW3508	Ranch 1	Santa Maria	62.3	27.3	ROW	Strawberry				2
20007892	AW3514	Banovac Ranch	Watsonville	37	0	ROW	Raspberry				2
20007903	AW3514	Willoughby Molara Ranch	Castroville	60	0	ROW	Strawberry				2
20008185	AW3515	Porter Ranch	Watsonville	65	45	ROW	Blackberry	Raspberry	Strawberry		2
20008184	AW3516	Trafton Ranch	Watsonville	75	75	ROW	Strawberry				2
20007320	AW3520	Brothers	Los Olivos, Ca. 93441	65		ROW	Squash	Pepper, Fruiting	Broccoli		2
20007732	AW3526	BOGNUDA RANCH	SANTA MARIA	70	70	ROW	Strawberry				2
20012202	AW3526	West Porter	Santa maria	54	54	ROW	Strawberry				2
20007518	AW3531	Ivancovich Family Orchards	Hollister	15	0	ORCHARD					2
20007609	AW3537	Machado Creek Vineyards	Morgan Hill	8.5	0	VINEYARD, ORCHARD					2
20008283	AW3540	Octavio Garcia Farms	Salinas	4.75	0	ROW	Strawberry	Squash	Broccoli		2
20008082	AW3541	Bradley Ranch #3	santa maria	335	0	ROW	Broccoli	Strawberry	Squash		2
20007549	AW3544	HETTRICK	SALINAS	71.2	71.2	ROW	Lettuce, Head	Broccoli	Artichoke		2
20007548	AW3544	SAN JON	SALINAS	169.5	169.5	ROW	Lettuce, Head	Broccoli	Spinach		2
20007552	AW3544	SCHNEIDER	SALINAS	16	16	ROW	Lettuce, Head	Broccoli	Cauliflower		2
20007551	AW3544	GEARY LYONS	CASTROVILLE	57.2	57.2	ROW	Artichoke	Lettuce, Head	Cauliflower		2
20007553	AW3544	MARTIN	CASTROVILLE	61	61	ROW	Broccoli	Lettuce, Head	Cauliflower		2
20007547	AW3544	BORONDA	SALINAS	462	462	ROW	Lettuce, Head	Broccoli	Spinach		2
20007557	AW3544	MATHEW	CHULAR	91	0	ROW	Lettuce, Head	Broccoli	Spinach		2
20010224	AW3544	SARGENTI	GREENFIELD	126.3	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010226	AW3544	MORGANTINI	GREENFIELD	76.13	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010225	AW3544	REGAZZI	GREENFIELD	110	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20010223	AW3544	MASSA	SALINAS	66.9	0	ROW	Broccoli	Cauliflower	Lettuce, Head		2
20008052	AW3545	Rufoni Ranch	Santa Maria	74.5	74.5	ROW	Strawberry				2
20008051	AW3545	Telephone Ranch	Santa Maria	91	91	ROW	Strawberry				2
20008060	AW3545	Sutti Ranch, Lot 18	Santa Maria	108	108	ROW	Strawberry				2
20008061	AW3545	Robinson Ranch	Santa Maria	104	104	ROW	Strawberry				2
20007567	AW3553	Tarpey	Watsonville	60	0	ROW	Blackberry	Raspberry		DIAZINON	2
20007573	AW3553	Pista	Watsonville	17.22		ROW	Blackberry			DIAZINON	2
20007572	AW3553	Ryan	Castroville	65	0	ROW	Strawberry	Raspberry			2
20007570	AW3553	Silvestre	Watsonville Ca	12.5	0	ROW	Raspberry				2
20007569	AW3553	Allison	Watsonville	35		ROW	Blackberry	Raspberry			2
20007565	AW3553	Rockinoee	watsonville	88.3		ROW	Raspberry			DIAZINON	2

20008421	AW3554	Tung Woon Leung Nursery	San Martin	3	0	GREENHOUSE	Other			2
20008702	AW3558	TKS Ranch	Carpinteria	34	34	ORCHARD	Avocado			2
20009044	AW3559	Palmas	Salinas	21	0	ROW	Strawberry			2
20009042	AW3559	Bajo	Salinas	50	0	ROW	Strawberry			2
20009043	AW3559	Pozzi	Salinas	37	0	ROW	Raspberry	Strawberry		DIAZINON	2
20009282	AW3565	Stephen Leung Nursery	Gilroy	3	0	ROW	Other	Celery	Other		2
20003448	AW3566	pacific organics Inc.	Creston	87	1	ROW	Onion, Dry				2
20010504	AW3567	STONE RANCH	SANTA MARIA	263	263	ROW	Strawberry	Other			2
20009487	AW3568	Gubser Ranch (owned and farmed by Christopher Ranch, LLC	Gilroy	288.3	288.3	ROW	Other	Corn, Human Con.	Pepper, Fruiting	CHLORPYRIFOS	2
20010182	AW3570	Success Valley Farms LLC	Santa Maria	75	75	ROW	Strawberry			CHLORPYRIFOS	2
20010202	AW3570	Success Valley Farms LLC	Santa Maria	43	43	ROW	Strawberry			CHLORPYRIFOS	2
20010203	AW3570	Success Valley Farms LLC	NIPOMO	37	37	ROW	Strawberry			CHLORPYRIFOS	2
20009991	AW3573	Higuera Farms Inc.	Santa Maria	33	33	ROW	Strawberry			CHLORPYRIFOS	2
20009979	AW3573	Higuera Farms Inc	Santa Maria	40	40	ROW	Strawberry			CHLORPYRIFOS	2
20009990	AW3574	Savino Farms Inc.	Santa Maria	8	8	ROW	Strawberry			CHLORPYRIFOS	2
20009989	AW3574	Savino Farms Inc.	Santa Maria	26	26	ROW	Strawberry			CHLORPYRIFOS	2
20009978	AW3574	Savino Farms Inc.	Santa Maria	40	40	ROW	Strawberry			CHLORPYRIFOS	2
20009987	AW3575	Big F Company Inc.	Santa Maria	25	25	ROW	Strawberry			CHLORPYRIFOS	2
20009977	AW3575	Big F Company Inc.	Santa Maria	80	80	ROW	Strawberry			CHLORPYRIFOS	2
20009988	AW3575	Big F Company Inc.	Santa maria	10	10	ROW	Strawberry			CHLORPYRIFOS	2
20009981	AW3576	La Palma Farms Inc.	Santa Maria	60	60	ROW	Strawberry			CHLORPYRIFOS	2
20009985	AW3576	La Palma Farms Inc.	Santa Maria	40	40	ROW	Strawberry			CHLORPYRIFOS	2
20010863	AW3578	RIVER RANCH	Santa Maria	23	23	ROW	Strawberry			CHLORPYRIFOS	2
20011005	AW3578	Blosser Ranch	Santa Maria	40	40	ROW	Strawberry			CHLORPYRIFOS	2
20011662	AW3583	Herb Ranch	Hollister	3	0.5	ROW	Other				2
20012084	AW3584	Trafton	Watsonville	65.32	0	ROW	Strawberry				2
20012085	AW3584	Leonardi	Salians	102	0	ROW	Strawberry	Raspberry			2
20012283	AW3591	Boyd	Santa maria	34	34	ROW	Strawberry				2
20012183	AW3593	Phelps Ranch	Carpinteria	43	43	ORCHARD	Avocado				2
20012026	AW3598	Mt. Carmel	Lompoc	21	0	VINEYARD					2
20011962	AW3601	SWIFT RANCH COMPANY INC.	SANTA MARIA	65	65	ROW	Pepper, Fruiting				2
20011797	AW3603	SEBASTIAN Eade Ranch	San Ardo	76	0	ROW	Broccoli	Lettuce, Leaf	Spinach		2
20011794	AW3604	ASA Industrial Ranch	Soledad	31.9	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20011796	AW3604	ASA Eade Ranch	San Ardo	486	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20011793	AW3604	ASA Grisetti Ranch	Soledad	268.2	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20011792	AW3604	ASA Braga Home Ranch	Soledad	457	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		2
20011795	AW3604	ASA Vineyard Ranch	Soledad	254	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		2
20011324	AW3605	Ranch 9	Nipomo	7	7	ROW	Strawberry			CHLORPYRIFOS	2
20011323	AW3605	Ranch 8	Nipomo	12	12	ROW	Strawberry			CHLORPYRIFOS	2
20011326	AW3605	Ranch 10	Nipomo	10	10	ROW	Strawberry			CHLORPYRIFOS	2
20011325	AW3605	Ranch 7	Nipomo	5	5	ROW	Strawberry			CHLORPYRIFOS	2
20011322	AW3605	HOME RANCH	Nipomo	13	13	ROW	Strawberry			CHLORPYRIFOS	2
20011882	AW3607	Creekside Floral	Carpinteria	4.5	0	GREENHOUSE	Other				2
20011862	AW3610	PROVIDENCE FARMS, LLC	SANTA MARIA	93.85	93.85	ROW	Blackberry	Strawberry	Raspberry		2
20013042	AW3619	Davis Ranch	Salinas	53.4	53.4	ROW	Strawberry				2
20013047	AW3621	Home	Salinas	53.5	0	ROW	Strawberry				2
20012722	AW3622	Harry a Giretti Farm	Gilroy	12	0	ORCHARD	Walnut				2
20003514	AW4503	Sea Smoke vineyard	Lompoc	105	0	VINEYARD					2
20003959	AW4547	Mahoney Brothers Inc. - Ranch #2	Santa Maria	125.2	125.2	ROW	Broccoli				2
20003956	AW4547	Mahoney Brothers Inc. -Ranch #1	Gudalupe	131.5	131.5	ROW	Lettuce, Head	Broccoli	Celery		2
20008603	AW4562	monterey bay farms llc	salinas	191	191	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		2
20001246	AW4562	massa ranch	salinas	119.5	119.5	ROW	Lettuce, Head	Lettuce, Leaf			2
20001206	AW4562	reeves ranch	salinas	197.8	0	ROW	Lettuce, Head	Lettuce, Leaf			2
20001225	AW4562	Harden ranch	salinas	100.3	0	ROW	Lettuce, Head	Lettuce, Leaf			2
20001232	AW4562	Bryggman ranch	salinas	87.5	87.5	ROW	Lettuce, Head	Lettuce, Leaf			2
20003162	AW4586	El Jabali	Buellton	6.6	0	VINEYARD					2
20003285	AW4589	Sanford Vineyard	Lompoc	139	0	VINEYARD					2
20010562	AW4608	ALFALFA CAMP RANCH	SANTA MARIA	50	0	ROW	Strawberry				2
20011982	AW4608	STONE RANCH	Santa Maria	55.15	0	ROW	Strawberry				2
20011984	AW4608	WHITE HILLS RANCH	Santa Maria	55	0	ROW	Strawberry				2
20001535	AW4608	WINEMAN RANCH	SANTA MARIA	110	110	ROW	Strawberry				2
20009402	AW4608	GRACIA RANCH	Santa Maria	70	0	ROW	Strawberry				2
20009422	AW4608	BATTLES RANCH	Santa Maria	52.15	0	ROW	Spinach				2

20007669	AW4608	COYOTE CREEK RANCH	SANTA MARIA	59.56	59.56	ROW	Strawberry				2
20007673	AW4608	KIM RANCH	SANTA MARIA	5	0	ROW	Strawberry				2
20007776	AW4608	HARRIS HILLS	LOS ALAMOS	60	0	ROW	Blackberry				2
20001210	AW4609	Lanini Ranch	Soledad	316.4	103.8	ROW	Broccoli	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001205	AW4609	Home Ranch	Soledad	47.3	31.3	ROW	Broccoli	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001207	AW4609	Roddick Ranch	Soledad	219.37	90.6	ROW	Broccoli	Lettuce, Leaf	Grapes, Wine	DIAZINON, CHLORPYRIFOS	2
20001221	AW4609	Bramers Ranch	Salinas	79.2	0	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001231	AW4609	Luchessa Ranch	Soledad	108.5	0	ROW	Broccoli	Lettuce, Leaf	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001213	AW4609	Casacca Ranch	Soledad	58	0	ROW	Broccoli	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001200	AW4609	Thompson Ranch	Soledad	51.4	51.4	ROW	Broccoli	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001211	AW4609	Fanoe Ranch	Gonzales	280.9	173.9	ROW	Broccoli	Lettuce, Leaf	Celery	DIAZINON, CHLORPYRIFOS	2
20001196	AW4609	Salmina Ranch	Soledad	83.8	43.2	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head	DIAZINON, CHLORPYRIFOS	2
20001233	AW4609	Rianda Ranch	Soledad	176.5	35.4	ROW	Broccoli	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001278	AW4610	Bianco Ranch	Gonzales	53.3	22.4	ROW	Cauliflower	Lettuce, Leaf	Broccoli	DIAZINON, CHLORPYRIFOS	2
20001273	AW4610	Balemi Ranch Map	Soledad	88.3	69.2	ROW	Lettuce, Head	Lettuce, Leaf	Spinach	DIAZINON, CHLORPYRIFOS	2
20001270	AW4610	Lindstrand Ranch	Soledad	18.7	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001275	AW4610	Barloggi Ranch	Soledad	131.3	31.8	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001293	AW4610	Frolli Ranch	Soledad	60	0	ROW	Lettuce, Leaf	Broccoli	Spinach	DIAZINON, CHLORPYRIFOS	2
20001292	AW4610	Nelson Ranch	Soledad	18.8	0	ROW	Lettuce, Leaf	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001290	AW4610	Radavero Ranch	Soledad	94.9	0	ROW	Lettuce, Leaf	Spinach	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001289	AW4610	Martignoni Ranch	Gonzales	120	0	ROW	Lettuce, Leaf	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001287	AW4610	Binsacca Ranch	Soledad	162.3	30	ROW	Lettuce, Head	Lettuce, Leaf	Cabbage	DIAZINON, CHLORPYRIFOS	2
20001285	AW4610	Daoro Ranch	Gonzales	85.3	41.7	ROW	Lettuce, Head	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001283	AW4610	Mann/Yoder Ranch	Chualar	138.7	106.4	ROW	Celery	Broccoli	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001279	AW4610	Vaughan Home Ranch	Soledad	57.5	0	ROW	Spinach	Lettuce, Leaf	Peas	DIAZINON, CHLORPYRIFOS	2
20001281	AW4610	Turri Ranch	Chualar	370.6	0	ROW	Broccoli	Lettuce, Leaf	Peas	DIAZINON, CHLORPYRIFOS	2
20001294	AW4610	Hidalgo Ranch	Soledad	14	0	ROW	Broccoli	Lettuce, Leaf	Peas	DIAZINON, CHLORPYRIFOS	2
20001286	AW4610	Silacci Ranch	Salinas	93.1	0	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower	DIAZINON, CHLORPYRIFOS	2
20001261	AW4610	Anderson Ranch	Soledad	52.4	52.4	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001277	AW4610	Bassi Ranch	Gonzales	167.9	78.1	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20001272	AW4610	Violini Home Ranch	Soledad	18.1	0	ROW	Broccoli	Lettuce, Leaf	Peas	DIAZINON, CHLORPYRIFOS	2
20001265	AW4610	Madonna Ranch	Soledad	18.6	18.6	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	2
20004747	AW4611	Rancho Ancho Arena (RAA)	Arroyo Grande	190	0	ROW	Strawberry	Other		CHLORPYRIFOS	2
20003735	AW4616	Struve Ranch	Watsonville	60	40	ROW	Strawberry				2
20008525	AW4616	Petersen Ranch	Watsonville	71	0	ROW	Strawberry				2
20003736	AW4616	Anderson Ranch	Watsonville	66	30	ROW	Strawberry			DIAZINON	2
20003734	AW4616	Pekoch Ranch	Watsonville	62	62	ROW	Strawberry				2
20003834	AW4626	Gaver Ranch	Castroville	290	290	ROW, NURSERY	Strawberry	Broccoli	Peas		2
20004987	AW4629	Azevedo	Royal Oaks	35	0	ROW	Strawberry				2
20008366	AW4629	Ranch 12	Guadalupe	110	110	ROW	Strawberry				2
20007821	AW4629	Merrill Bardin Ranch	Salinas	156.2		ROW	Strawberry				2
20008365	AW4629	Ranch 10	Santa Maria	125	125	ROW	Strawberry				2
20007825	AW4629	Meridian	Castroville	57		ROW	Strawberry				2
20005721	AW0197	Rancho Sisquoc	Santa Maria	291	0	VINEYARD	Grapes, Wine	Grapes, Wine	Grapes, Wine		3
20010522	AW0204	Kantro	Chualar	619	18.7	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20003194	AW0326	Jim Fanoe, Inc.	Salinas	700	700	ROW	Lettuce, Leaf	Broccoli	Spinach		3
20000614	AW0368	Sharer Brothers Farms	Santa Maria	210	10	ROW	Broccoli	Lettuce, Head	Strawberry		3
20004834	AW0368	Sharer Brothers Farms	Santa Maria	80	0	ROW	Broccoli	Strawberry	Lettuce, Head		3
20003936	AW0379	RANCH 21 (BOYD)	SANTA MARIA	127.62	0	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	3
20003869	AW0379	RANCH 05 (BATTLES)	SANTA MARIA	215.25	74.43	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	3
20003928	AW0379	RANCH 18 (SOARES)	SANTA MARIA	85.49	0	ROW	Broccoli	Cauliflower	Strawberry	CHLORPYRIFOS	3
20004154	AW0471	Christensen	Salinas	128.3	128.3	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	3
20001311	AW0549	Foothill, Simon, & Erro Dairy Ranches	Cuyama	561.35	80	ROW	Carrot	Bean, Unspecified			3
20001312	AW0549	Hub Russell Ranch SBC	New Cuyama	1249.14	40	ROW	Barley	Carrot			3
20002598	AW0550	Paicines	Paicines	464.1	464.1	ROW	Lettuce, Leaf	Broccoli	Cauliflower		3
20002586	AW0550	Farris	Hollister	466.8	466.8	ROW	Broccoli	Cauliflower	Lettuce, Leaf		3
20008445	AW0550	Wilson Ranch 10	San Lucas	630.8	630.8	ROW	Lettuce, Leaf	Spinach	Lettuce, Head		3
20008433	AW0550	Pedersen Ranch 7	Chualar	517	402	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		3
20002876	AW0681	Ranch 4 North	Gonzales	409.9	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002889	AW0681	Ranch 15	Salinas	322.7	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002905	AW0681	Ranch 26 South Reservoir	King City	339	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002900	AW0681	Davies 22	Salinas	263.8	208	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002885	AW0681	Ranch 11	Soledad	421.5	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3

20002903	AW0681	Ranch 25 East	King City	466	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	CHLORPYRIFOS	3
20002884	AW0681	Ranch 10	Soledad	386.1	0	ROW, VINEYARD	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002886	AW0681	Ranch 12	Salinas	474.6	474.6	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002898	AW0681	Ranch 20	Castroville	115	107	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002870	AW0681	Ranch 1 North	Salinas	299.8	0	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002880	AW0681	Ranch 7	Gonzales	435.2	187	ROW	Broccoli	Cauliflower	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20002651	AW0699	Ferry Morse Ranch	San Juan Bautista	822	822	ROW	Endive	Parsley	Tomato		3
20002664	AW0699	Firestone/Anderson-Fowler Ranches	Salinas	742	0	ROW	Broccoli	Cauliflower	Other		3
20003051	AW0706	Ranch 1 - Broome Ranch Conventional	Chualar	857	0	ROW	Broccoli	Lettuce, Head	Celery	DIAZINON, CHLORPYRIFOS	3
20003067	AW0706	Ranch 13 - Swale Ranch Conventional	Chualar	226	100	ROW	Strawberry	Broccoli	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20004871	AW0730	San Juan Bautista	San Juan Bautista, Ca	5	0	NURSERY, GREENHOUSE	Tomato	Celery	Lettuce, Leaf		3
20005199	AW0765	Highway 25 Area	Hollister	1051	200	ROW	Onion, Dry	Tomato	Lettuce, Head		3
20005018	AW1181	Temple (4)	Oceano	24	7	ROW	Broccoli	Cauliflower	Lettuce, Head		3
20001449	AW1251	Gallup AND Stribling Orchids INC.	Carpinteria	26	0	ROW, GREENHOUSE	Other	Other	Other	DIAZINON	3
20004405	AW1304	Li Fong Farm	Gilroy	40		ROW	Chinese Cabbage			DIAZINON	3
20004440	AW1328	Tierrasol Farms, LLC.	Gilroy	508	379	ROW	Celery	Lettuce, Leaf	Other	DIAZINON	3
20004585	AW1343	East Site	Gilroy	97	1.21	ROW, GREENHOUSE	Corn, Human Con.	Pepper, Fruiting	Other	CHLORPYRIFOS	3
20003832	AW1477	Freeway	Castroville , CA	161.7	161.7	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	3
20003846	AW1477	Rimassa	Watsonville, CA	29.6	29.6	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	3
20003863	AW1477	First St	Watsonville, CA	29	29	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	3
20003923	AW1477	Lights	Watsonville, CA	48	48	ROW	Lettuce, Head			DIAZINON	3
20004045	AW1477	Trafton #2	Watsonville, CA	104.1	104.1	ROW	Lettuce, Head	Cauliflower		DIAZINON	3
20003822	AW1477	Dethlefsen	Watsonville, CA	13	13	ROW	Lettuce, Head	Lettuce, Leaf		DIAZINON	3
20003796	AW1477	Cox	Watsonville, CA	29.9	29.9	ROW	Lettuce, Leaf	Lettuce, Head		DIAZINON	3
20004032	AW1477	Trafton #1	Watsonville, CA	227.1	227.1	ROW	Cauliflower	Lettuce, Head	Lettuce, Leaf	DIAZINON	3
20004964	AW1492	Lower Patrick Ranch	Salinas	499.4		ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		3
20004906	AW1492	McHarry Ranch	salinas	78.8		ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower		3
20004885	AW1492	Hageman Ranch	Salinas	498.7	0	ROW	Lettuce, Leaf	Broccoli	Lettuce, Head		3
20003880	AW1494	Molera	Salinas	340.7	189.1	ROW	Lettuce, Head	Lettuce, Leaf	Strawberry		3
20003874	AW1494	Los Coches	Soledad	1251.5	112.5	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		3
20000632	AW1496	BELLA VISTA Row Crop	KING CITY	1524.1	0	ROW	Spinach	Lettuce, Leaf	Cabbage		3
20000626	AW1496	ROSENBERG	San Ardo	498	0	ROW	Spinach	Cabbage	Lettuce, Leaf		3
20000633	AW1496	BELLA VISTA VINEYARD	KING CITY	81.6	0	VINEYARD					3
20003777	AW1503	CAULEY RANCH	KING CITY	598.35	0	ROW	Broccoli	Mustard	Spinach		3
20010045	AW1523	Ferini/Vecchioli (2,3,62)	Santa Maria	621	186	ROW	Broccoli	Cauliflower	Lettuce, Head		3
20004507	AW1523	Betteravia Investments - Harris Ranch (31, 32, 33, 34, 35)	Los Alamos	693	208	ROW	Broccoli	Cauliflower	Lettuce, Head		3
20004603	AW1523	LeRoy (1,27,29)	Santa Maria	700	210	ROW	Broccoli	Cauliflower	Lettuce, Head		3
20005275	AW1524	chen	gilroy	267	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		3
20008538	AW1524	Del monte	Gilroy	67	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		3
20005279	AW1524	New Ranch	gilroy	63	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		3
20005278	AW1524	Bennie Gilroy	Gilroy	80	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		3
20005271	AW1524	WANG	GILROY	26	0	ROW	Corn, Human Con.	Pepper, Fruiting	Tomato		3
20012982	AW1551	GALVAN RANCH	MOSS LANDING, CA	19.1	0	NURSERY				CHLORPYRIFOS	3
20003338	AW1556	Borina	Watsonville	36	0	ROW	Strawberry	Raspberry		DIAZINON	3
20010425	AW1560	Gold Coast Farms Ranch 3	Guadalupe	170	170	ROW	Cauliflower	Broccoli			3
20000740	AW1561	glau ranch / ranch 16	san ardo	585	585	ROW	Lettuce, Head	Carrot	Spinach		3
20003253	AW1568	RANCH 20	GUADALUPE	758.2	537.3	ROW	Lettuce, Head	Broccoli	Celery		3
20002829	AW1571	SILVEIRA RANCH	GREENFIELD	129.2	0	ROW	Lettuce, Head	Lettuce, Leaf	Cauliflower	DIAZINON	3
20003124	AW1627	Abe Ranch	Salinas	37	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli		3
20003123	AW1627	Lanini	Salinas	30	0	ROW	Lettuce, Leaf	Lettuce, Leaf	Broccoli		3
20007541	AW1634	Romie Ranch	Chualar	536	0	ROW	Lettuce, Leaf	Spinach	Broccoli		3
20004231	AW1636	Major Farms, Inc.	Soledad	1838	0	ROW	Lettuce, Leaf	Carrot	Bean, Dried		3
20004621	AW1641	T&A-Jensen	Salinas	66.9	54.7	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	3
20004638	AW1641	Rossi-Spreckels	Salinas	602.4	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	3
20004626	AW1641	T&A-Mathews	Salinas	26.7	0	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	3
20004618	AW1641	T&A-Frank McFadden	Salinas	109.8	109.8	ROW	Lettuce, Head	Lettuce, Leaf	Broccoli	CHLORPYRIFOS	3
20002599	AW1647	Fujii1	Watsonville	8.7	8.7	ROW	Lettuce, Head	Celery	Broccoli	DIAZINON, CHLORPYRIFOS	3
20002574	AW1651	Wilson East	King City	347.9	0	ROW	Celery	Lettuce, Head	Spinach	DIAZINON, CHLORPYRIFOS	3
20001360	AW1683	Hacienda Ranch	King City	740.1	0	ROW	Broccoli	Peas	Lettuce, Head	DIAZINON, CHLORPYRIFOS	3
20005183	AW1730	Ranch 1,2,5	greenfield	422.5	0	ROW	Lettuce, Head	Spinach	Bean, Unspecified		3
20004286	AW1748	Arnold Ranch	Soledad	671.07	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	3
20004301	AW1748	Violini Ranch	Salinas	43.8	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	3
20004302	AW1748	Pryor Ranch	Soledad	874.58	0	ROW	Broccoli	Cauliflower	Lettuce, Head	DIAZINON, CHLORPYRIFOS	3

20004281	AW1748	Callaghan Ranch	Soledad	1054.42	0	ROW	Broccoli	Lettuce, Head	Cauliflower	DIAZINON, CHLORPYRIFOS	3
20004105	AW1765	Ranch 10	Santa Maria	568	568	ROW	Broccoli	Cauliflower	Lettuce, Head		3
20000527	AW1793	Upper (East) Doud	King City	598.4	0	ROW	Celery	Lettuce, Leaf	Cauliflower	DIAZINON, CHLORPYRIFOS	3
20004196	AW1804	Williams Ranch	Gonzales	1248	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20004179	AW1804	Garin Ranch	Salinas	126.8	28	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20004191	AW1804	O.C. Bardin Ranch	Salinas	264	242	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf		3
20001171	AW1807	Fanoe Brothers Ranch	Gonzales	700	142.3	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20001178	AW1807	Johnson Ranch	Chualar	559.4	288.4	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20001175	AW1807	Closter Ranch	Chualar	107.8	0	ROW	Broccoli	Lettuce, Head	Lettuce, Leaf	DIAZINON, CHLORPYRIFOS	3
20003543	AW1817	Strobel	castroville	101	101	ROW	Lettuce, Leaf	Broccoli	Cauliflower	DIAZINON, CHLORPYRIFOS	3
20007438	AW1819	Freyer	Gonzales	589	32	ROW	Brussel Sprout	Lettuce, Leaf	Spinach	DIAZINON	3
20007456	AW1819	Wikstrom	Watsonville	50.4	5	ROW	Lettuce, Leaf	Mustard	Lettuce, Head	DIAZINON	3
20001622	AW1823	San Bernardo Ranch North	San Ardo	462.3	0	ROW	Carrot	Oat	Tomato		3
20001616	AW1823	Mortensen Ranch North	Salinas	219.3	0	ROW	Broccoli	Lettuce, Leaf	Lettuce, Head		3
20011573	AW1877	M. Hill - H. Bellone	Castroville	61.7	46	ROW	Artichoke	Lettuce, Head			3
20004810	AW1902	Teixeira Ranch 09	Nipomo	187.4	187.4	ROW	Strawberry	Broccoli	Lettuce, Head	CHLORPYRIFOS	3
20004397	AW1936	Home Ranch	Watsonville	48	48	ROW	Strawberry	Raspberry	Blackberry		3
20004403	AW1936	Stella Ranch	Watsonville	39	39	ROW	Strawberry				3
20007449	AW1948	Encinal 1	Salinas	17.31	0	NURSERY, GREENHOUSE	Broccoli	Tomato		DIAZINON, CHLORPYRIFOS	3
20004757	AW1961	Pinehill Piece	Carpinteria	20	20	ORCHARD				CHLORPYRIFOS	3
20002874	AW3027	Braga Ranches	San Lucas	940	280	ROW	Lettuce, Head	Onion, Dry	Broccoli		3
20004237	AW3035	B & M Farms, Inc.	Guadalupe	259	259	ROW	Broccoli	Peas		CHLORPYRIFOS	3
20007890	AW3121	Avila Ranch	Salinas	6	6	ROW, GREENHOUSE	Lettuce, Head	Lettuce, Leaf	Broccoli	DIAZINON	3
20002221	AW3233	benito valley farm	hollister	110	0	ROW	Chinese Cabbage	Peas	Spinach	DIAZINON	3
20004690	AW3414	Ranch 1 & 2 (JECL)	Guadalupe	328.75	328.75	ROW	Lettuce, Head	Broccoli	Cauliflower		3
20004322	AW3475	Cooper	Salinas	78.35	0	ROW	Strawberry			DIAZINON	3
20010222	AW3544	HUDSON	SOLEDAD	582.5	0	ROW	Broccoli	Cauliflower	Lettuce, Head		3

Exhibit 7

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April 1, 2010

Mr. Roger Briggs
Executive Officer
Regional Water Quality Control Board, Central Coast
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-7906
rbriggs@waterboards.ca.gov

Subject: Preliminary Draft Staff Recommendations for an Agricultural Order Conditionally Waiving Individual Waste Discharge Requirements for Discharges From Irrigated Lands

Dear Mr. Briggs:

Our firm represents the Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties (GSA) in the Central Coast Regional Water Quality Control Board's (Central Coast Water Board) matter for adoption of new regulations pertaining to discharges from irrigated lands. On behalf of GSA, we have reviewed the Preliminary Draft Staff Recommendations for an Agricultural Order (Preliminary Draft Staff Report), the Preliminary Draft Order Agricultural Order No. R3-2010-00XX (Preliminary Draft Order), and other associated documents.

The GSA is a non-profit agricultural trade association organized in 1947 to promote the general welfare of the produce industry in Santa Barbara and San Luis Obispo Counties. The GSA has 135 members who farm vegetables and strawberries in the Santa Maria, Arroyo Grande, and Lompoc valleys of central California. The GSA estimates its members annually ship over 60 million cartons of produce representing approximately $500 million in gross sales. The GSA employs in the aggregate approximately 15,000 workers. The GSA and its members will be directly impacted by the proposed staff recommendations contained in the February 1, 2010 Preliminary Draft Order.

In general, the Preliminary Draft Order includes significant and prescriptive requirements that gravely impact growers and the agricultural industry in the Central Coast. The proposed requirements are not only unlawful but put Central Coast growers at a severe disadvantage in a very competitive marketplace. If the Preliminary Draft Order is adopted as is, many growers in the Central Coast will no longer be able to afford to grow vegetables in this region, and potentially in California. Considering the devastating impact that this Preliminary Draft Order would have on the region's economy, we encourage you to direct staff to rescind the Preliminary Draft Staff Report and Preliminary Draft Order in their

entirety and instead enter into a constructive dialogue with the local agricultural community. To that end, the GSA supports the alternative agricultural proposal that has been submitted to the Central Coast Water Board under separate cover.

In the unfortunate event that the Central Coast Water Board staff proceed with recommending adoption of the Preliminary Draft Order, we submit the following significant comments on the Preliminary Draft Staff Report, Preliminary Draft Order, and associated documents.

As a preliminary matter, we must express our outrage with the tone and representation of information contained in the Preliminary Draft Staff Report. Never before have we experienced such biased hostility in a public document that should objectively explain the issue of concern and provide a well-balanced, rational basis for the requirement being proposed. Furthermore, the Preliminary Draft Staff Report makes blanket inflammatory statements but fails to provide any evidence to support staff's conclusion. For example, it states that because "evidence of on-farm improvements and reductions in pollution loading from farms is not required, . . .[it] therefore probably does not exist for most farms." (Preliminary Draft Staff Report, p. 7.) The statement implies that because reporting on-farm information is not required, farmers are not making on-farm improvements and reductions in pollutant loading. This type of a conclusion is unwarranted and not supported with any evidence. In fact, many growers in the Central Coast have changed cultural practices to better protect water quality. A lack of reporting such changes to the Central Coast Water Board in no way constitutes evidence that improvements are not being made.

We also take issue with the claim that "[t]he agricultural industry must implement the most effective management practices (related to irrigation, nutrient, pesticide and sediment management) that will most likely yield the greatest amount of water quality protection, and verify their effectiveness with on-farm data." (Preliminary Draft Staff Report, p. 7.) This statement is directly contrary to the legislative intent and purpose of the Porter-Cologne Water Quality Control Act (Porter-Cologne), Assem. Bill 413 Stats. 1969, ch. 482, codified at Water Code section 13000 et seq. Specifically, Porter-Cologne requires the Central Coast Water Board to regulate "to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters . . . ." (Wat. Code, § 13000.) Thus, any regulation of the agricultural industry must be reasonable considering a number of factors, including cost. Effectiveness alone is not a legal requirement in Porter-Cologne.

Additionally, the Preliminary Draft Order proposes to regulate agricultural discharges in a manner that far exceeds requirements imposed on municipal stormwater discharges subject to federal National Pollutant Discharge Elimination System (NPDES) permits. Agricultural discharges are specifically exempt from the NPDES permit provisions of the federal Clean Water Act (CWA), codified at 33 U.S.C. section 1251 et seq. (See 33 U.S.C. § 1342(l); CWA § 402(l); see also 40 C.F.R. § 122.3(e).) However, discharges from agriculture and municipal stormwater are similar in nature and include similar types of

pollutants (e.g., pesticides, nutrients). Although subject to different regulatory schemes (i.e., CWA v. Porter-Cologne), it makes no sense to regulate agricultural discharges more prescriptively than discharges from municipal stormwater.

Specifically, the CWA requires controls on municipal stormwater discharges to reduce pollutants "to the maximum extent practicable." (See 33 U.S.C. § 1342(p); CWA § 402(p).) The CWA *does not* require municipal stormwater discharges to comply with water quality standards, nor does it require the application of effluent limitations to the discharge. (*Defenders of Wildlife v. Browner* (1999) 191 F.3d 1159, 1166.) Like CWA requirements for municipal stormwater, Porter-Cologne does not require agricultural discharges to meet water quality standards at the end of the field. With respect to adopting a waiver, the Central Coast Water Board is required to ensure that the waiver is "consistent with any applicable state or regional water quality control plan and is in the public interest." (Wat. Code, § 13269(a)(1).) The Water Quality Control Plan for the Central Coast Region (Basin Plan) indicates that the Central Coast Water Board is implementing controls on nonpoint source pollution through outreach, education, public participation, technical assistance, financial assistance, interagency coordination, demonstration projects, and regulatory activities such as imposing septic tank area prohibitions. (See Basin Plan at p. IV-42 (Sept. 8, 1994).) Further, the Basin Plan states agricultural wastewaters and the effect of agricultural operations are a result of land use practices. (See Basin Plan at p. IV-46.) Nowhere does the Basin Plan state that the Central Coast Water Board is required or encouraged to adopt permit conditions on agriculture which require irrigation runoff to meet water quality standards at the end of the field. Considering the economic impact that the Preliminary Draft Order will have on individuals and the region in general, and the lack of consistency with the Basin Plan, the Preliminary Draft Order fails to meet the requirements for adoption as expressed in Water Code section 13269 because it is not consistent with the Basin Plan or in the public interest.

As a final general comment, the Central Coast Water Board must comply with Water Code section 13141 by first amending the Basin Plan to estimate the total cost and potential sources of funding for such a program. (See Wat. Code, § 13141.) In their current form, neither the Preliminary Draft Staff Report nor the Preliminary Draft Order indicate that the Central Coast Water Board intends to adopt a Basin Plan amendment that estimates the total cost and potential sources of funding for such a program. Failure to adopt a Basin Plan amendment with this information in advance of adopting a new agricultural water quality program would violate Porter-Cologne. (See Memorandum to Roy C. Hampson, Executive Officer of the Lahontan Regional Water Quality Control Board from the Office of the Chief Counsel (Jan. 21, 1983, at p. 6).)

When Water Code section 13141 was amended to include requirements related to agricultural water quality control programs, it was clear that these requirements would be met before implementation of any such program, including the type and nature of programs identified in the Preliminary Draft Order. More specifically, the State Water Board stated in its Enrolled Bill Report to the Governor's office that "[t]his bill will not prevent

implementation and enforcement of agricultural water quality control programs. It will require, however, that the State and Regional Boards consider, and include in the basin plans, an economic study of an agricultural water quality control program in terms of total cost estimate and potential sources of financing *before* implementing such a program." (See Enrolled Bill Report to SB 904 from State Water Resources Control Board at p. 1, emphasis added.) The purpose of this provision, and the State Water Board's reason for encouraging signature of the legislation, was further expressed as follows:

> This bill is consistent with existing SWRCB policy regarding regulation of agricultural wastewater discharges.
>
> Agriculture is presently the largest user of the State's freshwater resources. The Board recognizes that in many instances discharges of agricultural wastewaters create water quality problems. However, the Board also recognizes that there are inadequate institutional, financial, and technological means at this time for the development and management of a comprehensive and effective agricultural water quality control program. While, in specific instances, agricultural discharges can and should be dealt with under existing law, long-term water quality problems, such as nonpoint source control and salinity control programs, represent more difficult problems and the costs associated with implementation of these programs can be enormous. *Therefore, it is the Board' policy that any agricultural water quality control program must be carefully examined and formulated before it is implemented, and the costs and sources of financing would be a material consideration before any decision is made.* (*Id.* at p. 2, emphasis added.)

In light of the requirements expressed in Water Code section 13141, and the clear intent with respect to application of these requirements, the Preliminary Draft Staff Report must reflect the Central Coast Water Board's obligation to pursue a Basin Plan amendment accordingly prior to adoption of the program described in the Preliminary Draft Order. Further, as indicated above, the Central Coast Water Board must materially consider the costs associated with the program prior to adoption. Thus, we encourage the Central Coast Water Board to immediately commence development of cost information.

I. The Terms and Conditions in the Preliminary Draft Order Exceed the Central Coast Water Board's Lawful Authority to Protect Water Quality

The Preliminary Draft Order consists of many different parts, all of which are objectionable. The actual "waiver" is set forth in the Preliminary Draft Order and consists of 25 pages and 141 findings. The inaccuracy and unlawfulness of the findings are too many to address here. Further, the findings express the same hostility and bias found in the Preliminary Draft Staff Report. As stated earlier, we find the tenor and tone of the staff recommendation to be completely offensive as it fails to review information objectively and fails to propose a reasonable program to control agricultural discharges. Additionally, the

operative provisions of the Preliminary Draft Order contained in the various attachments are unlawful for many reasons, which are addressed below.

Attachment B to the Preliminary Draft Order, titled *Terms and Conditions for Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (Attachment B) contains most of the substantive provisions that would be applied to agricultural growers in the Central Coast Region. In general, Attachment B includes significant substantive provisions that exceed the Central Coast Water Board's legal authority to protect water quality. As indicated earlier, activities which may affect the quality of waters "shall be regulated to attain the highest water quality which is *reasonable*, considering all demands being made and to be made on those waters, ..." (Wat. Code, § 13000, emphasis added.) The Central Coast Water Board is required to conform to and implement these policies. (See Wat. Code, § 13001.) Significant provisions of Attachment B which fail to comply with the Legislature's intent, as well as other requirements in Porter-Cologne, include but are not limited to certain general provisions specified in Part A, certain discharge prohibitions in Part B, technical report requirements in Part C, management practice implementation requirements in Part E, groundwater protection requirements in Part F, and aquatic habitat protection requirements in Part G. Water quality standards identified in Part D are discussed with our comments on application of water quality objectives.

A. General Provisions – Part A

Part A provides general provisions with which growers would be required to comply. Failure to comply with the general provisions or any other provision in Attachment B may result in an enforcement action under the California Water Code. Enforcement under the Water Code may include the assessment of significant monetary penalties for failing to comply. Considering the potential impact that may result from a grower's inability to comply with the proposed conditions set forth in Attachment B, it is imperative that all of the terms and conditions be reasonable and feasible. Unfortunately, this is not the case. Many of the requirements expressed in Part A are not applicable to agricultural discharges, are inconsistent with Porter-Cologne, and/or are not reasonable.

For example, Part A would require dischargers to comply with the Basin Plan and all other applicable water quality control plans identified in Attachment A, *Applicable Water Quality Control Plans and Definitions for Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (Attachment A). (Attachment B at p. 52.) However, Attachment A identifies several plans and policies that are not applicable to discharges from agricultural operations. In particular, the following policies listed in Attachment A do not apply: *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California*, *Water Quality Control Policy for Enclosed Bays and Estuaries of California*, *Sources of Drinking Water Policy* (except as incorporated directly into the Basin Plan), *Policy for Implementation of*

Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, and *Water Quality Control Plan for Ocean Waters of California*.

In another example, Part A would require agricultural growers to not "(a) cause, (b) have a reasonable potential to cause, or (c) contribute to an excursion above or outside the acceptable range for any Regional, State or Federal numeric or narrative water quality standard . . . ." (Attachment B at p. 52.) The terms "cause," "have the reasonable potential to cause," "or contribute to an excursion" are legal terms used in the federal regulatory scheme for the application of water quality based effluent limitations to point sources subject to NPDES permit requirements. (See 40 C.F.R. § 122.44(d)(1)(i).) Such a requirement is inapplicable to agricultural discharges because discharges from agriculture are specifically exempt from the NPDES permit provisions of the CWA. (See CWA § 402(l); see also 40 C.F.R. § 122.3(e).)

Additionally, Part A would require irrigation water to be of a quality that complies with groundwater quality objectives at the time of application. (See Attachment B at p. 52.) Although the language used attempts to connect the requirement to excess irrigation water as it "enter[s] the ground," in reality the only way to "assure" protection is to control the quality of water used for irrigation. This requirement is unreasonable and inconsistent with Porter-Cologne because the use of water for irrigation is not a "discharge of waste."

The legislative history of Porter-Cologne indicates "[t]he discharge of waste does not take place while water is still being used to irrigate crops in the fields." (Report of the Assembly Committee on Water concerning Assem. Bill 413 (Assembly Report) at p. 3.) The Legislature also made the following clarification: "after the irrigation has taken place and after a subsequent discharge into a watercourse or other waters of the state of runoff water or return flows from the irrigated fields, it is not intended to limit the existing authority of the regional boards to issue waste discharge requirements that are needed to protect the quality of the waters of the state." (Assembly Report at p. 3.) The State Water Board's Office of Chief Counsel further explained "discharges of agricultural drainage which seep through the soil and reach groundwater come under the regulatory authority of the Regional Board." (Analysis of Legal Issues Raised by the San Joaquin River Basin Technical Committee, Prepared by Sheila K. Vassey, Office of Chief Counsel, State Water Resources Control Board (Feb. 1987, as amended April 1987) (Analysis) at p. 45.)

The Legislature has not defined what constitutes "agricultural drainage." The regulatory distinction between percolation from irrigation and agricultural drainage resulting in discharge is unclear. The State Water Board Office of Chief Counsel appears to support the argument that the discharge of agricultural drainage occurs after the drainage water has been collected and stored in a manner that then seeps through soil to reach groundwater. (Analysis at p. 45 ["[b]ecause irrigation return flows and agricultural drainage waters constitute waste, the discharge of these wastes into a disposal area or into receiving waters is subject to regulation if the discharge could affect either surface or groundwaters"].) Further,

the State Water Board's regulations governing the appropriation of water rights specifically provide that "[n]o permittee shall be required to file a report of waste discharge pursuant to Section 13260 of the Water Code for percolation to the groundwater of water resulting from the irrigation of crops." (Cal. Code Regs., tit. 23, § 783.) Thus, the State Water Board does not consider the percolation of irrigation water to groundwater a "discharge of waste."

Based on the State Water Board's treatment of the distinction between percolation and discharge, agricultural activities subject to regional board authority for the protection of groundwater is limited to those activities that collect and store agricultural drainage water versus the application of water for irrigation that may percolate to groundwater. Thus, the Central Coast Water Board proposes to exceed its authority by requiring irrigation water to be of a quality sufficient to protect beneficial uses.

Part A also includes mandates for compliance that apply to more specific provisions contained in other parts of Attachment B (e.g., Farm Plans and monitoring requirements). Our concerns with these provisions are addressed below.

B. Discharge Prohibitions – Part B

Part B includes discharge prohibitions that exceed relevant provisions in Porter-Cologne. Porter-Cologne provides "[a] regional board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted." (Wat. Code, § 13243.) Porter-Cologne does not authorize a regional board to prohibit discharges as part of a waiver issued pursuant to Water Code section 13269. (Wat. Code, § 13269.)

Furthermore, the discharge prohibition provisions proposed undercut the primary purpose for adoption of a waiver, or any order for that matter. Waivers from waste discharge requirements and water discharge requirements in general are intended to ensure that discharges of waste are controlled to protect water quality considering the beneficial uses of waters of the state, and water quality objectives reasonably required for the purpose of protecting beneficial uses. (See Wat. Code, §§ 13263, 13269.) Part B would propose blanket prohibitions on any discharge that may violate applicable water quality standards. For example, provision 21 directly contradicts provision 4 in Part A. Provision 4 in Part A provides for a compliance schedule in which discharges may not violate water quality standards. In contrast, provision 21 in Part B constitutes a direct prohibition without any consideration or application of time schedules contained in the Preliminary Draft Order.

Other discharge prohibitions in Part B are unlawful because they are completely unrelated to the discharge of waste and outside the Central Coast Water Board's authority to regulate and protect water quality. In particular, provisions 27 and 31 would prohibit activities that are NOT a discharge of waste. Provision 27 would prohibit the use of fertilizers in excess of crop needs. The Central Coast Water Board has no authority to dictate or control the amount of fertilizer used by any grower. Furthermore, the Central Coast Water Board

does not have the ability or expertise to determine if fertilizer application is in fact in excess of crop needs. As a practical matter, growers do not typically apply fertilizers in excess of crop needs because to do so is expensive and wasteful.

With respect to provision 31, the Central Coast Water Board is attempting to prohibit the degradation of habitat, which again exceeds the Central Coast Water Board's authority. Prohibiting activities that may degrade habitat is unrelated to a prohibition against a discharge of waste. Moreover, many of the activities identified in provision 31 are subject to review and regulation by the California Department of Fish and Game and its authority to regulate any activity that may substantially impact any bed, bank or channel of any stream. (See Fish & G. Code, § 16000 et seq.)

C. Technical Reports – Part C

According to Part C, the Central Coast Water Board is requiring technical reports pursuant to Water Code section 13267. The Central Coast Water Board's ability to require reports pursuant to this provision is not without constraints. In order for a section 13267 request to be upheld, the Central Coast Water Board has the burden of explaining to the discharger the need for the information and for identifying substantial factual evidence that supports requiring the reports, *i.e.*, demonstrates a nexus between the requested information and the Central Coast Water Board's statutory authority to investigate water quality. Mere assertions that such a nexus exists are insufficient to support a section 13267 request. Most of the technical report requests proposed in Part C, and the specific information required in Part E discussed in section I.D below, fail in whole or part to meet the Central Coast Water Board's statutory authority. Further, many of the technical report requirements include substantive provisions that exceed the Central Coast Water Board's authority.

1. Notice of Intent (NOI)

To be classified as a "Low-Risk Discharge," a grower would need to demonstrate in the NOI that all tailwater has been eliminated anad the farm is not within 1,000 feet of an impaired surface water body. Additionally, the NOI would need to demonstrate effective use of integrated pest management (IPM), a certified nutrient management plan and use of stormwater control measures. In this case, if the discharger is able to demonstrate that tailwater has been eliminated, there is no need for the discharger to provide information regarding location of the operation versus impaired water bodies. Also, the burden of demonstrating effectiveness of IPM and use of nutrient management plans bears no reasonable relationship to the Central Coast Water Board's need for the information.

For those that do not meet the eligibility requirements as a "Low-Risk Discharge," the NOI must include information regarding crops, chemical inputs used, irrigation system type, and nitrate concentrations in irrigation source water, among other things. In particular, the NOI would need to include an identification of "[c]hemicals applied in a manner that may result in the material coming in contact with irrigation water, stormwater, surface water, or

groundwater[,]" and would require identification of "nitrate concentration in irrigation source water." (Attachment B at p. 58.) The request for this information does not meet the Central Coast Water Board's burden because the Central Coast Water Board has failed to explain how the burden of providing such information assists them in investigating water quality associated with "discharges of waste." For example, chemicals are often applied to crops through the irrigation system (i.e., chemigation). However, the use of chemigation does not mean that agricultural tailwater will in fact include concentrations of these chemicals in levels that will impact water quality standards, which are applicable to the receiving waters.[1] Thus, this information would provide the Central Coast Water Board with no real information regarding water quality levels in nearby waters of the state. In contrast, the burden of identifying all potential chemicals that might be used within the five-year term of the waiver by an ever-changing farming operation would be speculative, and leave the grower in peril if a chemical needed in five years was not identified with the original NOI.

Similarly, the Central Coast Water Board fails to properly support its request for nitrate concentrations in irrigation source water. The level of nitrate in irrigation source water does not necessarily predict the level of nitrate that may result in receiving waters due to discharges of agricultural waste. The cost of testing irrigation source water that may be used within the next five-year period, however, is unreasonable as compared to the usefulness of the information. Thus, the request for this information in the NOI does not satisfy the requirements specified in Water Code section 13267.

2. Farm Water Quality Management Plan (Farm Plan)

Under the Preliminary Draft Order, the required Farm Plan would need to identify certain types of management practices including the use of IPM. In fact, the Farm Plan would require a grower to maximize IPM practices. However, the Central Coast Water Board has no authority to mandate or require the use of IPM by individual growers. IPM is defined in Attachment A to mean a pest management strategy that focuses on long-term prevention or suppression of pest problems and uses pesticides only when necessary according to pre-established guidelines or treatment thresholds. (Attachment A at p. 33.) In other words, through the Farm Plan, the Central Coast Water Board is attempting to prohibit the use of pesticides except in accordance with IPM guidelines and treatment thresholds.

In California, pesticides are regulated by the California Department of Pesticide Regulation (DPR). (Food & Agr. Code, § 11454.) The DPR's primary purposes include (1) providing for the proper, safe, and efficient use of pesticides essential for production of food and fiber; (2) protecting public health and safety; (3) protecting the environment; (4) protecting agricultural and pest control workers; (5) assuring consumers and users that pesticides are properly labeled; and (6) encouraging the development and implementation of pest management systems that stress application of biological and cultural pest control

[1] As discussed further in section II below, water quality standards apply to waters of the state, not tailwater leaving an agricultural property.

techniques with selective pesticides when necessary. (Food & Agr. Code, § 1501.) In 1984, the California Legislature declared that, "matters relating to (pesticides) are of a statewide interest and concern and are to be administered on a statewide basis by the state unless specific exceptions are made in state legislation for local administration." (Stats. 1984, ch. 1386.) To ensure that the state maintained sole jurisdictional authority over the regulation of pesticides, the California Legislature adopted a statute that vested complete control and regulation of pesticides including the registration, sale, transportation, or use of pesticides with the state, and the DPR in particular. (Food & Agr. Code, § 11501.1.)

Although the Central Coast Water Board is a state agency, it is not vested with the authority to regulate or restrict pesticide use by individuals. As the Food and Agricultural Code indicates, the DPR is vested with the authority to regulate and restrict the use of pesticides in California. The Central Coast Water Board's authority is limited to matters that pertain to water quality. (Wat. Code, § 13225.) It does not include the authority to direct growers with regard to its pesticide applications, storage and use records, or to direct the means to comply with a permit. Thus, the requirements in the Preliminary Draft Order that direct the growers to implement IPM practices are unlawful.

Additionally, Attachment B would require growers to submit the Farm Plans at any time, upon the request of the Executive Officer. (Attachment B at p. 60.) The burden of submitting Farm Plans, which will automatically make them public documents, does not bear a reasonable relationship to the Central Coast Water Board's need. Farm Plans contain significant amounts of proprietary information. Those individuals required to submit Farm Plans will be at a competitive disadvantage versus those that are not. In the meantime, the Central Coast Water Board has the authority to visit grower operations and review Farm Plans on-sight without requesting their submittal. Thus, the Central Coast Water Board is able to review Farm Plan content without placing an undue burden on some by requiring them to submit Farm Plans to a public agency thereby making public previously held proprietary information.

D. Management Practice Implementation Requirements – Part E

As discussed in part above, many of the Farm Plan requirements exceed the Central Coast Water Board's legal authority specified in Porter-Cologne. Part E provides further detail with respect to those Farm Plan requirements and therefore provides additional information to further support the fact that the Central Coast Water Board is attempting to place unlawful requirements on growers under the guise of protecting water quality. Applicable in all of the management practice implementation requirements is a prohibition of irrigation runoff from a farming operation that is "adjacent to, or in close proximity" of an impaired water body or a tributary to an impaired water body. (See Attachment B at pp. 62-65.) "Adjacent to or close proximity" is defined to mean within 1,000 feet. As stated previously, the Central Coast Water Board has the authority to place conditions on dischargers through waivers to protect beneficial uses and reasonable water quality objectives,

however, the Central Coast Water Board has no authority to require the elimination of tailwater discharges altogether. Further, discharge prohibitions must be adopted as part of a water quality control plan or waste discharge requirements, and are limited in scope and area. (See Wat. Code, § 13243.) Defining "adjacent to or in close proximity" to mean 1,000 feet is unreasonable and hardly limited in scope and area. To put it into perspective, 1,000 feet exceeds the distance of three football fields. The Central Coast Water Board has provided no justification or evidence to support the need for a discharge prohibition within 1,000 feet of an impaired water body or its tributaries.

We address other specific management practice implementation requirements in more detail here.

1. Irrigation Management

Attachment B would require submittal of irrigation management information that exceeds the Central Coast Water Board's authority pursuant to Water Code section 13267. As discussed above, Water Code section 13267 requires that technical report information bear a reasonable relationship to the Central Coast Water Board's need for the information. Further, a regional board bears the burden of showing that the request is reasonable. Part E would require a Farm Plan to include in relevant part information regarding: type of irrigation system, distribution efficiency, and distribution uniformity; average total water demand per crop; total water applied per crop; and, schedule, duration, and frequency of irrigation waters. The burden on a grower to prepare and put forward this type of information in a Farm Plan for the Central Coast Water Board's purposes is significant. Specifically, agriculture is not a static endeavor that remains the same on an annual, or seasonal basis. Irrigation demand is constantly changing due to hydrology and crop needs. It is not possible for a Farm Plan that is supposed to be prepared prospectively to include the schedule, duration, and frequency of irrigation for any crop. Thus, to meet the Farm Plan requirements, growers will need to speculate on future irrigation schedules. In contrast, speculative information regarding irrigation schedules provides the Central Coast Water Board with no useful information regarding potential impacts to water quality.

In another egregious example, Attachment B would set minimum irrigation system distribution uniformity requirements. (See Attachment B at p. 62.) As explained previously, the Central Coast Water Board has the authority to place conditions on waste discharges to protect waters of the state, not dictate agricultural irrigation management. Further, this requirement violates Water Code section 13360, which prohibits the regional board from dictating the particular manner of compliance.

2. Pesticide Runoff/Toxicity Elimination

As indicated above, the Central Coast Water Board does not have the legal authority to require growers to implement IPM, or the legal authority to restrict the use of pesticides. However, the pesticide runoff and toxicity elimination management measures include

requirements with respect to IPM and pesticide use restrictions that are outside the Central Coast Water Board's water quality authority. Specifically, Attachment B would require growers to use University of California IPM program guidelines and set buffers for pesticide applications. The use of IPM is voluntary and may not be mandated by the Central Coast Water Board, or for that matter, the DPR. More importantly, restrictions on the use of pesticides are solely within the DPR's legal authority. (Food & Agr. Code, § 11501.1.) Buffers are established on labels for specific pesticides, where appropriate. Moreover, the DPR is considering the adoption of *Restrictions to Address Pesticide Drift and Runoff to Protect Surface Water* (Surface Water Regulations).[2] In the draft Surface Water Regulations, DPR proposes to restrict ground applications of pesticides within 25 feet of any sensitive aquatic site. (See DPR's Draft Surface Water Regulations at § (a)(1).) Contrary to DPR's proposed regulations, the Central Coast Water Board proposes to limit ground applications of pesticides within 50 feet of *any* surface water body. (Attachment B at p. 64.) Regardless of the conflict, the Central Coast Water Board has no authority to restrict the use of pesticides in the manner proposed.

Further, the buffer requirements specified in Attachment B violate Water Code section 13360. As stated before, section 13360 prohibits the Central Coast Water Board from dictating the manner of compliance. In this case, Attachment B proposes to set forth specific prescriptions for which growers would need to comply. As such, the buffer requirements dictate the manner of compliance and are unlawful. (See *In the Matter of the Petition of the United States Department of Agriculture, Forest Service, etc.* (April 21, 1983) Order No. WQ 83-3, at pp. 4-6, State Water Board found certain best management practices to require dischargers to follow certain prescriptions and such prescriptions specified the manner of compliance in violation of Wat. Code, § 13360.)

3. Nutrient and Salt Management

The Central Coast Water Board proposes to regulate the use of fertilizers in a manner that far exceeds its authority to protect water quality. As stated previously in many ways, the Central Coast Water Board's authority to protect water quality is not without constraints. In general, Porter-Cologne requires a regional board to regulate in a manner that is reasonable, considering all the demands being placed on the water. Porter-Cologne also asserts that a regional board's request for technical information may not be unreasonable as compared to the burden of compiling the information, including cost. The proposed requirements related to nutrient and salt management clearly exceed any normal person's perception of what is reasonable.

For example, the nutrient management element of the Farm Plan must be approved by a Certified Crop Advisor, and would be required to include, in part, the following: (1) average total crop nutrient demand and method(s) of determination per crop; (2) average

[2] DPR is currently holding workshops on the proposed regulations and anticipates submitting them to the Office of Administrative Law in June of 2010. For more information, visit http://www.cdpr.ca.gov/docs/emon/surfwtr/regulatory.htm.

total water demand per crop and total water applied per crop; (3) monthly record of fertilizer applications per crop; (4) nitrate concentration of irrigation source water; (5) timing of fertilizer application to maximize crop uptake; (6) estimation of the amount of fertilizer applied in excess of crop needs; and (7) estimation of excess or residual fertilizer/nutrients in the root zone at the end of the crop growing season. While most of this information may be useful to a grower for business purposes, this information provides no benefit to the Central Coast Water Board to determine if best management practices are being implemented to protect water quality. Further, the request to compile this information into a Farm Plan that may become a public document upon the Central Coast Water Board's request is unreasonable as compared to the burden on the individual grower. Not only is there the cost of having a Certified Crop Advisor prepare and certify the nutrient management element, but it also provides for public access to proprietary information.

With respect to salt management, the provisions in Attachment B are *not* consistent with the salt management provisions in the Basin Plan. For example, Attachment B would propose to eliminate the use of leaching to control salt in the soil profile. However, the Basin Plan provides that implementation of leaching with the use of low leaching fractions can be beneficial. (See Basin Plan at p. IV-48.) The Basin Plan also recognizes that with salts the issue is much larger to solve than can be accomplished on an individual farm basis, yet the Preliminary Draft Order fails to recognize the need to address the issue regionally. (See Basin Plan at p. IV-49 ["The off- farm part of drainage, however, is too big for individual farmers to solve, and some form of collective, organized large scale action is needed."].)

4. Aquatic Habitat Protection

As with the other management practice implementation requirements, the information requested in conjunction with the aquatic habitat protection element of the Farm Plan exceeds the Central Coast Water Board's authority to request information. The burden of preparing the information does not bear a reasonable relationship to the Central Coast Water Board's need for the information. For example, the Farm Plan would need to document a wetland area habitat. The term wetland is somewhat ambiguous and has yet to be defined by the State Water Board. The definition identified in Attachment A is a definition developed for the Technical Advisory Team for the California Wetland and Riparian Area Protection Policy. The document that discusses the definition states upfront that "[t]his is not a draft or final California state wetland definition. This is the wetland definition recommended by the Technical Advisory Team to the Policy Development Team for the California Wetland and Riparian Area Protection Policy." In other words, the definition is not one proposed or adopted by the State Water Board in any way. Thus, it is inappropriate for the Central Coast Water Board to use the definition here. Further, it is unreasonable to request growers to identify wetland areas when such a term is not currently defined by the State Water Board for water quality regulatory purposes. Considering the controversy surrounding what constitutes a wetland, such an exercise would be futile.

Moreover, the requirements specified in Part G for which implementation is required as part of the Farm Plan, are unlawful and must be removed. We provide more specific comments on Part G below.

E. Groundwater Protection Requirements – Part F

The Central Coast Water Board may not require dischargers to construct and maintain ponds, reservoirs, and other containment structures to avoid leaching of waste to groundwater. (See Attachment B at p. 69.) As discussed previously, prescriptive requirements such as these are considered to dictate the manner of compliance, which is unlawful. (See section I.D.2, *ante*.) With respect to provision 77, it is unnecessary for the Central Coast Water Board to identify actions that the Central Coast Water Board "might" take. In this provision, the Central Coast Water Board attempts to threaten growers by stating that the Executive Officer may require sampling of private wells pursuant to Water Code section 13267, however, the provision does not indicate under what circumstances the Executive Officer would issue such an order. As indicated above, the Central Coast Water Board's authority, as implemented here through the Executive Officer, is not without constraints. Before requiring a grower to conduct such sampling, the Executive Officer would need to provide sufficient evidence to show that the cost and burden of collecting the information was necessary for the Central Coast Water Board's purposes.

Provision 77 further attempts to threaten growers by stating that the Central Coast Water Board may require growers to provide alternative water supplies pursuant to Water Code section 13304. Unfortunately, the references to this authority are incomplete and fail to fully explain how the Central Coast Water Board might be able to require growers to provide alternative water supplies. Water Code section 13304 is an enforcement mechanism that allows regional boards to issue Cleanup and Abatement Orders where waste is, or probably will be, discharged into waters of the state, and threatens to create a condition of pollution or nuisance. As part of a Cleanup and Abatement Order, a regional board may require replacement water be provided. To issue a Cleanup and Abatement Order, the Central Coast Water Board will need to provide substantial evidence that the grower in question was causing the condition of pollution or nuisance. It is not an authority that the Central Coast Water Board may use without appropriate due process. Nor is it appropriate to reference the Central Coast Water Board's enforcement authority here because it implies that it is a substantive provision of the Preliminary Draft Order itself.

F. Aquatic Habitat Protection Requirements – Part G

The aquatic habitat provisions in Part G are unlawful and impractical for many reasons. Among other things, the provisions result in an unconstitutional taking of private property, unlawfully dictate the manner of compliance, supersede the authority of the Department of Fish and Game, prevent waterway maintenance activities for flood control, prohibit growers from complying with buyer specifications that may be necessary for food

safety reasons, and unlawfully require federal permits under the CWA for activities that are specifically exempt.

1. The Aquatic Habitat Restrictions Are an Unconstitutional Taking of Private Property

The Preliminary Draft Order proposes minimum riparian buffer widths of 50 feet, 75 feet, and 100 feet for tier 1, 2, and 3 streams, respectively. The Preliminary Draft Order argues that the buffers are necessary to protect aquatic habitat. Additionally, the Preliminary Draft Order would mandate that growers maintain vegetation in the buffer zones, and would prohibit the removal of vegetation for food safety reasons. Individually and collectively, the aquatic habitat requirements are governmental regulations that deprive agricultural landowners near streams of the economic benefit of their private property. Deprivation in this manner constitutes a taking under the State and Federal Constitutions. (See *Penn Central Transp. Co. v. City of New York* (1978) 438 U.S. 104; see also *Allegretti & Co. v. County of Imperial* (2006) 138 Cal.App.4th 1261.) Pursuant to current regulatory takings jurisprudence, in making this determination courts examine the economic impact on the land in question, the investment-backed expectations of the landowner, and the character of the government action. For the reasons below, the Central Coast Water Board's aquatic habitat provisions would meet the balancing test set forth by the courts, and would be considered a taking of private property.

First, to address economic impact, it must be determined if the regulation unreasonably impairs the value or use of the property in light of the owner's general use of that property. The economic impact of the aquatic habitat regulations on growers in the Central Coast is potentially significant. Productive farmland will be forced out of production and produce buyers may not purchase product from growers where there is significant vegetation near the edge of the field. Thus, not only will growers lose valuable farmland in the buffer area, but the crop as a whole may be unmarketable because of the vegetation that would be required in the buffer area. Second, the general use of land affected by the proposed regulation is most likely designated for and dedicated to the production of agriculture. This general use would be completely eliminated by the regulatory requirements mandating the maintenance of a riparian buffer zone, thereby causing an unquestionably severe economic impact on the landowner. Next, the regulations proposed by the Central Coast Water Board would almost certainly interfere with the investment-backed expectations of the landowners. Agricultural land is purchased with the expectation that it is productive ground—suitable for the crops grown by the grower. With the purchase of agricultural land, growers also invest in machinery and a labor force necessary to grow and harvest the commodity in question. By depriving landowners of all economically beneficial use of the land by designating a riparian buffer zone and requiring maintenance of vegetation regardless of food safety concerns, the proposed regulation will severely interfere with the investment-backed expectations of the landowners. Finally, while the proposed regulation may not constitute a typical physical invasion or appropriation of the land, the proposed regulation would effectively appropriate

these riparian buffer zones to the Central Coast Water Board for their perceived public benefit. Even if no such appropriation is found, the severity of the economic impact and the devastation of the investment-backed expectations of the landowners are sufficient to demonstrate a regulatory taking.

2. The Aquatic Habitat Regulations Unlawfully Dictate the Manner of Compliance

As discussed previously (section II.D.2, *ante*), the Central Coast Water Board is prohibited from prescribing the manner of compliance. (Wat. Code, § 13360.) A regional board may adopt waiver conditions that identify what must be done (i.e., protect aquatic habitat); however, a regional board cannot prescribe how it should be done. In the Preliminary Draft Order, the Central Coast Water Board proposes to dictate that buffers of certain sizes must be maintained, vegetation must be maintained, clearing of beneficial vegetation is prohibited, clear cutting or creating bare dirt is prohibited, and channel clearing is prohibited. All of these requirements clearly dictate how to comply with the general requirement to protect aquatic habitat. Furthermore, the requirement for clear cutting or creating bare dirt would apply to all areas of the agricultural operation and not just the riparian buffer areas. In other words, growers would be prohibited from removing vegetation and debris prior to preparing ground for the next planting.

3. The Central Coast Water Board Is Attempting to Supersede the Department of Fish and Game's Requirements for Streambed Alteration Requirements

In Part G, the Central Coast Water Board is attempting to take control of decisions that are rightfully administered by the California Department of Fish and Game (DFG). Department of Fish and Game Code section 1600 et seq. provide the DFG with the authority for reviewing and approving any proposed activity that may substantially, "divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel or bank of, any river, stream, or lake . . . ." (Fish & G. Code, § 1602.) Without the DFG's approval, the activity is prohibited. (*Id.*) Here, the Central Coast Water Board is attempting to interfere with the DFG's authority by prohibiting any such activities altogether. We contend that the Central Coast Water Board has neither the authority nor the expertise to prohibit activities in the stream.

First, relevant portions of the Fish and Game Code may only be administered and enforced through the DFG. (Fish & G. Code, § 702.) Second, staff at the DFG have the expertise to determine what activities in streams may be detrimental to aquatic life—not Central Coast Water Board staff. Instead of adopting blanket prohibitions, the Central Coast Water Board should merely reference the need to comply with Fish and Game Code section 1600 et seq., as administered by the DFG.

4. The Central Coast Water Board Is Attempting to Expand Application of CWA Requirements

Provision 80 of the Preliminary Draft Order implies that an agricultural discharge to a water of the United States is subject to CWA permitting requirements. (Attachment B at p. 70.) If that is so, the Central Coast Water Board is ignoring the provisions in the CWA that specifically exempt agricultural discharges from the NPDES permitting requirements of the CWA. Further, the primary purpose of the Preliminary Draft Order is to provide growers with the ability to comply with Porter-Cologne. As worded in provision 80, the Preliminary Draft Order would not provide the regulatory mechanism for discharges to surface waters that are considered waters of the United States.

II. Preliminary Draft Order Inappropriately Proposes Application of Water Quality Objectives to Irrigation Runoff and Unlawfully Creates Unadopted Water Quality Objectives

Buried in the preface to Tables 1A and 1B in Attachment A is the statement that "water quality objectives indicated by a double asterisk (**) must be met in irrigation runoff per the compliance time schedule contained in the Preliminary Draft Agricultural Order, Part H and are included as individual discharge monitoring requirements." (Attachment A at p. 40.) Water quality objectives identified with the double asterisk include toxicity, ammonia, nitrate, pH, temperature, total dissolved solids, and turbidity. By requiring irrigation runoff to meet water quality objectives, the Central Coast Water Board is in effect adopting end-of-pipe effluent limitations for all irrigation runoff. Additionally, Tables 1A and 1B include numeric values as "Indicators of Narrative Objective" that are de facto water quality objectives.

Water quality objectives are defined to mean, "the limits or levels of water quality constituents or characteristics which are established for the *reasonable* protection of beneficial uses of water . . . ." (Wat. Code, § 13050(h), emphasis added.) Porter-Cologne requires each regional board to establish water quality objectives in Basin Plans, and to adopt the Basin Plans through a public hearing process. (Wat. Code, §§ 13241, 13244.) More importantly, when adopting water quality objectives, regional boards must comply with Water Code section 13241, which requires consideration of a number of factors, including economics and the feasibility of the meeting the objective. (See Wat. Code, §§ 13241(c), (d).) Table 1A identifies many "Indicators of Narrative Objectives." For example, the Biostimulatory Substances objective includes an indicator of 1 mg/L of nitrate to protect aquatic life beneficial uses from biostimulation. (Attachment A at p. 43.) The source for this indicator is a technical paper prepared by the Central Coast Water Board staff. The indicator of 1 mg/L for nitrate has never been proposed or adopted as a water quality objective. Thus, it has not been found to be necessary to *reasonably* protect the aquatic life beneficial use. Without going through the formal adoption process, it is impossible to know the economic impacts associated with meeting this objective, and if it could reasonably be achieved. The Central Coast Water Board cannot ignore its legal responsibility to adopt water quality

objectives pursuant to Porter-Cologne by claiming that they are "Indicators of Narrative Objectives." Unless the Central Coast Water Board adopts the pseudo water quality objectives pursuant to the law, the "indicator" values identified are unlawful and must be removed from Tables 1A and 1B.

Next, water quality objectives are adopted to protect the beneficial uses of the *receiving water*. In other words, water quality objectives apply to the receiving waters of the state and not irrigation runoff at the end of the field. It is inappropriate for the Central Coast Water Board to adopt blanket end-of-field effluent limitations for constituents by claiming that the objectives must be met in irrigation runoff. Effluent limitations are typically ordered by a regional board through the adoption of waste discharge requirements under Water Code section 13263. When adopting waste discharge requirements, a regional board is required to consider a number of factors, including the provisions of Water Code section 13241 (e.g., economics). (Wat. Code, § 13263(a).) A blanket effluent limitation as proposed for adoption here ignores the requirements of Water Code section 13263. Further, the adoption of effluent limitations is not consistent with adoption of a waiver from waste discharge requirements, and the Central Coast Water Board's adoption of a waiver cannot be used to circumvent requirements in Porter-Cologne that would otherwise apply.

As a practical matter, some of the constituents identified with a double asterisk cannot be applied directly to irrigation runoff. For example, the water quality objectives for pH and turbidity specifically refer to ambient, or receiving water conditions. Thus, it is impossible to apply these objectives directly to irrigation runoff. Attachment A and Tables 1A and 1B must be revised to indicate that the water quality objectives identified apply only to waters of the state, and not at the end of the field or in agricultural drainage facilities. Further, only actual water quality objectives adopted legally into the Basin Plan should be included in the tables. All others must be deleted, as they are unlawfully adopted water quality objectives.

III. The Burden of Preparing and Complying With the Monitoring and Reporting Requirements Fails to Bear a Reasonable Relationship to the Need, and Therefore are Unlawful

The Preliminary Draft Report describes the monitoring and reporting requirements anticipated for growers subject to the Preliminary Draft Order, including as follows: (1) Individual Discharge Characterization Monitoring; (2) Individual Discharge Monitoring; (3) Watershed Monitoring; and (4) Additional Monitoring Required by the Executive Officer. (See Preliminary Draft Report at pp. 19-25.) Although the details of the proposed monitoring programs have yet to be released, the descriptions provided indicate that the burden of preparing the individual discharge characterization and conducting individual discharge monitoring will not bear a reasonable relationship between the Central Coast Water Board's need for the information as compared to the benefits to be obtained. (See Wat. Code, § 13267(b)(1).) In particular, as part of the characterization report, individual growers will be required to monitor, among other things, flow, toxicity, total nitrogen, nitrate, and ammonia in

both surface and groundwater discharge. The brief description provided does not explain how or where a grower is to measure "discharge to groundwater." Further, the brief description does not indicate the frequency of monitoring that will be required as part of the characterization report. Based on the information obtained from the individual characterization report, we can anticipate that individuals will then be required to continue to monitor for these and perhaps other constituents on an ongoing basis. Individual growers will also be required to participate in watershed monitoring efforts for both surface water and groundwater. The collective costs for monitoring on an individual basis and participating in watershed monitoring efforts are likely to be extensive. In exchange, the Central Coast Water Board obtains reams of information that would not directly relay data results regarding water quality in waters of the state. For example, monitoring irrigation runoff is not useful for it fails to account for dilution and degradation of constituents that may occur prior to entering or impacting a water of the state. Considering the costs associated with individual monitoring, and the Central Coast Water Board's inability to determine water quality impacts to waters of the state from concentration levels in irrigation runoff, the burden does not bear a reasonable relationship to the benefits.

In light of the significant legal and practical failings in the Preliminary Draft Order, Central Coast Water Board staff have no alternative other than to rescind the Preliminary Draft Order in its entirety. Once rescinded, Central Coast Water Board staff can then turn their attention to working with the Central Coast agricultural community to draft a reasonable program as set forth in the agricultural alternative that GSA, Farm Bureaus, and others support.

Sincerely,

Theresa A. Dunham

cc: Jeffrey S. Young, Chair, CCRWQCB (via U.S. mail only)
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March 25, 2010

Central Coast Regional Water Quality Control Board
Ms. Angela Schroeter
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401-7906

Dear Ms. Schroeter,

My name is Dennis Caprara, President and owner of R.C. Farms and R.C. Packing. We farm 10,700 acres of vegetable crops in the Salinas Valley, San Joaquin Valley and Yuma, Arizona. We employ about 1200 people in our operations. We have been operating for the last 5 and one-half years under the current Ag Waiver. We have and are implementing management practices to be in compliance with that waiver. Now, it appears the Regional Water Quality Control Board wishes to impose restrictions in the new waiver that would severely damage our business economically and put a lot of people out of work.

The proposed new Ag Waiver has some of the components of the old waiver, which we can live with. However, I'll list a few of the proposals which are unreasonable and, more importantly, unattainable.

1. Establishment of riparian areas. This would make some of our property impossible to farm.

2. Elimination of tile systems or treatment of tile water. No science has been developed to treat this water.

3. The farm plan requires a nutrient management element be prepared and approved by a certified crop advisor. CPA's have no experience to make nutrient needs calls.

4. The farm plan requires that farmers map and photo document existing perennial, intermittent or ephemeral streams or riparian or wetland area habitat and implement mandatory buffers of 50, 75 & 100 feet from the stream bank for riparian habitat within 4 years of adoption. As an alternative to habitat buffers, farmers can prepare a Riparian Function Protection Restoration Plan, certified by a registered engineer or geologist, that restores aquatic life and wildlife support. This becomes a land use issue and the MRWQCB has no jurisdiction.

5. The Waiver prohibits channel clearing, except for ag ditches, hydro-modification and the clearing of beneficial vegetation for food safety reasons. This leaves no provision for flood control.

6. Leaching to control salt must not be performed to wash nitrate based salts from the soil profile. How do you perform leaching if you shut off the tile drains?

7. Within 2 years from adoption, farmers must eliminate all irrigation runoff or provide water quality data through individual on the farm monitoring that irrigation runoff has been sufficiently treated or controlled to meet water quality toxicity standards for pesticides. (Chlorpyrifos 0.025 ug/L; Diazinon 0.14 ug/L). For coarse soils with slope, this time period is unreasonable.

8. Within 3 years from adoption, farmers must eliminate all irrigation from their farming operation or in the alternative, provide data to show runoff has been treated or controlled to meet sediment and turbidity standards. (Turbidity 5 NTO when less than 25 NTU in receiving water; 20% when 25 to 50 NTU; 10 NTU when 30 to 100 NTU; 10% when greater than 100 NTU). This would put a lot of people out of work. Three years is unattainable.

9. Within 6 years from adoption nitrate and salt discharges to groundwater must meet water quality standards. Farm production wells are now above 1 mg/L in most cases. There is no way you could reduce any discharges to this standard.

10. For farms that cannot eliminate tail water, they will have to conduct individual on farm reported monitoring. A quality assurance plan (QAP) must be submitted within 3 months of order adoption, start implementing monitoring within 6 months and start submitting reports to RWQCB 3 months later. A third party entity can conduct this monitoring, but all data must be reported to RWQCB. The Executive Office may postpone individual monitoring where discharges within a watershed collectively are making progress toward meeting the timelines of compliance. The timeline for this requirement is unreasonable.

These are a few of the issues for us in our operation. There could be more.

In summary, I believe there is a fatal flaw in the Ag Waiver in that the beneficial uses for some of the 303d listed surface waters are wrong and need to be challenged legally or changed legislatively. Why would you require drinking water standards for a watershed, where it is not used for drinking water? Why require standards for fish where there is no fishing? Why would you require the water meet standards for recreation where that is and never has been the use?

The RWQCB is requiring Agriculture to meet standards for constituents which are unattainable and there has been no science developed to correct the problem.

In these economic times and with unemployment what it is, someone needs to start applying some common sense.

Sincerely,

Dennis Caprara
RC Farms and RC Packing

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April 1, 2010

Jeffrey S. Young, Chairman of the Board
Roger Briggs, Executive Officer
California Regional Water Quality Control Board
Central Coast Region
895 Aerovista Place, Suite 101
San Luis Obispo, California 93401

Re: ***Comments in Response to Preliminary Staff Recommendations for an Agricultural Order to Control Discharges from Irrigated Lands***

The California Farm Bureau Federation is a non-governmental, non-profit, voluntary membership California corporation whose purpose is to protect and promote agricultural interests throughout the state of California and to find solutions to the problems of the farm, the farm home and the rural community. Farm Bureau is California's largest farm organization, comprised of 53 county Farm Bureaus currently representing approximately 81,000 members in 56 counties. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of California's resources.

On behalf of the Santa Barbara County Farm Bureau, the San Luis Obispo County Farm Bureau, the Monterey County Farm Bureau, the San Benito County Farm Bureau, the Santa Cruz County Farm Bureau, the Santa Clara County Farm Bureau, and the San Mateo County Farm Bureau, the California Farm Bureau Federation ("Farm Bureau") respectfully presents the following concerns regarding the Preliminary Staff Recommendations for an Agricultural Order to Control Discharges from Irrigated Lands and accompanying Staff Report (hereinafter "Staff Draft Waiver") released on February 1, 2010. Farm Bureau has many concerns with Staff's Draft Waiver and Staff Report.[1]

[1] The Preliminary Draft Waiver and Staff Report consist of many different parts, all of which are objectionable. The actual "waiver" is set forth in the Preliminary Draft Agricultural Order No. R3-2010-00XX and consists of 25 pages and 141 findings. The inaccuracy and unlawfulness of the findings are too many to identify here. Farm Bureau reserves the right to provide additional comments and concerns in the future.

Agriculture is one of the most important industries in the Central Coast Region because of the ability to produce large quantities of readily available food and fiber, the substantial economic benefits it provides to the Region and the State, and the number of workers it employs which leads to significant positive impacts to both the Region's and State's labor force. Farm Bureau members of the Central Coast agricultural community recognizes agriculture's importance and necessary role in the State and Region. Additionally, they recognize that the quality of agricultural water discharges can and will improve through implementation of on-farm practices.

The true goal of the Conditional Ag Waiver is to improve water quality over time. The State Water Code and the Regional Board Basin Plan provide authority for the Regional Board to impose regulations on dischargers to improve water quality. Farmers are equally concerned about water quality and the environment. However, there is no need for the Regional Board to impose arbitrary restrictions on commercial agriculture so long as farmers take necessary steps to demonstrate water quality improvement over a scientifically feasible timeline with intermediate milestones.[2] In order to reach this goal, the primary focus of maintaining and improving water quality over time should remain. To aid in reaching this goal, the Regional Board should evaluate water quality data collected and use such data to implement and adjust management practice implementation. The process of designing and adopting a new Ag discharge program will not be simple or quick. Further collaboration between the Regional Board and agriculture will be necessary to develop a workable long term solution. The Farm Bureaus hope the Regional Board will proceed with the development of a long term program rather than conditional waivers limited to five year terms.

Staff's Draft Waiver contains stringent new conditions that will subject growers in the Region to the most rigorous regulatory program in the state. The Waiver contains duplicative regulations concerning existing perennial, intermittent, and ephemeral streams along with riparian and wetland area habitat. It includes strict controls for the use of pesticides which is already regulated by the Department of Pesticide Regulation and the California Department of Food and Agriculture. Riparian and wetland area habitat is already being regulated by a variety of different regulatory agencies including, but not limited to, the U. S. Fish and Wildlife Service, the Department of Fish and Game, the Army Corp of Engineers, and local land use regulations already in place. The Draft Waiver also contains numerous provisions that are improper, illegal, and exceed the Regional Board's statutory authority. Additionally, Farm Bureau is concerned that the Regional Board may fail to recognize that agricultural lands are a part of the physical environment, thus consideration of impacts to agricultural resources must be included as part of a proper California Environmental Quality Act ("CEQA") environmental review.

Failure to Comply with CEQA Requirements

The Regional Board has failed to comply with the provisions of the California Environmental Quality Act ("CEQA"), Cal. Pub. Resources Code §§ 21000 et seq. CEQA was enacted to address concerns about environmental quality in the State of California. CEQA establishes processes and procedures to ensure that California agencies complete an environmental analysis

[2] The agricultural community has been taking necessary steps to demonstrate water quality improvements.

and consider and disclose to the public the environmental impacts of a proposed project. (Cal. Resources Code, §§ 21000 et seq; Cal. Code Regs., tit. 14, § 15000 et seq.) CEQA's statutory framework sets forth a series of analytical steps intended to promote the fundamental goals and purposes of environmental review—information, public participation, mitigation, and governmental agency accountability. (Cal. Code Regs., tit. 14, § 15002.) Specifically, the Legislature's intent in enacting CEQA includes:

- Disclose potential environmental impacts of agency decisions to decision-makers and the public;
- Analyze and minimize environmental effects of projects before final approval;
- Foster public involvement in governmental decision making;
- Facilitate interagency coordination;
- Identify and mitigate significant effects; and
- Improve decision-making.

(See Pub. Resources Code, §§ 21001, 21001.1, 21002, 21003, 21006, 21064.) CEQA's intent and purpose foster informed public participation and decision-making. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 404.)

To date, the process and the development of the Staff's Draft Waiver has not been an open, collaborative, or transparent process. The lack of detail, supporting evidence, proper environmental analysis, and proper evaluation of alternatives effectively bars the public from providing meaningful and necessary information on the development of future agricultural discharge programs. Such action and inaction has not satisfied the intent of CEQA.

Agricultural Resources Must Be Considered During Environmental Review

Agricultural resources are an important feature of the existing environment of the State, and are protected under federal policies, such as the Farmland Protection Policy Act and National Environmental Policy Act ("NEPA"), State policies, and CEQA. Agriculture is the number one industry in California, which is the leading agricultural state in the nation. (Food & Agr. Code, § 802(a).) Agriculture is one of the foundations of this State's prosperity, providing employment for one in 10 Californians and a variety and quantity of food products that both feed the nation and provide a significant source of exports. (CALFED Final Programmatic EIS/EIR, July 2000, pg. 7.1-1.) In 1889, the State's 14,000 farmers irrigated approximately one million acres of farmland between Stockton and Bakersfield. By 1981, the number of acres in agricultural production had risen to 9.7 million. (Littleworth & Garner, California Water II (Solano Press Books 2007) p. 8.) More recently, the amount of agricultural land in the State has declined. From 1982 to 1992, more than a million acres of farmland were lost to other uses. Between 1994 and 1996, another 65,827 acres of irrigated farmland were lost, and this trend is expected to continue.

In order to preserve agriculture and ensure a healthy farming industry, the Legislature has declared that "a sound natural resource base of soils, water, and air" must be sustained, conserved, and maintained. (Food & Agr. Code, § 802(g).) Prior to negatively impacting agricultural lands, decision makers must consider the impacts to the agricultural industry, the

State as a whole, and "the residents of this state, each of whom is directly and indirectly affected by California agriculture." (Food & Agr. Code, § 803.)

CEQA require analysis of significant environmental impacts and irreversible changes resulting from proposed projects. These include unavoidable impacts; direct, indirect, and cumulative effects; irreversible and irretrievable commitment of resources; relationships between short-term uses and long-term productivity; and growth-inducing impacts to the environment. Pursuant to CEQA, the physical environment includes agricultural lands and resources. Given the national and statewide importance of agriculture and the legal requirements of environmental review, Farm Bureau urges the Regional Board to properly assess all direct and indirect effects on the agricultural environment resulting from the proposed Staff Draft Waiver.

Agricultural Resources Must be Considered In a Legally Defensible CEQA Review

One of the major principles of the State's environmental and agricultural policy is to sustain the long-term productivity of the State's agriculture by conserving and protecting the soil, water, and air that are agriculture's basis resources. (Food & Agr. Code, § 821(c).) As currently proposed, Staff's Draft Waiver goes beyond its intent to maintain and improve the quality of waters of the state, and instead, imposes a highly burdensome, enforcement driven program, many aspects of which are beyond the Regional Board's authority, that will negatively impact the ability to produce food and fiber and will lead to possible changes in the physical environment. It is foreseeable that such impacts have the potential to convert agricultural lands to other uses. This conversion would add to the existing statewide conversion of substantial amounts of agricultural lands to other uses, and may conflict with adopted plans of many local governments, including cities and counties, and existing habitat conservation plans or natural community conservation plans.

Of particular relevance is CEQA Guidelines Appendix G, section II, Agricultural Resources, which states the following:

> In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agriculture Land Valuation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optimal model to use in assessing impacts on agriculture and farmland. Would the project:
>
> (a) Convert prime farmland, unique farmland, or farmland of state-wide importance . . . to non-agricultural use?
> (b) Conflict with existing zoning for agricultural use or a Williamson Act contract?
> (c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use?

(Cal. Code Regs., tit. 14, Appendix G, section II, Agricultural Resources.) Any and all adverse environmental effects on agricultural resources resulting from the project, as well as cumulative

impacts that will occur over time, must be fully assessed and disclosed under CEQA, as well as avoided or mitigated as required by CEQA. Thus, proper environmental analysis of agricultural impacts must be considered.

The Regional Board Failed to Analyze Probable Physical Changes to the Environment

CEQA requires lead agencies to analyze the potential physical changes in the environment. For a waiver of waste discharges from irrigated lands, the analysis should consider numerous areas, including the physical impacts that would likely occur as a result of monitoring activities, the implementation of management practices to maintain the quality of waters or mitigate the impacts of agricultural wastes on the waters of the State, social and economic effects stemming from physical changes in the environment.[3]

CEQA requires agencies to consider a reasonable range of foreseeable methods of compliance. For each method, the agency must consider impacts, mitigation, alternatives, costs, and technical factors. (Pub. Resources Code, § 21100; Cal. Code Regs., tit. 14, §§ 15064, 15126.6.) Staff's Draft Waiver must consider the reasonably foreseeable consequences of adoption of the draft policy. Staff's Draft Waiver and accompanying "environmental analysis" fails to contain: an analysis of the reasonably foreseeable methods of compliance, the reasonably foreseeable environmental impacts of the methods of compliance, an analysis of reasonably foreseeable feasible mitigation measures, and an analysis of reasonably foreseeable alternative means of compliance within the rule or regulation.

A full description of monitoring activities proposed under Staff's Draft Waiver is not provided. Thus, it is premature for Staff to conclude that such activities will not have a physical change on the environment, and/or a possible significant effect. (See Attachment 5.) Additionally, some management practices may require physical changes to the environment. For example, a physical change in the environment may occur if structural controls to reduce the discharges of waste to waters of the State are implemented. Even with the lack of details, reasonably foreseeable means of compliance may have an adverse impact on the environment. Thus, by failing to consider any of the above, the Regional Board fails to comply with CEQA.

Regional Board's Consideration of Project Alternatives Is Not Adequate

The Regional Board must consider all reasonable alternatives to the project. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 400; ["The foregoing CEQA provisions and Guidelines make clear that 'One of its [an EIR's] major functions . . . is to ensure that all reasonable alternatives to proposed projects are thoroughly assessed by the responsible official.' (*Wildlife Alive v. Chickering* (1976) 18 Cal.3d 190, 197 [132 Cal.Rptr. 377, 553 P.2d 537].)"] The Guidelines require the evaluation of a "'reasonable range of alternatives to the project, or to the location of the project, which could feasibly attain the basic objectives of the project and evaluate the comparative merits of the alternatives." (Guidelines, § 15126, subd. (d).) These alternatives must be discussed, 'even if these alternatives would impede to some degree the attainment of the project objectives, or would be

[3] Discussed infra.

more costly.' (Guidelines, § 15126, subd. (d)(3).)" "'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." (Cal. Code Regs., tit. 14, § 15364; *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 402.) Alternatives to be evaluated must be potentially feasible and should feasibly attain most of the basic objectives of the project. (Cal. Code Regs., tit. 14, § 15126.6.)

Given CEQA's requirements, the Regional Board should consider feasible alternatives, especially those alternatives to be submitted by the public and the agricultural community. However, within the Preliminary Draft Report, one page of text is devoted to a brief and vague outline of possible alternatives of the project. (Attachment 5, pp. 7-8.) Three "alternatives" are inadequately described in a conclusory nature in which all three "alternatives" are not recommended. Such "brief" treatment of so called alternatives is legally deficient, as no project alternatives are fully analyzed, described, evaluated, or provided in detail to allow the public to provide meaningfully comments. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 404; ["The key issue is whether the selection and discussion of alternatives fosters informed decisionmaking and informed public participation."]; Cal. Code. Regs., tit. 14, § 15126(d)(5).) This failure to properly consider project alternatives cannot be upheld under CEQA and the "rule of reason" for considering alternative project components and regulatory requirements.

Reliance on the 2004 Negative Declaration is Unreasonable and Invalid

Staff's Draft Waiver is significantly different and drastically distinct from the 2004 Conditional Waiver. As stated in the Preliminary Draft Report, specific changes in Staff's Draft Waiver include:

- Extends effective term of the conditional waiver to 2015.
- Revises enrollment and termination process (new information required).
- Requires submittal, certification, and revision (if needed) of Farm Plans.
- Expands contents of Farm Plan, including management practices to eliminate or reduce pollution loading and discharges.
- Adds management practices implementation schedule.
- Requires riparian buffer (or alternative aquatic habitat protection) setback in certain circumstances.
- Prohibits disturbance of wetlands and streams.
- Removes education as a requirement.
- Adds monitoring to facilitate compliance evaluation.
- Adds definitions, references, and expanded findings to clarify and support the requirements specified in the Preliminary Draft Irrigated Ag Order.

(Attachment 5, pp. 2-3.) In addition to the above revisions and addition, Staff's Draft Waiver deviates significantly from the 2004 Conditional Waiver. Although both waivers are conditional waivers of waste discharge limited to 5 year periods of time and regulate discharges from irrigated lands, the two waivers are extremely different in scope, regulatory focus, requirements, breadth, enforcement, intent, types and contents of monitoring, types of discharges to be

regulated, reporting requirements, as well as other differences. Thus, reliance on the 2004 Negative Declaration to fully determine and analyze the new environmental impacts of Staff's 2010 Draft Waiver is inappropriate and improper.

In addition to significantly altering the scope of the waiver, significant new information has been gathered and is now available since the completion of the 2004 Conditional Waiver. Given this significant information and substantial changes to the current Conditional Waiver, which should constitute a new project under CEQA, Staff cannot rely upon the environmental analysis that was completed in 2004. Notwithstanding the fact that reliance on a previous project that is distinct from the project at hand is improper, any changes to the "project" after environmental analysis constitute "significant new information" that requires additional environmental analysis.[4]

<u>The Initial Study and Environmental Checklist is Inadequate and Conclusory In Nature</u>

Under CEQA, it is the responsibility of the lead agency to determine whether an EIR shall be required. (Cal. Code Regs., tit. 14, § 15365.) The initial study is the preliminary analysis that the lead agency prepares in order to determine whether the project might have a significant effect on the environment. (*Friends of Davis v. City of Davis* (2000) 83 Cal. App. 4th 1004, 1016, ["the task of the lead agency is not to determine whether the project will have a significant effect on the environment, but only *whether it might have such an effect*." (emphasis added)].) When the agency determines that an EIR is unnecessary, the initial study serves the purpose of "providing documentation of the factual basis" for concluding that a negative declaration will suffice. (Cal. Code Regs., § 15063(c)(5).)

Specifically, the purposes of an initial study are to:

(1) Provide the Lead Agency with information to use as the basis for deciding whether to prepare an EIR or a Negative Declaration.
(2) Enable an applicant or Lead Agency to modify a project, mitigating adverse impacts before an EIR is prepared, thereby enabling the project to qualify for a Negative Declaration.
(3) Assist in the preparation of an EIR, if one is required, by:
    (A) Focusing the EIR on the effects determined to be significant,
    (B) Identifying the effects determined not to be significant,
    (C) Explaining the reasons for determining that potentially significant effects would not be significant, and

[4] CEQA Guidelines section 15088.5(a) states that "significant new information" includes:
(1) A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
(2) A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted that reduce the impact to a level of insignificance.
(3) A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the environmental impacts of the project, but the project's proponents decline to adopt it.
(4) The draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.

(D) Identifying whether a program EIR, tiering, or another appropriate process can be used for analysis of the project's environmental effects.
(4) Facilitate environmental assessment early in the design of a project;
(5) Provide documentation of the factual basis for the finding in a Negative Declaration that a project will not have a significant effect on the environment;
(6) Eliminate unnecessary EIRs;
(7) Determine whether a previously prepared EIR could be used with the project.
(Cal. Code Regs., tit. 14, § 15063(c).)

The initial study serves to document the agency's reasoning in reaching its conclusion to prepare an environmental impact review document or a negative declaration. Here, Staff's Initial Study fails to "disclose the data or evidence upon which the person(s) concluding the study relied. Mere conclusions simply provide no vehicle for judicial view." (*Citizens Assn. for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal. App. 3d 151, 171.) By failing to disclose all data and evidence relied upon, the Regional Board is abusing its discretion and failing to comply with CEQA. (*Citizens Assn. for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal.App.3d 151, 171, ["Section 1094.5, subdivision (b), states that '[abuse] of discretion is established if the respondent has not proceeded in the manner required by law, the order or decision is not supported by the findings, or the findings are not supported by the evidence.' The Supreme Court has elaborated that '. . . implicit in section 1094.5 is a requirement that the agency which renders the challenged decision must set forth findings to bridge the analytic gap between the raw evidence and ultimate decision or order." (*Topanga Assn. for a Scenic Community v. County of Los Angeles, supra*, 11 Cal.3d at p. 515; see *Myers v. Board of Supervisors* (1976) 58 Cal.App.3d 413, 429-431 [129 Cal.Rptr. 902].)"

Conclusory comments in support of environmental conclusions are generally inappropriate. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal. 3d 376, 404.) Staff's Initial Study is fundamentally and basically inadequate and conclusory in nature, precluding meaningful public review and comment. *(Mountain Lion Coalition v. Fish and Game Com.* (1989) 214 Cal.App.3d 1043, 1051; *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404; Cal. Code Regs., tit. 14, § 15063(c); see Cal. Code Regs., tit. 14, § 15088.5, [regulations apply substantially to initial studies and negative declaration thresholds for recirculation as well.].)

In the Initial Study, the Regional Board merely concludes that the Draft Waiver will not cause any effects "more severe than discussed in the 2004 Environmental Analysis/Negative Declaration" and, therefore, will protect waters of the State. (Attachment 5, p. 1.) The Regional Board provides no citation or evidence for such conclusions. This sort of conclusory statement provides "no basis for a comparison of the problems involved with the proposed project and the difficulties involved in the alternatives." (*People v. County of Kern* (1974) 39 Cal.App.3d 830, 841-842, quoting Silva v. Lynn (1973) 482 F.2d 1282, 128; see also *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404, ["but neither can we countenance a result that would require blind trust by the public, especially in light of *CEQA's fundamental goal that the public be fully informed* as to the environmental consequences of action by their public officials" (emphasis added)]; *City of Redlands v. County of San*

Bernardino (2002) 96 Cal.App.4th 398, 415, ["The County's conclusory evaluation of the amendments fail to support its decision to adopt a negative declaration."].)

Given that the Regional Board's Initial Study relies on conclusory language, lack of evidence, unidentified and unsubstantiated claims, and unlike comparisons to support its findings that no significant environmental affects will occur, the public's ability to provide input, to collaborate with, and to aid in finding solutions to maintain and/or improve water quality is largely restricted and makes it impossible for the public, many of whom have actively asserted a keen and sophisticated interest in the development of revised/new discharge requirements, to fully participate in the assessment of project impacts and alternatives associated with the project. (See *Mountain Lion Coalition v. Fish & Game Comm.* (1989) 214 Cal. App. 3d 1043, 1051.)

The Initial Study Predisposes the Project's Outcome

As discussed *infra*, the Initial Study and the Staff Report fail to identify and mitigate the Project's significant impacts, fail to provide proper analysis of alternatives, and are improperly predisposed toward Staff's Draft Waiver. (See Attachment 5 Initial Study, pp. 7-8.)

Staff's findings improperly determine that any alternative besides Staff's preferred "Draft Waiver" is infeasible. (Attachment 5, pp. 7-8.) Regional Board Staff must study and evaluate a reasonable range of alternatives and present a fair and unbiased analysis of such alternatives. There are dozens of different ways to formulate methods to maintain and/or improve water quality, if needed, including proper analysis of alternatives yet to presented to the Board. Public alternatives will be submitted to the Board on April 1, 2010, two full months after Staff's conclusory predetermination of the preferred project. Staff should not determine its preferred alternative until after proper analysis of all alternatives.

The Draft Staff Waiver Contains an Inadequate Assessment of Significant Impacts and Effects on the Environment

The CEQA Guidelines define a "significant effect" as: "… a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic and aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant." (Cal. Code Regs., tit. 14 § 15382; see also Pub. Resources Code, § 21068.)

The CEQA Guidelines further state that, "An ironclad definition of significant effect is not possible because the significance of an activity may vary with the setting. For example, an activity which may not be significant in an urban area may be significant in a rural area." (Cal. Code Regs., tit. 14 § 15064.) Appendix G of the CEQA Guidelines describes impacts that the California Resources Agency has determined are normally considered significant. These guidelines require that physical changes in the environment be evaluated based on factual evidence, reasonable assumptions supported by facts, and expert opinion based on fact. Given that many factors have to be analyzed and significant effects and impacts should be determined

on a case-by-case basis, the Regional Board cannot rely on previous antiquated environmental analysis to conclude possible potential impacts to Staff's Draft Waiver. Rather, the Regional Board must review all scientific data and facts, especially information collected since the initiation of the 2004 Conditional Waiver, prior to determining the Staff's Draft Waiver's potential to significantly effect or impact the environment.[5]

The Draft Staff Waiver Fails to Consider Significance of Social and Economic Impacts and Cumulative Effects

Although impacts that are solely economic in nature do not constitute "significant effects on the environment," economic or social impacts that will or have the potential to cause a physical change should be considered. (Cal. Code Regs., tit. 14, §§ 15064(e), 15131.) The term "significant effect on the environment" is defined in Section 21068 of CEQA as meaning "a substantial or potentially substantial adverse change in the environment." (Pub. Resources Code, § 21068.) This focus on physical changes is further reinforced by Sections 21100 and 21151. (Discussion following Cal. Code Regs., tit. 14, § 15131.) Despite the implication of these sections, CEQA does not focus exclusively on physical changes, and it is not exclusively physical in concern. (*Ibid*.) Thus, in certain situations such as the adoption of an expansive regulatory irrigated lands discharge program, economic and social effects of the project must be used to determine the significant effects on the environment. (*Citizens Assn. for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal. App. 3d 151, 170, ["The lead agency shall consider the secondary or indirect environmental consequences of economic and social changes."].) Since such effects were not considered in the Initial Study, the document is incomplete and flawed.

In *Citizens Association for Sensible Development of Bishop Area v. Inyo*, the court held that "economic or social change may be used to determine that a physical change shall be regarded as a significant effect of the environment. Where a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment." ((*Citizens Assn. for Sensible Development of Bishop Area v. County of Inyo* (1985) 172 Cal. App. 3d 151, 170.)

Staff's Draft Waiver proposes dramatic and severe impacts on the agricultural industry, which will have a significant effect on the economic and social environment of the Region. Such impacts include negative economic consequences, the possibility of eliminating agricultural crops produced in the area, loss of jobs, loss of food supply, loss of prime agricultural lands,

[5] Water quality regulations that aim to improve environmental quality can have unintended consequences that harm the environment and natural resources. The reallocation of water from one location to another, to meet water quality regulations, may reduce the well-being of fish and wildlife dependent on the water in the source region. Reduction of use of chemical pesticides that reduce farm productivity may lead to an increase in utilized land use and expansion of the utilized land base to wilderness areas. Diversion of water resources to meet environmental quality objectives may reduce the capacity to utilize this water in provision of environmental amenities. Thus, proper environmental analysis is needed.

economic collapse of local communities, changes the landscape and land uses, loss of wildlife habitat, loss of groundwater recharge areas, as well as other social and economic impacts. In addition to direct impacts, indirect impacts and consequences, cumulative[6] consequences are reasonably foreseeable and must be analyzed.

The Draft Staff Waiver Fails to Evaluate Economic Costs

The requirement to consider economics under Porter-Cologne Water Quality Control Act ("Porter-Cologne") is absolute. Water Code, section 13141 explicitly mandates:

> State policy for water quality control adopted or revised in accordance with the provisions of this article, and regional water quality control plans approved or revised in accordance with Section 13245, shall become a part of the California Water Plan effective when such state policy for water quality control, and such regional water quality control plans have been reported to the Legislature at any session thereof.
> However, prior to implementation of any agricultural water quality control program, an estimate of the total cost of such a program, together with an identification of potential sources of financing, shall be indicated in any regional water quality control plan.

(Wat. Code, § 13141.) Before a Regional Board can impose waste discharge requirements or conditioned water quality certification for discharges from irrigated lands, Porter-Cologne requires that it "shall take into consideration" the following factors: "the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241." (Wat. Code, § 13263.) Section 13241 in turn lists six "factors to be considered," including "economic considerations" and "water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area." (Wat. Code, § 13241.) 13241

Anticipated program implementation costs to the agricultural community include increases in potential fees, management practice implementation, monitoring costs, report preparation, and cost for education, as well as other costs. Given that the impacts of water quality regulations frequently take years to materialize, the Regional Board should analyze the economic costs and impacts within a dynamic framework taking into account the projected changes in the economic situation *over time*.

In addition to direct costs imposed on the agricultural community, the Regional Board should evaluate indirect costs, including the economic consequences that are transmitted via market interactions to other groups, such as consumers. Water quality regulation, such as Staff's Draft Waiver, increases the average cost of production and has a direct negative effect on the producer and the consumer through the resulting increase in variable costs and the output price. The

[6] "Cumulative impacts" are "two or more individual effects which, when considered together, are considerable or….compound to increase other environmental impacts. (Cal. Code Regs., tit. 14, § 15355.)

propagation of the impacts of a regulation through the economy is well documented and can be quantified by economic analysis.

The Scope of Staff's Draft Waiver is Improper

Staff's Draft Waiver seeks to greatly expand the current Conditional Waiver, venturing from a waiver that aims to improve water quality to a waiver that is unlawful, exceeds Regional Board authority, and contains significant and prescriptive requirements that gravely impact growers and agriculture in the Central Coast.

Given the size of the Region and the variety in topography, geography, water conditions, weather conditions, and crops produced, a one size fits all approach is not appropriate. What makes sense basin-wide may not make sense in a particular location, or for a portion of a particular stream. The Regional Board should consider local conditions, both economic and environmental, which can vary widely throughout the Region. In addition, all types of agricultural practices cannot be regulated in the same manner. Staff must account for these differences.

The Staff's Draft Waiver claims that "[t]he agricultural industry must implement the most effective management practices (related to irrigation, nutrient, pesticide and sediment management) that will most likely yield the greatest amount of water quality protection, and verify their effectiveness with on-farm data." (Preliminary Draft Report, p. 7.) This statement runs directly contrary to the legislative intent and purpose of the Porter-Cologne Act. Specifically, Porter-Cologne requires the Regional Board to regulate "to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters . . . ." (Wat. Code, § 13000.) Thus, any regulation of the agricultural industry must be reasonable considering a number of factors, including cost. Effectiveness alone is not a legal requirement in Porter-Cologne.

Improper Regulation of Nursery Operations

Staff's Draft Waiver expands the current Conditional Waiver to include nurseries, especially commercial nurseries, nursery stock production, and greenhouse operations. Such operations with "soil floors that do not have point-source type discharges, and are not currently operating under individual WDRs," are now regulated. (Attachment 3, p. 5.)

Staff's Draft Waiver contains many undefined and potentially highly impractical requirements for nursery operations. Of particular concern are: (1) Regulation of non-storm water discharge that must have no toxicity, drinking water standards for nitrates, low turbidity, and temperatures below 68°F; (2) Keeping rainwater and/or stormwater separated from wastewater and irrigation runoff; (3) Having to prevent all rainwater from coming into contact with containerized plants. Such requirements are unlawful and infeasible. Prior to mandating industry specific requirements, the Regional Board should gather and utilize nursery specific data and data specific to the Region. This Region is very different from areas throughout the state. Additionally, the geography, climatology, and topography within the Region itself varies substantially. Thus, proper and appropriate data is needed.

Staff's Draft Waiver Exceeds the Regional Board's Statutory Authority and Cannot Regulate Pesticides

California has regulated pesticides for over a century. The California Legislature has established a comprehensive body of law to control every aspect of pesticide sales and use. The California Department of Pesticide Regulation ("DPR") is mandated by law to protect the public health and environment by regulating pesticide sales and use and by fostering reduced-risk pest management. (Food & Agr. Code, §§ 11454, 11454.1, 12981.)

This strict oversight begins with product evaluation and registration and continues through statewide licensing of commercial applicators (including Appellant), dealers, and consultants, environmental monitoring, and residue testing of fresh produce. DPR currently has a staff of over 400 employees with an annual budget of approximately $70 million. (*Governor's Budget 2010-11, Proposed Budget Details*, <www.ebudget.ca.gov/stateagencybudgets> [as of March 28, 2010].) This work is augmented by approximately 400 biologists working for County Agricultural Commissioners in all 58 counties on local pesticide enforcement. (California Department of Pesticide Regulation, *A Guide to Pesticide Regulation,* p. 1 http://www.cdpr.ca.gov/doc/pressrls/dprguide/htm> [as of March 28, 2010].)

The California Food and Agriculture Code, division 7, chapter 2 and implementing regulations promulgated at title 3 of the California Code of Regulations, division 6 establish this comprehensive program under which DPR regulates the manufacture, distribution, sale and use of pesticides. The program seeks to provide for the proper, safe, and efficient use of pesticides essential for production of food and fiber, and to protect the public health and safety, as well as the environment, from harmful pesticides by ensuring proper stewardship of those pesticides. (*Californians for Alternatives to Toxics v. California Department of Pesticide Regulation* (2006) 136 Cal. App. 4th 1049, 1057, citing Food & Agr. Code, §11501.)

DPR oversees a multi-tiered enforcement infrastructure. While the Department has primary responsibility for enforcement of pesticide laws, the Pesticide Enforcement Branch and the Pest Management and Licensing Branch work with the County Agricultural Commissioners to enforce regulations at a local level. (California Department of Pesticide Regulation, *A Guide to Pesticide Regulation,* p. 45 <http://www.cdpr.ca.gov/doc/pressrls/dprguide/htm> [as of March 28, 2010].)

Given the need for proper and effective oversight of pesticide use, pesticide regulation is a matter of "statewide concern" that must be regulated from the state level. (Food & Agr. Code, § 11501.5(a).) The Legislature made this unmistakably clear by commencing the section with "this division and Division 7 (commencing with Section 12501) are of statewide concern and occupy the whole field of regulation." (*Ibid.*) The plain meaning of the words within this sentence illustrates the Legislature's intent for state regulation of pesticides and such regulation to be conducted by the Department of Pesticide Regulation and not the Regional Water Quality

Control Boards. Thus, the imposition of pesticide buffers for ground and aerial application is improper and exceeds statutory authority.[7] (See Attachment 3, pp. 63-64.)

Intellectual Property, Trade Secrets, and Proprietary Information Must Remain Confidential

Staff's Draft Waiver expands the nature, scope, contents, and use of the Farm Water Quality Management Plan. Requirements now include additional reporting, including detailed management practices and implementation practices. In addition, upon request, Farm Plans must be sent to the Regional Board. Notwithstanding the issues regarding additional reporting and the management implementation practices report, submittal of proprietary information to the Regional Board is disconcerting. Information within farm plans contains intellectual property, trade secrets, and proprietary information, much of which has no correlation or nexus to the Regional Board's authority to regulate water quality. Prior to any request for the submittal of the entire farm plan, the Regional Board should make a finding showing the necessity of the data and information required to be submitted and how such data is related to water quality. Such information must remain confidential. The Porter-Cologne Act explicitly provides protection to growers for intellectual property, trade secrets, and proprietary information that may be within a farm plan or report:

> When requested by the person furnishing a report, **the portions of a report that might disclose trade secrets or secret processes may not be made available for inspection by the public but shall be made available to governmental agencies for use in making studies**. However, these portions of a report shall be available for use by the state or any state agency in judicial review or enforcement proceedings involving the person furnishing the report.

(Wat. Code, § 13267(b)(2) (emphasis added).) Thus, the Regional Board must acknowledge that farm specific information, including pesticide application, irrigation practices, crop rotations, best management practices, etc., are intellectual property, trade secrets, and proprietary information that must remain confidential.

The Regional Board is Attempting to Circumvent DFG's Longstanding Streambed Alternation Requirements

Many of the activities and impacts sought to be regulated are currently directly or indirectly regulated through local governments, federal, and state agencies. For example, the Department of Fish and Game ("DFG") is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. To meet this responsibility, the Fish and Game Code requires an entity to notify DFG of any proposed activity that may substantially modify a river, stream, or lake. (Fish § Game Code, § 1602.) Persons must notify DFG prior to any activity that will:

[7] Additionally, the prescription of pesticide buffers, besides not being within the Regional Board's jurisdictional authority, equates to a mandate of a specific management practice. Such mandates are not within the Regional Board's authority.

- Substantially divert or obstruct the natural flow of any river, stream or lake;
- Substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or
- Deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

(Fish § Game Code, § 1602.) Given DFG's authority to regulate activities such as channel clearing and other activities, actions included in Staff's Draft Waiver present significant risk of regulatory overlap and duplication and infringe upon the regulatory authority of DFG. Additionally, by including specific provisions within the Draft Waiver that regulate and control streambed alternation, clearing, maintenance, etc, the Regional Board is attempting to circumvent DFG's longstanding streambed alternation requirements. Thus, any expansion of an irrigated discharge waiver to include such activities is duplicative regulation and unnecessary.

The Regulation of Riparian and Wetland Area Habitat Areas Exceeds the Regional Board's Statutory Authority

Regulating land use is not within the purview of the Regional Board. The Water Code and the Basin Plan focus on water quality and activities which may impair water quality. As discussed within, while the Regional Board has authority to prohibit an act which may result in a discharge, the Board does not have authority to require an act which is unrelated to discharges to waters of the state. (Wat. Code, § 13360.) In addition to exceeding its jurisdiction, dictating certain land use practices and prohibitions amounts to a regulatory taking of land by restricting its use without any relationship to water quality. (See *Penn Central Transp. Co. v. City of New York* (1978) 438 U.S. 104; see Attachment 3, pp. 69-72, proposing minimum riparian buffer widths of 50 feet, 75 feet and 100 feet for tier 1, 2, and 3 streams, respectively.)

Notwithstanding the lack of authority, it is also premature to regulate wetlands and riparian habitats. Staff relies upon the State Water Resources Control Board's wetlands definition and "Wetlands and Riparian Area Policy," a policy that is currently still in its infancy and draft stages. (See Attachment 1, p. 26.) Inclusion or exclusion of managed wetlands and riparian areas should depend on the development and final outcome of the State Water Board's Wetlands and Riparian Areas Policy and definition of "wetland." Action prior to the creation of the policy is futile.

Additionally, through its section 1600 Streambed Alteration Program, DFG already regulates upland riparian areas the Regional Board now seeks to regulate. (Fish § Game Code, 1602.) Such duplicative regulation is both inefficient and unnecessary. Thus, any expansion of an irrigated discharge waiver to protect wetland and riparian areas is duplicative regulation and unnecessary.

The Regional Board Does Not Have Authority To Dictate Management Practices and Methods of Compliance

The Regional Board does not have the statutory authority to mandate specific management practices. (Wat. Code, § 13360(a).) The Regional Board has the authority to adopt water quality

control plans, water quality objectives to "ensure the reasonable protection of beneficial uses," and waste discharge requirements. (Wat. Code, §§ 13240, 13241, 13242.) However, it cannot dictate the management and business practices undertaken by a landowner to reach the applicable discharge goal. Specifically, the Water Code states:

> No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order, or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner.

(Wat. Code, § 13360(a).) Within the Initial Study, it states that the "Preliminary Draft Irrigated Ag Order does not specify management practices that must be implemented." (Attachment 5, p. 16.) Unfortunately, this statement is incorrect since numerous times within the "Preliminary Draft Order" (Attachment 3), specific types of management practices are mandated.

Under the Preliminary Draft Order, the required Farm Plan would need to identify certain types of management practices including the use of integrated pest management ("IPM"). In fact, the Farm Plan would require a grower to maximize integrated pest management practices. Additionally, the Preliminary Draft Order requires specific management practices to control erosion and sediment, including maintaining crop residue or vegetative cover on the soil. However, the Regional Board has no authority to mandate or require the use of integrated pest management by individual growers or the use of specific types of crop covers.

<u>The Regional Board's Regulation of Groundwater is Improper</u>

As outlined in Staff's Draft Waiver, the Regional Board's proposed manner of groundwater regulation is improper. The Regional Board may not require dischargers to construct and maintain ponds, reservoirs and other containment structures to avoid leaching of waste to groundwater. (See Attachment 3, p. 69.) As discussed previously, prescriptive requirements such as these are considered to dictate the manner of compliance, which is unlawful and improper. (Wat. Code, § 13360.)

In formulating an irrigated lands program, the Regional Board should seek to develop the most efficient program that accomplishes water quality goals. The most efficient and effective methods for achieving these goals do not include the exploratory regulation of groundwater. Water is a critical resource for all of California, especially for agriculture. Without water, irrigated agriculture in the Central Coast will not exist. As a result, a high priority should be placed on efforts to assure that water management and monitoring programs are appropriately tailored to include only the regulation of surface water and equitably distribute regulatory costs across *all* waste dischargers, including those outside the agricultural community.

Groundwater monitoring and regulation is fraught with complexity and is very different than surface water quality monitoring. Monitoring will require a lot of time, expense, and science to identify and solve pollution problems since the ability to obtain good water quality data is difficult due to percolation and groundwater movement. Additionally, detecting pollutants in

groundwater and then identifying the source will be a time consuming, exploratory, and difficult endeavor. Before any groundwater monitoring program should be imposed, the Regional Board and State Board should coordinate with other government agencies that are involved in groundwater quality programs, such as the Department of Pesticide Regulation, to avoid duplication and additional expense. Coordination is also needed in order to adequately assess groundwater resources. Using best available science, evaluation of groundwater supplies within the Central Coast must be completed, including mapping of hydrogeologic features; determination of accurate locations and altitudes of wells; accurate estimates of water-budget components; measurements of groundwater levels; collection and analysis of groundwater samples; analysis of numerical models of groundwater flow to evaluate potential effects of changes in land and water use; determination of aquifer storage; stream depletion; well interference; and concrete determination of sources of pollution.

Farm Bureau proposes that the Regional Board defer groundwater management activities to other appropriate agencies and entities that are responsible for the protection of groundwater resources at the local level. Groundwater quality issues are unique to groundwater basins and subbasins. Thus, such issues are best addressed and managed locally.[8] Besides adequate local regulation, the Regional Board should avoid duplicative regulation among a number state agencies working on the same topic. Within the California Department of Pesticide Regulation, there exists the Ground Water Protection Program that regulates the use of certain pesticides found in ground water. (See Cal. Code. Regs., tit. 3, § 6800 et seq.) DPR's program is implemented and enforced by local County Agricultural Commissioners that are familiar with local groundwater conditions.

In light of the local agency efforts to manage groundwater resources, and the DPR regulatory activities that already exist, Farm Bureau recommends that the Regional Board recognize these activities and entities as the appropriate programs for addressing groundwater issues, and therefore determine that it is inappropriate, or at least premature, to adopt a new regulatory program for irrigated agriculture specific to groundwater. Additionally, it is within the Regional Water Board's authority to identify control actions recommended for implementation by others. (Wat. Code, § 13242(a).)[9]

<u>The Aquatic Habitat Protection Requirements are Unlawful</u>

The aquatic habitat provisions within Staff's Draft Waiver are unlawful and impractical for many reasons. The provisions result in an unconstitutional taking of private property, unlawfully dictate the manner of compliance, impede the authority of the Department of Fish and Game, prevent waterway maintenance activities for flood control, prohibit growers from complying

[8] For example, local management occurs through voluntarily developed groundwater management programs with quality objectives pursuant to Water Code section 10750 et seq.

[9] "Water quality objectives, we realize, may not always be readily enforceable. The statutory factors enumerated in section 13242, particularly the provisions for recommended action and time schedule, reflect the Legislature's recognition that an implementing program may be a lengthy and complex process requiring action by entities over which the Board has little or not control and also requiring significant time intervals." (*United States v. State Water Resources Control Board,* 182 Cal.App.3d 82, 122 (1st District COA, 1986).)

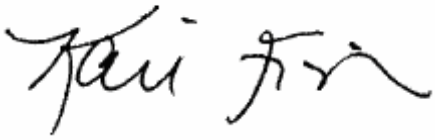
with buyer specifications that may be necessary for food safety reasons, and unlawfully require federal permits under the Clean Water Act for activities that are specifically exempt.

Conclusion

The agricultural community is committed to being stewards of the land and has attempted to work with the Regional Board on this matter since 2003. The agricultural community is fundamentally interested in ensuring the long term improvement of water quality in the region.

Given the diverse array of geography, topography, soil, microclimates, local conditions, and agricultural commodities grown in the Central Coast, water management and monitoring programs must be flexible and allow for necessary adaptations, both for localized areas and throughout the Central Coast. A one-size-fits-all approach to regulating all types of discharges from irrigated lands does not work in this Region due to the diversity of the Region that supports a corresponding variety of plant and animal communities and crop types. As currently drafted, Staff's Draft Waiver contains numerous flaws, areas of concern, exceedances of authority, and infeasible and improper regulations. Farm Bureau urges the Regional Board to revise the Draft Waiver in light of these concerns. Additionally, rather than continuing to amend and negotiate the contents of a conditional agricultural waiver every 5 years, Farm Bureau urges the Regional Board to pursue alternative regulatory vehicle alternatives including a long-term irrigated lands program.

Sincerely,



Kari E. Fisher
Associate Counsel

Implementation of Management Practices
Hearing Testimony excerpts from growers or grower representatives.

March 17, 2011
Page 179 - 180
Danny Merkeley
Growers today -- particularly the better
23 growers -- do pedio samples, do soil samples to know what
24 nitrogen, for example, in this case, needs -- there will
25 be for that particular commodity. In addition to that, we will add soil
2 amendments and things to change the Ph, change the makeup
3 of that soil to increase the -- the ability of -- of that
4 particular commodity to uptake those nutrients.
5 As a farmer, I know that.

Page 246
DR. CAHN: And we monitored for the whole
19 season. I'm giving you numbers that are the average for
20 the whole season. There can be individual irrigation
21 events. You might lose a little water.
22 But the indication here is that the current
23 practices growers are using in strawberries is fairly
24 well in check with what we understand of best management
25 practices.

Page 251
MR. TOMLINSON: And -- and that's what he was
16 -- part of his answer - right? - is that each crop is
17 going to have a different set of practices to try and
18 reduce risk for groundwater because we all need to -- to
19 achieve those goals. But it's all going to look
20 different for each commodity.
21 For here, for strawberries, we have a drip
22 irrigation system that's highly efficient.

Bob Martin Page 230
King City area.
2 As technology brings us information that we can
3 use to lessen negative impacts on water quality, we
4 listen, we learn and we improvise.
5 The shear size of our operation allows us to
6 experiment and utilize improved methods. If they've
7 proved successful, we're not shy in -- in sharing these
8 results with fellow farmers.
9 I have 15 growers that are raising onions for
10 -- for our company, right now. And I -- I share
11 everything with them.
12 Quick nitrate soil testing has been in our
13 program for close to 15 years now. Backflow prevention
14 devices have been in all of our wells for as long as I
15 can remember.
16 I can't understand why our large operation is
17 singled out in the draft -- staff's proposal, as the
18 highest risk category.

Page 350-351
MR. OVEREEM: Mr. Chairman, members of the
23 board. My name is Eric Overeem, O-V-E-R-E-E-M.
24 I'm a licensed pest control advisor, a
25 certified crop advisor, and I've had the opportunity of

Page 351
1 working in the Salinas Valley for almost 30 years, now.
2 In my experience, there have been substantial
3 changes to the overall nutrient management, to grow some
4 of the cash crops that we do.
5 Tissue and soil tests; a quick nitress test,
6 prior to sidedress; suction lysimeters to determine
7 what's in the root zone, et cetera, et cetera, I think
8 these have all gone a long ways to improve the nitrogen
9 use efficiency.
10 Also, the adoption of irrigation monitoring
11 programs and drip irrigation have significantly improved
12 the -- the irrigation use efficiency in this valley.

May4
Page 490. LOS HUERTOS: I would say that, in general,
21 growers need to be investing more in having better and
22 more sophisticated irrigation fertility management,

Exhibit 8

2006 Management Practice Checklist Update Summary Report

June 2007

State of California
REGIONAL WATER QUALITY CONTROL BOARD
Central Coast Region (3)

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Appendices

Appendix A: Farm Water Quality Management Practices Form

Introduction

The purpose of the 2006 Management Practice Checklist Update Report (2006 update report) is to summarize water quality management practice implementation reported by irrigated commercial farming operations (growers) in the Central Coast Region. Discharges from irrigated lands to surface and ground water are regulated in the Central Coast Region by the Conditional Wavier for Discharges from Irrigated Lands (conditional waiver), Order No. R3-2004-0117. The Central Coast Regional Water Quality Control Board (Water Board) adopted the conditional waiver on July 9, 2004, for a five-year cycle.

Upon enrollment, growers are required to submit a management practice checklist (checklist). In addition, growers must submit an update of the checklist at least once during the five-year cycle of the conditional waiver. The checklist is a short questionnaire that allows growers to identify planned or implemented farm water quality management practices. All enrolled growers were required to submit updated checklists by January 1, 2007. The checklist is included as Appendix A.

Methods

Determining Goals for the Checklist

One of the initial steps in the planning process for the checklist was to establish its goals. Some goals were outlined in the conditional waiver while others were outlined by Water Board staff. Additional goals were submitted by interested parties such as education and outreach coordinators and growers. A summary of the checklist goals is listed below.

Checklist Goals for the Conditional Waiver

- Establish the management practice checklist as a short questionnaire that allows the grower to identify management practices that are being planned and/or implemented for water quality protection.
- Allow growers to add practices that are known to or are likely to have a water quality benefit.
- Use the checklist to assess whether practices need to be adjusted or increased based on where water quality problems have been identified.

Checklist Goals from Water Board Staff

- Document management practices at the site level (e.g., ranches and farms) so that relationships between management practices and water quality can be examined.
- Make the checklist form easy to use and submit.
- Track management practices that benefit water quality and are applicable to irrigated agriculture in the Central Coast Region.

- Identify where to focus future outreach.
- Document progress towards achieving a Regional Water Quality Control Board long-term goal that, by 2025, 80% of the land within any watershed is properly managed to support a healthy functioning watershed, with the remaining 20% achieving positive trends.

Checklist Goals from Interested Parties

- Determine the amount of management practice implementation throughout the region and in the various counties and major watersheds.
- Make the checklist available to non-English speakers.

Developing the Management Practice Checklist

The practice reporting form was designed to determine the level of implementation for four types of farm water quality management practices: pesticide management, irrigation water management, erosion and sediment management, and nutrient management. Checklist questions were directed at the grower/operation level so that growers could submit only one checklist for their entire operation and not for each ranch site. This was done to simplify the submittal process for growers and the processing time for staff.

Delivering and Submitting the Checklist

On December 5, 2006, checklists were mailed to 1,775 enrolled growers who represent approximately 400,000 commercially irrigated acres in the Central Coast Region. The submittal due date was previously established in the conditional waiver as January 1, 2007. However, for inclusion in this report, late submittals were accepted until January 18, 2007.

Data Tabulation

The checklist responses submitted to the Water Board were entered into an Access database along with the growers' Conditional Waiver enrollment records. Database tables were queried and the results exported to Excel spreadsheets for processing into tables and graphs presented in this report.

Reporting the Results

The results of the checklist were processed into two primary formats. The first was by percent of responding growers and the second was by percent of represented acres.

Percent of Responding Growers

The percent of responding growers was defined as the number of grower responses at a particular type of implementation, divided by the total number of responding growers, multiplied by 100. For example, 1,040 growers responded by submitting a checklist. Of these, 771 growers implemented an Integrated Pest Management Program (question

P_1). Therefore, 74.1% of responding growers had implemented an Integrated Pest Management Program.

The growers were also separated into groups based on the major crop type farmed. Some growers farmed more than one crop type; in this situation the major crop type was establish as the one reported with the largest acreage.

Represented Acreage
The represented acreage was defined as the crop acreage farmed by growers who responded to the checklist. For example, a grower who responded to question P_1 of the checklist that they had implemented an Integrated Pest Management Program (IPM) and farms 100 acres of vineyard and 50 acres of row crops would have 150 represented acres as having IPM implemented.

Percent of Represented Acreage
The percent of represented acreage was defined as the represented acreage at a particular level of implementation divided by the total represented acreage times 100. For example, in question P_1, the total represented row crop acreage for the Central Coast Region is 287,533 and the implemented represented row crop acreage is 165,744, which represents 90.8% of the represented crop acreage.

Survey Limitations

This report presents the number and percentage of growers who responded to the checklist. It also presents the represented acreage of the grower. It does not present the actual acreage of implementation affected by a management practice.

Factors limiting the accuracy of the data include:

- The actual acreage for each type of response is difficult to capture using a self-reporting checklist because the checklist asked growers the level of implementation for each management practice, not the amount of acreage associated with each level of implementation.
- The actual acreage implemented is likely significantly less than the represented acreage that was recorded in this report due to most practices not being implemented across the entire operation. Also, the checklist responses were for the entire operation and did not assess implementation on an individual ranch level.
- The checklist was a self-assessment survey; the responses may vary based on the growers' interpretation of the questions and understanding of the management practices.
- The crop data for each grower was reported at the time the grower enrolled and acreage may have changed from the time of enrollment to the time when the checklist was completed. It was estimated that this was not a significant amount of error because of an acreage update for all growers collected two months prior to the checklist.

Results

This report presents the results of the checklist in two broad categories. One is by the represented crop acreage in the major counties in the region and the entire region. The other is by the responses and represented acreage for each management practice.

Represented Crop Acreage in Major Counties and Entire Region

The county with greatest total represented crop acreage was Monterey County with 147,351 acres (refer to Table 1). 71% of the crop acreage in Monterey County was reported as row crop. In the entire region the largest percentage of represented crop acreage was row crop at 66% followed by vineyard at 28% (refer to Figure 1).

Table 1
Represented Crop Acreage by Major Counties and Region Totals

	Row Crop		Orchard		Vineyard		Nursery		Greenhouse		Other		Total	
County	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Monterey	104,330	71%	1,431	1%	41,499	28%	144	<1%	247	<1%	6,948	5%	147,651	100%
San Benito	16,030	86%	1,790	10%	701	4%	1	<1%	49	<1%	805	4%	18,571	100%
San Luis Obispo	7,700	28%	2,839	10%	16,780	60%	327	1%	92	<1%	3,496	13%	27,738	100%
Santa Barbara	32,074	58%	6,779	12%	15,648	28%	247	<1%	236	<1%	870	2%	54,984	100%
Santa Clara	3,921	71%	678	12%	785	14%	69	1%	57	1%	632	11%	5,510	100%
Santa Cruz	13,192	88%	1,314	9%	122	1%	161	1%	255	2%	827	5%	15,044	100%
Entire Region	177,247	66%	14,831	6%	75,535	28%	949	<1%	936	<1%	13,578	5%	269,498	100%

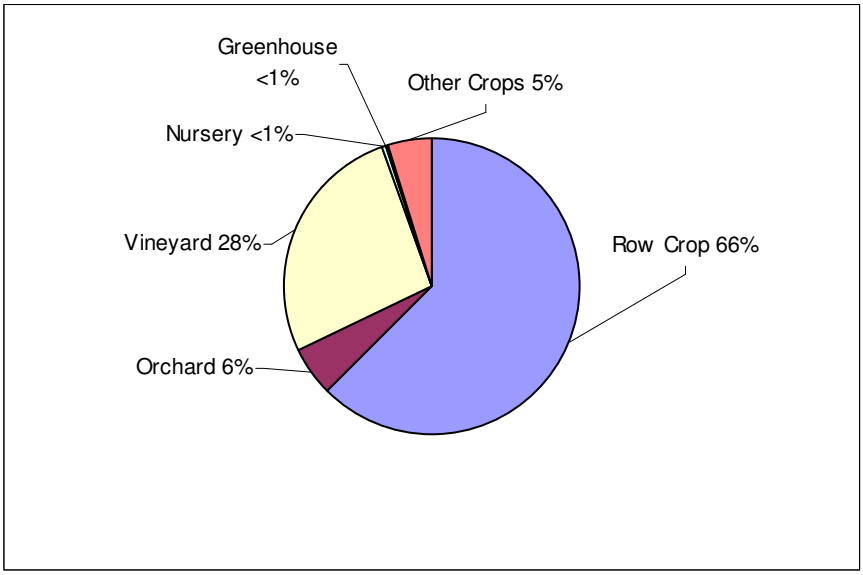

Figure 1: Percentage of represented crop acreage in the entire region.

Responses and Represented Acreage for each Management Practice Reported

The results in this section are organized in the same format as the questions were in the checklist (refer to Appendix A). The results are organized by four management practice categories: pesticide management, irrigation water management, erosion and sediment control management, and nutrient management. For each category, summary graphs show levels of implementation of each management practices for both responding growers and represented acreage (in percentage).

Pesticide Management

Pesticide management questions are listed below. The responses for all crop types to the individual questions follow in the summary graphs (refer to Figures 2 and 3). The responses by growers to each pesticide management question are outlined by major crop type along with the represented acreage.

<u>Pesticide Management Questions</u>

P_1) Is an integrated Pest Management program established?

P_2) Are pest populations assessed and pesticides applied based on scouting data, thresholds, and/or risk assessment models?

P_3) Are introduced or managed biological control agents utilized?

P_4) Does pesticide selection consider runoff or leaching potential?

P_5) Does pesticide selection consider toxicity to non-target organisms?

P_6) Is pesticide application equipment regularly inspected, maintained, and calibrated to ensure appropriate application rates and distributions?

P_7) Is yearly pesticide training provided for all pesticide handlers who apply, load, mix, transport, clean, and repair pesticide application equipment?

P_8) Do pesticide storage facilities have concrete pads and curbs for containment of spills?

P_9) Are pesticide mixing and loading areas located in such a manner to reduce the likelihood of a spill or overflow contaminating a water source?

P_10) Are production wells on elevated concrete bases upslope of pesticide storage and handling facilities?

P_11) Does wellhead protection consist of an elevated concrete seal, sump, or buffer area of 100’ around the wellhead and a backflow prevention device?

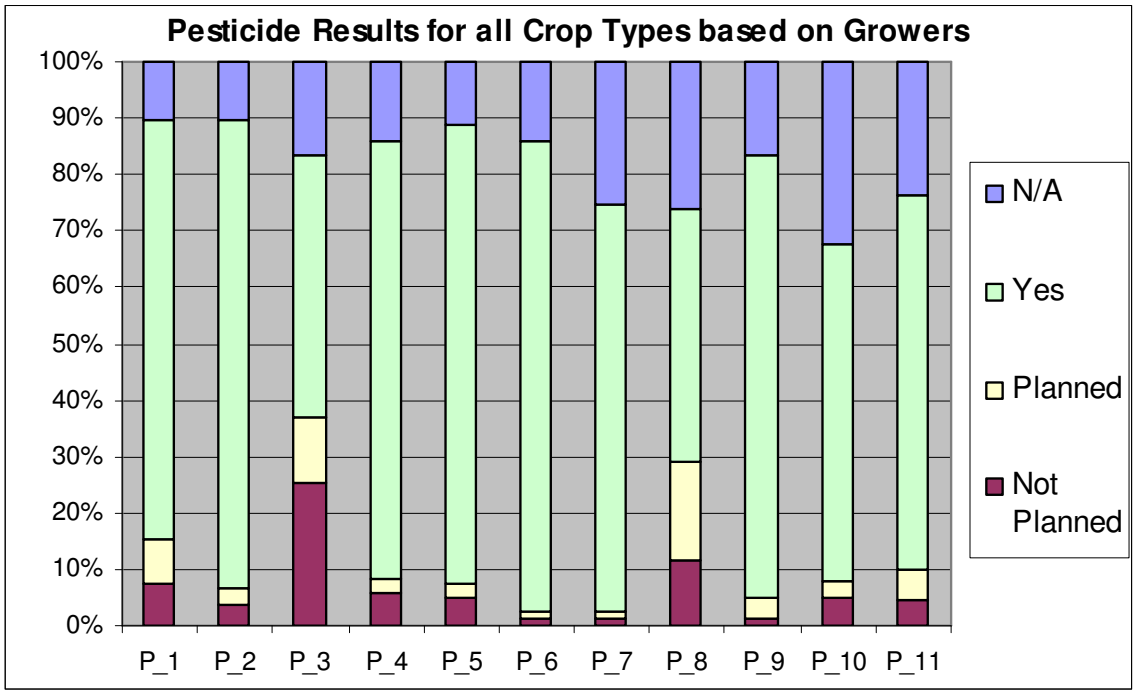

Figure 2: Level of implementation of pesticide management practices for all represented growers.

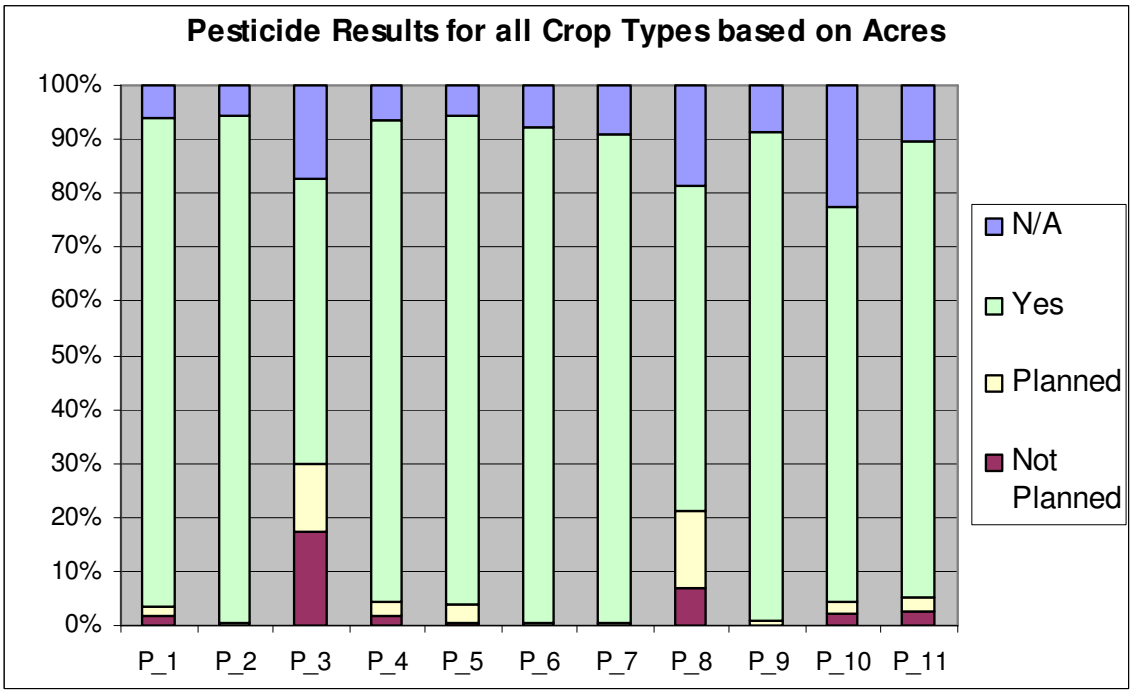

Figure 3: Level of implementation of pesticide management practices for all represented acres.

P_1) Is an Integrated Pest Management Program established?

Responding Growers for all Crop Types

- 74.1% (771 growers) have established an Integrated Pest Management Program.
- 7.8% (81 growers) plan implementation within three years.
- 7.6% (79 growers) do not plan to implement this practice.
- 10.5% (109 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	771	74.1	81	7.8	79	7.6	109	10.5	1,040	100
Row Crop	224	82.4	15	5.5	13	4.8	20	7.4	272	100
Orchard	168	65.9	25	9.8	26	10.2	36	14.1	255	100
Vineyard	224	77.8	27	9.4	14	4.9	23	8.0	288	100
Nursery	40	74.1	4	7.4	6	11.1	4	7.4	54	100
Greenhouse	34	64.1	3	5.7	5	9.4	11	20.8	53	100
Other	42	64.6	3	4.6	11	16.9	9	13.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 90.5% (260,078 acres) have established an Integrated Pest Management Program.
- Growers representing 1.5% (4,332 acres) plan implementation within three years.
- Growers representing 1.8% (5,305 acres) do not plan to implement this practice.
- Growers representing 6.2% (17,818 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	260,078	90.5	4,332	1.5	5,305	1.8	17,818	6.2	287,533	100
Row Crop	165,744	90.8	1980	1.1	5,636	3.1	9163	5.0	182,523	100
Orchard	13,914	84.5	1221	7.4	559	3.4	781	4.7	16,475	100
Vineyard	72,884	90.0	701	0.9	244	0.3	7157	8.8	80,986	100
Nursery	841	84.1	76	7.6	65	6.5	18	1.8	1,000	100
Greenhouse	803	81.7	36	3.7	79	8.0	65	6.6	983	100
Other	14,039	92.8	351	2.3	289	1.9	454	3.0	15,133	100

P_2) Are pest populations assessed and pesticides applied based on scouting data, thresholds, and/or risk assessment models?

Responding Growers for all Crop Types

- 83.1% (864 growers) assess pest populations and apply pesticides based on scouting data, thresholds, and/or risk assessment models.
- 2.7% (28 growers) plan implementation within three years.
- 3.8% (39 growers) do not plan to implement this practice.
- 10.5% (109 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	864	83.1	28	2.7	39	3.8	109	10.5	1,040	100
Row Crop	234	86.0	8	2.9	4	1.5	26	9.6	272	100
Orchard	198	77.6	4	1.6	15	5.9	38	14.9	255	100
Vineyard	254	88.2	8	2.8	9	3.1	17	5.9	288	100
Nursery	45	83.3	1	1.9	4	7.4	4	7.4	54	100
Greenhouse	42	79.2	3	5.7	1	1.9	7	13.2	53	100
Other	50	76.9	1	1.5	2	3.1	12	18.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 93.9% (270,076 acres) assess pest populations and apply pesticides based on scouting data, thresholds, and/or risk assessment models.
- Growers representing 0.4% (1,154 acres) plan implementation within three years.
- Growers representing 0.2% (504 acres) do not plan to implement this practice.
- Growers representing 5.5% (15,799 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	270,076	93.9	1,154	0.4	504	0.2	15,799	5.5	287,533	100
Row Crop	173,686	95.2	884	0.5	238	0.1	7,715	4.2	182,523	100
Orchard	15,499	94.1	194	1.2	158	0.9	624	3.8	16,475	100
Vineyard	73,637	90.9	106	0.1	58	0.01	7,185	8.9	80,986	100
Nursery	928	92.8	3	0.3	50	5.0	19	1.9	1,000	100
Greenhouse	919	93.5	39	5.0	8	0.8	17	1.7	983	100
Other	14,657	96.9	14	0.09	13	0.09	449	3.0	15,133	100

P_3) Are introduced or managed biological control agents utilized?

Responding Growers for all Crop Types

- 46.3% (481 growers) utilize introduced or managed biological control agents.
- 11.9% (124 growers) plan implementation within three years.
- 25.2% (262 growers) do not plan to implement this practice.
- 16.6% (173 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	481	46.3	124	11.9	262	25.2	173	16.6	1,040	100
Row Crop	138	50.7	28	10.3	62	22.8	44	16.2	272	100
Orchard	107	41.9	30	11.8	65	25.5	53	20.8	255	100
Vineyard	131	45.5	44	15.3	73	25.3	40	13.9	288	100
Nursery	27	50.0	6	11.1	14	25.9	7	13.0	54	100
Greenhouse	22	41.5	6	11.3	15	28.3	10	18.9	53	100
Other	28	43.1	5	7.7	17	26.1	15	23.1	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 52.9% (152,075 acres) utilize introduced or managed biological control agents.
- Growers representing 12.5% (36,017 acres) plan implementation within three years.
- Growers representing 17.4% (50,046 acres) do not plan to implement this practice.
- Growers representing 17.2% (49,395 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	152,075	52.9	36017	12.5	50,046	17.4	49,395	17.2	287,533	100
Row Crop	112,215	61.5	16125	8.8	31,759	17.4	22424	12.3	182,523	100
Orchard	8,855	53.7	2236	13.6	3,412	20.7	1972	12.0	16,475	100
Vineyard	25,537	31.5	17314	21.4	13,337	16.5	24798	30.6	80,986	100
Nursery	435	43.5	239	23.9	223	22.3	103	10.3	1,000	100
Greenhouse	673	53.7	34	2.7	242	19.3	304	24.3	983	100
Other	11,995	79.2	783	5.2	1,388	9.2	967	6.4	15,133	100

P_4) Does pesticide selection consider runoff or leaching potential?

Responding Growers for all Crop Types

- 77.6% (807 growers) consider runoff or leaching potential with pesticide selection.
- 2.4% (25 growers) plan implementation within three years.
- 5.7% (59 growers) do not plan to implement this practice.
- 14.3% (149 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	807	77.6	25	2.4	59	5.7	149	14.3	1,040	100
Row Crop	218	80.2	11	4.0	9	3.3	34	12.5	272	100
Orchard	183	71.8	5	2.0	15	5.8	52	20.4	255	100
Vineyard	241	83.7	6	2.1	20	6.9	21	7.3	288	100
Nursery	45	83.3	0	0.0	3	5.6	6	11.1	54	100
Greenhouse	32	60.4	2	3.8	6	11.3	13	24.5	53	100
Other	47	72.3	1	1.5	5	7.7	12	18.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 89.2% (256,520 acres) consider runoff or leaching potential with pesticide selection.
- Growers representing 2.6% (7,694 acres) plan implementation within three years.
- Growers representing 1.7% (4,897 acres) do not plan to implement this practice.
- Growers representing 6.4% (18,422 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	256,520	89.2	7,694	2.6	4,897	1.7	18,422	6.4	287,533	100
Row Crop	162,043	88.8	6,364	3.5	3,890	2.1	10,226	5.6	182,523	100
Orchard	14,922	90.6	287	1.7	225	1.4	1,041	6.3	16,475	100
Vineyard	72,801	89.9	679	0.8	556	0.7	6,950	8.6	80,986	100
Nursery	915	91.5	4	0.4	37	3.7	44	4.4	1,000	100
Greenhouse	790	80.4	6	0.6	49	5.0	138	14.0	983	100
Other	14,290	94.4	273	1.8	148	1.0	422	2.8	15,133	100

P_5) Does pesticide selection consider toxicity to non-target organisms?

Responding Growers for all Crop Types

- 81.2% (844 growers) consider toxicity to non-target organisms with pesticide selection.
- 2.5% (26 growers) plan implementation within three years.
- 5.0% (52 growers) do not plan to implement this practice.
- 11.3% (118 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	844	81.2	26	2.5	52	5.0	118	11.3	1,040	100
Row Crop	231	84.9	11	4.0	7	2.6	23	8.5	272	100
Orchard	198	77.6	1	0.4	11	4.3	45	17.7	255	100
Vineyard	246	85.4	8	2.8	18	6.3	16	5.5	288	100
Nursery	45	83.3	1	1.9	3	5.6	5	9.2	54	100
Greenhouse	30	56.6	3	5.6	10	18.9	10	18.9	53	100
Other	51	78.5	1	1.5	2	3.1	11	16.9	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 90.3% (259,779 acres) consider toxicity to non-target organisms with pesticide selection.
- Growers representing 3.5% (10,134 acres) plan implementation within three years.
- Growers representing 0.5% (1,300 acres) do not plan to implement this practice.
- Growers representing 5.7% (16,320 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	259,779	90.3	10,134	3.5	1,300	0.5	16,320	5.7	287,533	100
Row Crop	163,698	89.7	9,920	5.4	538	0.3	8,367	4.6	182,523	100
Orchard	15,476	93.9	35	0.2	173	1.1	791	4.8	16,475	100
Vineyard	73,455	90.7	145	0.2	512	0.6	6,874	8.5	80,986	100
Nursery	916	91.6	20	2.0	35	3.5	29	2.9	1,000	100
Greenhouse	859	87.4	11	1.1	70	7.1	43	4.4	983	100
Other	14,766	97.6	37	0.2	17	0.1	313	2.1	15,133	100

P_6) Is pesticide application equipment regularly inspected, maintained, and calibrated to ensure appropriate application rates and distribution?

Responding Growers for all Crop Types

- 83.4% (867 growers) regularly inspect, maintain, and calibrate pesticide application equipment to ensure appropriate application.
- 1.3% (14 growers) plan implementation within three years.
- 1.3% (13 growers) do not plan to implement this practice.
- 14.0% (146 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	867	83.4	14	1.3	13	1.3	146	14.0	1,040	100
Row Crop	232	85.3	4	1.5	1	0.4	35	12.8	272	100
Orchard	183	71.8	4	1.6	6	2.4	62	24.2	255	100
Vineyard	264	91.7	5	1.7	3	1.0	16	5.6	288	100
Nursery	46	85.2	0	0.0	2	3.7	6	11.1	54	100
Greenhouse	47	88.7	0	0.0	0	0.0	6	11.3	53	100
Other	51	78.5	1	1.5	1	1.5	12	18.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 91.9% (264,171 acres) regularly inspect, maintain, and calibrate pesticide application equipment to ensure appropriate application.
- Growers representing 0.2% (548 acres) plan implementation within three years.
- Growers representing 0.04% (132 acres) do not plan to implement this practice.
- Growers representing 7.9% (22,682 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	264,171	91.9	548	0.2	132	0.04	22,682	7.9	287,533	100
Row Crop	167,791	91.9	348	0.2	14	0.008	14,370	7.9	182,523	100
Orchard	15,159	92.0	154	0.9	68	0.4	1,094	6.7	16,475	100
Vineyard	74,030	91.4	84	0.1	11	0.01	6,861	8.5	80,986	100
Nursery	936	93.6	0	0.0	29	2.9	35	3.5	1,000	100
Greenhouse	956	97.3	6	0.6	6	0.6	15	1.5	983	100
Other	14,607	96.5	12	0.08	6	0.04	508	3.4	15,133	100

P_7) Is yearly pesticide training provided for all pesticide handlers who apply, load, mix, transport, clean, and repair pesticide application equipment?

Responding Growers for all Crop Types

- 72.4% (753 growers) provide yearly pesticide training for all pesticide handlers.
- 1.1% (11 growers) plan implementation within three years.
- 1.3% (14 growers) do not plan to implement this practice.
- 25.2% (262 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	753	72.4	11	1.1	14	1.3	262	25.2	1,040	100
Row Crop	224	82.4	1	0.4	2	0.7	45	16.5	272	100
Orchard	144	56.4	3	1.2	6	2.4	102	40.0	255	100
Vineyard	224	77.8	4	1.4	3	1.0	57	19.8	288	100
Nursery	43	79.6	0	0.0	1	1.9	10	18.5	54	100
Greenhouse	45	84.9	1	1.9	0	0.0	7	13.2	53	100
Other	40	61.5	1	1.5	2	3.1	22	33.9	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 90.7% (260,818 acres) provide yearly pesticide training for all pesticide handlers.
- Growers representing 0.3% (767 acres) plan implementation within three years.
- Growers representing 0.1% (250 acres) do not plan to implement this practice.
- Growers representing 8.9% (25,698 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	260,818	90.7	767	0.3	250	0.09	25,698	8.9	287,533	100
Row Crop	166,522	91.2	200	0.1	21	0.01	15,780	8.6	182,523	100
Orchard	14,333	87.0	518	3.2	140	0.8	1,484	9.0	16,475	100
Vineyard	73,375	90.6	105	0.1	4	0.005	7,502	9.3	80,986	100
Nursery	932	93.2	0	0.0	24	2.4	44	4.4	1,000	100
Greenhouse	957	97.4	1	0.1	7	0.7	18	1.8	983	100
Other	13,719	90.7	32	0.2	77	0.5	1305	8.6	15,133	100

P_8) Do pesticide storage facilities have concrete pads and curbs for containment of spills?

Responding Growers for all Crop Types

- 44.6% (464 growers) have pesticide storage facilities with concrete pads and curbs for containment of spills.
- 17.5% (182 growers) plan implementation within three years.
- 11.7% (122 growers) do not plan to implement this practice.
- 26.2% (272 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	464	44.6	182	17.5	122	11.7	272	26.2	1,040	100
Row Crop	142	52.2	37	13.6	21	7.7	72	26.5	272	100
Orchard	94	36.9	36	14.1	33	12.9	92	36.1	255	100
Vineyard	137	47.6	58	20.1	31	10.8	62	21.5	288	100
Nursery	24	44.4	10	18.5	9	16.7	11	20.4	54	100
Greenhouse	25	47.2	14	26.4	8	15.1	6	11.3	53	100
Other	24	36.9	16	24.6	9	13.9	16	24.6	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 60.4% (173,649 acres) have pesticide storage facilities with concrete pads and curbs for containment of spills.
- Growers representing 14.4% (41,547 acres) plan implementation within three years.
- Growers representing 6.8% (19,461 acres) do not plan to implement this practice.
- Growers representing 18.4% (52,876 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	173,649	60.4	41,547	14.4	19,461	6.8	52,876	18.4	287,533	100
Row Crop	104,090	57.0	21,513	11.8	16,033	8.8	40,887	22.4	182,523	100
Orchard	7,990	48.5	4,488	27.2	1,885	11.5	2,112	12.8	16,475	100
Vineyard	53,503	66.1	12,763	15.8	4,556	5.5	10,164	12.6	80,986	100
Nursery	472	47.2	345	34.5	112	11.2	71	7.1	1,000	100
Greenhouse	460	46.8	384	39.1	116	11.8	23	2.3	983	100
Other	8,497	56.1	4,307	28.5	692	4.6	1,637	10.8	15,133	100

P_9) Are pesticide mixing and loading areas located in such a manner to reduce the likelihood of a spill or overflow contaminating a water source?

Responding Growers for all Crop Types

- 78.7% (818 growers) locate pesticide mixing and loading areas to reduce the likelihood of a spill or overflow contaminating a water source.
- 3.7% (39 growers) plan implementation within three years.
- 1.1% (11 growers) do not plan to implement this practice.
- 16.5% (172 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	818	78.7	39	3.7	11	1.1	172	16.5	1,040	100
Row Crop	220	80.9	5	1.8	1	0.4	46	16.9	272	100
Orchard	170	66.7	13	5.1	4	1.5	68	26.7	255	100
Vineyard	247	85.8	16	5.5	2	0.7	23	8.0	288	100
Nursery	43	79.6	1	1.9	2	3.7	8	14.8	54	100
Greenhouse	42	79.2	3	5.7	1	1.9	7	13.2	53	100
Other	52	80.0	1	1.5	1	1.5	11	17.0	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 90.1% (259,195 acres) locate pesticide mixing and loading areas to reduce the likelihood of a spill or overflow contaminating a water source.
- Growers representing 1.0% (2,856 acres) plan implementation within three years.
- Growers representing 0.07% (203 acres) do not plan to implement this practice.
- Growers representing 8.8% (25,279 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	259,195	90.1	2,856	1.0	203	0.07	25,279	8.8	287533	100
Row Crop	164,627	90.2	1,050	0.6	15	0.008	16,831	9.2	182,523	100
Orchard	14,458	87.8	790	4.8	64	0.4	1,163	7.1	16,475	100
Vineyard	73,029	90.2	955	1.2	86	0.1	6,916	8.5	80,986	100
Nursery	928	92.8	6	0.6	27	2.7	39	3.9	1,000	100
Greenhouse	789	80.3	71	7.2	8	0.8	115	11.7	983	100
Other	14,460	95.6	196	1.3	7	0.05	470	3.1	15,133	100

P_10) Are production wells on elevated concrete bases upslope of pesticide storage and handling facilities?

Responding Growers for all Crop Types

- 60.0% (624 growers) have production wells on elevated concrete bases upslope of pesticide storage and handling facilities.
- 2.8% (29 growers) plan implementation within three years.
- 4.9% (51 growers) do not plan to implement this practice.
- 32.3% (336 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	624	60.0	29	2.8	51	4.9	336	32.3	1,040	100
Row Crop	189	69.5	8	2.9	8	2.9	67	24.6	272	100
Orchard	116	45.5	6	2.4	10	3.9	123	48.2	255	100
Vineyard	181	62.8	12	4.2	24	8.3	71	24.7	288	100
Nursery	30	55.6	0	0.0	1	1.9	23	42.6	54	100
Greenhouse	39	73.6	3	5.7	2	3.8	9	17.0	53	100
Other	41	63.1	0	0.0	4	6.2	20	30.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 73.3% (210,873 acres) have production wells on elevated concrete bases upslope of pesticide storage and handling facilities.
- Growers representing 2.2% (6,198 acres) plan implementation within three years.
- Growers representing 2.2% (6,402 acres) do not plan to implement this practice.
- Growers representing 22.3% (64,060 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	210,873	73.3	6,198	2.2	6,402	2.2	64,060	22.3	287,533	100
Row Crop	143,432	78.6	1,527	0.8	3,080	1.7	34,484	18.9	182,523	100
Orchard	10,327	62.7	1,298	7.9	559	3.4	4,291	26.0	16,475	100
Vineyard	50,209	62.0	3,033	3.7	2,554	3.1	25,190	31.1	80,986	100
Nursery	594	59.4	7	0.7	181	18.1	218	21.8	1,000	100
Greenhouse	745	75.8	55	5.6	10	1.0	173	17.6	983	100
Other	12,959	85.6	1	0.007	186	1.2	1,987	13.1	15,133	100

P_11) Does wellhead protection consist of an elevated concrete seal, sump, or buffer area of 100' around the wellhead and a backflow prevention device?

Responding Growers for all Crop Types

- 66.3% (690 growers) provide wellhead protection through an elevated concrete seal, sump, or buffer area of 100' around the wellhead and a backflow prevention device.
- 5.4% (56 growers) plan implementation within three years.
- 4.5% (47 growers) do not plan to implement this practice.
- 23.8% (247 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	690	66.3	56	5.4	47	4.5	247	23.8	1,040	100
Row Crop	218	80.1	16	5.9	10	3.7	28	10.3	272	100
Orchard	125	49.0	9	3.5	14	5.5	107	42.0	255	100
Vineyard	205	71.2	18	6.3	14	4.9	51	17.7	288	100
Nursery	32	59.3	3	5.6	3	5.6	16	29.6	54	100
Greenhouse	38	71.7	4	7.5	0	0.0	11	20.8	53	100
Other	44	67.7	4	6.1	3	4.6	14	21.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 84.1% (241,680 acres) provide wellhead protection through an elevated concrete seal, sump, or buffer area of 100' around the wellhead and a backflow prevention device.
- Growers representing 2.8% (8,055 acres) plan implementation within three years.
- Growers representing 2.6% (7,493 acres) do not plan to implement this practice.
- Growers representing 10.5% (30,305 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	241,680	84.1	8,055	2.8	7,493	2.6	30,305	10.5	28,7533	100
Row Crop	161,752	88.6	5710	3.1	2,443	1.3	12618	6.9	182,523	100
Orchard	11,302	68.6	811	4.9	1,372	8.3	2990	18.1	16,475	100
Vineyard	60,582	74.8	1178	1.5	3,173	3.9	16053	19.8	80,986	100
Nursery	632	63.2	15	1.5	208	20.8	145	14.5	1,000	100
Greenhouse	789	80.3	51	5.2	17	1.7	126	12.8	983	100
Other	13,490	89.1	502	3.3	202	1.3	939	6.2	15,133	100

Irrigation Water Management

The questions for this section are listed below. The responses for all crop types to the individual questions follow in the summary graphs (refer to Figures 4 and 5). The responses by growers to each irrigation water management question are outlined by major crop type along with the represented acreage.

Irrigation Water Management Questions

I_1) Is drip irrigation distribution uniformity maximized and maintained through regular system equipment and system pressure maintenance?

I_2) Is sprinkler and micro-sprinkler irrigation distribution uniformity maximized and maintained through regular system pressure maintenance and water application during low wind conditions?

I_3) Is furrow and flood irrigation distribution uniformity maximized and maintained by either managing furrow lengths, installing surge irrigation valves, installing irrigation field ditches, or using alternate row irrigation?

I_4) Is your irrigation system design optimized by matching sprinkler nozzle/drip applicator flow rates to the infiltration rate of the soil?

I_5) Are measured or published evapo-transpiration data (CIMIS) used to determine crop water use?

I_6) Is the soil water-holding capacity known?

I_7) Are records kept for each crop irrigated? (Records include the date, amount of each irrigation water applied, and the source of water used.)

I_8) Have all irrigators who apply irrigation water and maintain irrigation systems received training?

I_9) Has an irrigation mobile lab system evaluation been completed and the system been adjusted accordingly?

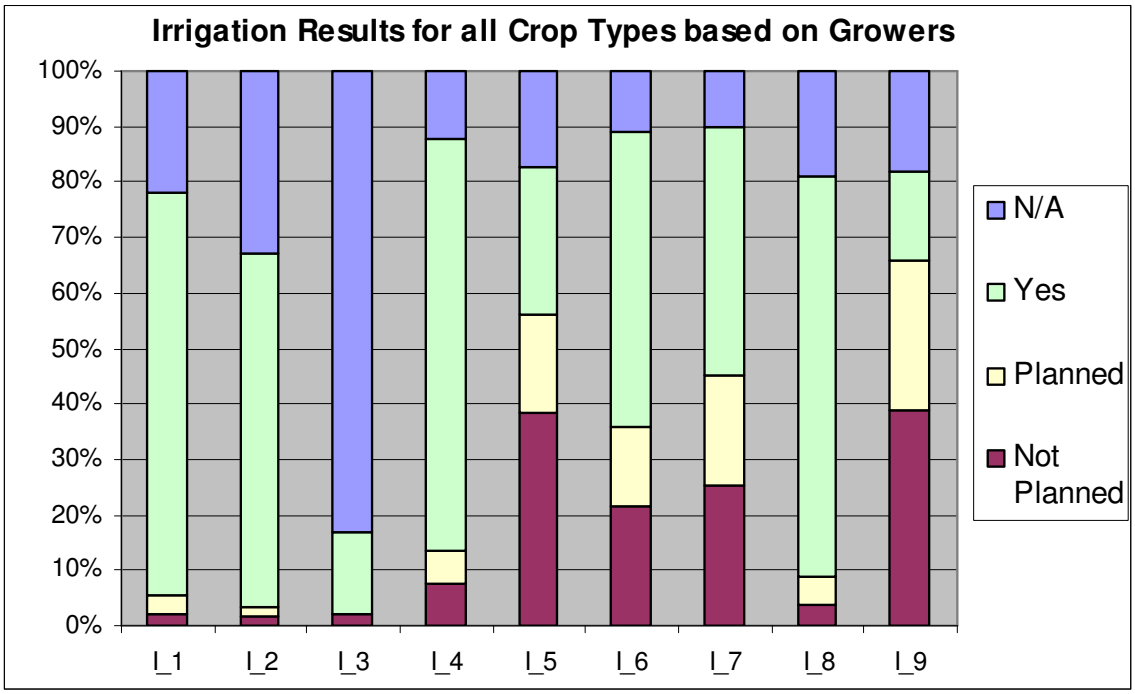

Figure 4: Level of implementation of irrigation water management practices for all represented growers.

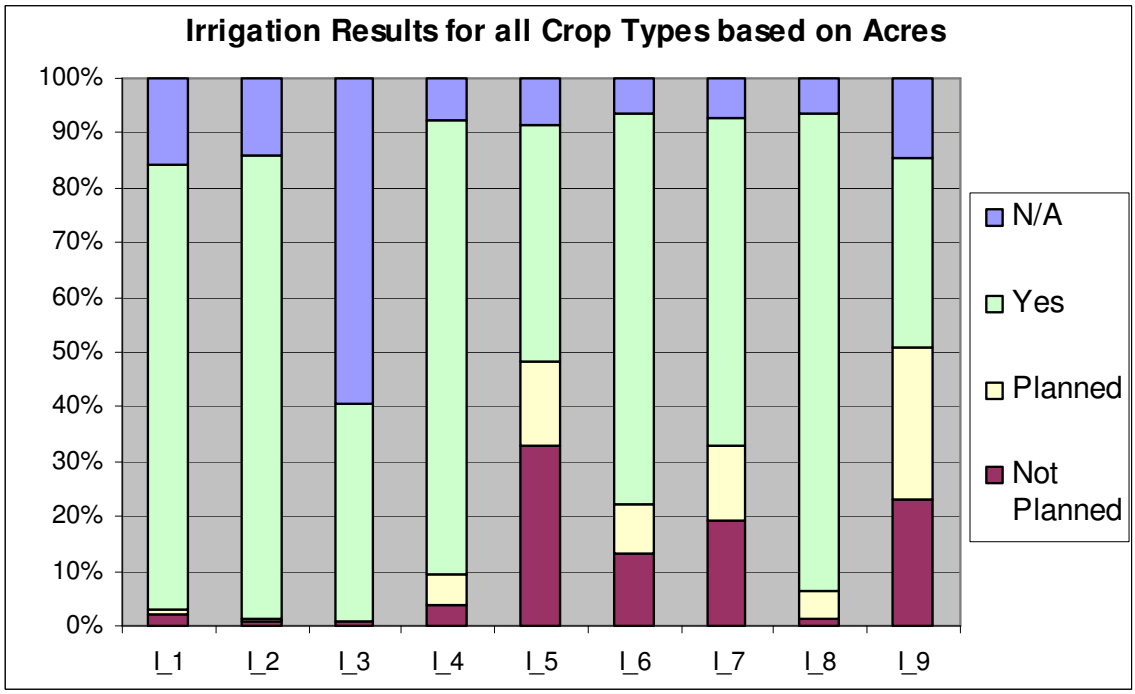

Figure 5: Level of implementation of irrigation water management practices for all represented acres.

I_1) Is drip irrigation distribution uniformity maximized and maintained through regular system equipment and system pressure maintenance?

Responding Growers for all Crop Types

- 72.7% (756 growers) maximize and maintain drip irrigation distribution uniformity.
- 3.2% (33 growers) plan implementation within three years.
- 2.2% (23 growers) do not plan to implement this practice.
- 21.9% (228 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	756	72.7	33	3.2	23	2.2	228	21.9	1,040	100
Row Crop	207	76.1	8	2.9	9	3.3	48	17.6	272	100
Orchard	145	56.9	9	3.5	7	2.7	94	36.9	255	100
Vineyard	264	91.7	11	3.8	1	0.3	12	4.2	288	100
Nursery	32	59.3	1	1.9	3	5.6	18	33.3	54	100
Greenhouse	34	64.2	1	1.9	1	1.9	17	32.1	53	100
Other	37	56.9	0	0.0	2	3.1	26	40.0	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 80.9% (232,732 acres) maximize and maintain drip irrigation distribution uniformity.
- Growers representing 1.1% (3,080 acres) plan implementation within three years.
- Growers representing 2.1% (6,022 acres) do not plan to implement this practice.
- Growers representing 15.9% (45,699 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	232,732	80.9	3,080	1.1	6,022	2.1	45,699	15.9	287,533	100
Row Crop	144,692	79.3	1,425	0.8	5,109	2.8	31,297	17.1	182,523	100
Orchard	10,819	65.7	871	5.3	391	2.4	4,394	26.7	16,475	100
Vineyard	72,848	90.0	864	1.1	181	0.2	7,093	8.8	80,986	100
Nursery	799	79.9	13	1.3	35	3.5	153	8.7	1,000	100
Greenhouse	756	76.9	5	0.5	57	5.8	165	16.8	983	100
Other	11,835	78.2	1	0.00006	249	1.6	3,048	20.1	15,133	100

I_2) Is sprinkler and micro-sprinkler irrigation distribution uniformity maximized and maintained through regular system pressure maintenance and water application during low wind conditions?

Responding Growers for all Crop Types

- 63.7% (662 growers) maximize and maintain sprinkler irrigation distribution uniformity.
- 2.0% (21 growers) plan implementation within three years.
- 1.5% (16 growers) do not plan to implement this practice.
- 32.8% (341 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	662	63.7	21	2.0	16	1.5	341	32.8	1,040	100
Row Crop	223	82.0	4	1.5	5	1.8	40	14.7	272	100
Orchard	204	80.0	10	3.9	2	0.8	39	15.3	255	100
Vineyard	99	34.4	1	0.3	4	1.4	184	63.9	288	100
Nursery	36	66.7	2	3.7	2	3.7	14	25.9	54	100
Greenhouse	33	62.3	1	1.9	1	1.9	18	34.0	53	100
Other	40	61.5	3	4.6	1	1.5	21	32.3	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 84.6% (243,349 acres) maximize and maintain sprinkler irrigation distribution uniformity.
- Growers representing 0.4% (1,087 acres) plan implementation within three years.
- Growers representing 1.0% (2,822 acres) do not plan to implement this practice.
- Growers representing 14.0% (40,275 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	243,349	84.6	1,087	0.4	2,822	1.0	40,275	14.0	287,533	100
Row Crop	168,525	92.3	467	0.3	1,742	1.0	11,789	6.5	182,523	100
Orchard	14,259	86.5	554	3.4	101	0.6	1,561	9.5	16,475	100
Vineyard	53,489	66.0	21	0.02	893	1.1	26,583	32.8	80,986	100
Nursery	770	77.0	30	3.0	31	3.1	169	16.9	1,000	100
Greenhouse	838	85.2	10	1.0	17	1.8	118	12.0	983	100
Other	13,121	86.7	58	0.4	17	0.1	1,937	12.8	15,133	100

I_3) Is furrow irrigation distribution uniformity maximized and maintained by either managing furrow lengths, installing surge irrigation valves, installing irrigation field ditches, or using alternate row irrigation?

Responding Growers for all Crop Types

- 14.4% (150 growers) maximize and maintain furrow irrigation distribution uniformity.
- 0.3% (3 growers) plan implementation within three years.
- 2.0% (21 growers) do not plan to implement this practice.
- 83.3% (866 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	150	14.4	3	0.3	21	2.0	866	83.3	1,040	100
Row Crop	119	43.8	2	0.7	5	1.8	146	53.7	272	100
Orchard	10	3.9	0	0.0	6	2.4	239	93.7	255	100
Vineyard	7	2.4	1	0.3	4	1.4	276	95.8	288	100
Nursery	1	1.9	0	0.0	2	3.7	51	94.4	54	100
Greenhouse	4	7.5	0	0.0	1	1.9	48	90.6	53	100
Other	7	10.8	0	0.0	2	3.1	56	86.2	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 39.8% (114,423 acres) maximize and maintain furrow irrigation distribution uniformity.
- Growers representing 0.02% (54 acres) plan implementation within three years.
- Growers representing 0.8% (2,232 acres) do not plan to implement this practice.
- Growers representing 59.4% (170,824 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	114,423	39.8	54	0.02	2,232	0.8	170,824	59.4	28,533	100
Row Crop	116,451	63.8	43	0.02	1,324	0.7	64,705	35.4	182,523	100
Orchard	1,075	6.5	0	0.0	407	2.5	14,993	91.0	16,475	100
Vineyard	480	0.6	16	0.02	245	0.3	80,245	99.1	80,986	100
Nursery	42	4.2	0	0.0	28	2.8	930	93.0	1,000	100
Greenhouse	26	6.8	0	0.0	15	3.9	342	89.3	983	100
Other	2,165	14.3	0	0.0	190	1.3	12778	84.4	15,133	100

I_4) Is your irrigation system design optimized by matching sprinkler nozzle/drip applicator flow rates to the infiltration rate of the soil?

Responding Growers for all Crop Types

- 74.3% (773 growers) optimize irrigation system design by matching sprinkler nozzle/drip flow rates with infiltration rate of the soil.
- 6.1% (63 growers) plan implementation within three years.
- 7.5% (78 growers) do not plan to implement this practice.
- 12.1% (126 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	773	74.3	63	6.1	78	7.5	126	12.1	1,040	100
Row Crop	217	79.8	21	7.7	15	5.5	19	7.0	272	100
Orchard	195	76.5	19	7.5	24	9.4	17	6.7	255	100
Vineyard	226	78.5	15	5.2	19	6.6	28	9.7	288	100
Nursery	25	46.3	5	9.2	5	9.3	19	35.2	54	100
Greenhouse	29	54.7	0	0.0	4	7.5	20	37.7	53	100
Other	47	72.3	2	3.1	6	9.2	10	15.4	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 82.7% (237,884 acres) optimize irrigation system design by matching sprinkler nozzle/drip flow rates with infiltration rate of the soil.
- Growers representing 5.6% (16,003 acres) plan implementation within three years.
- Growers representing 3.9% (11,277 acres) do not plan to implement this practice.
- Growers representing 7.8% (22,369 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	237,884	82.7	16,003	5.6	11,277	3.9	22,369	7.8	287,533	100
Row Crop	158,225	86.7	7,549	4.1	7,897	4.3	8,852	4.8	182,523	100
Orchard	12,436	75.5	1,276	7.7	2,207	13.4	556	3.3	16,475	100
Vineyard	59,400	73.3	7,414	9.2	2,472	3.1	11,700	14.4	80,986	100
Nursery	653	65.3	58	5.8	76	7.6	213	21.3	1,000	100
Greenhouse	549	55.8	24	2.4	56	5.7	354	36.0	983	100
Other	13,713	90.6	118	0.8	206	1.4	1,096	7.2	15,133	100

I_5) Are measured or published evapo-transpiration data (CIMIS) used to determine crop water use?

Responding Growers for all Crop Types

- 26.3% (273 growers) use measured or published evapo-transpiration data to determine crop water use.
- 17.7% (184 growers) plan implementation within three years.
- 38.6% (402 growers) do not plan to implement this practice.
- 17.4% (181 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	273	26.3	184	17.7	402	38.6	181	17.4	1,040	100
Row Crop	64	23.5	56	20.6	115	42.3	37	13.6	272	100
Orchard	61	23.9	47	18.4	110	43.1	37	14.5	255	100
Vineyard	120	41.7	49	17.0	91	31.6	28	9.7	288	100
Nursery	3	5.6	6	11.1	20	37.0	25	46.3	54	100
Greenhouse	2	3.8	6	11.3	20	37.7	25	47.2	53	100
Other	9	13.8	14	21.5	27	41.5	15	23.1	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 42.9% (123,443 acres) use measured or published evapo-transpiration data to determine crop water use.
- Growers representing 15.5% (44,437 acres) plan implementation within three years.
- Growers representing 33.0% (94,884 acres) do not plan to implement this practice.
- Growers representing 8.6% (24,769 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	123,443	42.9	44,437	15.5	94,884	33.0	24,769	8.6	287,533	100
Row Crop	49,960	27.4	31,456	17.2	86,323	47.3	14,784	8.1	182,523	100
Orchard	5,582	33.9	2,347	14.2	7,281	44.2	1,265	7.7	16,475	100
Vineyard	64,872	80.1	4,325	5.3	4,374	5.4	7,415	9.2	80,986	100
Nursery	250	25.0	108	10.8	272	27.2	370	37.0	1,000	100
Greenhouse	34	3.5	156	15.9	511	52.0	282	28.7	983	100
Other	4,725	31.2	5,298	35.0	3,889	25.7	1,221	8.1	15,133	100

I_6) Is the soil water-holding capacity known?

Responding Growers for all Crop Types

- 53.3% (554 growers) know the soil water-holding capacity.
- 14.4% (150 growers) plan implementation within three years.
- 21.5% (224 growers) do not plan to implement this practice.
- 10.8% (112 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	554	53.3	150	14.4	224	21.5	112	10.8	1,040	100
Row Crop	141	51.8	44	16.2	65	23.9	22	8.1	272	100
Orchard	119	46.7	44	17.3	74	29.0	18	7.1	255	100
Vineyard	204	70.8	33	11.5	43	14.9	8	2.8	288	100
Nursery	19	35.2	5	9.3	8	14.8	22	40.7	54	100
Greenhouse	14	26.4	3	5.7	12	22.6	24	45.3	53	100
Other	32	49.2	13	20.0	12	18.5	8	12.3	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 71.2% (204,841 acres) know the soil water-holding capacity.
- Growers representing 8.9% (25,682 acres) plan implementation within three years.
- Growers representing 13.4% (38,519 acres) do not plan to implement this practice.
- Growers representing 6.4% (18,491 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	204,841	71.2	25,682	8.9	38,519	13.4	18,491	6.4	287,533	100
Row Crop	115,738	63.4	20,999	11.5	35,843	19.6	9,943	5.4	182,523	100
Orchard	8,313	50.5	2,557	15.5	4,832	29.3	773	4.7	16,475	100
Vineyard	71,339	88.1	1,997	2.5	934	1.2	6,716	8.3	80,986	100
Nursery	487	48.7	91	9.1	159	15.9	263	26.3	1,000	100
Greenhouse	283	28.8	79	8.0	262	26.6	359	36.5	983	100
Other	11,624	76.8	1,648	10.9	944	6.2	917	6.1	15,133	100

I_7) Are records kept for each crop irrigated? (Records include the date, amount of each irrigation water applied, and the source of water used)

Responding Growers for all Crop Types

- 44.9% (467 growers) keep records for each crop irrigated.
- 19.6% (204 growers) plan implementation within three years.
- 25.5% (265 growers) do not plan to implement this practice.
- 10.0% (104 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	467	44.9	204	19.6	265	25.5	104	10.0	1,040	100
Row Crop	102	37.5	73	26.8	74	27.2	23	8.5	272	100
Orchard	116	45.5	47	18.4	72	28.2	20	7.8	255	100
Vineyard	180	62.5	51	17.7	46	16.0	11	3.8	288	100
Nursery	5	9.3	8	14.8	23	42.6	18	33.3	54	100
Greenhouse	15	28.3	8	15.1	17	32.1	13	24.5	53	100
Other	24	36.9	10	15.4	21	32.3	10	15.4	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 59.9% (172,254 acres) keep records for each crop irrigated.
- Growers representing 13.5% (38,769 acres) plan implementation within three years.
- Growers representing 19.4% (55,848 acres) do not plan to implement this practice.
- Growers representing 7.2% (20,662 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	172,254	59.9	38,769	13.5	55,848	19.4	20,662	7.2	287,533	100
Row Crop	92,421	38.1	90,152	37.2	47,800	19.7	12,150	5.0	182,523	100
Orchard	9414	57.1	2,862	17.4	3,617	22.0	582	3.5	16,475	100
Vineyard	66,477	82.1	4,680	5.8	3,052	3.8	6,777	8.4	80,986	100
Nursery	388	38.8	139	13.9	276	27.6	197	19.7	1,000	100
Greenhouse	271	27.6	124	12.6	459	46.7	129	13.1	983	100
Other	9,227	61.0	1,499	9.9	3,677	24.3	730	4.8	15,133	100

I_8) Have all irrigators who apply irrigation water and maintain irrigation systems received training?

Responding Growers for all Crop Types

- 72.0% (749 growers) have trained irrigators for applying irrigation water.
- 5.1% (53 growers) plan implementation within three years.
- 3.8% (40 growers) do not plan to implement this practice.
- 19.0% (198 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	749	72.0	53	5.1	40	3.8	198	19.0	1,040	100
Row Crop	221	81.3	21	7.7	8	2.9	22	8.1	272	100
Orchard	169	66.3	13	5.1	6	2.4	67	26.3	255	100
Vineyard	217	75.3	9	3.1	6	2.1	56	19.4	288	100
Nursery	34	63.0	1	1.9	4	7.4	15	27.8	54	100
Greenhouse	31	58.5	3	5.7	6	11.3	13	24.5	53	100
Other	40	61.5	5	7.7	6	9.2	14	21.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 87.6% (251,771 acres) have trained irrigators for applying irrigation water.
- Growers representing 4.8% (13,785 acres) plan implementation within three years.
- Growers representing 1.4% (4,087 acres) do not plan to implement this practice.
- Growers representing 6.2% (17,890 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	251,771	87.6	13,785	4.8	4,087	1.4	17,890	6.2	287,533	100
Row Crop	160,665	88.0	10,231	5.6	2,446	1.3	9,181	5.0	182,523	100
Orchard	14,341	87.0	702	4.3	331	2.0	1,101	6.6	16,475	100
Vineyard	71,314	88.1	2,149	2.6	124	0.2	7,399	9.1	80,986	100
Nursery	833	83.3	31	3.1	58	5.8	78	7.8	1,000	100
Greenhouse	792	80.6	46	4.7	70	7.1	75	7.6	983	100
Other	12,686	83.8	810	8.4	1,146	7.6	491	3.2	15,133	100

I_9) Has an irrigation mobile lab system evaluation been completed and the system been adjusted accordingly?

Responding Growers for all Crop Types

- 16.0% (166 growers) completed an irrigation mobile lab system evaluation.
- 27.0% (281 growers) plan implementation within three years.
- 38.8% (404 growers) do not plan to implement this practice.
- 18.2% (189 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	166	16.0	281	27.0	404	38.8	189	18.2	1,040	100
Row Crop	63	23.2	87	32.0	92	33.8	30	11.0	272	100
Orchard	37	14.5	75	29.4	102	40.0	41	16.1	255	100
Vineyard	38	13.2	77	26.7	121	42.0	52	18.1	288	100
Nursery	5	9.3	13	24.1	20	37.0	16	29.6	54	100
Greenhouse	4	7.5	4	7.5	21	39.6	24	45.3	53	100
Other	12	18.5	17	26.2	24	36.9	12	18.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 34.3% (98,763 acres) completed an irrigation mobile lab system evaluation.
- Growers representing 28.0% (80,482 acres) plan implementation within three years.
- Growers representing 23.0% (66,243 acres) do not plan to implement this practice.
- Growers representing 14.6% (30,305 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	98,763	34.3	80,482	28.0	66,243	23.0	42,045	14.6	287,533	100
Row Crop	75,159	41.2	42,239	23.1	46,073	25.2	19,052	10.4	182,523	100
Orchard	3,903	23.7	5,148	31.2	5,524	33.5	1900	11.5	16,475	100
Vineyard	23,521	29.0	24,393	30.1	12,631	15.6	20,441	25.2	80,986	100
Nursery	220	22.0	255	25.5	299	29.9	226	22.6	1,000	100
Greenhouse	97	9.9	111	11.3	367	37.3	408	41.5	983	100
Other	5,386	35.6	6,237	41.2	2,828	18.7	682	4.5	15,133	100

Erosion and Sediment Control Management

The questions for this section are listed below. The responses for all crop types to the individual questions follow in the summary graphs (refer to Figures 6 and 7). The responses by growers to each erosion and sediment control management question are outlined by major crop type along with the represented acreage.

<u>Erosion and Sediment Control Management Questions</u>

E_1) Are cover crops used to protect bare soil from erosion during fallow cycles and to build up solid organic matter as a crop rotation?

E_2) Are hedgerows, trees, and shrubs established along field margins or between field blocks to reduce wind effects, and protect slopes from erosion?

E_3) Are farm access roads located and graded to minimize erosion potential?

E_4) Are farm access roads protected from concentrated runoff through the use of vegetative material, gravel, and/or mulch?

E_5) Are ditches and channel banks protected from concentrated flow through the use of grassed waterway, lined channels, and/or diversions?

E_6) Are field layout and row length designed to minimize erosion potential?

E_7) Are sediment basins constructed to intercept sediment-laden runoff in locations where erosion is expected and sediment is known to leave the farm?

E_8) Are water and sediment control basins used in locations where sediment and excess runoff may cause gullies or flooding problems downstream?

E_9) Are vegetative buffers implemented between cropped areas, along the lower edge of the farm, and along roadways? (*This practice is also effective in removing nutrients and pesticides from runoff.*)

E_10) Where streams cross or property, are riparian buffers established and maintained?

E_11) Are culverts properly sized and maintained?

E_12) Are implemented management practices evaluated for effectiveness (i.e. photo-point monitoring, water quality testing)?

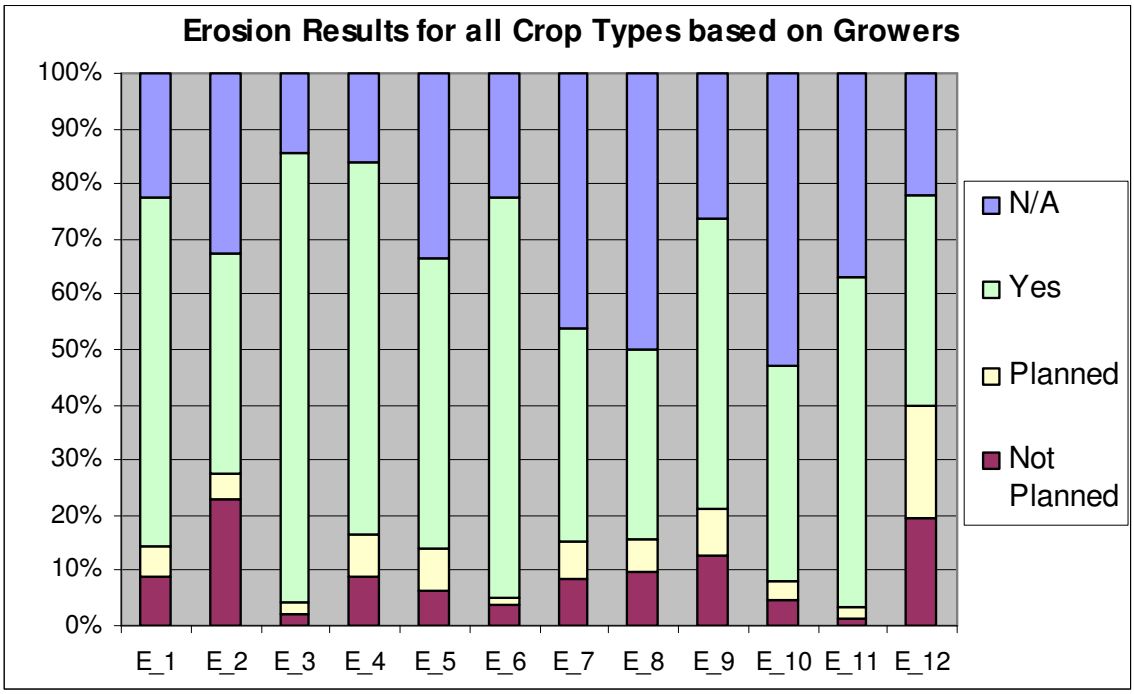

Figure 6: Level of implementation of erosion and sediment management practices for all represented growers.

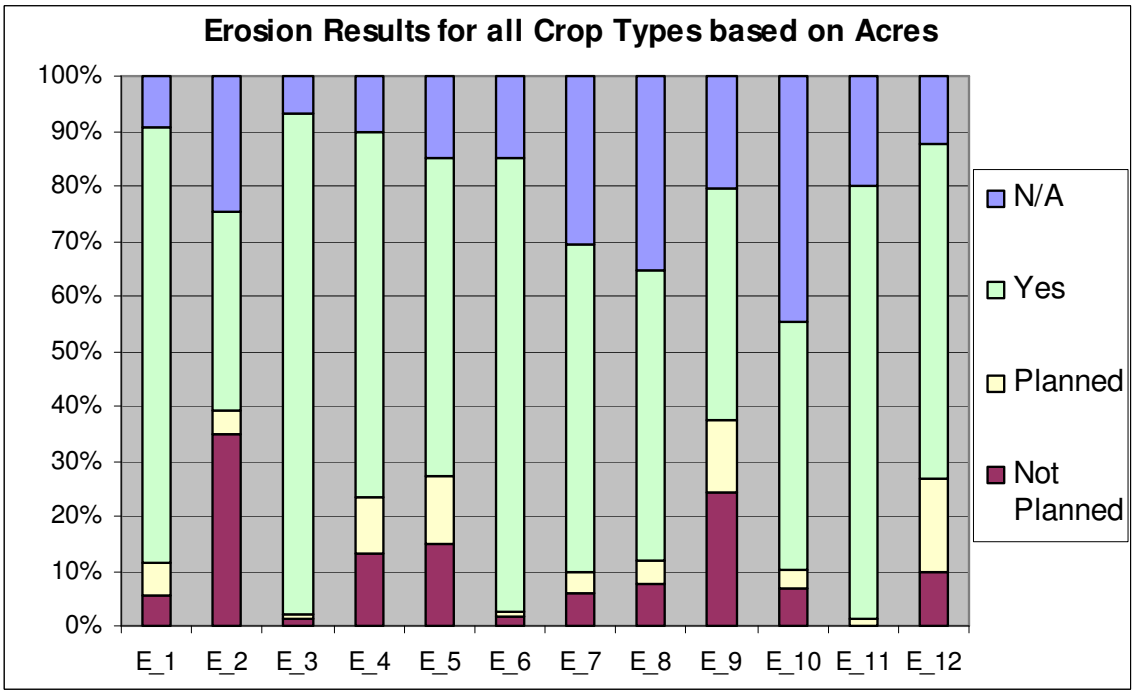

Figure 7: Level of implementation of erosion and sediment management practices for all represented acres.

E_1) Are cover crops used to protect bare soil from erosion during fallow cycles and to build up soil organic matter as a crop rotation?

Responding Growers for all Crop Types

- 63.1% (656 growers) use cover crops to protect bare soil during fallow cycles.
- 5.7% (59 growers) plan implementation within three years.
- 8.8% (92 growers) do not plan to implement this practice.
- 22.4% (233 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	656	63.1	59	5.7	92	8.8	233	22.4	1,040	100
Row Crop	191	70.2	22	8.1	27	9.9	32	11.8	272	100
Orchard	139	54.5	19	7.5	36	14.1	61	23.9	255	100
Vineyard	241	83.7	9	3.1	10	3.5	28	9.7	288	100
Nursery	12	22.2	1	1.9	3	5.6	38	70.4	54	100
Greenhouse	9	17.0	1	1.9	3	5.7	40	75.5	53	100
Other	39	60.0	5	7.7	7	10.8	14	21.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 79.4% (228,278 acres) use cover crops to protect bare soil during fallow cycles.
- Growers representing 5.7% (16,461 acres) plan implementation within three years.
- Growers representing 5.7% (16,464 acres) do not plan to implement this practice.
- Growers representing 9.2% (26,330 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	228,278	79.4	16,461	5.7	16,464	5.7	26,330	9.2	287,533	100
Row Crop	143,975	78.9	14,313	7.8	11,584	6.3	12,651	6.9	182,523	100
Orchard	9,145	55.5	1,335	8.1	3,761	22.8	2,234	13.6	16,475	100
Vineyard	70,313	86.8	189	0.2	746	0.9	9,738	12.0	80,986	100
Nursery	432	43.2	18	1.8	41	4.1	509	50.9	1,000	100
Greenhouse	234	23.8	64	6.5	29	3.0	656	66.7	983	100
Other	12,729	84.1	808	5.3	582	3.8	1,014	6.7	15,133	100

E_2) Are hedgerow, trees, and shrubs established along field margins or between field block to reduce wind effects and protect slopes from erosion?

Responding Growers for all Crop Types

- 40.0% (416 growers) establish hedgerows, trees, and shrubs along field margins or between field blocks.
- 4.8% (50 growers) plan implementation within three years.
- 22.7% (236 growers) do not plan to implement this practice.
- 32.5% (338 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	416	40.0	50	4.8	236	22.7	338	32.5	1,040	100
Row Crop	103	37.9	23	8.5	93	34.2	53	19.5	272	100
Orchard	108	42.4	9	3.5	45	17.6	93	36.5	255	100
Vineyard	106	36.8	11	3.8	70	24.3	101	35.1	288	100
Nursery	25	46.3	1	1.9	5	9.3	23	42.6	54	100
Greenhouse	12	22.6	1	1.9	2	3.8	38	71.7	53	100
Other	31	47.7	4	6.1	16	24.6	14	21.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 36.2% (104,147 acres) establish hedgerows, trees, and shrubs along field margins or between field blocks.
- Growers representing 4.4% (12,679 acres) plan implementation within three years.
- Growers representing 34.7% (99,833 acres) do not plan to implement this practice.
- Growers representing 24.6% (70,874 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	104,147	36.2	12,679	4.4	99,833	34.7	70,874	24.6	287,533	100
Row Crop	52,098	28.5	11,180	6.1	87,984	48.2	31,261	17.1	182,523	100
Orchard	5,990	36.4	285	1.7	5,402	32.8	4,798	29.1	16,475	100
Vineyard	41,252	50.9	716	0.9	8,511	10.5	30,507	37.7	80,986	100
Nursery	520	52.0	3	0.3	230	23.0	247	24.7	1,000	100
Greenhouse	348	35.4	21	2.1	54	5.5	560	57.0	983	100
Other	7,293	48.2	773	5.1	3,414	22.6	3,653	24.1	15,133	100

E_3) Are farm access roads located and graded to minimize erosion potential?

Responding Growers for all Crop Types

- 81.3% (846 growers) locate and grade farm access roads to minimize erosion potential.
- 2.2% (23 growers) plan implementation within three years.
- 2.1% (22 growers) do not plan to implement this practice.
- 14.3% (149 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	846	81.3	23	2.2	22	2.1	149	14.3	1,040	100
Row Crop	236	86.8	4	1.5	9	3.3	23	8.5	272	100
Orchard	194	76.1	7	2.7	3	1.2	51	20.0	255	100
Vineyard	249	86.5	6	2.1	4	1.4	29	10.1	288	100
Nursery	42	77.8	1	1.9	2	3.7	9	16.7	54	100
Greenhouse	33	62.3	0	0.0	1	1.9	19	35.8	53	100
Other	53	81.5	2	3.1	2	3.1	8	12.3	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 90.8% (260,944 acres) locate and grade farm access roads to minimize erosion potential.
- Growers representing 1.0% (2,851 acres) plan implementation within three years.
- Growers representing 1.3% (3,630 acres) do not plan to implement this practice..
- Growers representing 7.0% (20,108 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	260,944	90.8	2,851	1.0	3,630	1.3	20,108	7.0	287,533	100
Row Crop	169,569	92.9	2,006	1.1	1,985	1.1	8,963	4.9	182,523	100
Orchard	14,597	88.6	396	2.4	119	0.7	1,363	8.3	16,475	100
Vineyard	70,522	87.1	351	0.4	634	0.8	9,479	11.7	80,986	100
Nursery	884	88.4	2	0.2	28	2.8	86	8.6	1,000	100
Greenhouse	656	66.7	18	1.8	16	1.6	293	29.8	983	100
Other	14,465	95.6	226	1.5	36	0.2	406	2.7	15,133	100

E_4) Are farm access roads protected from concentrated runoff through the use of vegetative material, gravel, and/or mulch?

Responding Growers for all Crop Types

- 67.4% (701 growers) protect farm access roads from concentrated runoff through the use of vegetative material, gravel, and/or mulch.
- 7.5% (78 growers) plan implementation within three years.
- 8.9% (93 growers) do not plan to implement this practice.
- 16.2% (168 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	701	67.4	78	7.5	93	8.9	168	16.2	1,040	100
Row Crop	155	57.0	26	9.6	51	18.8	40	14.7	272	100
Orchard	168	65.9	21	8.2	18	7.1	48	18.8	255	100
Vineyard	224	77.8	15	5.2	13	4.5	36	12.5	288	100
Nursery	452	97.4	5	1.1	2	0.4	5	1.1	54	100
Greenhouse	28	52.8	3	5.7	2	3.8	20	37.7	53	100
Other	45	69.2	6	9.2	5	7.7	9	13.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 66.4% (190,907 acres) protect farm access roads from concentrated runoff through the use of vegetative material, gravel, and/or mulch.
- Growers representing 10.1% (28,906 acres) plan implementation within three years.
- Growers representing 13.3% (38,335 acres) do not plan to implement this practice.
- Growers representing 10.2% (29,385 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	190,907	66.4	28,906	10.1	38,335	13.3	29,385	10.2	287,533	100
Row Crop	110,261	60.4	21,261	11.6	34,714	19.0	16,287	8.9	182,523	100
Orchard	8,985	54.5	1,181	7.2	4,556	27.7	1,753	10.6	16,475	100
Vineyard	66,499	82.1	3,873	4.8	758	0.9	9,856	12.2	80,986	100
Nursery	838	83.8	63	6.3	25	2.5	74	7.4	1,000	100
Greenhouse	561	57.1	74	7.5	100	10.2	248	25.2	983	100
Other	12,592	83.2	1,736	11.5	289	1.9	516	3.4	15,133	100

E_5) Are ditches and channel banks protected from concentrated flow through the use of grassed waterways, lined channels, and/or diversions?

Responding Growers for all Crop Types

- 52.5% (546 growers) protect ditches and channel banks from concentrated flows through the use of grassed waterways and lined channels.
- 7.7% (80 growers) plan implementation within three years.
- 6.4% (67 growers) do not plan to implement this practice.
- 33.4% (347 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	546	52.5	80	7.7	67	6.4	347	33.4	1,040	100
Row Crop	149	54.8	34	12.5	40	14.7	49	18.0	272	100
Orchard	121	47.5	17	6.7	10	3.9	107	42.0	255	100
Vineyard	173	60.1	8	2.8	7	2.4	100	34.7	288	100
Nursery	24	44.4	9	16.7	4	7.4	17	31.5	54	100
Greenhouse	19	35.8	5	9.4	4	7.5	25	47.2	53	100
Other	33	50.8	5	7.7	1	1.5	26	40.0	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 57.6% (165,546 acres) protect ditches and channel banks from concentrated flows through the use of grassed waterways and lined channels.
- Growers representing 12.5% (35,950 acres) plan implementation within three years.
- Growers representing 14.9% (42,723 acres) do not plan to implement this practice.
- Growers representing 15.1% (43,314 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	165,546	57.6	35,950	12.5	42,723	14.9	43,314	15.1	287,533	100
Row Crop	92,462	50.7	24,534	13.4	43,310	23.7	22,217	12.2	182,523	100
Orchard	8,120	49.3	1,652	10.0	2,621	15.9	4,082	24.8	16,475	100
Vineyard	59,733	73.8	3,642	4.5	285	0.4	17,326	21.4	80,986	100
Nursery	377	37.7	208	20.8	45	4.5	370	37.0	1,000	100
Greenhouse	446	45.4	100	10.2	68	6.9	369	37.5	983	100
Other	8091	53.5	4,043	26.7	895	5.9	2,104	13.9	15,133	100

E_6) Are field layout and row length designed to minimize erosion potential?

Responding Growers for all Crop Types

- 72.7% (756 growers) design field layout and row length to minimize erosion potential.
- 1.3% (14 growers) plan implementation within three years.
- 3.7% (38 growers) do not plan to implement this practice.
- 22.3% (232 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	756	72.7	14	1.3	38	3.7	232	22.3	1,040	100
Row Crop	235	86.4	3	1.1	5	1.8	29	10.7	272	100
Orchard	176	69.0	6	2.4	8	3.1	65	25.5	255	100
Vineyard	220	76.4	2	0.7	19	6.6	47	16.3	288	100
Nursery	29	53.7	1	1.9	2	3.7	22	40.7	54	100
Greenhouse	15	28.3	2	3.8	0	0.0	36	67.9	53	100
Other	48	73.8	0	0.0	1	1.5	16	24.6	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 82.8% (237,955 acres) design field layout and row length to minimize erosion potential.
- Growers representing 1.0% (2,850 acres) plan implementation within three years.
- Growers representing 1.5% (4,440 acres) do not plan to implement this practice.
- Growers representing 14.7% (42,288 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	237,955	82.8	2,850	1.0	4,440	1.5	42,288	14.7	287,533	100
Row Crop	166,158	91.0	1,623	0.9	1,569	0.9	13,173	7.2	182,523	100
Orchard	12,148	73.7	155	0.9	438	2.7	3,734	22.7	16,475	100
Vineyard	53,734	66.3	1,120	1.4	2,187	2.7	23,945	29.6	80,986	100
Nursery	679	67.9	20	2.0	34	3.4	267	26.7	1,000	100
Greenhouse	463	47.1	17	1.7	10	1.0	493	50.2	983	100
Other	13,657	90.2	0	0.0	118	0.8	1,358	9.0	15,133	100

E_7) Are sediment basins constructed to intercept sediment-laden runoff in locations where erosion is expected and sediment is known to leave the farm?

Responding Growers for all Crop Types

- 38.8% (403 growers) construct sediment basins to intercept sediment-laden runoff in locations where erosion is expected.
- 6.7% (70 growers) plan implementation within three years.
- 8.4% (87 growers) do not plan to implement this practice.
- 46.2% (480 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	403	38.8	70	6.7	87	8.4	480	46.2	1,040	100
Row Crop	143	52.6	20	7.4	25	9.2	84	30.9	272	100
Orchard	77	30.2	21	8.2	25	9.8	132	51.8	255	100
Vineyard	106	36.8	11	3.8	25	8.7	146	50.7	288	100
Nursery	17	31.5	8	14.8	4	7.4	25	46.3	54	100
Greenhouse	14	26.4	5	9.4	2	3.8	32	60.4	53	100
Other	29	44.6	1	1.5	3	4.6	32	49.2	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 59.4% (170,694 acres) construct sediment basins to intercept sediment-laden runoff in locations where erosion is expected.
- Growers representing 3.9% (11,249 acres) plan implementation within three years.
- Growers representing 6.1% (17,635 acres) do not plan to implement this practice.
- Growers representing 30.6% (87,955 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	170,694	59.4	11,249	3.9	17,635	6.1	87,955	30.6	287,533	100
Row Crop	117,466	64.4	6,960	3.8	13,047	7.1	45,050	24.7	182,523	100
Orchard	7,378	44.8	1,949	11.8	1,668	10.1	5,480	33.3	16,475	100
Vineyard	35,996	44.4	1,642	2.0	3,962	4.9	39,386	48.6	80,986	100
Nursery	473	47.3	140	14.0	67	6.7	320	32.0	1,000	100
Greenhouse	404	41.1	56	5.7	106	10.8	417	42.4	983	100
Other	11,922	78.8	699	4.6	482	3.2	2,030	13.4	15,133	100

E_8) Are water and sediment control basins used in locations where sediment and excess runoff may cause gullies or flooding problems downstream?

Responding Growers for all Crop Types

- 34.2% (356 growers) use water and sediment control basins in locations where runoff may cause gullies or flooding downstream.
- 6.0% (62 growers) plan implementation within three years.
- 9.6% (100 growers) do not plan to implement this practice.
- 50.2% (522 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	356	34.2	62	6.0	100	9.6	522	50.2	1,040	100
Row Crop	125	46.0	15	5.5	27	9.9	105	38.6	272	100
Orchard	69	27.1	20	7.8	27	10.6	139	54.5	255	100
Vineyard	97	33.7	14	4.9	26	9.0	151	52.4	288	100
Nursery	14	25.9	7	13.0	4	7.4	29	53.7	54	100
Greenhouse	11	20.8	3	5.7	4	7.5	35	66.0	53	100
Other	22	33.8	1	1.5	8	12.3	34	52.3	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 52.8% (151,901 acres) use water and sediment control basins in locations where runoff may cause gullies or flooding downstream.
- Growers representing 4.4% (12,609 acres) plan implementation within three years.
- Growers representing 7.5% (21,481 acres) do plan to implement this practice.
- Growers representing 35.3% (101,542 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	151,901	52.8	12,609	4.4	21,481	7.5	101,542	35.3	287,533	100
Row Crop	97,058	53.2	8,872	4.9	13,566	7.4	63,027	34.5	182,523	100
Orchard	6,155	37.4	1,541	9.4	2,879	17.5	5,900	35.8	16,475	100
Vineyard	39,283	48.5	1,776	2.2	4,162	5.1	35,765	44.2	80,986	100
Nursery	378	37.8	108	10.8	64	6.4	450	45.0	1,000	100
Greenhouse	346	35.2	19	1.9	90	9.2	528	53.7	983	100
Other	9,543	63.1	505	3.3	2,254	14.9	2,831	18.7	15,133	100

E_9) Are vegetative buffers implemented between cropped areas, along the lower edge of the farm, and along roadways?

Responding Growers for all Crop Types

- 52.4% (545 growers) implement vegetative buffers between cropped areas, along the lower edge of the farm, and along roadways.
- 8.5% (88 growers) plan implementation within three years.
- 12.9% (134 growers) do not plan to implement this practice.
- 26.3% (273 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	545	52.4	88	8.5	134	12.9	273	26.3	1,040	100
Row Crop	123	45.2	33	12.1	65	23.9	51	18.8	272	100
Orchard	130	51.0	25	9.8	28	11.0	72	28.2	255	100
Vineyard	192	66.7	18	6.3	20	6.9	58	20.1	288	100
Nursery	24	44.4	5	9.3	6	11.1	19	35.2	54	100
Greenhouse	15	28.3	0	0.0	6	11.3	32	60.4	53	100
Other	31	47.7	5	7.7	7	10.8	22	33.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 41.9% (120,405 acres) implement vegetative buffers between cropped areas, along the lower edge of the farm, and along roadways.
- Growers representing 13.4% (38,461 acres) plan implementation within three years.
- Growers representing 24.2% (67,710 acres) do not plan to implement this practice.
- Growers representing 20.5% (58,957 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	120,405	41.9	38,461	13.4	69,710	24.2	58,957	20.5	287,533	100
Row Crop	56,920	31.2	24,338	13.3	63,202	34.6	38,063	20.9	182,523	100
Orchard	8,362	50.8	3,161	19.2	2,637	16.0	2,315	14.1	16,475	100
Vineyard	45,383	56.0	11,109	13.7	6,677	8.2	17,817	22.0	80,986	100
Nursery	525	52.5	49	4.9	86	8.6	340	34.0	1,000	100
Greenhouse	258	26.2	23	2.3	141	14.3	561	57.1	983	100
Other	10,064	66.5	389	2.6	3,110	20.6	1,570	10.4	15,133	100

E_10) Where streams cross or border property, are riparian buffers established and maintained?

Responding Growers for all Crop Types

- 38.9% (405 growers) established and maintain riparian buffers where streams cross or border property.
- 3.6% (37 growers) plan implementation within three years.
- 4.5% (47 growers) do not plan to implement this practice.
- 53.0% (551 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	405	38.9	37	3.6	47	4.5	551	53.0	1,040	100
Row Crop	113	41.5	13	4.8	17	6.3	129	47.4	272	100
Orchard	103	40.4	11	4.3	11	4.3	130	51.0	255	100
Vineyard	118	41.0	4	1.4	10	3.5	156	54.2	288	100
Nursery	16	29.6	2	3.7	2	3.7	34	63.0	54	100
Greenhouse	11	20.8	2	3.8	4	7.5	36	67.9	53	100
Other	26	40.0	4	6.2	2	3.1	33	50.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 45.1% (129,769 acres) established and maintain riparian buffers where streams cross or border property.
- Growers representing 3.3% (9,480 acres) plan implementation within three years.
- Growers representing 6.8% (19,482 acres) do not plan to implement this practice.
- Growers representing 44.8% (128,802 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	129,769	45.1	9,480	3.3	19,482	6.8	128,802	44.8	287,533	100
Row Crop	89,435	49.0	1,987	1.1	14,852	8.1	76,249	41.8	182,523	100
Orchard	9,428	57.2	630	3.8	1,781	10.8	4,636	28.1	16,475	100
Vineyard	27,126	33.5	6,621	8.2	1,805	2.2	45,434	56.1	80,986	100
Nursery	522	52.2	21	2.1	26	2.6	431	43.1	1,000	100
Greenhouse	168	17.1	56	5.7	20	2.0	739	75.2	983	100
Other	6,998	46.2	412	2.7	649	4.3	7,074	46.7	15,133	100

E_11) Are culverts properly sized and maintained?

Responding Growers for all Crop Types

- 59.6% (620 growers) properly size and maintain culverts.
- 2.5% (26 growers) plan implementation within three years.
- 1.1% (11 growers) do not plan to implement this practice.
- 36.8% (383 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	620	59.6	26	2.5	11	1.1	383	36.8	1,040	100
Row Crop	194	71.3	7	2.6	2	0.7	69	25.4	272	100
Orchard	132	51.8	7	2.7	4	1.6	112	43.9	255	100
Vineyard	177	61.5	2	0.7	2	0.7	107	37.2	288	100
Nursery	30	55.6	4	7.4	1	1.9	19	35.2	54	100
Greenhouse	21	39.6	2	3.8	2	3.8	28	52.8	53	100
Other	38	58.5	3	4.6	0	0.0	24	36.9	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 78.5% (225,636 acres) properly size and maintain culverts.
- Growers representing 1.2% (3,561 acres) plan implementation within three years.
- Growers representing 0.1% (386 acres) do not plan to implement this practice.
- Growers representing 20.2% (57,950 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	225,636	78.5	3,561	1.2	386	0.1	57,950	20.2	287,533	100
Row Crop	147,652	80.9	2,740	1.5	87	0.05	32,044	17.6	182,523	100
Orchard	11,855	72.0	177	1.1	55	0.3	4,388	26.6	16,475	100
Vineyard	59,519	73.5	35	0.04	204	0.3	21,228	26.2	80,986	100
Nursery	773	77.3	50	5.0	24	2.4	153	15.3	1,000	100
Greenhouse	534	54.3	25	2.5	16	1.6	408	41.5	983	100
Other	12,304	81.3	453	3.0	0	0.0	2,376	15.7	15,133	100

E_12) Are implemented management practices evaluated for effectiveness (i.e. photo-point monitoring, water quality testing)?

Responding Growers for all Crop Types

- 38.4% (399 growers) evaluate implemented management practices for effectiveness.
- 20.2% (210 growers) plan implementation within three years.
- 19.5% (203 growers) do not plan to implement this practice.
- 21.9% (228 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	399	38.4	210	20.2	203	19.5	228	21.9	1,040	100
Row Crop	130	47.8	60	22.1	46	16.9	36	13.2	272	100
Orchard	78	30.6	56	22.0	57	22.4	64	25.1	255	100
Vineyard	111	38.5	59	20.5	51	17.7	67	23.3	288	100
Nursery	20	37.0	11	20.4	12	22.2	11	20.4	54	100
Greenhouse	18	34.0	4	7.5	13	24.5	18	34.0	53	100
Other	20	30.8	12	18.5	13	20.0	20	30.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 60.8% (174,835 acres) evaluate implemented management practices for effectiveness.
- Growers representing 17.1% (49,256 acres) plan implementation within three years.
- Growers representing 9.6% (27,535 acres) do not plan to implement this practice.
- Growers representing 12.5% (35,907 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	174,835	60.8	49,256	17.1	27,535	9.6	35,907	12.5	287,533	100
Row Crop	119,784	65.6	30,234	16.6	9,733	5.3	22,772	12.5	182,523	100
Orchard	6,556	39.8	3,833	23.3	2,756	16.7	3,330	20.2	16,475	100
Vineyard	42,025	51.9	14,801	18.3	12,574	15.5	11,586	14.3	80,986	100
Nursery	451	45.1	310	31.0	138	13.8	101	10.1	1,000	100
Greenhouse	388	39.5	112	11.4	192	19.5	291	29.6	983	100
Other	9,436	62.4	1,831	12.1	1,702	11.2	2,164	14.3	15,133	100

Nutrient Management

The questions for this section are listed below. The responses for all crop types to the individual questions follow in the summary graphs (refer to Figures 8 and 9). The responses by growers to each nutrient management question are outlined by major crop type along with the represented acreage.

Nutrient Management Questions

N_1) Are the crop's nutrient requirements known and are nutrient budgets established and recorded?

N_2) Do you test irrigation water for nitrogen content and incorporate that information into your fertilization program?

N_3) Is plant tissue analysis used to aid in fertilizer decisions?

N_4) Do you test your soil for residual nitrogen and incorporate that information into your fertilization program?

N_5) If fertigation is used, are measures in place to ensure that there is no backflow into wells or other water sources?

N_6) Do you regularly maintain and calibrate your fertilizer equipment?

N_7) Do field personnel receive nutrient management training?

N_8) Do fertilizer storage facilities include concrete pads and curbs for containment of spills and are they protected from weather?

N_9) Is mixing and loading performed on sites with low runoff hazard, over 100' down slope of wells?

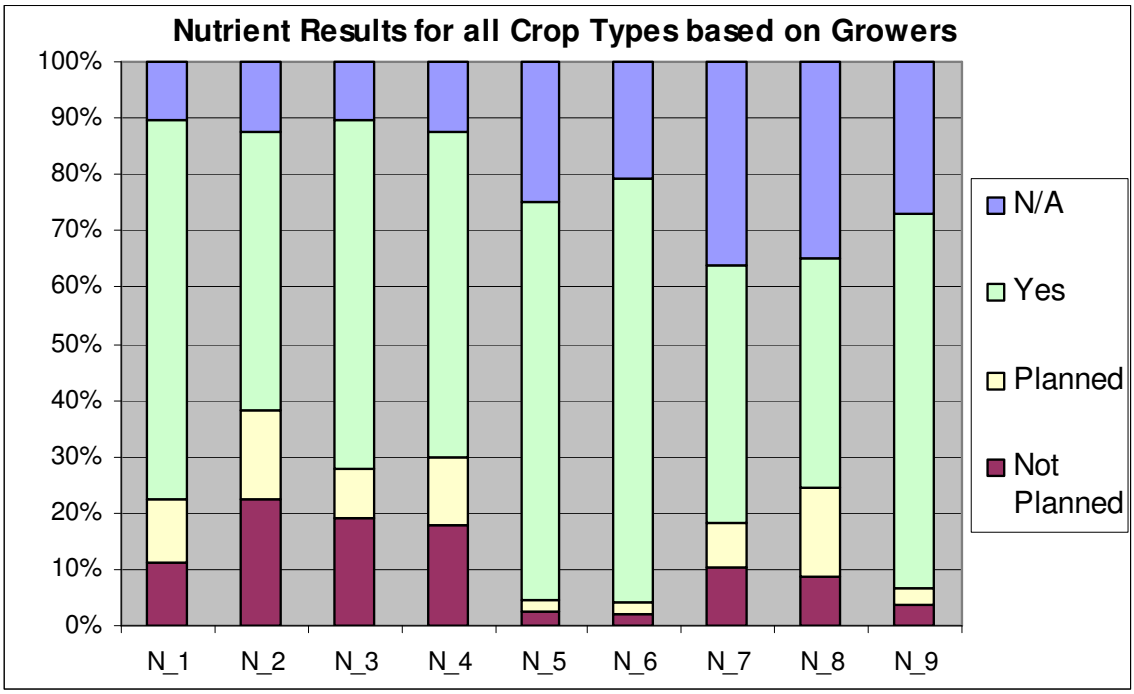

Figure 8: Level of implementation of nutrient management practices for all represented growers.

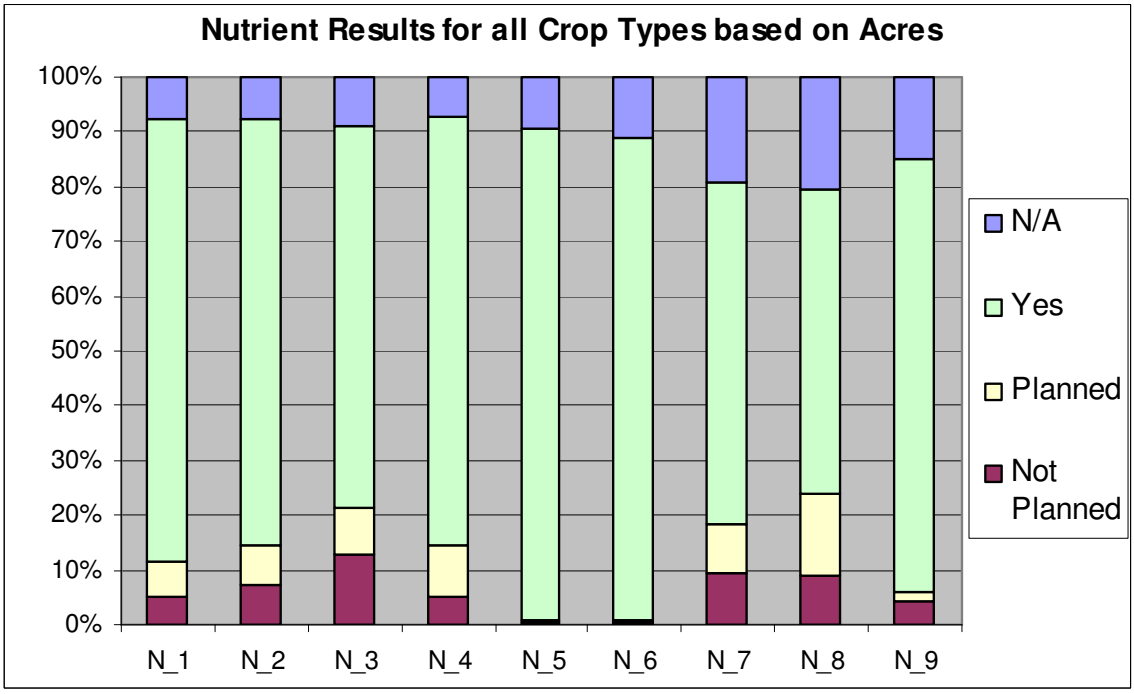

Figure 9: Level of implementation of nutrient management practices for all represented acres.

N_1) Are the crop's nutrient requirements known and are nutrient budgets established and recorded?

Responding Growers for all Crop Types

- 67.4% (701 growers) know crop nutrient requirements and nutrient budgets are established and recorded.
- 11.2% (116 growers) plan implementation within three years.
- 11.2% (116 growers) do not plan to implement this practice.
- 10.3% (107 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	701	67.4	116	11.2	116	11.2	107	10.3	1,040	100
Row Crop	191	70.2	31	11.4	29	10.7	21	7.7	272	100
Orchard	168	65.9	29	11.4	32	12.5	26	10.2	255	100
Vineyard	220	76.4	26	9.0	13	4.5	29	10.1	288	100
Nursery	32	59.3	5	9.3	12	22.2	5	9.3	54	100
Greenhouse	27	50.9	5	9.4	9	17.0	12	22.6	53	100
Other	33	50.8	13	20.0	12	18.5	7	10.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 80.9% (232,540 acres) know crop nutrient requirements and nutrient budgets are established and recorded.
- Growers representing 6.5% (18,579 acres) plan implementation within three years.
- Growers representing 5.0% (14,307 acres) do not plan to implement this practice.
- Growers representing 7.7% (22,107 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	232,540	80.9	18,579	6.5	14,307	5.0	22,107	7.7	287,533	100
Row Crop	145,157	79.5	14,450	7.9	11,974	6.6	10,942	6.0	182,523	100
Orchard	13,581	82.4	846	5.1	1,424	8.6	624	3.8	16,475	100
Vineyard	68,268	84.3	2,731	3.4	414	0.5	9,573	11.8	80,986	100
Nursery	741	74.1	76	7.6	153	15.3	30	3.0	1,000	100
Greenhouse	665	67.7	45	4.6	88	9.0	185	18.8	983	100
Other	11,431	75.5	2,163	14.3	645	4.3	894	5.9	15,133	100

N_2) Do you test irrigation water for nitrogen content and incorporate that information into your fertilization program?

Responding Growers for all Crop Types

- 49.3% (513 growers) test irrigation water for nitrogen content and information is incorporated into fertilization program.
- 6.0% (166 growers) plan implementation within three years.
- 22.3% (232 growers) do not plan to implement this practice.
- 12.4% (129 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	513	49.3	166	16.0	232	22.3	129	12.4	1,040	100
Row Crop	166	61.0	40	14.7	40	14.7	26	9.6	272	100
Orchard	99	38.8	52	20.4	69	27.1	35	13.7	255	100
Vineyard	146	50.7	43	14.9	69	24.0	30	10.4	288	100
Nursery	25	46.3	5	9.3	14	25.9	10	18.5	54	100
Greenhouse	28	52.8	4	7.5	8	15.1	13	24.5	53	100
Other	22	33.8	15	23.1	19	29.2	9	13.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 78.1% (224,550 acres) test irrigation water for nitrogen content and information is incorporated into fertilization program.
- Growers representing 7.3% (21,058 acres) plan implementation within three years.
- Growers representing 7.1% (20,406 acres) do not plan to implement this practice.
- Growers representing 7.5% (21,519 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	224,550	78.1	21,058	7.3	20,406	7.1	21,519	7.5	287,533	100
Row Crop	147,227	80.7	11,615	6.4	13,789	7.6	9,892	5.4	182,523	100
Orchard	9,978	60.6	2,903	17.6	1,885	11.4	1,709	10.4	16,475	100
Vineyard	61,248	75.6	6,009	7.4	4,138	5.1	9,591	11.8	80,986	100
Nursery	615	61.5	219	21.9	105	10.5	61	6.1	1,000	100
Greenhouse	614	62.5	42	4.3	92	9.4	235	23.9	983	100
Other	11,992	79.2	1,205	8.0	1,101	7.3	835	5.5	15,133	100

N_3) Is plant tissue analysis used to aid in fertilizer decisions?

Responding Growers for all Crop Types

- 62.0% (645 growers) use plant tissue analysis to aid in fertilizer decisions.
- 8.8% (92 growers) plan implementation within three years.
- 18.9% (197 growers) do not plan to implement this practice.
- 10.2% (106 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	645	62.0	92	8.8	197	18.9	106	10.2	1,040	100
Row Crop	145	53.3	34	12.5	69	25.4	24	8.8	272	100
Orchard	167	65.5	24	9.4	40	15.7	24	9.4	255	100
Vineyard	237	82.3	14	4.9	11	3.8	26	9.0	288	100
Nursery	17	31.5	4	7.4	25	46.3	8	14.8	54	100
Greenhouse	24	45.3	3	5.7	14	26.4	12	22.6	53	100
Other	24	36.9	11	16.9	23	35.4	7	10.8	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 69.3% (119,183 acres) use plant tissue analysis to aid in fertilizer decisions.
- Growers representing 8.7% (25,114 acres) plan implementation within three years.
- Growers representing 12.8% (36,930 acres) do not plan to implement this practice.
- Growers representing 9.1% (26,306 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	199,183	69.3	25,114	8.7	36,930	12.8	26,306	9.1	287,533	100
Row Crop	111,263	61.0	18,902	10.4	36,664	20.1	15,694	8.6	182,523	100
Orchard	13,639	82.8	1,099	6.7	1,033	6.3	704	4.3	16,475	100
Vineyard	70,858	87.5	208	0.3	398	0.5	9,522	11.8	80,986	100
Nursery	638	63.8	91	9.1	206	20.6	65	6.5	1,000	100
Greenhouse	597	60.7	36	3.7	144	14.6	206	21.0	983	100
Other	7,239	47.8	5,012	33.1	2,303	15.2	579	3.8	15,133	100

N_4) Do you test your soil for residual nitrogen and incorporate that information into your fertilization program?

Responding Growers for all Crop Types

- 57.8% (601 growers) test soil for residual nitrogen and information is incorporated into fertilization program.
- 12.1% (126 growers) plan implementation within three years.
- 17.7% (184 growers) do not plan to implement this practice.
- 12.4% (129 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	601	57.8	126	12.1	184	17.7	129	12.4	1,040	100
Row Crop	191	70.2	29	10.7	29	10.7	23	8.5	272	100
Orchard	129	50.6	41	16.1	58	22.7	27	10.6	255	100
Vineyard	171	59.4	41	14.2	43	14.9	33	11.5	288	100
Nursery	24	44.4	1	1.9	13	24.1	16	29.6	54	100
Greenhouse	23	43.4	5	9.4	9	17.0	16	30.2	53	100
Other	33	50.8	7	10.8	19	29.2	6	9.2	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 78.2% (224,829 acres) test soil for residual nitrogen and information is incorporated into fertilization program.
- Growers representing 9.3% (26,683 acres) plan implementation within three years.
- Growers representing 5.2% (14,841 acres) do not plan to implement this practice.
- Growers representing 7.4% (21,180 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	224,829	78.2	26,683	9.3	14,841	5.2	21,180	7.4	287,533	100
Row Crop	152,883	83.8	10,010	5.5	11,362	6.2	8,268	4.5	182,523	100
Orchard	10,773	65.4	3,441	20.9	1,440	8.7	821	5.0	16,475	100
Vineyard	56,394	69.6	11,860	14.6	1,416	1.7	11,316	14.0	80,986	100
Nursery	430	43.0	64	6.4	126	12.6	380	38.0	1,000	100
Greenhouse	520	52.9	35	3.6	97	9.9	331	33.7	983	100
Other	12,553	83.0	887	5.9	1,152	7.6	541	3.6	15,133	100

N_5) If fertigation is used, are measures in place to ensure that there is no backflow into wells or other water sources?

Responding Growers for all Crop Types

- 70.7% (735 growers) have measures in place to ensure that there is no backflow into water sources, if fertigation is used.
- 2.2% (23 growers) plan implementation within three years.
- 2.3% (24 growers) do not plan to implement this practice.
- 24.8% (258 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	735	70.7	23	2.2	24	2.3	258	24.8	1,040	100
Row Crop	227	83.5	6	2.2	6	2.2	33	12.1	272	100
Orchard	151	59.2	7	2.7	8	3.1	89	34.9	255	100
Vineyard	226	78.5	3	1.0	3	1.0	56	19.4	288	100
Nursery	29	53.7	1	1.9	1	1.9	23	42.6	54	100
Greenhouse	32	60.4	2	3.8	1	1.9	18	34.0	53	100
Other	35	53.8	1	1.5	3	4.6	26	40.0	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 89.6% (257,608 acres) have measures in place to ensure that there is no backflow into water sources, if fertigation is used.
- Growers representing 0.4% (1,229 acres) plan implementation within three years.
- Growers representing 0.4% (1,273 acres) do not plan to implement this practice.
- Growers representing 9.5% (27,423 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	257,608	89.6	1,229	0.4	1,273	0.4	27,423	9.5	287,533	100
Row Crop	169,798	93.0	1,118	0.6	458	0.3	11,149	6.1	182,523	100
Orchard	12,388	75.2	133	0.8	576	3.5	3,378	20.5	16,475	100
Vineyard	70,178	86.7	87	0.1	202	0.2	10,519	13.0	80,986	100
Nursery	721	72.1	5	0.5	24	2.4	250	25.0	1,000	100
Greenhouse	624	63.5	5	0.5	17	1.7	337	34.3	983	100
Other	11,948	78.9	10	0.07	351	2.3	2,824	18.7	15,133	100

N_6) Do you regularly maintain and calibrate your fertilizer equipment?

Responding Growers for all Crop Types

- 74.9% (779 growers) regularly calibrate and maintain fertilizer equipment.
- 2.3% (24 growers) plan implementation within three years.
- 1.9% (20 growers) do not plan to implement this practice.
- 20.9% (217 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	779	74.9	24	2.3	20	1.9	217	20.9	1,040	100
Row Crop	219	80.5	5	1.8	3	1.1	45	16.5	272	100
Orchard	173	67.8	5	2.0	8	3.1	69	27.1	255	100
Vineyard	226	78.5	7	2.4	1	0.3	54	18.8	288	100
Nursery	41	75.9	1	1.9	1	1.9	11	20.4	54	100
Greenhouse	37	69.8	3	5.7	1	1.9	12	22.6	53	100
Other	45	69.2	3	4.6	3	4.6	14	21.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 88.0% (253,010 acres) regularly calibrate and maintain fertilizer equipment.
- Growers representing 0.4% (1,033 acres) plan implementation within three years.
- Growers representing 0.4% (1,155 acres) do not plan to implement this practice.
- Growers representing 11.2% (32,335 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	253,010	88.0	1,033	0.4	1,155	0.4	32,335	11.2	287,533	100
Row Crop	161,439	88.4	512	0.3	790	0.4	19,782	10.8	182,523	100
Orchard	14,434	87.6	164	1.0	305	1.9	1,572	9.5	16,475	100
Vineyard	70,433	87.0	97	0.1	13	0.0	10,443	12.9	80,986	100
Nursery	932	93.2	1	0.1	9	0.9	58	5.8	1,000	100
Greenhouse	787	80.1	12	1.2	16	1.6	168	17.1	983	100
Other	13,149	86.9	455	3.0	23	0.2	1,506	10.0	15,133	100

N_7) Do field personnel receive nutrient management training?

Responding Growers for all Crop Types

- 45.6% (474 growers) have field personnel who received nutrient management training.
- 8.1% (84 growers) plan implementation within three years.
- 10.2% (106 growers) do not plan on implementing this practice.
- 36.2% (376 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	474	45.6	84	8.1	106	10.2	376	36.2	1,040	100
Row Crop	146	53.7	31	11.4	33	12.1	62	22.8	272	100
Orchard	98	38.4	16	6.3	19	7.5	122	47.8	255	100
Vineyard	140	48.6	19	6.6	19	6.6	110	38.2	288	100
Nursery	23	42.6	4	7.4	12	22.2	15	27.8	54	100
Greenhouse	22	41.5	4	7.6	7	13.2	20	37.7	53	100
Other	19	29.2	9	13.8	11	16.9	26	40.0	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 62.6% (179,901 acres) have field personnel who received nutrient management training.
- Growers representing 8.7% (24,886 acres) plan implementation within three years.
- Growers representing 9.6% (27,659 acres) do not plan to implement this practice.
- Growers representing 19.2% (55,087 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	179,901	62.6	24,886	8.7	27,659	9.6	55,087	19.2	287,533	100
Row Crop	122,853	67.3	9,873	5.4	17,768	9.7	32,029	17.5	182,523	100
Orchard	10,529	63.9	1,518	9.2	1,194	7.2	3,234	19.6	16,475	100
Vineyard	42,452	52.4	9095	11.2	7,011	8.7	22,428	27.7	80,986	100
Nursery	577	57.7	26	2.6	308	30.8	89	8.9	1,000	100
Greenhouse	542	55.1	66	6.7	102	10.4	273	27.8	983	100
Other	5,895	39.0	4161	27.5	2,658	17.6	2,419	16.0	15,133	100

N_8) Do fertilizer storage facilities include concrete pads and curbs for containment of spills and are they protected from weather?

Responding Growers for all Crop Types

- 40.8% (424 growers) have fertilizer storage facilities that include concrete pads and curbs for containment of spills and protection from weather.
- 15.6% (162 growers) plan implementation within three years.
- 8.7% (90 growers) do not plan to implement this practice.
- 35.0% (364 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	424	40.8	162	15.6	90	8.7	364	35.0	1,040	100
Row Crop	119	43.8	40	14.7	25	9.2	88	32.4	272	100
Orchard	91	35.7	43	16.9	31	12.2	90	35.3	255	100
Vineyard	104	36.1	44	15.3	20	6.9	120	41.7	288	100
Nursery	33	61.1	5	9.3	4	7.4	12	22.2	54	100
Greenhouse	31	58.5	10	18.9	1	1.9	11	20.8	53	100
Other	23	35.4	10	15.4	7	10.8	25	38.5	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 55.4% (159,229 acres) have fertilizer storage facilities that include concrete pads and curbs for containment of spills and protection from weather.
- Growers representing 14.9% (42,901 acres) plan implementation within three years.
- Growers representing 9.0% (25,968 acres) do not plan to implement this practice.
- Growers representing 20.7% (59,435 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	159,229	55.4	42,901	14.9	25,968	9.0	59,435	20.7	287,533	100
Row Crop	113,702	62.3	24,387	13.4	11,280	6.2	33,154	18.2	182,523	100
Orchard	6,487	39.4	3,490	21.2	1,908	11.6	4,590	27.9	16,475	100
Vineyard	34,075	42.1	13,075	16.1	14,177	17.5	19,659	24.3	80,986	100
Nursery	615	61.5	127	12.7	42	4.2	216	21.6	1,000	100
Greenhouse	462	47.0	270	27.5	72	7.3	179	18.2	983	100
Other	8,971	59.3	2,079	13.7	1,635	10.8	2,448	16.2	15,133	100

N_9) Is mixing and loading performed on sites with low runoff hazard, over 100' downslope of wells?

Responding Growers for all Crop Types

- 66.2% (688 growers) perform mixing and loading on sites with low runoff hazard, over 100' downslope of wells.
- 3.0% (31 growers) plan implementation within three years.
- 3.8% (39 growers) do not plan to implement this practice.
- 27.1% (282 growers) replied N/A.

Responding Growers	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Responses	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	688	66.2	31	3.0	39	3.8	282	27.1	1,040	100
Row Crop	197	72.4	9	3.3	14	5.1	52	19.1	272	100
Orchard	145	56.9	9	3.5	7	2.7	94	36.9	255	100
Vineyard	202	70.1	7	2.4	8	2.8	71	24.7	288	100
Nursery	35	64.8	0	0.0	3	5.6	16	29.6	54	100
Greenhouse	28	52.8	3	5.7	4	7.5	18	34.0	53	100
Other	42	64.6	3	4.6	1	1.5	19	29.2	65	100

Represented Irrigated Acreage for all Crop Types

- Growers representing 79.1% (227,353 acres) perform mixing and loading on sites with low runoff hazard, over 100' down slope of wells.
- Growers representing 1.4% (4,035 acres) plan implementation within three years.
- Growers representing 4.4% (12,615 acres) do not plan to implement this practice.
- Growers representing 15.1% (43,530 acres) replied N/A.

Represented Acres	Level of Implementation									
	Yes, implemented		No, but planned in 3 years		No, and not planned		Not applicable		Total Acres	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All Crop Types	227,353	79.1	4,035	1.4	12,615	4.4	43,530	15.1	287,533	100
Row Crop	154,679	84.7	795	0.4	5,941	3.3	21,108	11.6	182,523	100
Orchard	11,659	70.8	1,146	7.0	324	2.0	3,346	20.3	16,475	100
Vineyard	55,932	69.1	1,561	1.9	5,646	7.0	17,847	22.0	80,986	100
Nursery	701	70.1	0	0.0	43	4.3	256	25.6	1,000	100
Greenhouse	639	65.0	100	10.2	32	3.3	212	21.6	983	100
Other	13,027	86.1	300	2.0	35	0.2	1,771	11.7	15,133	100

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Central Coast Water Board

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Central Coast
Water Board

Exhibit 9

Appendix F

Staff Recommendations for Agricultural Order

TECHNICAL MEMORANDUM:

Cost Considerations Concerning Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands

CENTRAL COAST REGIONAL WATER QUALITY CONTROL BOARD

March 2011

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1 INTRODUCTION

On July 9, 2004, the Central Coast Regional Water Quality Control Board (Central Coast Water Board) adopted a *Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands* (2004 Conditional Waiver). Since the adoption of the 2004 Conditional Waiver, the Central Coast Water Board has documented that discharges of waste from irrigated lands, including nutrients, toxic compounds, and other constituents found in fertilizers, pesticides, and sediment, continue to degrade water quality and impair beneficial uses. Activities that have resulted in the discharges of waste that degrade water quality and impair beneficial uses include farm management practices and removal and degradation of riparian and wetland habitat. The 2004 Conditional Waiver expired on July 9, 2009 and has been renewed without revisions until March 2011. The Central Coast Water Board will consider renewing the 2004 Conditional Waiver prior to the expiration of the 2004 Conditional Waiver.

Central Coast Water Board staff prepared this Technical Memorandum to present cost considerations concerning the proposed renewal of the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Draft Agricultural Order No. R3-2011-0006 (Draft Ag Order)). The goal of this cost analysis is to present the full range of costs associated with the Draft Ag Order and to address concerns raised at Public Workshops held during the spring and summer of 2010.

The Central Coast Water Board is not generally required to consider costs when it adopts a waiver of waste discharge requirements pursuant to Water Code section 13269. Water Code section 13269 requires the Water Board to impose conditions on any waiver and the waiver must be consistent with the applicable water quality control plan (Basin Plan). Water Code section 13141 requires regional water boards to estimate the total costs of any agricultural water quality control program and an identification of potential sources of financing when a Regional Water Board amends a Basin Plan. The Draft Ag Order is not proposed to be included in the Basin Plan; however, this cost analysis provides the information that would be required by Water Code section 13141. The Central Coast Water Board is not required to consider economic or social impacts under the California Environmental Quality Act (CEQA) except where such impacts result in actual physical adverse impacts on the environment caused by the project. This cost analysis provides information that is used in the CEQA document to be considered by the Central Coast Water Board. The Central Coast Water Board is not required to perform a formal cost/benefit analysis when issuing waste discharge requirements or a waiver of waste discharge requirements or when complying with CEQA.

2 COSTS OF IMPLEMENTATION

2.1 Introduction

Growers, farmland owners, and the Central Coast Water Board, as the administering entity, would potentially incur the direct costs of implementing the Draft Ag Order. Staff compiled information available from various sources to characterize the type and approximate scale of these costs.

2.2 Cost Of Compliance to Growers and Farmland Owners

2.2.1 Management Practice Implementation, Monitoring and Reporting

The Draft Ag Order includes specific conditions requiring irrigated agricultural dischargers to implement management practices and conduct monitoring and reporting. The Draft Ag Order does not generally specify the manner of compliance – many different management practices could be implemented to comply with the conditions of the Draft Ag Order to attain water quality standards in the receiving waters. This portion of this Memorandum includes an estimate of costs of implementation of possible management practices that growers could use to comply. These requirements, summarized in Table 1, have the potential to increase costs to growers and agricultural land owners, depending on current level of compliance and other factors.

The Draft Ag Order requires dischargers to comply with conditions for the “tier” that applies to their operation. The tiers are based on criteria that indicate operations that have a low, moderate or high level of waste discharge, or a low, moderate or high threat or contribution to water quality degradation. Tier 1, lowest threat, dischargers have the fewest requirements (including implementation, monitoring and reporting) and Tier 3, highest threat, dischargers have the most requirements. Therefore, Tier 3 dischargers will most likely incur higher costs than Tier 1 or Tier 2 dischargers and a greater increase in costs compared to the cost of complying with the 2004 Conditional Waiver. For all dischargers, most of the costs to comply with the Draft Ag Order will be for implementation of management practices. Remaining additional costs will be for monitoring and reporting.

For example, the proposed draft 2011 Agricultural Order proposes the following implementation and reporting requirements:

- Implement pesticide management practices to reduce toxicity in discharges so receiving waterbodies meet water quality standards;
- Implement nutrient management practices to eliminate or minimize nutrient and salt in discharges to surface water so receiving waterbodies meet water quality standards;
- Implement nutrient management practices to minimize fertilizer and nitrate loading to groundwater to meet nitrate loading targets ;

- Install and properly maintain back flow prevention devices for wells or pumps that apply fertilizers, pesticides, fumigants or other chemicals through an irrigation system;
- Implement erosion control and sediment management practices to reduce sediment in discharges so receiving water bodies meet water quality standards;
- Protect and manage existing aquatic habitat to prevent discharge of waste to waters of the State and protect the beneficial uses of these waters;
- Implement stormwater runoff and quality management practices.
- Develop, implement, and annually-update Farm Water Quality Management Plans.
- Submit an Annual Compliance Document (for higher threat dischargers) that includes individual discharge monitoring results, nitrate loading potential evaluation and, if nitrate loading potential is high, irrigation and nutrient management plan, verification of irrigation and nutrient management plan effectiveness.
- Submit a water quality buffer plan (for higher threat dischargers), if operations contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(d) List of Impaired Waterbodies as impaired for temperature or turbidity.

Staff developed this Draft Order to address the documented severe and widespread water quality problems in the Central Coast Region, predominately unsafe levels of nitrate in ground water used for drinking water and toxicity impairing communities of aquatic organisms.

This proposed draft 2011 Agricultural Order requires dischargers to implement practices or operational changes to reduce pollutant loading to waters of the State in the Central Coast Region. The proposed draft 2011 Agricultural Order requires more specific and measurable tracking and evaluation of effectiveness of practices and more comprehensive water quality monitoring (e.g., individual discharges and groundwater) than the 2004 Conditional Waiver.

Table 1: Requirements in Draft Ag Order with Potential to Increase Costs to Dischargers

CONDITIONS	Due in:[1]
Pesticide Runoff/Toxicity Elimination	
All dischargers must implement management practices to eliminate or minimize toxicity and pesticide discharges so receiving water bodies meet water quality standards	immediately
Nutrient and Salt Management	
All dischargers must implement nutrient management practices to minimize nutrient and salt discharges so receiving water bodies meet water quality standards	immediately
All dischargers must minimize nutrient discharges from fertilizer and nitrate loading to groundwater so receiving water bodies meet water quality standards and safe drinking water is protected	immediately
Tier 3 dischargers must evaluate the nitrate loading potential factor (as high, medium or low) of their operations, annually	1 Yr
Tier 3 dischargers *with a high nitrate loading potential* must develop and initiate implementation of a certified Irrigation and Nutrient Management Plan (INMP) to meet specified nitrogen balance ratio targets	2 Yrs
Sediment Management / Erosion Control / Stormwater Management	
All dischargers must implement erosion control and sediment management practices to eliminate or minimize the discharge of sediments and turbidity so receiving water bodies meet water quality standards	3 Yrs
All dischargers must protect existing aquatic habitat (including perennial, intermittent, or ephemeral streams, lakes, and riparian and wetland area habitat or other waterbodies) to prevent discharges of waste so receiving water bodies meet water quality standards.	immediately
All dischargers must implement stormwater management practices to minimize stormwater runoff	immediately
Tier 2 and Tier 3 Dischargers must evaluate conditions of riparian and wetland habitat areas *if their operations contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(Dd) List of Impaired Waterbodies as impaired for temperature or turbidity.*	1 Yr
Tier 3 dischargers must develop and initiate implementation of a Water Quality Buffer Plan to prevent waste discharge or water quality degradation, *if their operations contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(d) List of Impaired Waterbodies as impaired for sediment, temperature or turbidity and the discharger's runoff drains to that waterbody.* The plan must include the following or the functional equivalent: minimum of 30 foot buffer; wider buffer if necessary to prevent discharge of waste; three zones with distinct types of vegetation (moving from area closest to waterbody to areas away from waterbody) to jointly provide shade, pollutant treatment through infiltration and reduced velocity of flow to promote sediment deposition; schedule for implementation; and maintenance provisions.	4 Yrs
General Groundwater Protection Requirements	
All dischargers that apply fertilizers, pesticides, fumigants or other chemicals through an irrigation system must have functional and properly maintained back flow prevention devices installed at the well or pump to prevent contamination of groundwater or surface water.	3 Yrs
All dischargers must properly destroy all abandoned groundwater wells, exploration holes or test holes, in such a manner that they will not produce water or act as a conduit for mixing or otherwise transfer groundwater or waste constituents between permeable	NA

[1] Where specified time periods/deadlines are included in the proposed Order. NA = no time period specified in order.

zones or aquifers.	
All dischargers who choose to utilize containment structures (such as retention ponds or reservoirs) to achieve treatment or control of the discharge of wastes, must construct and maintain such containment structures to avoid percolation of waste to groundwater that causes or contributes to exceedancess of water quality standards and to avoid surface water overflows that have the potential to impair water quality	NA
MONITORING	
All dischargers must sample private domestic and agricultural supply groundwater wells located at their operation, twice in one year	2Yrs
All dischargers must conduct watershed-scale (receiving water) monitoring as part of cooperative group or individually, monthly for five years	6 Months
Tier 2 and Tier 3 dischargers must photo-document existing conditions of riparian and wetland habitat areas, one time in five years, *if their operation(s) contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(d) List of Impaired Waterbodies as impaired for sediment, temperature or turbidity.*	1 Yr
Tier 3 dischargers must conduct individual discharge monitoring, two to four times per year for five years	6 months
REPORTING	
All dischargers must submit Notice of Intent to Enroll	60 days
All dischargers must submit results of groundwater sampling and related well information	6 Months
Tier 2 and 3 dischargers must submit an Annual Compliance Document that includes status information on implementation of required conditions (e.g. implementation of management practices) and results of any required sampling or monitoring, appropriate for the tier applicable to the discharger's operation.	2 Yrs
Tier 2 and Tier 3 dischargers must submit photo-documentation of conditions of riparian and wetland habitat areas with the Annual Compliance Document, *if their operation(s) contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(d) List of Impaired Waterbodies as impaired for sediment, temperature or turbidity.*	1 yr
Tier 3 dischargers must submit results of individual discharge monitoring	2 Yrs
Tier 3 dischargers must submit results of evaluating nitrate loading potential factor (high, medium, or low)	1 Yr
Tier 3 dischargers *with a high nitrate loading potential* must submit verification of Irrigation and Nutrient Management Plan (INMP) and other related nitrate loading and balance information	2 Yrs
Tier 3 dischargers must submit Water Quality Buffer Plan to prevent waste discharge or water quality degradation, *if their operations contain or are adjacent to a waterbody identified on the Clean Water Act Section 303(d) List of Impaired Waterbodies as impaired for sediment, temperature or turbidity.*	4 Yrs

2.2.2 Costs of Implementing Management Practices

2.2.2.1 Estimated Costs of New Compliance Actions

The scope of this cost analysis is intended to encompass the incremental costs to growers and landowners of new compliance actions beyond those taken to comply with the 2004 Conditional Waiver. Compliance actions for the Draft Ag Order are attached to a schedule (Table 1, above) and staff recognizes these actions may include the implementation of management practices in addition to those already implemented in response to the 2004 Conditional Waiver. However, staff possesses limited information to determine the extent of management practice implementation to date. Consequently, staff can not quantify the incremental costs associated with additional management measures. Staff assumes that many growers will not have to incur entirely new cost of implementing management practices as they will have already implemented some practices for compliance with the 2004 Conditional Waiver. Growers and landowners are likely to implement only some of the actions described below. The higher the assumed rate of management practice implementation over the past nearly seven years, the lower is the incremental increase in cost of the 2011 Draft Ag Order. This analysis provides an estimate of total costs, but the Water Board does not expect that each grower will be subject to all the costs identified since it is up to the grower to choose and implement management practices specific to its situation.

2.2.2.2 Potential Water Quality Management Practices

A broad choice of water quality management practices is available to growers to achieve compliance with the Draft Ag Order. Practices include those designed to manage sediment, nutrients, pesticides, and aquatic habitat. Growers implement many of these management practices for purposes other than water quality protection and staff makes no estimation of the proportion of practices that growers have implemented, or will implement, exclusively for water quality protection.

Most management practices contribute to meeting multiple management objectives (Table 2). For example, management practices implemented to capture and treat irrigation water runoff (tailwater) before it leaves the farming operation can result in improved irrigation efficiency and reduced transport of multiple constituents off-site, including nutrients, sediment and pesticides. Similarly, management practices that emphasize source control, such as nutrient management planning, reduce the need for more expensive management practices to remove a pollutant from tailwater before it enters receiving waters.

Source control practices also provide cost savings to growers who reduce their use of irrigation water and agricultural chemicals. These cost savings potentially combine with other benefits to reduce the cost of management practice implementation. Reduced water use, energy use, labor costs for irrigation and fertilization, and chemical use are all examples of benefits with potential to decrease costs to dischargers (Table 2).

2.2.2.3 Potential Cost Factors Considered

Staff evaluated detailed implementation requirements for management practices to identify specific costs of management practice implementation (Table 2). For example, the practice of installing backflow prevention and safety devices has a direct cost associated with purchasing and installing the devices and various related costs to the farming operation, including potential system upgrades to accommodate backflow prevention devices and regular maintenance of backflow prevention devices.

The specific combination of management practice actions undertaken by growers will be unique to the water quality conditions of each operation and will vary widely. To further illustrate the types of costs associated with management practice implementation, Table 3 describes typical activities that incur costs in managing sediment and stormwater, nutrients, pesticides, irrigation, and riparian habitat on farms in the Central Coast Region. Management practices include costs associated with assessment, on-the-ground actions, and technical assistance.

Table 2: Water Quality Management Practices with Potential to Change Costs to Dischargers

WATER QUALITY MANAGEMENT PRACTICES WITH POTENTIAL TO INCREASE COSTS TO DISCHARGERS	DETAILS OF IMPLEMENTATION REQUIREMENTS FOR WATER QUALITY MANAGEMENT PRACTICES	BENEFITS WITH POTENTIAL TO DECREASE COSTS TO DISCHARGERS	*Implementation Achieves Management Objectives for:*			
			Irrigation	*Nutrients*	*Erosion*	*Pesticide*
Eliminate or reduce irrigation runoff through installation and management of a highly efficient irrigation system	Weather station equipment and/or data Expertise/ technical assistance in crop growth, soil science, atmospheric demand, irrigation requirements and economics to prepare an irrigation strategy Labor for installation, operation, and maintenance Direct cost of equipment/system investment	Reduced water use Reduced energy use Reduced agro-chemical use Reduced labor for fertilizer applications Reduced labor through fewer irrigations	✓	✓	✓	✓
Capture and treat irrigation water runoff before it leaves the farming operation	Land out of production to collect tailwater Design and implementation of a tailwater recovery system that collects all discharge Direct cost for recovery/recycle system components Labor for installation, operation, and maintenance Design and implementation of a tailwater treatment system Management time to create and implement a monitoring plan that verifies treatment: collect water samples; evaluate results of samples and recalibrate treatment system	Reduced water use Reduced energy use Reduced need for additional conservation practices Reduced time dealing with clean-ups associated with chemical contamination of other farm water supplies/systems Reduced agro-chemical use	✓	✓	✓	✓
Install backflow prevention and safety devices	Purchase of backflow prevention device Labor for installation and regular maintenance of backflow prevention device Potential system upgrades to accommodate backflow prevention device Expertise/technical assistance	Reduced time and cost dealing with clean-ups associated with chemical contamination of other farm water supplies/systems Reduced agro-chemical use		✓		✓
Conduct analysis of salts to limit unnecessary leaching	Reduced yield from growing current crops with higher salinity in irrigation water Less profit from growing alternative, salt-tolerant crops/varieties Proper training for the collection of samples Labor for the collection of soil samples and water samples Laboratory costs for salinity tests that identify salt problems in soil	Reduced water use and cost by altering irrigation schedule for less frequent heavy watering Reduced energy use to not pump extra water for leaching salts Reduced fertilizer costs by keeping nutrients at the root zone instead	✓	✓		

WATER QUALITY MANAGEMENT PRACTICES WITH POTENTIAL TO INCREASE COSTS TO DISCHARGERS	DETAILS OF IMPLEMENTATION REQUIREMENTS FOR WATER QUALITY MANAGEMENT PRACTICES	BENEFITS WITH POTENTIAL TO DECREASE COSTS TO DISCHARGERS	*Implementation Achieves Management Objectives for:*			
			Irrigation	*Nutrients*	*Erosion*	*Pesticide*
	Expertise/technical assistance to interpret results	of leaching				
Stormwater Management Plan to control, stop, and/or eliminate the release of pollutants from farms to surface waters	Management time to: prepare a stormwater management plan coordinate with other growers and agencies submit plan to Central Coast Water Board oversee implementation of management plan continually review and update management plan Labor associated with implementation Implementation and structural improvements Labor for continued maintenance Expertise/technical assistance to help develop measures, strategies, practices, etc.	Reduced need for additional conservation practices	✓	✓	✓	✓
Dredge, remove, and dispose of sediments from treatment systems every year, before the first rain event	Management time to oversee dredging operation Labor to operate heavy equipment Rental/use of heavy equipment Disposal of contaminated soil Re-vegetating treatment system				✓	✓
Drainage Water Management Program for Dischargers who operate tile drains or other sub-surface drainage systems	Expertise/technical assistance to assist with system design and program Modification of drainage system design and operation Equipment cost for water control structures and/or retrofits Installation of structures Management time to operate structures at appropriate times	Reduced water use Reduced energy use	✓	✓		✓
Develop, implement, and periodically update a Nutrient Management Plan that is approved by a Certified Crop Advisor, a PE, GR, or similarly certified professional	Acquire technical assistance to help measure, calculate, budget, and/or estimate nutrient requirements, uptake, application, including consultant costs to review and approve management plan (CCA, PE, CR, etc.) Train on how to measure, calculate, budget, estimate, and apply nutrients Management time to oversee implementation of management	Reduced energy use Reduced agro-chemical use Reduced labor for fertilizer applications Reduced labor through fewer applications Increased crop yields		✓		

WATER QUALITY MANAGEMENT PRACTICES WITH POTENTIAL TO INCREASE COSTS TO DISCHARGERS	DETAILS OF IMPLEMENTATION REQUIREMENTS FOR WATER QUALITY MANAGEMENT PRACTICES	BENEFITS WITH POTENTIAL TO DECREASE COSTS TO DISCHARGERS	*Implementation Achieves Management Objectives for:*			
			Irrigation	*Nutrients*	*Erosion*	*Pesticide*
	plan; continually review and update management plan Labor for implementation Direct costs associated with implementation Labor associated with continued maintenance					
Estimate loading of nutrients directly below the root zone	Direst cost for measurement equipment Management time and labor for installation and maintenance Management time for regular checks and pumping for sampling Laboratory analysis of samples Management time evaluate sample and make appropriate system changes Hire consultant to collect samples or proper training for employees to collect samples	Reduced water use Reduced energy use Reduced labor for fertilizer applications Reduced agro-chemical use Reduced labor through fewer irrigations	✓	✓		✓
Trap residual fertilizers (and nutrients) in the root zone, between crop rotations	Soil testing and measurements Management time to analyze results and make appropriate fertilizer application changes Installation of leaching reduction (nutrient trapping) control practices	Reduced fertilizer use Reduced energy use Reduced water use and costs for leaching fertilizer to root zone	✓	✓	✓	✓

Table 3: Example Types of Management Practice Implementation Costs

PLANNING AND ASSESSMENT COSTS	ON-THE-GROUND COSTS	COST OF TECH ASSISTANCE
SEDIMENT / EROSION CONTROL / STORMWATER MANAGEMENT		
Prepare Stormwater Management Plan Measure runoff from field Implement smart irrigation scheduling Install and monitor weather station	Construct stormwater storage facility Construct sediment basin Residue and tillage management Re-grade to alter drainage Plant cover crop, filter strips, field borders, grassed waterways, etc. Apply polyacrylamides (PAM)	Consulting fees for technical assistance to implement Stormwater Mgmt. Plan
IRRIGATION MANAGEMENT		
Install and monitor weather station Conduct irrigation system evaluation on a drip, sprinkler, and/or furrow irrigation system Measure soil moisture content Implement smart irrigation scheduling Install flow meter on a pipeline Measure runoff from a field	Convert to drip irrigation from either sprinkler or furrow irrigation, Install dual drip and sprinkler system for frost control Repair and/or replace sprinkler system Install filter station for drip irrigation system Install time clock for irrigation pump Install automatic equipment such as a shut-off switch, backflow prevention device (when chemigation is used) Construct furrow irrigation tailwater recovery/recycling system, including storage facilities Construct water holding structure Construct underground detention / retention unit for tailwater recovery/recycling system	Retain irrigation scheduling service that provides growers with written reports of soil and crop status information throughout the growing season, as well as a seasons end agronomic report
NUTRIENT AND SALT MANAGEMENT		
Prepare Nutrient Management Plan Measure soil moisture content Measure runoff from a field Install and monitor weather station Install shallow groundwater monitoring well Do laboratory well water analysis Do laboratory soil analysis	Install automatic equipment such as a shut-off switch, backflow prevention device Time for a manager and an irrigator to improve the irrigation efficiency and water management (including research, education, and information gathering) Install time clock for irrigation pump to improve irrigation scheduling The cost of additional PVC pipe runs Install or improve sprinkler irrigation system Nutrient trapping Effective cover crops	Consulting fees for technical assistance to implement a nutrient management plan
PESTICIDE RUNOFF / TOXICITY ELIMINATION		
Conduct smart irrigation scheduling Install and monitor weather station Install flow meter on pipeline Do laboratory well water analysis Do laboratory soil analysis	Purchase and install wellhead protection block Install automatic equipment such as a shut-off switch, backflow prevention device Install dual drip and sprinkler system Establish windbreaks/shelterbelts to reduce pesticide drift Apply polyacrylamides (PAM) Construct furrow irrigation tailwater recovery/recycling system Construct underground detention/retention unit for a tailwater recovery/recycling system	The cost of technical assistance to implement an Integrated Pest Management Plan (IPM)
AQUATIC HABITAT PROTECTION		
Prepare Water Quality Buffer Plan	Erosion Control Modify drainage infrastructure Plant riparian vegetation Install irrigation Monitoring and maintenance (for several years to ensure success) Stream bank and channel re-contouring Weed (invasive vegetation) management	Consulting fees for technical assistance to implement a nutrient management plan

2.2.2.4 Unit Costs for Management Practices

This Technical Memo presents unit cost information for the common management practices available to dischargers to achieve compliance with the Draft Ag Order. Staff reviewed information from the United States Department of Agriculture Natural

Resources Conservation Service, the University of California Cooperative Extension (UCCE), and obtained cost quotes from numerous agricultural technical consultants and growers.

2.2.2.4.1 UCCE Conservation Practices

UCCE prepared estimates of costs and potential benefits for a selection of common conservation practices employed in the Central Coast Region. UCCE estimated low, representative, and high costs for the installation and maintenance of the conservation practices. UCCE emphasizes that farmers, ranchers and landowners should evaluate each conservation practice for potential benefits and drawbacks with respect to their own operation.[2] Furthermore, UCCE states their assumptions in preparing the estimates. For example, UCCE did not include in the analysis land ownership and rental rates, which are specific to each operation. Also, the estimates reflect current prices as of 2003, when the studies were prepared.

Table 4 presents a summary of UCCE's cost estimates for nine conservation practices. The complete UCCE studies detail specific actions required to implement each practice and break out costs by machine and non-machine labor, material costs, and annual operation and maintenance costs for up to five years of implementation.

Costs and reduced returns refer to direct costs for practice installation, operation and maintenance, and any negative impact on returns. Two practices, non-engineered water/sediment control basins, and underground outlets, include reduced returns of up to $1,125 from the removal of 0.1 acre of strawberry from production. The representative net change in income for these two practices however, is the greatest of all the practices studied: non-engineered water/sediment control basins *decrease* income by -$1,367/unit/year while underground outlets *increase* income by $1,332/unit/year, over the longer term (four to five years), according to UCCE. These positive and negative effects of implementing conservation practices illustrate how a reduction in returns does not necessarily translate into a reduction in income.

As expected, most conservation practices UCCE evaluated result in a negative effect on income that may be reduced after the initial year of implementation. For example, critical area planting may cost $903/acre in the first year of implementation, but in years 2 – 4, that cost could go down to $121/acre/year.

[2] University of California Cooperative Extension, 2003. Estimated Costs and Potential Benefits for [Nine Conservation Practices] http://www.awqa.org/pubs/coststudies.html

Table 4: Cost Estimates and Potential Benefits for Nine Conservation Practices

CONSERVATION PRACTICE	COSTS PER UNIT		
	Low	**Representative**	High
Annually Planted Cover Crop			
Costs & Reduced Returns	$48	$147	$163
Additional Returns & Reduced Cost	$0	$28	$110
Net Change in Income Per Acre	*-$48*	***-$119***	*-$53*
Annually Planted Grassed Filter Strip (0.5 ac)			
Costs & Reduced Returns	$26	$234	$580
Additional Returns & Reduced Cost	$0	$165	$220
Net Change in Income Per Unit Per Year	*-$26*	***-$69***	*-$360*
Grassed Farm Roads (5,800 Linear Feet/20 ac of Cropland)			
Costs & Reduced Returns	$137	$310	$503
Additional Returns & Reduced Cost	$0	$650	$1,950
Net Change in Income Per Unit (5,800 Linear Ft.) Per Year	*-$137*	***$340***	*$1,447*
Non-Engineered Grassed Waterways (1,000 Linear Ft.)			
Costs & Reduced Returns Per Unit Year 1	$28	$980	$2,250
Costs & Reduced Returns Per Unit Per Year - Years 2-5	$27	$329	$767
Additional Returns & Reduced Cost Per Unit Year 1	$0	$275	$660
Additional Returns & Reduced Cost Per Unit Per Year -Years 2-5	$0	$275	$660
Net Change in Income Per Unit Year 1	*-$28*	***-$705***	*-$1,590*
Net Change in Income Per Unit Per Year - Years 2-4	*-$27*	***-$54***	*-$107*
Non-Engineered Water/Sediment Control Basin (237 Cubic Yards)			
Costs & Reduced Returns Per Unit Year 1	$1,698	$4,061	$7,002
Costs & Reduced Returns Per Unit Per Year - Years 2-5	$354	$2,017	$3,751
Additional Returns & Reduced Cost Per Unit Per Year	$0	$650	$1,950
Net Change in Income Per Unit Year 1	*-$1,698*	***-$3,411***	*-$5,052*
Net Change in Income Per Unit Per Year - Years 2-4	*-$354*	***-$1,367***	*-$1,801*
On-Farm Row Arrangement (25 Acre Parcel)			
Costs & Reduced Returns Per Unit Per Year**	$474	$920	$1,849
Additional Returns & Reduced Cost Per Unit Per Year	$0	$3,500	$7,000
Net Change in Income Per Unit Per Year	*-$474*	***$2,580***	*$5,151*
Net Change in Income Per Acre Per Year	*-$19*	***$103***	*$206*
** First year costs are $125 higher than subsequent years to account for costs to purchase measuring devices			
Perennial Critical Area Planting (Acre)			
Costs & Reduced Returns Per Unit - Year 1	$394	$903	$1,780
Costs & Reduced Returns Per Unit Per Year - Years 2 - 5	$50	$121	$241
Additional Returns & Reduced Costs Per Unit Per Year - Years 1-5	$0	$0	$0
Net Change in Income Per Acre Year 1	*-$394*	***-$903***	*-$1,780*
Net Change in Income Per Acre Per Year - Years 2-5	*-$50*	***-$121***	*-$241*
Perennial Hedgerow Planting (1,000 Linear Ft. X 8 Ft.)			
Costs & Reduced Returns Per Unit Year 1	$1,276	$2,918	$3,938
Costs & Reduced Returns Per Unit Per Year - Years 2-5	$280	$515	$739
Additional Returns & Reduced Cost Per Unit Per Year	$0	$0	$0
Net Change in Income Per Unit (1,000 LF) Year 1	*-$1,276*	***-$2,918***	*-$3,938*
Net Change in Income Per Unit Per Year - Years 2-5	*-$280*	***-$515***	*-$739*
Underground Outlet (400 Linear Ft.)			
Costs & Reduced Returns Per Unit Year 1	$4,630	$5,918	$6,834
Costs & Reduced Returns Per Unit Per Year - Years 2-5	$91	$726	$1,362
Additional Returns & Reduced Cost Per Unit Per Year	$0	$2,058	$4,062
Net Change in Income Per Unit Year 1	*-$4,630*	***-$3,860***	*-$2,772*
Net Change in Income Per Unit Per Year - Years 2-5	*-$91*	***$1,332***	*$2,700*

2.2.2.4.2 Sample Per-Unit Costs from NRCS and Other Sources

The detailed analysis of potential costs and benefits of practice implementation developed by UCCE covers soil conservation practices principally supporting sediment/erosion control and stormwater management objectives. A variety of management practices are available to address other management objectives identified in the Draft Ag Order, including: irrigation management, nutrient and salt management, pesticide runoff/toxicity elimination, and aquatic habitat protection. A broad sample of the per-unit costs associated with these practices is presented in Table 5.

The UCCE cost studies illustrate the variable effect of practice implementation on the bottom line of farming operations. As the UCCE cost studies show, and as Table 2 describes, most practices do yield benefits that improve overall conditions for farming operations, potentially reducing, and in some cases completely covering, the direct cost of implementation. The cost information presented in Table 5, by contrast, simply identifies per unit costs and includes no estimate of potential effects on returns, be they positive or negative.

The practices described in Table 5 range from planning and assessment actions to on-the-ground changes to field operations, including, for example, purchasing or replacing new equipment, constructing new facilities, and managing edge-of-field vegetation for habitat protection. The highest per-unit costs are associated with facility construction. For example, stormwater basins, tailwater recovery facilities, and monitoring wells can exceed several thousand dollars per facility. Habitat restoration and revegetation costs are substantial as well on a per-acre basis, including stream habitat improvement and management costs of approximately $10,000/acre, according to NRCS.

Irrigation management includes several costly practices (in excess of $3,000 per unit). The costs to improve irrigation efficiency may include assessment activities, equipment upgrades, and storage facility construction that represent significant investments for growers. Investments in irrigation efficiency however, may have the greatest potential of all the management practices to generate a stream of benefits that over time are likely to decrease costs for water and energy use. Most critically, irrigation efficiency improvements that result in the elimination of tailwater runoff from the operation allow the grower to avoid the costs of monitoring and treating tailwater discharges.

Table 5: Sample Per-Unit Costs of Management Practices Benefiting Water Quality

MANAGEMENT PRACTICE	DESCRIPTION	UNIT	UNIT COST*	COST RANGE		SOURCE
				Low	High	
SEDIMENT/EROSION CONTROL/STORMWATER MANAGEMENT						
Conservation Cover	Orchard/Vineyard Floor Cover	Acre		$429.91	$690.18	1
	Erosion Control, Water Quality, Wildlife	Acre		$569.71	$1,255.34	1
	Permanent Native Cover; Prep, Seed/Seeding, Weed Control	Acre		$1,252.76	$1,445.26	1
	Perm Native Cover Arid Lands; Prep, Seed/Seeding, Weed Control	Acre		$1,271.81	$1,736.81	1
Conservation Crop Rotation	Rotation for IPM/Organic/SCI/Erosion	Acre	$394.36			1
Cover Crop	Cover Crop	Acre		$159.14	$249.14	1
Cover Crop for Roads	Seasonal Road Cover, Non-Irrigated	Acre	$96.06			1
Residue and Tillage Management	Residue Management	Acre		$50.88	$61.14	1
Sediment Basin	Embankment Sediment Basin <1,200 CYD	No.	$8,190.00			1
	Embankment Sediment Basin	CYD	$3.15			2
Well Decommissioning	1,000-foot deep, 6-inch diameter	Foot	$3.75			1
	30-foot deep, 48-inch diameter	Foot	$140.65			1
Field Border	Seedbed Preparation, Seed	Acre		$392.46	$969.18	1
Filter Strip	Seedbed Prep, Seeding	Acre		$461.68	$1,015.30	1
Grassed Waterway	Grassed Waterway	Acre		$811.88	$1,246.58	1
Underground Outlet	4" diameter	Foot		$5.95	$19.82	1
	12" diameter	Foot		$19.82	$49.52	1
Polyacrylamides Erosion Control	Furrow erosion control	Acre	$50.00			1
Mulching	Soil Fertility, Moisture, Weed & Erosion Control	Acre		$314.05	$807.50	1
	Soil Cover - Moisture, Weed, Erosion Control	Acre				1
Stormwater Management Plan	Stormwater Management Plan for typical scale operation	-		$3,000.00	$1M	3
Greenhouse Covering	Permanent covering construction costs	Sq. Ft.		$6.00	$12.00	24
IRRIGATION MANAGEMENT						
Irrigation System, Microirrigation	Row-Field Cropland	Acre		$990.00	$1,500.00	1
	Nursery or Greenhouse	Acre	$3,000.00			1
	Orchard/vineyard <10 ac and >10ac	Acre		$1,400.00	$2,000.00	1
	Micro Irrigation on Hillside	Acre	$1,500.00			1
	Upgrade media filter tank	Each	$4,500.00			1
	Upgrade media filter station	Each	$15,000.00			1
	Upgrade screen or disk filter unit	Each	$1,800.00			1
	Upgrade screen or disk filter station	Each	$7,000.00			1
Drip irrigation	Materials and installation (w/filter station) new system in vineyard	Acre	$2,353.00			4
	New wellhead protection block	Each	$8,000.00			5

MANAGEMENT PRACTICE	DESCRIPTION	UNIT	UNIT COST*	COST RANGE		SOURCE
Row Arrangement	Row Arrangement Moderate to Steep Slope	Acre		$100.00	$150.00	1
Water and Sediment Control Basin	Embankment, <1,200 CYD	Each	$8,190.00			1
	Earthen Reservoir	Acre-Ft	$1,020.00			1
Irrigation Regulating Reservoir	Tank, <15K gal	Gal	$1.00			1
Pond Sealing or Lining, Soil Cement	Pond Sealing, Soil Cement	SqFt	$0.72			1
Roof Runoff Structure	Rain Gutters & Downspouts	Foot	$11.64			1
Water Harvesting Catchment	Storage Tank	Each		$2,500.00	$3,500.00	1
	Catchment	Each	$1,500.00			1
Runoff Management System	Runoff Management System	Each	$10,000.00			1
Tailwater Recovery System	Installed in: Crop/Pasture	Acre		$153.00	$306.00	1
	Installed in: Nursery	Acre		$1,632.00	$2,550.00	1
	Excavated pond/basin/catchment	CYD	$1.58			2
	Embankment pond/basin/catchment	CYD	$3.15			2
	Underground detention/retention unit	CuFt	$6.00			6
Irrigation Efficiency Measurement	Equipment to measure applied irrigation water	Each		$800.00	$1,200.00	7
	Equipment Installation	Each	$500.00			7
	Mobile Irrigation Lab: measure Distribution Uniformity (furrow length)	1/4 Mile		$950.00	$1,100.00	8
		1/2 Mile		$1,250.00	$1,450.00	8
	Equipment to measure runoff from a field: flume with a stilling well and pressure transducer	Each		$2,200.00	$2,600.00	7
Consulting Costs for Irrigation Management Plan Implementation	Irrigation Scheduling Service: monitor soil moisture 1/wk; recommend irrigation timing; reports, yield analysis; 2 visits/week	Acre		$20.00	$45.00	8
	Single irrigation scheduling visit	Acre	$3.50			8
NUTRIENT AND SALT MANAGEMENT						
Nutrient Management	Implemented for Seasonally Planted Crops	Acre	$55.00			1
	Implemented for Tree and Vine Crops	Acre	$56.00			1
Irrigation/Chemigation System Improvements	Backflow Prevention Check Valves	Each		$95.00	$435.00	9
	Chemigation Check Valves	Each		$597.00	$1,097.00	9
	Ancillary Equipment: smaller check valves, switches, controllers	Each		$21.00	$134.00	9
	Chemical injection pump	Each	$1,022.00			9
Vegetated Treatment Area	Vegetated Treatment Area	Acre	$404.00			1
Fertilizer Additives to Increase Nitrogen Utilization by Crop	Additive (urease inhibitor) to nitrogen-based fertilizers	Per pound of Fertilizer		4.5 cents	6 cents	10
Equipment to Measure Soil Moisture, Crop Water Demand, Evapotranspiration	Tensiometer	Each		$70.00	$120.00	11
	Atmometer equipped with a data logger. ETgage Model E	Each	$608.00			13
	ETGage Model A	Each	$192.00			13
Quantifying Nutrients in	Groundwater Monitoring Well (shallow, 40-ft)	Each	$6,000.00			14

MANAGEMENT PRACTICE	DESCRIPTION	UNIT	UNIT COST*	COST RANGE		SOURCE
Groundwater	Laboratory analyses of water sample	Each	$55.00			15
	Laboratory analyses of soil sample	Each		$40.00	$60.00	15
Equipment Rental to Measure Soil Moisture and Service to determine actual Crop Water Demand	4 tensiometers and central communication unit	Acre/Yr	$152.00			12
Consulting Costs Associated with Nutrient Management Plan Implementation	Crop logging service (tissue sampling prior to each side dress and irrigation, record keeping of pertinent agronomic information such as varieties, irrigations, fertilizer applications, and yield; season end agronomic report with cost, and yield analysis)	Acre/Yr		$11.10	$19.47	8
	Field sampling and consulting fee: Sampling, GPS, Report	Day	$766.00			8
		Acre	$20.00			8
	Certified Crop Advisor	Hour		$120.00	$240.00	18
PESTICIDE RUNOFF/TOXICITY ELIMINATION						
Pest Management	Year-Round IPM Level 1	Acre		$88.00	$160.00	1
	Reduced Risk Level 1	Acre		$45.00	$117.00	1
	Basic IPM consulting; Wine Grapes	Ac/Yr	$22.00			17
	Basic IPM consulting: Pears	Ac/Yr	$40.00			17
	High Cost Organic Pest Management Practices	Acre	$72.00			1
	Pest Suppression during Transition to Organic	Acre	$95.00			1
Precision Pest Control Application	Precision Spray Technology	Acre	$60.00			1
	Fumigant, Sprinklers for crop irrigation and VOC control	Acre	$40.00			1
Consulting Services	IPM and related consultations by: Certified Professional Agronomist, Accredited Farm Manager, Accredited Rural Appraiser, Certified Professional Soil Scientist	Hour		$110.00	$250.00	18
		Acre		$5.00	$20.00	19
Windbreak/Shelterbelt Establishment	Direct costs to implement practices to reduce drift	Foot	$1.76			20
Tailwater Recovery/Recycling System	Waste Utilization	Acre		$9.00	$10.00	20
	Storage Facility	Each		$13,000.00	$18,000.00	20
	Water Structure	Each		$1,000.00	$1,200.00	20
Products to Treat Water to Reduce Pesticide Content	PAM total cost per acre; includes product, labor, other	Acre	$25.70			22
	PAM: Liquid; 2 to 3 applications/year to wine grapes	Ac/Yr		$54.00	$81.00	23
AQUATIC HABITAT PROTECTION						
Critical Area Planting	From seed to establishment	Acre		$1,043.56	$4,673.70	1
Channel Bank Vegetation	Native Tree & Shrub Establishment	Acre	$3,324.28			1
Stream Habitat Improvement and Management	Stream Improvement	Acre	$10,027.20			1
Channel Stabilization	Bioengineered Stabilization	Foot	$50.00			1
Riparian Herbaceous Cover	Native Seed, Drilled	Acre	$1,085.86			1

MANAGEMENT PRACTICE	DESCRIPTION	UNIT	UNIT COST*	COST RANGE		SOURCE
	Native Species, Plugs	Acre	$4,392.40			1
Riparian Forest Buffer	Establishment	Acre		$640.05	$2,282.25	1
Hedgerow Planting	Hedgerow Planting	Foot		$2.25	$4.07	1
Restoration and Management of Rare and Declining Habitats	Arundo Eradication	Acre		$1,000.00	$4,310.00	1
	Blackberry Eradication	Acre		$1,142.50	$3,770.00	1
	Perennial Pepperwood Eradication	Acre		$79.00	$180.00	1
	Thistle or Other Invasive Eradication	Acre		$84.50	$129.00	1
	Wildlife Structures	Acre		$20.00	$40.00	1
Establishing Upland Wildlife Habitat	Irrigation System, Microirrigation	Acre	$800.00			1
Native Perennial Herbaceous Veg.	Irrigation System, Microirrigation	Acre	$1,678.16			1
Wetland Wildlife Habitat Mgmt.	Various Intensity	Acre	$20.00	$100.00		1
Constructed Wetland	Constructed Wetland	Acre	$4,351.76			1
Wetland Restoration	Wetland Restoration - Shaping & Grading	Acre	$330.76			1
	Wetland Restoration - Planting Only	Acre	$1,282.64			1
	Wetland Restoration - Southern California	Acre	$595.82			1
	Wetland Restoration - Coast	Acre	$2,470.58			1
Wetland Enhancement	Various Intensity	Acre		$55.00	$205.00	1
Tree/Shrub Site Preparation	Hand Site Preparation, Light	Acre	$1,045.00			1
Early Successional Habitat Development/Management	Early Successional Habitat Management	Acre	$25.00			1

* A low to high range is provided where available. The reported unit cost from Natural Resources Conservation Service (NRCS), Environmental Quality Incentives Program (EQIP) source is two times the unit cost provided by NRCS. Costs provided by NRCS are based on EQIP Program's cost basis for financial assistance, which is one-half the cost to implement the practice (personal communication, Roney Gutierrez, NRCS)

SOURCES for Table 5:

1 Natural Resources Conservation Service (NRCS), Environmental Quality Incentives Program 2010 Cost Tables, provided by Roney Gutierrez, NRCS.
2 Beau Schoch - Engineer USDA - NRCS Salinas Service Center
3 Dale Gropp, former Civil Engineer Technician at Cachuma RCD
4 Quote from Pacific Ag Water, Santa Maria
5 Coastal nursery manager re: installation of a new block Sept-Nov 2008
6 Hanes Geo Components, Area Sales Manager
7 USDA Engineer, NRCS Coastal RCD
8 Irrigation consultant and CCA who wishes to remain anonymous
9 Quote from Pacific Ag Water, Santa Maria
10 Regional Manager, Agrotain International
11 Irrometer, Google devices and Ben Meadows; ETgage Company
12 Hortau Simplified Irrigation
13 ETgage.com; ETgage Company rep., Loveland, CO
14 RWQCB, NPS Section 319 proposal for Pinto Lake grant
15 A&L Western laboratories
16 Numerous Certified Crop Advisors quotes for services
17 Devin W. Gordon, AG Unlimited, Ukiah, CA
18 Numerous Pesticide Crop Advisors quotes for services
19 Pesticide Crop Advisor, Yuba City, CA; Devin W. Gordon, AG Unlimited
20 NRCS online EQIP data for Pacific Region: http://www.ers.usda.gov/Data/eqip/
22 Michael Cahn, Irrigation Specialist UC Cooperative Extension, Davis
23 Stillwaters Aviation
24 California Association of Nurseries and Garden Centers, March 30, 2010 letter to staff. http://www.waterboards.ca.gov/centralcoast/water_issues/programs/ag_waivers/docs/ag_order/group_2.pdf

Management practices vary in terms of scope, making it difficult to identify actual costs of practices. For example, a runoff management system ($10,000 each) may include several of the individual tailwater recovery practices listed separately at lower per-unit cost, such as excavated pond/basin/catchments at $1.58/cubic yard excavated. Table 5 is therefore intended to provide as broad a sample as possible from available information, and to illustrate the range of options available for selecting the appropriate suite of practices to achieve specific management objectives. While entries are listed under management practice categories, there is considerable overlap among the categories. For example, tailwater recovery is a management practice supporting both irrigation and pesticide runoff management objectives. For the purposes of complying with the Draft Ag Order, a grower's selection of a particular management practice would be based on the effectiveness and extent of existing practices and water quality issues specific to the operation.

2.2.2.4.3 Management Cost Estimates from the Central Valley Region

Table 6 provides cost figures from the Central Valley Water Board to compare with Table 5 and UCCE expenditures (Table 4) above. The starkly different costs reported for the low and high cost ranges, as well as among the various sources available, point to the level of uncertainty associated with any estimates of actual individual or cumulative cost of management practice implementation.

Table 6: Management Practice Costs for Central Valley Water Board Region

Management Practice	Cost Range	Source of Information*
Nutrient Management	$5–$9/acre-year excludes idle land	Blackman 2010; Fry 2010; Kasapligil 2010; and Rathburn 2010
Irrigation Water Management	$50–$88/acre-year excludes idle land	Fry 2010; IID 2007
Tailwater Recovery System	$89/acre-year	NRCS 2010; IID 2007
Pressurized Irrigation System	$160/acre-year	NRCS 2010; IID 2007
Cover Crop	$48/acre-year	Tourte and Buchanan 2003a, b, c
Buffer Strip-Sediment Trap	$1/acre-year	Tourte and Buchanan 2003a, b, c
Abandoned Well Protection	$250/well/year	Lewis 2010
IID = Imperial Irrigation District, NRCS = Natural Resources Conservation Service, UCCE = University of California Cooperative Extension.		

* Secondary sources cited in CVRWQCB, 2010, p. 2-17.

2.2.2.4.4 Discharger Estimates of Cost

Groups representing dischargers provided cost information to the Water Board in response to the February 1, 2010 release of Preliminary Draft Staff Recommendations for an updated Agricultural Order. The information, presented in letters[3] and public comments at two Public Workshops (May 12 and July 8, 2010), reported on information

[3] Grower-Shipper Association of Central California, March 31, 2010 and May 5, 2010 letters to Central Coast Water Board Chair Jeffrey Young; Central Coast Agricultural Water Quality Coalition April 1, 2010 letter to Jeffrey Young.

collected through various methods including surveys and interviews with grower members, and economic modeling to estimate the economic effects of staff's draft recommendations. The results were gross estimates and indicated a wide range of approximate values for per acre costs of compliance in select crops, and county and regional losses to: business revenues, indirect tax revenue, labor income, and jobs.

The discharger representatives' estimates were based on the February 1, 2010 Preliminary Draft Staff Recommendations, and on assumptions about monitoring requirements, which were not included in those Staff Recommendations. The stated requirements in the February Preliminary Draft Staff Recommendations and any assumptions about their implementation are no longer valid, since staff has modified the Draft Ag Order.

2.2.2.5 Conclusions on Cost of Management Practice Implementation

Most water quality management practices achieve multiple objectives, though they often vary in terms of scope, making it difficult to identify actual costs. Management practices typically result in costs that lessen after the initial year of implementation. Detailed studies of implementation costs illustrate both positive and negative effects and reveal that a reduction in returns does not necessarily translate into similar effects on income. Most practices do yield benefits that improve overall conditions for farming operations, partially reducing the direct cost of implementation.

The highest per-unit costs are associated with management practices that require facility construction. Habitat restoration and revegetation costs can be substantial on a per-acre basis. Investments in irrigation management practices may have the greatest potential to generate a stream of benefits that over time support cost-effective farming operations. Notably, irrigation efficiency improvements that result in the elimination of tailwater runoff from the operation allow the grower to avoid the costs of treating discharges.

For the purposes of complying with the Draft Ag Order, a grower's selection of a particular management practice would be based on the effectiveness and extent of existing practices, and on water quality conditions specific to the operation. However, starkly different costs reported for the low and high cost ranges, as well as among the various sources available, point to the level of uncertainty associated with any estimates of actual individual or cumulative cost of management practice implementation. Furthermore, staff possesses limited information to determine the extent of management practice implementation to date.

Staff therefore applied best professional judgment and conservative assumptions in constructing an estimate of total cost for management practice implementation. Staff estimated costs in five management practice categories using median costs/acre for practices in each category (Table 7). The categories were then summed and total costs for the first year and for all five years of the program were calculated.

In the absence of information about the current extent of management practice implementation, staff made assumptions concerning the number of acres to which dischargers might apply management practices to achieve compliance with the Draft Ag Order. For practices to manage sediment, erosion and stormwater, staff conservatively assumed the basis, or the area potentially requiring management improvements, to be all irrigated farmland. However, staff then used a correction factor of five percent to estimate the number of acres that might be subject to actual management to reduce erosion, sedimentation and stormwater impacts to water quality.

The management practice cost per acre was derived from the broad selection of costs staff compiled and reported in Table 5. Staff calculated the median of all reported values presented in cost per acre, using the high value of the cost range where available to maintain a conservative bias. This cost per acre value was then applied to the acres that might be subject to management practice implementation.

Staff followed this approach for each management practice category, using a different area basis and correction factors based on professional judgment. For example, the basis for irrigation management was assumed to be operations that generate tailwater and staff assumed 50 percent of these acres might be subject to implementation of an irrigation management practice. For nutrient and salt management practices, staff used the total acreage planted in vegetables as a basis, since vegetables have a higher potential to load groundwater with nitrogen. For both pesticide runoff/toxicity elimination and aquatic habitat protection, staff used the number of operations along listed waterbodies as a basis for calculating acres subject to practice implementation. Staff used the median operation size of 20 acres as the multiplier for estimating the acres potentially requiring treatment for pesticide/toxicity elimination.

Costs for the first year of implementation was the basis for calculating costs in subsequent years, which staff assumed would be from 10 to 50 percent of the first year's cost. Staff did not account for the Draft Ag Order's sequencing of compliance milestones (e.g., aquatic habitat management is not required for Years 1-5, but rather by Year 3), and as a result the estimate of costs for the entire five-year program is higher than it would be if staff assumed a phased implementation of practices.

Several other assumptions further contribute to a bias toward higher estimates of total cost. Staff assumed independence among the investments made in each management practice category, discounting the likely effect that an investment in one category, would reduce the need to invest in another. Staff expects this effect would be stronger in some categories than others. For example, investments in irrigation management have a strong potential to provide benefits to nutrient management by reducing nitrogen loading in tailwater and groundwater. Similarly, aquatic habitat protection could reduce the need for expenditures on practices to control sediment and stormwater, and to eliminate pesticide runoff. Without a way to quantify this overlapping of benefits among implementation practices (also described in Table 2), the total estimate likely exaggerates actual expenditures.

Table 7: Estimation of Cost to Implement Management Practices

Management Practice Category	Area Basis (Acres)	Acres/ Operation	Acres	Correction Factor	Acres Practice Applied to:	Cost/Acre [d]	Cost Year 1	% Year 1 Cost in Yrs 2-4	Cost Years 2-4	Cost 5 Years
Sediment / Erosion Control & Stormwater Management	Total irrigated farm acreage[a]	NA	539,284	5%	26,964	$992	$26,748,486	25%	$26,748,486	$53,496,973
Irrigation Management	Operations with tailwater[b]	NA	74,121	50%	37,061	$903	$33,465,632	10%	$13,386,253	$46,851,884
Nutrient & Salt Management	Total Vegetable Crop acreage[c]	NA	444,443	20%	88,889	$56	$4,977,762	25%	$4,977,762	$9,955,523
Pesticide Runoff / Toxicity Elimination	102 Operations on toxicity impaired streams	20	2,040	50%	1,020	$72	$73,440	50%	$146,880	$220,320
Aquatic Habitat Protection	10 Large Operations on temp. & turbidity impaired streams	1,000	10,000	50%	5,000	$1,184	$5,920,000	10%	$2,368,000	$8,288,000
						One Year	**$71,185,320**		**Five Years**	**$118,812,700**
						Per Operation	**$23,728**		**Per Operation**	**$39,604**

[a] State Farmland Mapping Program (FMMP) data consists of farmland classifications that include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance.

[c] Total Vegetable Crop acreage from County Crop Reports, Table 12. Staff assumed these crops have high potential to discharge nitrogen to groundwater.

[b] Amount of irrigated acreage that has tailwater and is enrolled and active. Source: Central Coast Regional Water Quality Control Board Agricultural Regulatory Program Database, December 2009. While the number of operations is dynamic, staff has not made a broad effort to verify the accuracy of reported irrigated acreage and tailwater acreage. Growers can continually update their irrigated acreage and tailwater acreage to reflect seasonal growing changes. The Water Board officially requested acreage updates in 2007 and 2008.

[d] Median of high end of cost range/acre, or, unit cost/acre, whichever is higher from Table 5.

2.2.3 Cost of Aquatic Habitat Protection Using Buffers

The following discussion of costs associated with Draft Ag Order requirements for aquatic habitat protection is provided to examine whether there is potential for these costs to affect regional and/or county economies. This discussion is presented separate from the previous discussion of aquatic habitat management practices available to individual growers and farm operations (2.2.2 Costs of Implementing Management Practices).

While implementation of a waterbody buffer is an option available to individual growers to achieve habitat management objectives, staff does not know how many growers will select this option. As such, staff estimated potential costs of buffers only for grower operations that are specifically required to implement them in the Draft Ag Order: those operations larger than 1,000 acres, and adjacent to a waterbody listed as impaired for temperature, sediment or turbidity on the Clean Water Act Section 303(d) List of Impaired Waters.

staff recognizes that buffers provide benefits that can be met through other means, but anticipates that buffers could be selected by growers as the most effective means for maintaining the riparian functions such as, stream bank stabilization and erosion control; stream shading and temperature control; chemical and sediment filtration; flood water storage; aquatic life support; and wildlife support. The greatest potential benefit to the grower of implementing a buffer could be the avoided cost of implementing other potentially more expensive water quality management practices to maintain these functions.

To serve as a basis for considering local and regional economic effects from implementing habitat buffers, staff prepared a spatial analysis of potentially affected farmland and made assumptions regarding the productivity and value of those lands. Staff purposely made conservative assumptions in calculating the approximate scale of anticipated effects, and considers the resulting cost estimate to be considerably higher than is reasonably likely to occur.

2.2.3.1 Spatial Analysis to Support Cost Analysis

Staff estimated the amount of irrigated agricultural land that would be removed from production in order to establish 30- and 50-foot wide habitat buffers. Only lands in operations greater than 1,000 acres and adjacent to waterbodies impaired by temperature, sediment or turbidity were included. Staff selected operations over 1,000 acres using the GIS crop maps distributed by the Agriculture Commissioner's Office in each Central Coast county (excluding San Benito and Ventura Counties). These maps are updated every two years within each county. For the identification of impaired waterbodies, staff used a 2008 version of the 2006 Clean Water Act Section 303(d) List of Impaired Waters spatial data file maintained by the Central Coast Ambient Monitoring Program.

Of all operations with 1,000 acres or more, the analysis identified only ten adjacent to waterbodies impaired for temperature, sediment or turbidity (Table 8). For these operations, staff determined the acreage that would be included in 30-ft and 50-ft buffers.

Table 8: Acreage Potentially Affected by Buffers on Waterbodies Impaired by Sediment [a]

County	Grower Operation	Total Acres	Acres in 30-ft buffer	Acres in 50-ft buffer
Monterey	1	4,017	12.54	43.00
	2	2,164	21.60	37.00
	3	1,329	7.70	27.00
	4	3,879	0.20	0.20
	5	1,020	0.06	0.13
	6	10,619	8.95	30.00
	7	1,132	4.80	17.00
	Subtotal	*24,160*	*56*	*154*
San Luis Obispo	1	1,274	8.12	14.00
	Subtotal	*1,274*	*8*	*14*
Santa Barbara	1	7,331	18.52	65.00
	2	1,490	0.10	0.30
	Subtotal	*8,821*	*19*	*65*
	TOTALS	**34,255**	**83**	**234**

[a] Includes only operations > 1,000 acres in size and adjacent to or including waterbodies listed for temperature, sediment or turbidity on the 2006 Clean Water Act Section 303(d) List of Impaired Waterbodies.

2.2.3.1.1 Crop Report Gross Value Analysis

To assess the potential economic effects of establishing buffers, staff calculated an approximate value of current agricultural productivity from farmlands. Staff compiled county crop report information on crop value and acreage to estimate average gross values per acre of crops requiring irrigation (Table 9). The resulting average crop value per acre ranges from $5,739/ac in San Benito County, to $22,047/ac in Santa Cruz County. This broad range reflects the variation in both crop types and crop values grown throughout the Central Coast. The regional average crop value per acre is $9,387/ac.

2.2.3.1.1.1 Potential Loss in Gross Production and Acreage

Based on the estimated acres of farmland included in buffers (Table 8), and average crop value (Table 9), staff estimated potential loss in production that would result from implementing 30- and 50-ft habitat protection buffers (Table 10). A range of approximately $774K to $2.2M of gross value would be lost to riparian buffers region-wide, based on this analysis. This represents approximately 0.24% to 0.68% of total

crop value in the operations affected. Lost income to an individual grower, while not known, is a fraction of gross value lost, since the grower avoids costs of farming areas no longer in production.

2.2.3.2 Factors to Consider Relative to Buffer Cost Estimates

There are several factors to consider when reviewing these estimates of economic effects of implementing buffers on irrigated farm operations. However, for larger operations loss of crop productivity in the range of 0.21% – 1.1% could be less than losses to smaller operations implementing buffers, with a larger proportion of the entire operation dedicated to the buffer. The use of buffers could also result in avoided costs for other potentially high cost methods to achieve farm water quality management objectives, including, for example, tailwater treatment and sedimentation control facilities.

As stated above, staff considers these estimates to be higher than the economic effects that may actually occur. This is because of several conservative assumptions made in constructing the analysis, including:

Size of Buffer: The buffer dimension of 50 feet used in the analysis is potentially larger than what is necessary to protect and maintain beneficial uses affected by discharges from irrigated agriculture. Buffers of smaller dimensions would reduce the effect on losses in acreage and productivity.

Uniform Implementation: staff does not anticipate that buffers would be established in all 1,000-acre plus operations adjacent to impaired waterbodies. Staff expects that some growers will pursue alternatives to buffers on portions of riparian-adjacent farmland that provide comparable protection, restoration and maintenance of beneficial uses.

Current Productivity of Farmland Adjacent to Waterbodies: The analysis assumed that all waterbody-adjacent farmland is currently productive at the average rate for the county in which they are located. This is not the case and there can be many reasons for this, including: land in poor agronomic condition; land impacted by geomorphologic factors (e.g., bank failure, channel migration, overbank sediment deposits, floodplain saturation); flood-related crop loss. These conditions are among those taken into consideration when growers establish the limits of cultivation. Consequently, some lands are currently in riparian or semi-riparian conditions by default, while others are uncultivated and/or entirely de-vegetated, serving as food safety setbacks. Either way, the land is not in production, as was assumed in the analysis. Dedicating low or non-productive lands to riparian buffers would have no near-term effect on individual farm or regional agricultural productivity.

No Change to Price-Output Equilibrium: Lower productivity, (i.e., output, supply), even reductions as low as one to two percent, interacts with market demand to influence the price-output equilibrium for agricultural products. As such, the value per unit of output would be expected to increase as the market compensates for reduced supply. While staff made no attempt to model the change in value – and anticipates a relatively minor overall impact – the effect would be to reduce the

estimated loss in productivity, as expressed in the value per acre figures used in the analysis.

Other areas of uncertainty in the analysis may either overstate or understate the estimated effect. These include specific attributes of the data staff relied upon, including the accuracy of county crop reporting, and Staff's aggregation of those data.

A final factor to consider is that implementation of waterbody buffers would not happen immediately and/or simultaneously throughout the region. The more probable phasing of buffer implementation over a period of years would be expected to significantly lessen economic effects as market forces and changes in farming operations play out. On the other hand, the effect would be recurring, or at least continue beyond a single year, in that some riparian lands with agricultural production potential would be permanently removed from production.

Table 9: Estimated Average Gross Value per Acre of Select Crops, by County (2009)[4]

County	Vegetable Crops			Fruit & Nuts			Seed Crops			Total Irrigated Crops		
	Value (Millions)	Acres	Average $/Ac	Value (Millions)	Acres	Average $/Ac	Value (Millions)	Acres	Average $/Ac	Value	Acres	Average $/Ac
Santa Cruz	$47	7,431	$6,322	$317	9,074	$34,925				$364M	16,505	$22,047
San Luis Obispo	$187	31,926	$5,867	$271	46,034	$5,897				$459M	77,960	$5,885
Monterey	$2,632	314,311	$8,373	$1,043	55,095	$18,925	$9	4,995	$1,863	$3.7 B	374,401	$9,839
Santa Barbara	$469	65,775	$7,135	$547	39,963	$13,698	$10	2,199	$4,701	$1.0 B	107,937	$9,515
San Benito	$157	25,000	$6,262	$31	7,641	$4,029				$187M	32,641	$5,739
TOTAL	$3,492	444,443	$7,857	$2,209	157,807	$14,000	$20	7,194	$2,730	$5.7 Billion	609,444	$9,387

Table 10: Calculated Loss in Gross Production Value and Crop Acreage for Habitat Buffers [a]

County	Avg. Crop Value per Acre*	Total Operation Acres	Total Operation Crop Value	Acres and Value Loss to 30' Buffer			Acres and Value Loss to 50' Buffer		
				Acres	Gross Value	% of Total Operation Crop Value*	Acres	Gross Value	% of Total Operation Crop Value*
Monterey	$9,839	24,160	$237,710,240	56	$549,508	0.23%	154	$1,518,453	0.64%
San Luis Obispo	$5,885	1,274	$7,497,490	8	$47,786	0.64%	14	$82,390	1.10%
Santa Barbara	$9,515	8,821	$83,931,815	19	$177,169	0.21%	65	$621,330	0.74%
Total Operation Loss to Buffers		**34,255**	**$329,139,545**	**83**	**$774,464**	**0.24%**	**234**	**$2,222,172**	**0.68%**

[a] For operations 1,000 acres or larger and adjacent to or including waterbodies impaired for temperature, sediment or turbidity (See Table 8).
* Vegetable, Fruit & Nut, and Seed Crops only (see Table 9).

[4] All figures for 2009 with the exception of San Benito County for which staff used 2008 crop reports, since 2009 crop report was unavailable when calculated.

2.2.4 Monitoring Program Costs

Staff price estimates for MRP analytical costs come from several commercial laboratory bids to the Central Coast Ambient Monitoring Program (CCAMP) and Surface Water Ambient Monitoring Program contractor costs. Anywhere from two to four prices per analyte were used to develop average costs. Water quality lab bids included BC Analytical, Creek Environmental Lab (no longer in business), Sequoia Labs, Surface Water Ambient Monitoring Program (SWAMP) and Groundwater Ambient Monitoring and Assessment Program (GAMA). Pyrethroid pesticide analysis costs came from SWAMP and CalTest, a private water quality lab. Bioassessment pricing came from Pacific Ecorisk and SWAMP. Actual prices charged to a cooperative monitoring program or individual may vary from these estimates. Attachment 1 includes monitoring cost information tables supporting the following discussion of receiving water, groundwater, and individual monitoring.

2.2.4.1 Receiving Water Monitoring

The receiving water monitoring program has estimated analytical costs ranging from about $600,000 to $785,000, depending on site count. The current cooperative monitoring program requires 50 sites (plus five percent field duplicates). The proposed program requires at least one site on each of 37 impaired waterbodies. The price range reflects this site count spread. The proposed MRP includes the basic trend component of the current program. In addition, it adds several analytes to the basic monitoring suite, water and sediment chemistry in the second year of the program, and two stormwater samples taken at each trend site each winter. It adds quarterly and stormwater monitoring for pathogen indicators. It eliminates follow-up monitoring entirely (which in the original program was 20 percent of total program costs) and reduces benthic invertebrate monitoring down from annually to once per permit term.

In addition to analytical costs, the cooperative receiving water monitoring program must pay sampling costs, administrative costs, and reporting costs. Depending on how the program is structured these can range widely. For example, if sampling costs are charged on a per site basis, at $500 per site per visit, these costs could range up to $250,000 per year. However, if program staff conducts the sampling these costs could be significantly lower. The existing Cooperative Monitoring Program (CMP) maintains two full-time staff, which probably cost the program at least an additional $150,000 per year. Some of the reporting costs are absorbed by staff. Consulting laboratories may charge additional data management and analysis costs. Using the above estimates for consultant site visits costs and staffing costs, the total program costs would range between $1,000,000 and $1,185,000 per year (with higher costs for the second year averaged out through all years of the program), or $5 to $5.5 million for the five-year program.

Dropping site count from the 50 required by the current program down to one site per listed waterbody reduces receiving water monitoring costs by about 25 percent. As a result, some larger waterbodies like the Salinas River would have poor site coverage for understanding spatial extent of agricultural impacts. Though CCAMP monitoring can

help address this, CCAMP watershed rotation monitoring only occurs once every five years.

The new elements of the program (pollutants in water and sediment, additional monthly parameters, Toxicity Identification Evaluations (TIEs)) add approximately $130,000 to $148,000 per year in analytical costs (amortizing once in five year costs over each of the five years of the program). This is assuming 10 TIEs are conducted per year. If no TIEs are conducted, additional monitoring costs are approximately $76,000 to $97,000 per year. These costs are offset by elimination of follow-up monitoring, reduction of benthic invertebrate monitoring to once per permit term, and any site count reductions.

2.2.4.2 Groundwater Monitoring

Tier 1 and Tier 2 analytical cost estimates for groundwater monitoring described in the MRP are approximately $190 per well for the five-year program (with both sampling events in the first year), using cost estimates from the GAMA program. Tier 3 analytical costs are approximately $760 per well for the five-year program (four times in the first year; annually thereafter for a total of eight sampling events). This does not include costs paid to consultants to collect the samples, assess depth to groundwater and deliver the results. Staff estimates these additional costs at approximately $300 per visit. Staff assumes that there are 1,600 dischargers that fall into Tiers 1 and 2 and another 100 that fall into Tier 3. Based on these numbers and a consultant visit fee of $500 (with a discounted rate of $150 for sampling a second well), and assuming one well sampled for Tiers 1 and 2, and two wells sampled for Tier 3, this program element would cost approximately $1,740,000, or $790 for Tier 1 & 2 growers and $4,740 for Tier 3 growers, for the five-year term of the Draft Ag Order.

2.2.4.3 Individual Monitoring

Tier 1 and 2 does not require any surface water quality monitoring. Tier 3 individual monitoring is further subdivided into operations between 1,000 and 5,000 acres, and operations over 5,000 acres. Staff estimates that analytical costs will be approximately $3,150 per site sampled for smaller operations (1,000 to 5,000 acres) and $6,300 for larger operations (>5,000 acres). Most of this cost is from toxicity sampling. In addition, for each site sampled, flow and field parameters are collected, which may cost between $500 and $750 each visit. This brings the annual cost to between $4,100 and $4,600 for smaller Tier 3 operations and between $8,200 and $9,300 for larger operations.

Tier 3 tailwater pond monitoring can be done using United States Environmental Protection Agency approved field methodologies or a commercial laboratory. Commercial laboratory analysis costs are estimated at $180/year (4 irrigation season, 2 wet season samples). If a consultant is required to visit the pond for each of the six sampling events, at $500 - $750/event, that could add $3,000 to $4,500 to annual costs.

Staff estimate that there are approximately 85 dischargers that fall into the 1,000 – 5,000 acre Tier 3 category, and 15 falling into the >5000 category. Total cost of implementing this monitoring element is approximately $500,000 per year, or $2.5 million for the five-year program. This does not include additional costs for tailwater

pond monitoring. Staff does not currently have an estimate of how many tailwater ponds would fall into the Tier 3 category.

2.2.4.4 Quality Assurance Project Plan (QAPP)

QAPP development for a large complex project can cost up to $10,000. If templates with all language for basic individual sampling except for some minor details are prepared and made available, costs could be vastly reduced. Staff estimates these documents could be prepared for $750 or less for individual and/or groundwater monitoring, assuming a ready-to-use QAPP template is available for use. This should be a one-time cost for the term of the program.

2.2.4.5 Photo-Monitoring

To serve as a basis for estimating costs of habitat buffer photo-monitoring, staff prepared a spatial analysis to estimate the amount of irrigated agricultural land that exists adjacent to streams. Staff selected all streams included in National Hydrographic Data-Plus data and “clipped” the adjacent 50 feet of land identified in California Department of Conservation, Farmland Mapping and Monitoring Program (FMMP) land use data. The result provides an estimate of the amount of irrigated farmland that occurs within 50 feet of a stream throughout the Central Coast Region.

The FMMP data consists of farmland classifications that include Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance. Prime Farmland and Farmland of Statewide Importance are irrigated lands with good combination of physical and chemical characteristics for the production of agricultural crops. Unique Farmland has lesser quality soils and is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Generally for land to be included in these categories it must have been cropped at some time during the four years prior to the mapping date.

Staff excluded Farmland of Local Importance from the analysis, since these are designated by counties and are generally non-irrigated lands. Specific criteria used by the counties to classify these farmlands support their exclusion from the analysis (Table 11).

Table 11: County Farmland Designations Not Included in Buffer Analysis

County	Designation Criteria for Farmland of Local Importance
Monterey	The Board of Supervisors determined that there will be no Farmland of Local Importance for Monterey County.
San Benito	Land cultivated as dry cropland. Usual crops are wheat, barley, oats, safflower, and grain hay. Also, orchards affected by boron.
San Luis Obispo	Farmland of Local Importance: areas of soils that meet all the characteristics of Prime or Statewide, with the exception of irrigation. Local Potential: lands having the potential for farmland, which have Prime or Statewide characteristics and are not cultivated.
Santa Barbara	All dryland farming areas and permanent pasture (if the soils were not eligible for either Prime or Statewide).
Santa Clara	Small orchards and vineyards primarily in the foothill areas. Also land cultivated as dry cropland for grains and hay.
Santa Cruz	Soils used for Christmas tree farms and nurseries, and that do not meet the definition for Prime, Statewide, or Unique.

Source: "Farmland of Local Importance" http://www.conservation.ca.gov/dlrp/fmmp/Documents/Local_definitions_00.pdf

Table 12 presents the results of the spatial analysis to quantify farmland within 50 feet of a stream. Based on this analysis, Monterey County has approximately 877 acres and the entire Region has approximately 2,373 acres of irrigated farmland within 50 feet of a stream. The majority of this land is classified by the FMMP as prime farmland.

Table 12: Estimated Farmland Within 50 feet of a Waterbody

COUNTY	FARMLAND TYPE	Acres within 50-ft of Stream
		Total
Santa Cruz	Prime Farmland	140
	Farmland of Statewide Importance	2
	Unique Farmland	25
		166
San Luis Obispo	Prime Farmland	292
	Farmland of Statewide Importance	57
	Unique Farmland	158
		507
Monterey	Prime Farmland	550
	Farmland of Statewide Importance	92
	Unique Farmland	235
		877
Santa Barbara	Prime Farmland	181
	Farmland of Statewide Importance	40
	Unique Farmland	111
		332
San Benito	Prime Farmland	73
	Farmland of Statewide Importance	37
	Unique Farmland	155
		265

Santa Clara	Prime Farmland	113
	Farmland of Statewide Importance	26
	Unique Farmland	85
		224
San Mateo	Unique Farmland	1
	TOTAL	**2,373**

Within one year of the adoption of the Draft Ag Order or enrollment, Tier 2 and Tier 3 dischargers that have operations that contain or are adjacent to a waterbody impaired for temperature or turbidity must conduct photo monitoring to document the condition of perennial, intermittent or ephemeral streams (wet or dry), riparian or wetland area habitat, and associated management practices implemented to prevent waste discharge and protect water quality. Photo monitoring must be repeated every three years.

Staff estimated that large (greater than 1,000 acres) operations on temperature or turbidity impaired waterbodies had approximately 234 acres within 50 feet of the waterbodies (see analysis of habitat buffer costs). This is close to ten percent of the total acreage of riparian farmland. Absent information on which Tier an operation will be in, staff took the median of the two acreage figures as a conservatively high estimate of the total number of acres subject to the Draft Ag Order requirement that Tier 2 and Tier 3 dischargers in operations on waterbodies impaired for temperature or turbidity must conduct photo monitoring.

Total farm acres within 50 feet of a waterbody	*2,373*
Total farm acres within 50 feet of a waterbody in large operations on temperature and turbidity impaired waterbodies	*234*
MEDIAN	*1,304*

Using the median of 1,304 acres, staff then calculated the linear distance of riparian farmland to be 1,135,460 feet. Assuming one photo point every 600 feet of linear stream buffer length, a total of 1,893 photo points would be established on farm areas subject to this Draft Ag Order requirement.

Based on a median operation size of 20 acres, approximately 65 operations would be affected by this requirement. Each operation could incur approximately $155 in one-time costs for a camera ($140), compass ($10), farm map ($3), and notebook ($2). Assuming a cost of $27 per photo point ($2.00 to copy photos and $25/hour/photopoint), and two photo monitoring events for the 5-year term of the Order, staff estimates the total cost of complying with this monitoring requirement to be approximately $112,280 (Table 13).

Table 13: Cost Calculation for Photo Monitoring Requirement

Acres	Square Feet = (ac) x (43,560 sq ft/ac)	Stream Length = Sq ft/50 ft width	1 Photo Point/600 ft	Per Point Cost ($54)	One-time Cost ($155)	Total
1,304	56,780,460	1,135,609	1,893	$102,205	$10,075	$112,280

2.3 Cost to Water Board for Program Administration

The cost for the Central Coast Water Board to implement the Agricultural Regulatory Program is incurred primarily to pay for employees' time conducting program activities. Staff in the program generally evaluates compliance and progress by reviewing water quality data, evaluating chemical use, inspecting farms and ranches, conducting outreach and taking enforcement actions.

With the current staffing and budget, staff cannot review information from, nor inspect, most of the operations in the region. Staff prioritizes efforts in watersheds and areas with most severe water quality problems, and focuses on individual farms or ranches that are or may be discharging in violation of water quality laws to determine the amount of outreach and enforcement.

With the Draft Ag Order, staff plans to implement at the same level of resources but expects to gain efficiencies in encouraging and tracking progress and responding with enforcement as needed. Staff will be able to prioritize more effectively by relying on both watershed-scale water quality data and refined and increased reporting. The Draft Ag Order requires basic information from all operations that better indicates water quality threats (such as pesticide use and proximity of applications to waterbodies). Additional reporting information will vary for different tiers of operations based on an operation's threat to water quality and proximity to impaired waterbodies. The highest threat tiers must submit the most information and the lowest threat tiers must submit more limited information. Additionally, staff plans to rely on new and enhanced databases to collect and manage data and information so that the increased volume of information and data can be reviewed, organized and analyzed more efficiently. Staff estimates the cost of program implementation based on the annual cost of each staff position and the numbers of staff positions needed to be approximately $882,375 (Table 14).

Table 14: Water Board Staff Annual Cost to Administer Program[5]

Classification	Cost/position	Positions	Total Cost
Environmental Scientist	$123,360	2.5	**$308,400**
Senior Environmental Scientist	$142,080	0.2	**$28,416**
Environmental Program Manager	$163,620	0.4	**$65,449**
Engineering Geologist	$181,920	0.5	**$90,960**
Senior Engineering Geologist	$193,644	0.5	**$96,822**
Supervisory Engineering Geologist	$212,592	0.2	**$42,518**
Water Resource Control Engineer	$180,984	1.0	**$180,984**
Supervisory Water Resource Control Engineer	$212,592	0.2	**$42,518**
Office Technician, Typing	$70,500	0.2	**$14,100**
Office Assistant, Typing	$61,044	0.2	**$12,208**
All Positions:			**$882,375**

[5] Costs include total cost to State for all expenditures (salary, benefits, etc.).

3 EFFECTS OF INCREASED COSTS ON FARM AND REGIONAL ECONOMY

3.1 Introduction

California's agricultural industry is characterized by a variety of economic conditions that have permitted its expansive growth over the last century – most notably continued population growth contributing consumers of produce and the ability to market produce to consumers worldwide. Numerous studies describe the favorable economic conditions for the agricultural sector, while others caution that in the future growers will have to be increasingly flexible, adaptive and innovative to survive as they confront water scarcity, pressures of a globalizing agricultural economy, and less favorable government crop price support policies.[6] Water quality regulations are also among the factors challenging the industry to adapt.

In this Technical Memorandum the costs for dischargers to achieve compliance with the Draft Ag Order are considered in terms of expenses for management practice implementation, monitoring, and reporting. These expenses combine with other factors, such as increased energy costs and the challenges described above, to incrementally increase the discharger's cost of production. Examining the impact of any increase in cost of production on viability of a farming enterprise is challenging. The fact is that changes in costs of production are one of many factors affecting viability and the interaction of these factors is highly dynamic through time.

3.2 Strawberries: An Example of Multiple Factors Affecting Farm Economy

The anticipated effects of increased costs of production resulting from a ban on methyl bromide[7] in strawberry cultivation, illustrate how many of these factors can affect outcomes for growers. Strawberries are a particularly high value crop and are not necessarily representative of agriculture throughout the Central Coast. Nevertheless, the research on strawberries is particularly germane to the Central Coast Region where strawberries contribute a substantial amount (more than $1.4 billion farm gate value in 2009) to the region's overall agricultural productivity. The region also accounts for more than 50 percent of total United State's strawberry production.[8] (California contributes approximately 90 percent of the nation's strawberries.[9]) Research on the potential costs of the ban[10] is presented here because it specifically addresses how several of

[6] Vaux, Henry J. Jr., 1996. "Future trends challenge irrigated agriculture." California Agriculture, Volume 51, Number 1. p. 2.

[7] Methyl bromide is a toxic chemical pesticide that depletes the earth's protective ozone layer but which also serves as a soil-sterilizing agent for farmers. Strawberry farmers are among users fearing significant losses and even farm failures without the continued availability of methyl bromide as a fumigant.

[8] Mark Murai, President, California Strawberry Commission. April 1, 2010-Letter to Water Board Chair Jeffry Young for May 12, 2010 Workshop on Preliminary Draft Ag Order.

[9] Starrs, Paul F., and Peter Goin, 2010. Field Guide to California Agriculture. U.C. Press.

[10] The Montreal Protocol on Substances that Deplete the Ozone Layer has been the most successful international environmental agreement ever reached (Norman, et al, 2005). While methyl bromide is

the factors that influence the viability of producing any agricultural commodity in the Central Coast interact, including: cost of environmental compliance; costs of production; characteristics of price response in the market; and the effects of globalization (as manifested in competition from Mexican growers).

Researchers[11] found that estimates of economic loss attributable to the new regulation banning methyl bromide "incorporate losses from lower yields, lower quality fruit, and higher production costs. The high end of the estimate translates to between 20 and 57% of net returns above operating costs for a typical grower... These estimates are alarming to farmers but they do not account for important market effects that will reduce the burden borne by farmers even without any transitional assistance."

In regards to the market response to increased costs of production, the researchers observe that, "A cost increase to producers is reflected in an upward (leftward) shift of the long-term supply curve by an amount equal to the cost increase, as farmers require higher prices to produce any given quantity of strawberries. This interacts with market demand to determine a new price-output equilibrium." The researchers then state that, "demand at every price is increasing, because of income and population growth effects… at a rate estimated at 2.3% annually. [This] effect dominates, suggesting that farmers will not face losses at all but simply a slowing of the rate of increase in the gains that they would have expected in the absence of a cost increase." The current conditions of stagnating income growth are different from 2005 when this research was completed. Nevertheless, the ban on methyl bromide is not implicated in declines in strawberry production.

Finally, with respect to the pressures of globalization and the potential for a competitive advantage by Mexican strawberry growers, these economists state:

> "In the long term, all else held constant, on the margin some increase in imported berries from Mexico can be expected if U.S. prices rise in response to a possible cost increase as methyl bromide is phased out in the U.S. while use is still allowed in Mexico. However, capacity to produce for export in Mexico would have to grow dramatically at a rate without historical precedent for imports to make a serious dent in the U.S. market even then."
>
> "In the last 10 years, Mexican strawberry exports to the U.S. have quadrupled. If they quadruple again in the next 10 years and if the U.S. market does not grow at all…Mexican imports would then be 24% of U.S. consumption. The majority of the market would still be supplied by domestic producers, and given relatively

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only one of many substances being phased out under the Protocol, it has so far been the most controversial.

[11] Norman, Catherine S. 2005. *Potential impacts of imposing methyl bromide phaseout on US strawberry growers: a case study of a nomination for a critical use exemption under the Montreal Protocol*. Journal of Environmental Management 75 (2005) 167-176.

> inelastic demand, cost increases to U.S. growers would be passed through to consumers to a significant degree."

More recent information on strawberry market conditions from USDA further illustrates the diversity of influences affecting market conditions and, by extension, the ultimate viability of agricultural enterprises. The USDA Economic Research Service May 2010[12] outlook reports:

> "Strawberry retail prices experienced the biggest decline in April, falling 10 percent to $1.667 per 12-ounce (oz) pint from the April 2009 price. Retailers were faced with an abundance of strawberries as Florida supplies, while slow to recover from the late-January freeze, soared at the tail end of their shipping season and were competing with early-season supplies from California. Last year the same time, Florida supplies were already winding down. In California, wet and cold weather has interrupted production sporadically this spring but seasonal supply increases are occurring. Production is forecast to be down in California this year, likely putting upward pressure on strawberry prices this summer relative to last."
>
> "A decline in strawberry supplies in the U.S. market this year may be attributed mostly to smaller crops in two of the biggest producing States—California and Florida. The initial forecast from USDA's National Agricultural Statistics Service (NASS) calls for a 7-percent decline in strawberry production in California in 2010 from a year ago, reaching 2.3 billion pounds. A distant second to California, the winter strawberry crop in Florida was forecast down to 144.0 million pounds, declining by 39 percent. Both strawberry harvested acres and the average yield per acre in California are forecast to be reduced compared to last year, driving down production this year. Intermittent rainy weather caused by an El Nino weather pattern disrupted shipments early in the season as field workers had to alternate between picking and stripping the fields. Current projections are for harvested acreage in 2010 to decline 6 percent from 2009, reaching 37,500 acres (fig. 3). NASS also forecast average yields to be down 2 percent this year to 61,500 pounds per acre."

The strawberry example illustrates the relative influence of multiple factors in determining the ultimate economic viability of farming enterprises, and places in context the incremental increased costs of production attributable to environmental compliance. As the USDA outlook report shows, factors such as weather and the timing of production in Florida appear to dominate the near term economic conditions for the fresh market in strawberries.

3.2.1 Price Elasticity

[12] USDA, Economic Research Service, 2010. "Fruit and Tree Nuts Outlook: California's Strawberry and Peach Crops Smaller but Almond Production Up." May 28.

The market for strawberries, like that of most agricultural commodities, is characterized by relatively inelastic demand. One measure of this, *own price elasticity* – a measure that indicates the extent to which consumption is sensitive to price – is calculated as the percentage change in quantity demanded of a good or service divided by the percentage change in its price, other factors remaining unchanged. The higher the price elasticity, the more sensitive consumers are to price changes. Very high price elasticity suggests that when the price of a good goes up, consumers will buy much less of it and when the price goes down, they will buy much more. Very low price elasticity (or, inelasticity) implies just the opposite, that changes in price have little influence on demand. If elasticity is greater than one, demand is said to be elastic; between zero and one demand is inelastic. Realistically, elasticity is best considered in relative terms, since the greater than/less than one boundary is not a bright line, i.e., calculations of elasticity are generally more reliable the farther they are from the number one.

For strawberries, the mean own-price elasticity reported by the United States Department of Agriculture's Economic Research Service is -0.92826.[13] This means that a one percent increase in price would give a 0.92 percent decrease in quantity demanded. Conversely, a one percent decrease in quantity would give a 1.08 percent increase in price. Own price elasticities for lettuce, broccoli, grapes and celery are presented in Table 15. According to these data, among these major regional crops, only grapes and broccoli have relatively elastic demand.

Several factors affect elasticity of demand for a good, including, for example, availability of substitute goods, necessity, and brand loyalty. The primary determinant of agricultural commodity elasticity is likely necessity: the more necessary a good, the lower the elasticity, since consumers will attempt to buy it no matter the price.

[13] USDA Economic Research Service, 2010. Data Sets. "Commodity and Food Elasticities: Demand Elasticities from Literature Results." http://www.ers.usda.gov/Data/Elasticities/ShowTable.aspx?geo=United%20States&com=Strawberry

Table 15: Own Price Elasticity of Several Crops in the Central Coast Region

Crop	Own Price Elasticity[a]						
							Average
Strawberries	0.449	0.438	2.398	1.957	0.2753		0.92826
Lettuce	0.131	0.0139					0.07245
Bagged Lettuce	[b]						0.56023
Broccoli	1.048	1.043					1.0455
Onion	0.11	0.289	0.1964	0.1832			0.19465
Grapes	1.468	2.092	1.378	1.5	1.168	0.9075	1.41892
Celery	0.2516	0.0501					0.15085
Fruit and Vegetable	0.45	0.06986					0.25993
Vegetables	[b]						0.68613

Source: USDA Economic Research Service
a) Expressed in terms of absolute value.
b) Individual elasticities too numerous to list in table (see source).

3.2.1.1 The Significance of Price Elasticity on Total Revenue

When increases in costs of production are passed on to consumers as higher prices, elasticity is important in determining the affect this will have on total revenues for the commodity producer. Due to the fact that most agricultural commodities are characterized by relatively inelastic demand (<1), the following relationship between price elasticity and total revenue holds: the percentage change in quantity demanded is smaller than the percentage change in price. So, when prices go up, total revenue rises, and vice versa. Where the price elasticity of demand is relatively elastic, the percentage change in quantity demanded is greater than the percentage change in price, so total revenue falls.

The relatively inelastic nature of demand for most agricultural products means that consumers share the costs of production by paying higher prices, and that the effect on total revenue of increased costs of production is substantially attenuated.

3.2.2 Effects of Increased Costs on Regional Economy

To further characterize the potential effects of implementing the 2011 Draft Ag Order on the regional economy, staff evaluated data on Monterey County's agricultural output, employment and income. At $3.7 billion, Monterey County's agricultural production is three times that of Santa Barbara, the county nearest in production; and it is more than all the other Central Coast counties combined (Table 16). Given the County's dominant role in the region with respect to the agricultural sector, and the limitations in obtaining comparable information from the region's other counties, staff presents the Monterey County data to convey the magnitude of potential effects of the Draft Ag Order region-wide.

Table 16: Central Coast Counties Total Agricultural Production from Crop Reports[14]

County	Production
Monterey	$3,683,754,000
Santa Barbara	$1,027,047,467
San Luis Obispo	$458,783,000
Santa Cruz	$363,888,000
Santa Clara	$247,950,400
San Benito	$187,334,000

A 2004 report completed for the County evaluated output, employment, and income in the agricultural sector based on a popular economic model for which the principal input was total agricultural production.[15] The report put agriculture production in the County at about $2.9 billion, and the model estimated total economic impact to be approximately $5.2 billion (Table 17). The total economic impact included the sum of all direct, indirect, and induced economic activity associated with agricultural production. The indirect industry output is the economic value of the supplier relationships needed to support the production sector. The $5.2 billion figure also includes $788 million of induced output from household spending. The report also cites economic studies that indicate the added economic activity associated with food processing doubles the total economic benefit of the agriculture industry cluster in Monterey County to more than $10 billion.

Table 17: Baseline Economic Agricultural Production, Monterey County 2001

Baseline Monterey County Agriculture	Direct	Indirect	Induced	Total
Industry Output	$2,891,741,245	$1,509,444,557	$788,242,109	$5,189,427,933
Labor Income	$657,575,605	$606,230,491	$301,479,428	$1,565,285,535
Employment (jobs)	26,371	30,434	9,579	66,384

Source: Applied Development Economics, 2004. Table 2-7, p. 30.

The 2004 report examined the economic impact of the then proposed County General Plan. Included among the potential impacts of the General Plan was approximately 12,768 acres of agricultural land conversion to non-agricultural uses. The report assessed the degree to which these land conversions would reduce agricultural production in the County, and examined "the extent to which these direct impacts potentially affect other businesses that have existing buyer-supplier relationships with agricultural businesses or rely on household spending from agricultural workers," (p. 43).

The nearly 12,800 acres of farmland projected for conversion in the General Plan comprised about $131 million of crop production, according to the report (p. 46). The resulting economic impact would total approximately $232 million, or less than five

[14] All figures for 2009 with the exception of San Benito and Santa Clara County for which staff used 2008 crop reports, since 2009 crop report was unavailable.

[15] Applied Development Economics, 2004. "Monterey County General Plan Update: Economic Impact Analysis." February.

percent of total economic activity generated through agriculture (Table 18). Labor income impacts would be around $68 million, and approximately 3,100 jobs would be lost. These impacts would be expected to play out over the 20-year planning horizon of the General Plan.

Table 18: Economic Impact of General Plan Farmland Conversion, Monterey County 2001

Monterey County Agriculture	Baseline	General Plan Agricultural Acreage Reduction Impacts
Industry Output	$5,189,427,933	$231,637,351
Labor Income	$1,565,285,535	$67,655,440
Employment (jobs)	66,384	-3,126

Source: Applied Development Economics, 2004. Table 2-25, p. 46.

Staff finds the County's 2004 report to be valuable in illustrating the indirect effects of economic impacts to agriculture. The report's reliance on economic modeling that integrates multipliers to estimate these impacts is an appropriate and common practice. Given the significance of Monterey's agricultural economy in the Central Coast region overall (Table 16), the report's findings are generally helpful in characterizing impacts to agricultural productivity that could potentially result from implementation of the Draft Ag Order. As the report states:

> "The significance of the impacts of agricultural conversion can vary from one location within Monterey County to another, because different agricultural commodities have different economic value. Although even worst-case estimates of agricultural acreage conversion totals do not generate impacts that would potentially wipe out any of the crop categories…it is still important to examine the impacts that agricultural land conversions will potentially have…because these land conversions do not only affect farm production. A multitude of support services and local-serving businesses depend on spending from not only the agricultural businesses but their employees and their families as well." (pp. 40-41).

4 SOURCES OF FUNDING FOR IMPLEMENTATION

4.1 Summary of Funding Sources

A number of existing or potential funding sources may be available to offset portions of the cost of implementing the Draft Ag Order. These program descriptions were taken from an economic analysis conducted for the Central Valley Regional Water Quality Control Board.[29] Central Coast irrigated agricultural discharges would be subject to the same eligibility criteria and access to these sources of funding. The programs described are illustrative and are not intended to constitute a comprehensive list of funding sources.

4.1.1 Federal Farm Bill

Title II of the 2008 Farm Bill (the Food, Conservation, and Energy Act of 2008, in effect through 2012) authorizes funding for conservation programs such as the Environmental Quality Incentives Program (EQIP) and the Conservation Stewardship Program. Both of these programs provide financial and technical assistance for activities that improve water quality on agricultural lands. For example, the NRCS provides financial and technical assistance to growers to improve water quality.

The assistance is through the Agricultural Water Enhancement Program, an element of the NRCS EQIP. The program is a voluntary conservation initiative in which NRCS develops partnership agreements with eligible growers. Farm bills typically are in place for four to five years. Subsequent farm bills may expand, reduce, eliminate, or replace EQIP. Farm bills or other future legislation may authorize spending for direct grants, loans, or cost-sharing for irrigation practices that improve water quality.

4.1.2 State Water Resources Control Board

The Division of Financial Assistance administers water quality improvement programs for the State Water Board. The programs provide grant and loan funding to reduce non-point-source pollution discharge to surface waters. The Division of Financial Assistance currently administers two programs that improve water quality—the Agricultural Drainage Management Loan Program and the Agricultural Drainage Loan Program. Both of these programs were implemented to address the management of agricultural drainage into surface water. The Agricultural Water Quality Grant Program provides funding to reduce or eliminate the discharge of non-point-source pollution from agricultural lands into surface and groundwater. It is currently funded through bonds authorized by Proposition 84. The State Water Pollution Control State Revolving Fund Program also has funding authorized through Proposition 84. It provides loan funds to a wide variety of point-source and non-point source water quality control activities. The State Water Board also administers Clean Water Act funds that can be used for agricultural water quality improvements.

4.1.3 Safe, Clean, and Reliable Drinking Water Supply Act of 2010

This act was passed by the Legislature as SBX 7-2, and if approved by voters in November of 2010, would provide grant and loan funding for a wide range of water-related activities, including agricultural water quality improvement, watershed protection, and groundwater quality protection. The actual amount and timing of funding availability will depend on its passage, on the issuance of bonds and the release of funds and on the kinds of programs and projects proposed and approved for funding.

4.1.4 Other Funding Programs

Other state and federal funding programs have been available in recent years to address agricultural water quality improvements. Integrated Regional Water Management grants were authorized and funded by Proposition 50 and now by

Proposition 84. These are being administered jointly by the State Water Board and DWR. Proposals can include agricultural water quality improvement projects. The Bureau of Reclamation also can provide assistance and cost-sharing for water conservation projects that help discharges.

4.2 Effect of External Funding on Economic Impacts

The following conclusion from the Central Valley economic study holds for this analysis as well:

> "Funding received from grants, cost-sharing, or low-interest loans would offset some of the local growers' expenditures for compliance and management practice implementation, and likely would reduce the losses in irrigated acreage and value of production described above. Funding that is targeted toward lands, crops, or growers having the greatest potential for losses and economic hardship would be most effective at reducing the impact. Regional economic impacts also would be reduced."

5 COMPREHENSIVE COST CONSIDERATIONS

5.1 Costs of Implementation and Costs of Current Conditions

A comprehensive consideration of costs associated with the Draft Ag Order includes costs of current conditions, without implementation of the Draft Ag Order, and the costs of implementation of the Draft Ag Order. The costs associated with current conditions include, for example, environmental (beneficial use impacts) and public health impacts from contaminated drinking water sources. While these costs may be in part borne by dischargers, they fall principally on the public at-large, with greatest effects felt by the public living in agricultural areas. Though not a formal cost-benefit analysis[16], this Technical Memorandum provides information about costs associated with the Draft Ag Order and identifies sources of financing.

5.2 Full Costs of Agriculture as Currently Practiced

5.2.1 Financial Costs of Production

Environmental regulatory compliance is among the many financial costs borne by growers as primary inputs to production. Other financial costs include: labor, energy, water, equipment, land, agricultural chemicals and seed or nursery stock.

5.2.1.1 Public Sector Funding for Agriculture

[16] A formal cost benefit analysis is not required when issuing waste discharge requirements or a waiver of waste discharge requirements or when complying with CEQA. Benefits to society of agricultural production are nearly immeasurable. However, different forms of agricultural production provide food sources while having different costs and causing different watershed changes.

Federal and State programs supporting conservation practices (e.g., Natural Resources Conservation Service, Environmental Quality Incentives Program (EQIP)), water quality monitoring (Central Coast Water Board funding for cooperative monitoring program), and funding for non-point source pollution control (USEPA CWA Section 319(h)) are examples of agricultural production costs shared by the public sector.

Table 19 presents examples of public funding that supports Central Coast agriculture. These funds contribute to the continued profitability of agriculture by supporting the industry's investments in practices to increase production, while at the same time providing incentive to growers to address environmental impacts, including degraded water quality. In this sense, taxpayers share certain costs of production, including, at times, the costs of environmental protection.

Table 19: Example Public Sector Funding to Agriculture

Funding Type	Amount	Source
Water Board Administered Funding to Agriculture-related Projects, Region-wide	$14.4 Million Total 2005 – 2010	CCRWQCB
Federal EQIP Obligation Amount in Marine Sanctuary Counties	$1.6 - $2.6 Million Per year 2005 – 2009*	USDA[17]

* $18 million in Farm Bill funding was obligated to EQIP contracts in Marine Sanctuary Counties over ten years. Farmers have invested $15 million of their own money in match over the same period.

5.2.1.2 Public Health and Environmental Financial Impacts of Discharges of Waste Associated with Agriculture (Externalities)

Discharges of waste associated with agricultural activities result in impacts on public health and the environment, including impacts related to environmental justice issues. Those impacts result in costs to the public and the environment rather than the discharger of the waste that are not typically considered in evaluating costs.

This Technical Memorandum includes information about some social and environmental costs associated with irrigated agriculture in the Central Coast that staff would expect to be reduced over time with implementation of the Draft Ag Order.

5.2.2 Social Costs of Current Conditions

Costs to the public associated with discharges of waste from irrigated agriculture in the Central Coast Region can be discussed in three broad categories: Public Health, Environmental Health, and Environmental Justice.

5.2.2.1 Public Health

Thousands of people in the agricultural areas of the Central Coast Region rely on public supply wells and shallow private domestic wells with unsafe levels of nitrate and other

[17] Mountjoy, Daniel, USDA, NRCS. Salinas, CA. October 2009 Presentation on 10-Year Anniversary of Agriculture and Rural Lands Program.

waste constituents. Excessive nitrate concentration in drinking water is a significant public health issue resulting in increased health risk to infants and adults. While acute health effects from excessive nitrate levels in drinking water are primarily limited to infants (methemoglobinemia or "blue baby syndrome"), evidence suggests there may also be adverse health effects among adults as a result of long-term ingestion exposure, and in older individuals who have genetically impaired enzyme systems. These effects include: increased risk of non-Hodgkin's lymphoma, diabetes, Parkinson's disease, Alzheimer's disease, endocrine disruption, and cancer of the organs. One recent study identified a role of drinking water and dietary nitrate in risks of thyroid cancer.[18] Generally, families drawing their water supply from farm areas experience the greatest exposure to elevated nitrate concentrations in drinking water.[19]

Nitrate as nitrogen concentrations of 4 mg/L or more in rural drinking-water supplies have been associated with increased risk of non-Hodgkin's lymphoma. [20] Additionally, researchers from the University of Iowa found that up to 20 percent of ingested nitrate is transformed in the body to nitrite, which can then undergo transformation in the stomach, colon, and bladder to form N-nitroso compounds.[21] These compounds are known to cause cancer in a variety of organs in more than 40 animal species, including higher primates.

In addition to nitrate, exposure to other agricultural chemicals is associated with public health risks. For example a recent study in the Salinas Valley identified effects on neurological development in children exposed to organophosphate pesticides.[22]

Staff has not measured the individual or cumulative costs of these public health consequences. The costs range from the direct costs incurred by individuals and their families in lost wages, medical expenses, and pain and suffering, to the collective costs to communities in declining productivity and wealth. Where public sector agencies expend resources to reduce or prevent these costs (e.g., well-head treatment for drinking water supply wells), the costs are alternately described as "Public Health" and "Environmental Health" expenditures. Environmental Health costs are discussed below.

5.2.2.2 Environmental Health

Environmental Health costs are defined here as costs incurred principally by public agencies and service providers for actions to address environmental quality problems. These costs may, but do not necessarily also benefit public health. For example the public health cost of contaminated water is borne by those individuals suffering from health effects and by the public at large. At the same time, the environmental health cost to clean up or prevent the pollution of a water supply falls largely on public

[18] Kilfoy BA, Zhang Y, Park Y, Holford TR, Schatzkin A, Hollenbeck A, Ward MH. 2010. *Dietary nitrate and nitrite and the risk of thyroid cancer in the NIH-AARP diet and health study*. Sept. 7.

[19] R. B. Brinsfield and K. W. Staver, *Addressing groundwater quality in the 1990 farm bill: Nitrate contamination in the Atlantic Coastal Plain*, Journal of Soil and Water Conservation, March 1990, vol 45., no. 2, 285-286.

[20] M.H. Ward, Mark S.D., Cantor K.P., et al., *Drinking Water Nitrate and the Risk of Non-Hodgkin's Lymphoma*, Journal of Epidemiology and Community Health, 1996, Vol. 7, pgs 465-471.

[21] Peter Weyer, *Nitrate in Drinking Water and Human Health*, 2001, http://www.agsafetyandhealthnet.org/Nitrate.PDF

[22] Marks AR, Harley K, Bradman A, Kogut K, Barr DB, Johnson C, et al. 2010. *Organophosphate Pesticide Exposure and Attention in Young Mexican-American Children.* Environmental Health Perspectives.

agencies and private water vendors who must spread these costs broadly among the populations they serve.

This discussion of environmental health costs is limited to those costs associated with addressing groundwater overdraft/seawater intrusion, and treating nitrate contaminated water supplies from groundwater.

The Draft Ag Order does not require any dischargers of irrigated agricultural runoff to implement treatment or to replace drinking water for public or domestic water supplies affected by agricultural pollutants, nor does it establish any conditions or criteria that would trigger these requirements. Therefore, the following costs are not costs to dischargers if the proposed order is adopted. Rather these costs provide examples and estimates of the current and potential future costs to restore groundwater to public health standards, if pollution continues unabated.

The Draft Ag Order does refer to the *existing* authority pursuant to Water Code §13304 for the Central Coast Water Board to require dischargers to provide alternative water supplies or replacement water service, including wellhead treatment, to affected public water suppliers or private domestic well owners. The Draft Ag Order does not add or invoke this authority, nor establish new requirements. Staff does not speculate here on if or how this authority might become a requirement for an individual agricultural discharger complying with the proposed order and therefore, cannot meaningful estimate cost to an individual discharger.

5.2.2.2.1 Cost of Treating Nitrate in Groundwater

Data from public supply wells in the Central Coast region suggest that the municipal beneficial use of groundwater is impaired or threatened by nitrates in several areas of the Central Coast region's groundwater basins. A Department of Water Resources survey of groundwater quality data collected between 1994 and 2000 from 711 public supply wells in the Central Coast found that 17 percent of the wells (121 municipal supply wells) detected a constituent exceeding one or more primary MCL.[23] Nitrate exceeded the MCL (45 mg/L nitrate as nitrate) the most, with approximately nine percent of the wells (64 wells) exceeding the MCL for nitrate. Research shows that nitrate concentrations found in groundwater above 14 mg/L (as nitrate) are likely from anthropogenic activity such as agriculture, so concentrations above 45 mg/L indicate a significant anthropogenic impact.[24] According to the State Water Board's GAMA Geotracker website, recent impacts to public supply wells are greatest in portions of the Salinas Valley (up to 20 percent of wells impacted) and the Santa Maria (approximately 17 percent) groundwater basins. In the Gilroy-Hollister groundwater basin, 11 percent are impacted but the California Department of Health identified more than half of the drinking water supply wells as vulnerable to agricultural related activities.

A study of sources of loading of nitrates and salts to the soil and potentially to groundwater in Santa Cruz and Monterey Counties indicated that irrigated agriculture

[23] Department of Water Resources, 2003. *California's Groundwater Update, Central Coast Hydrologic Region.*
[24] W.M. Alley, 1993. Regional Ground-Water Quality. Van Nostrand Reinhold, New York NY

contributes approximately 78 percent of the loading.[25] Less than 50 percent of applied fertilizer-nitrogen is taken up by the crops and of the approximately 50 percent not taken up, approximately 25 percent is lost to the atmosphere due to ammonia volatilization.[26] Based on these proportions, approximately 38 percent or more of applied fertilizer-nitrogen is leached to groundwater.

Due to elevated concentrations of nitrate in groundwater, many public water supply systems have abandoned wells and established new wells or sources of drinking water, or are required to remove nitrate before delivery to the drinking water consumer, often, at significant cost.

Removing nitrates from groundwater is very expensive. There is significant variability in costs to remove nitrate from groundwater depending on whether the goal is to perform groundwater treatment at the wellhead or to achieve groundwater cleanup on a basin-wide scale. The cost estimates that follow were developed by cost modeling using data from existing pump-and-treat cleanup projects within the region, and present-day nitrate treatment and blending costs for groundwater projects throughout the State.

Current strategies for addressing nitrate in groundwater typically include avoidance (abandoning impacted wells or drilling adjacent deeper wells), groundwater treatment to remove nitrate (i.e., dilution using blending, ion exchange, reverse osmosis, biological de-nitrification, and distillation), or developing additional water supplies (i.e., percolation ponds, surface water pipelines, reservoirs) to dilute nitrate-impacted groundwater resources. The costs associated with these strategies vary depending on various factors including, but not limited to: affected population, area impacted by elevated nitrate concentrations, number of replacement wells needed, capacity and depth of replacement wells, concentration of nitrate to be treated, presence of other constituents in groundwater, distance to alternative low nitrate concentration water source, installation of new infrastructure (e.g., treatment system, conveyance pipeline, etc.), equipment costs, and long-term maintenance and operational expenses.

Private parties and municipalities with elevated nitrate concentrations in the wells they own and operate can incur significant costs to treat or lower nitrate concentrations.[27] Some options include:

- Rely on bottled water: Average costs to buy bottled water for a family of four: $190 per year[25]
- Remove nitrate at sink: Average cost to buy a nitrate removal system (under the sink-type reverse osmosis system): $800 plus $100 per year for maintenance[25]
- Wellhead treatment:

[25] Monterey County Flood Control and Water Conservation District, November 1990. "Report of the Ad Hoc Salinas Valley Nitrate Advisory Committee." Zidar, Snow, and Mills.

[26] Harter, Thomas, 2009. *Agricultural Impacts on Groundwater Nitrate,* in Southwest Hydrology, July/August.

[27] A.M. Lewandowski, B.R. Montgomery, C.J. Rosen, and J.F. Moncrief, *Groundwater nitrate contamination costs: A survey of private well owners*, Journal of Soil and Water Conservation, May 2008, vol. 63, no. 3, 153-161.

  - Average cost to operate an ion exchange system for wellhead treatment on a private well (for a 15 gallons per minute well): $25,000 capital costs plus $37,000/year on operation and maintenance costs.[28]
  - Average cost to operate an ion exchange system for wellhead treatment on a municipal supply well (for a 1,000 gpm well): $200,000 plus operating and maintenance costs.
- Replace well:
  - Average cost to install a new replacement shallow private domestic supply well: $7,200.[25]
  - Average cost to install a municipal water supply well (see Table 20).

According to data prepared for the Central Valley Water Board, well replacement costs depend on the geology of the water supply area, well design and depth, well construction, pumping rate and wellhead protection. Table 20 presents a range of well replacement costs. Based on these costs the estimated total costs for well replacement and one year of operation and maintenance range from $76,500 to $1.085 million.[29]

Table 20: Well Replacement Costs

Well Size	**General Cost Assumptions**
10 to 30 gal/min (gpm)	$25,000 to $50,000 ($37,500 average)
30 to 100 gpm	$100,000
1,000 gpm to 2,000 gpm	Can he as high as $1 Million
Items	**Cost Ranges**
Labor per person	$30,000 to $60,000 per year
Power for <100 gpm size	$3,000 to $5,000 (average $4,000)
Administration/fees	$2,000 per year
Analytical Costs – Groundwater	$2,000 per year with no treatment or compliance issues
Maintenance – Groundwater	$1,000 per year if done by operator

Note: Actual costs should be verified by local drilling company
Source: CVRWQCB, 2010, p. 5-4, 5-5.

An example of well replacement costs in the Central Coast Region is provided by the Monterey County community of San Jerardo. At the October 23, 2009 Central Coast

[28] Stephany Burge and Rolf Halden, *Nitrate and perchlorate Removal from Groundwater by Ion Exchange Pilot Testing and Cost Analysis*, Lawrence Livermore National Laboratory, University of California, Livermore, California, September 8, 1999.

[29] Central Valley Regional Water Quality Control Board (CVRWQCB). July 2010. *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program.* Prepared by: Megan Smith, ICF International; with assistance from: Mark Roberson, Ph.D., Stephen Hatchett, Ph.D., CH2MHill, and Thomas Wegge, TCW Economics.

Water Board hearing,[30] the Board approved a resolution requesting $543,826 of Cleanup and Abatement Account funding to assist San Jerardo in financing alternative water supply and interim nitrate treatment. This small rural community (approximately 60 households) located in an agricultural area southeast of Salinas has high levels of nitrate and 1,2,3-Trichloropropane (1,2,3-TCP) in groundwater. The community, whose water system has been under a bottled water order for drinking water since 2001, requested the funds in October 2009 to continue interim treatment of drinking water.[33] Up to that time, Monterey County incurred $615,582 in interim filtration system costs for the San Jerardo water supply, and anticipated an additional $232,400 in expenses through the expected completion date of an approximately $1 million project to permanently replace the water.[31]

When well replacement is not an option, either wellhead treatment (the interim strategy for San Jerardo) or basin wide cleanup (pump and treat) are the typical strategies for reducing nitrate in drinking water supplies. Cleanup strategies rely on source control/removal as the cornerstone component for nearly all groundwater cleanup sites in the Central Coast Region, and the cleanup strategy for nitrate is no different. So, these options are only reasonable if nitrate loading has been addressed through management practices, such as those required in the Draft Ag Order.

To understand the costs associated with nitrate cleanup, staff selected an example involving the cleanup of a perchlorate (a chemical similar to nitrate) plume within the Llagas Subbasin in Santa Clara County.[32] The extent of the perchlorate plume is approximately 10 miles in length and more than two miles in width. The plume also extends through three underlying aquifer zones, to depths greater than 500 feet. To clean up the perchlorate plume to background concentrations, consultants estimate that capital costs to install a hydraulic containment and treatment system (e.g., wells, piping, pumps, treatment system) with reinjection of treated water is approximately $32 million plus operation and maintenance costs estimated to be $11 million per year for at least 20 years. Over a 20-year timeframe, groundwater cleanup for the perchlorate plume described above will cost more than $250 million dollars.

A nitrate plume of similar magnitude would cost significantly more due to the increased cost of nitrate resin compared to perchlorate resin and due to waste disposal costs (nitrate ion exchange resin waste). The perchlorate plume described above is a small fraction of the size of the nitrate plumes found in most of the major groundwater basins throughout the region. Additionally, the nitrate plumes in the Llagas Subbasin and other basins are significantly more concentrated than the perchlorate plume described above. Increased concentration would significantly increase treatment cost regardless of treatment method. The Llagas Subbasin is one of many groundwater basins within the

[30] Central Coast Water Board October 23, 2009 Meeting Agenda: http://www.waterboards.ca.gov/centralcoast/board_info/agendas/2009/oct/item_12/index.shtml

[31] Monterey County Board of Supervisors October 27, 2009 Meeting Agenda http://publicagendas.co.monterey.ca.us/MG75707/AS75733/AS75740/AI84201/DO84202/1.DOC

[32] MACTEC Engineering and Consulting, Inc, *Llagas Subbasin Cleanup Feasibility Study – Revised* Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California, December 6, 2006

region that are severely impaired by discharges of nitrate associated with irrigated agriculture.

Given the extent of nitrate pollution in Central Coast groundwater basins, it would cost many times the costs identified for the Llagas perchlorate plume to cleanup nitrate pollution in the region's groundwater.

5.2.2.2.2 Cost of Groundwater Overdraft and Seawater Intrusion

Groundwater overdraft in a basin is a decrease in groundwater storage that results in a significant prolonged period of groundwater level declines. Along the Central Coast, prolonged periods of groundwater level decline are causing seawater intrusion into aquifers that are hydraulically connected to the Pacific Ocean. Overdraft can also cause upward or downward migration of poor-quality groundwater, loss of surface water flows, and land subsidence with corresponding permanent loss of aquifer storage capacity, as well as infrastructure and property damage (settlement damages sewers, other utilities, buildings, etc.).

Agriculture accounts for approximately 80 to 90 percent of groundwater pumping from the Salinas, Pajaro, and Santa Maria groundwater basins. The Gilroy-Hollister, Salinas, and Santa Maria groundwater basins are actively managed to enhance groundwater recharge from streams in order to meet pumping demand, but excessive pumping (primarily related to agriculture) continues to cause seawater intrusion into the Salinas and Pajaro groundwater basins, with increasing portions of the basins unusable for agriculture and municipal supply as a result.

The Salinas Valley Water Project illustrates the scale of costs associated with addressing seawater intrusion. The three major components of the project include, operation and maintenance of Nacimiento and San Antonio Reservoirs; construction of the modification to the spillway at Nacimiento Reservoir; and construction of the Salinas River Diversion Facility (Table 21). The project will reduce seawater intrusion from Monterey Bay into aquifers underlying the Salinas Valley agricultural region by providing a source of water to replace the use of groundwater. The project includes benefits beyond addressing seawater intrusion, groundwater quality and increased recharge, including: flood control, drought protection, and recreation.

The costs for the project are shared by all land owners with land under active use, including: residential, commercial, industrial, institutional, and irrigated agricultural uses. The project's annual assessment to landowners with land under these active uses is expected to range from $3.99 to $23.93 per acre. [33]

[33] Monterey County Water Resources Agency. *Salinas Valley Water Project Cost Advisory Committee Draft Recommended Strategy*, November 2002, p. 9. http://www.mcwra.co.monterey.ca.us/SVWP/draft_final_CAC_summary.pdf

Table 21: Estimated Costs for Salinas Valley Water Project for Assessed Area[33]

Description	Capital Cost	Annual Cost
Operation and Maintenance of Nacimiento and San Antonio Reservoirs	-	$2,390,000
Construction of Modification to Nacimiento Spillway	$7,300,000	$470,000
Construction of Salinas River Diversion Facility	$11,500,000	$750,000
Maintaining Assessment Rolls		$273,000
TOTAL	**$18,800,000**	**$3,883,000**

In addition to the Salinas Valley Water Project, the Castroville Seawater Intrusion Project began construction in 1995 and started delivering recycled water to fields near Castroville in 1998, leading to reduced pumping of groundwater and slowing of the rate of seawater intrusion. More recently, the Watsonville Recycling Project came online. This project provides the Pajaro Valley Water Management (PVWMA) Agency with 4,000 acre-feet of water to distribute to farmers through the PVWMA's Coastal Distribution System. The combined cost of the Pajaro Water Recycling Project and the Coastal Distribution System is $65 million.[34] Grant funding from state and federal sources in the amount of $28 million[35] were requested to off-set the cost to affected landowners.

The PVWMA also constructed the Harkins Slough Project in 2001, to divert and filter wet-weather flows from Harkins Slough, to a recharge basin. The recharged groundwater is then extracted and delivered during the irrigation season for growers through the Coastal Distribution System. Operation of the Harkins Slough project with other supplemental water projects in the basin, help reduce overdraft and slow the rate of seawater intrusion. [36] The project also offers flood control benefits to Watsonville. Excessive sedimentation now prevents the project from functioning as designed and additional public funds are being requested to improve the project's function and improve management of the Watsonville Sloughs wetlands ecosystem.[37]

While these are only examples of projects whose principal purpose is to address the problems caused by groundwater overdraft, they clearly illustrate that overdraft and associated seawater intrusion are significant problems that require expensive public works and capital projects to address. These examples further illustrate that the costs of these large-scale projects are borne not exclusively by the agricultural industry, which has the primary role in causing overdraft in most of our over drafted basins, but also by the public in the form of individual assessments on property, higher prices for delivered water, and state and federal subsidies.

[34] Eric Anderson, "Water Recycling Project about 95 Percent Complete," Register Pajaronian, October 9, 2008.

[35] Pajaro Valley Water Management Agency, 2010. Web page on Watsonville Area Water Recycling Project: http://www.pvwma.dst.ca.us/project_planning/projects_recycling.shtml

[36] Pajaro Valley Water Management Agency, 2010. Proposition 218 Service Charge Report. March. p. 8.

[37] Regional Water Management Foundation, 2010. *Santa Cruz IRWM Prop 84 Planning Grant Application*, Attachment 3, p. 23.

5.2.2.2.3 Municipal Stormwater Agency Costs

Throughout the Central Coast region, cities and towns have grown alongside a growing agricultural industry resulting in stormwater conveyances that drain both municipal and agricultural lands. Both wet and dry season flows from urban and farm lands commingle in many of these conveyances before discharging to receiving waters. Municipal stormwater discharges are subject to NPDES permits, which require municipalities to address the quality of the discharges from their stormwater drainage facilities to the maximum extent practicable. Where municipal stormwater facilities include non-stormwater tailwater and/or farm stormwater runoff in their discharges, the municipalities are currently under regulatory requirements to implement best management practices to reduce pollutants to the technology-based standard of maximum extent practicable.

Municipal stormwater permits in the Central Coast Region require municipalities to address commingled urban-farm runoff during the current five-year permit cycle. Staff anticipates municipalities will incur costs associated with coordination with growers in and outside of incorporated communities, targeted assessment and monitoring, and capital projects to treat, separate and/or divert flows.

The City of Watsonville incurred such costs when the City constructed a detention system and large trash rack alongside a residential subdivision. The City estimates that approximately 80 percent ($2 million) of the project costs were expended because of agricultural drainage related sedimentation problems caused by a conversion from orchard to strawberry cultivation, upstream, in erosive soils. [38] The City also reports expenditures of approximately $1.4 million to construct cast-in-place culverts and a new pump station at Corralitos Creek to handle additional flow volumes from agricultural areas upstream. [38]

5.2.2.3 Environmental Justice

California statute defines Environmental Justice as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of all environmental laws, regulations, and policies" (Government Code Section 65040.12).[39] Across the nation, poor and minority communities more often suffer from the impacts of exposure to pollution, poor air and water quality and associated health hazards. The impacts of nitrate contamination on disadvantaged communities may in some communities be considered Environmental Justice impacts.

The costs of drilling a new well or paying for water treatment can be infeasible for small, disadvantaged communities, such as San Jerardo, discussed above, and Chualar, a 900-resident economically disadvantaged community just south of Salinas where nitrate

[38] City of Watsonville Public Works, Robert Ketley.

[39] Consistent with legislative mandates, the State Water Resources Control Boards' Environmental Justice Program includes the goal of integrating Environmental Justice considerations into the development, adoption, implementation and enforcement of Board decisions, regulations and policies.

contamination of the water supply was identified in 1996.[40] The impact is also felt among poor and minority communities in cities such as Salinas, Watsonville, King City and Soledad, where ratepayers pay higher prices for water treatment compared to communities relying on uncontaminated groundwater.

Impacts on Environmental Justice are a social cost of irrigated agriculture as it is practiced under current water quality regulations in the Central Coast Region. While the monetary costs of addressing contaminated drinking water are quantifiable, as described in the Environmental Health examples above, Environmental Justice represents a social value whose loss comes at incalculable costs. Should implementation of the Draft Ag Order result in reduced incidence of drinking water contamination in disadvantaged and minority communities, these social costs would be reduced.

5.2.3 Environmental Cost of Current Conditions

5.2.3.1 Watershed Health

The Draft Ag Order addresses the effects of irrigated agriculture on water quality. Irrigated agriculture has the potential to alter the various processes governing surface water, groundwater, sediment, and aquatic habitat, which play out at the watershed scale. The Draft Ag Order is intended to ensure protection of water quality, beneficial uses, and the biological and physical integrity of watersheds and aquatic habitat.

The costs of failing to provide this protection are manifest in many ways that have been described in detail elsewhere. Where these costs are translated into monetary quantities, such as when dollars are expended to address seawater intrusion caused by over-pumping, or, to reduce flooding impacts exacerbated by loss of flood storage, they can be construed as costs to the public. Where the dollar value of these costs is not known or has not been estimated, they represent agriculture's unquantified cost to watershed health.

5.2.3.1.1 Land Productivity

The effect of irrigated agriculture on land productivity is difficult to quantify, but information is provided in this Technical Memorandum to be considered when reviewing costs potentially affected by the Draft Ag Order. Declining productivity of agricultural land can eventually lead to an exhausted resource. The long-term productivity and profitability of irrigated agriculture is determined largely by factors such as prices for crops, labor supply, markets, accessibility, and land tenure. But it also depends on practices that maintain and conserve the native land's characteristics contributing to long-term productivity.

Soil loss, soil salinization, seawater intrusion, land subsidence, and contamination by agricultural chemicals are examples of consequences of unsustainable agricultural practices that can result in potentially lasting negative effects on land productivity.

[40] Monterey County Water Resources Agency, May 2006. *Salinas Valley Integrated Regional Water Management Functionally Equivalent Plan Summary Document Update*. P. 14-3.

Central Coast irrigated agriculture has witnessed some of these effects, most notably seawater intrusion, and the prospect of further declines in productivity exists. Critically, declining productivity from greater intensity of cultivation can result in increased dependence on synthetic nutrients, increasing the risk that applied chemicals will reach surface waters and groundwater in concentrations above protective levels.

5.3 The Triple Bottom Line

The above discussion of financial, social, and environmental costs associated with irrigated agriculture addresses the broad spectrum of effects that could potentially result from implementation of the Draft Ag Order. This framing of the consideration of costs is consistent with what has been termed the "triple bottom line," which attempts to describe the social and environmental impact of an organization's actions to provide a more in-depth evaluation to its economic effects (Presidio Graduate School, 2010).

In considering the costs for the agricultural industry to comply with water quality regulations, the triple bottom line is a useful concept, since these costs are not accurately viewed in isolation from the other social and environmental costs such as those discussed here. The industry's characteristic externalities, which transfer costs to the public-at-large (e.g., groundwater cleanup costs), and the public's share of the cost of production in the form of public subsidies (e.g., federal funding from Environmental Quality Incentives Program) are examples of what is revealed by a more comprehensive analysis of cost.

ATTACHMENT 1:

TABLES SUPPORTING MONITORING COST DISCUSSION

TABLE: RECEIVING WATER MONITORING COST BASIS															
	Laboratory Costs ($)								Receiving Water Monitoring						
	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	Lab 6	Routine site visit	Test Avg.	No. of Trend	No. of Storm water	No. of Dry Season	QA Sites	No. of Sites	Annual ($)	5-Year Cost ($)
Field Visit (including flow and field measures)							400		12	2			45	252,000	1,260,000
Total Nitrogen		60	60	20				47							
Nitrate+Nitrite		25	30	20				25	12	2		2	45	16,538	82,688
Total Ammonia	35	35	30	20				30	12	2		2	45	19,845	99,225
Orthophos	see NO	25	60	20				35	12	2		2	45	23,153	115,763
Kjehldahl Nitrogen		26	30	30				29	12	2		2	45	18,963	94,815
Total Phosphorus		16	18	20				18	12	2		2	45	11,907	59,535
Total Organic Carbon		12	30	40				27	12	2		2	45	18,081	90,405
Hardness		13	10	20				14	12	2		2	45	9,482	47,408
TDS	35	15	25	12				17	12	2		2	45	11,466	57,330
Color		15	10	15				13							
Chlor a	71	60	75	50				64	12	2		2	45	42,336	211,680
pH		5	5	10				7	12	2		2	45	4,410	22,050
Conductivity		5	5	10				7	12	2		2	45	4,410	22,050
Turbidity		8	5	12				8	12	2		0	45	5,250	26,250
Total and fecal		30	10	30				23	4	2		0	45	6,300	31,500
E. coli		25	10	30				22	4	2		0	45	5,850	29,250
Toxicity															
Ceriodaphnia	750	733	650	375	735			649		2	2	0	45	116,760	583,800
Selenastrum	750	733	650	650	735			704		2	2	0	45	126,660	633,300
Pimephales	775	733	250	375	735			574		2	2	0	45	103,260	516,300
Hyallela in sed		1000			1040			1020			1	0	45	45,900	229,500
Pyrethroid suite		350				395		373			1	0	45		16,763
Organochlorine in sed		130	225	125				160			1	0	45		7,200
Particle size		15	50	75				47			1	0	45		2,100
OP suite	561	175	225	100		190		250		2	2	0	45		45,036
Nitrogen Pesticides (includes atrazine, cyanazine, simazine)		210		190				200		2	2	0	45		36,000
Carbamates (includes diuron, glyphosate, linuron)		160		265				213		2	2	0	45		38,250
Metals															
Boron		5	7	10				7		2	2	0	45		1,320
Cadmium		6	10	30				15		2	2	0	45		2,760
Copper		6	10	30				15		2	2	0	45		2,760
Lead		6	10	30				15		2	2	0	45		2,760
Nickel		6	10	30				15		2	2	0	45		2,760
Molybdenum		6	10	10				9		2	2	0	45		1,560
Selenium		6	10	30				15		2	2	0	45		2,760
Zinc		6	10	30				15		2	2	0	45		2,760
Phenol		40						40		2	2	0	45		7,200
Paraquat dichloride				75				75		2	2	0	45		13,500
Bioassessment	750							750			1		45	33,750	33,750
TIE Water	4250				6000			5125			5			25,625	128,125
TIE Sediment	4250				6000			5125			5			25,625	128,125
Subtotals														**927,570**	**4,688,336**
5-Year Cost															**4,688,336**
Average Annual Cost															**937,667**

TABLE: GROUNDWATER MONITORING COST ESTIMATE										
				Tier 1 and 2			Tier 3			
	Cost/visit ($)	Add'l Well Cost ($)	Analysis Cost ($)	No. of wells	No. of Samples	5- yr cost ($)	No. of wells	Frequency First Year	Frequency other 4 years	5-year cost ($)
Field Visit (including depth and field measures)	300	150		1	2	$600	2	4	1	$3,600
Mineral Suite (GAMA)			**95**	1	2	$190	2	4	1	$760
Cost/grower/5 Yr						$790				$4,360
No.of Growers						1,600				100
						$1,264,000				$436,000
TOTAL 5-YR PROGRAM COST ALL TIERS										**$1,700,000**