



# ILRP Ag Order 4.0

An Agricultural Perspective

Central Coast Regional Water Quality Control Board

September 20, 2018



# Ag Panel Presentations

- ▶ Nutrient, Irrigation & Pesticide Management - 90 minutes
- ▶ Farm Management Considerations - 40 minutes
  - ▶ Including Food Safety & Harvest Decisions
- ▶ Generating Meaningful Data & Balancing the Level of Detail with Reporting Burden - 35 minutes
- ▶ Looking Forward: Getting to the Core Regulatory Principles - 35 minutes

*It's essential that we keep on schedule to ensure all information is presented today.*

# Achieving Core Regulatory Goals in 4.0

## Importance of Central Coast Agriculture:

- ▶ Value of working landscapes
- ▶ Agriculture is #1 economic sector in almost all Central Coast Counties
- ▶ Central Coast Agriculture enhances dinner tables of our Nation and the World
- ▶ Balance of Water Quality Objectives and the Three Pillars of Sustainability
- ▶ Agriculture is focused on Water Quality Improvements that have been achieved over the last 14 years in some watersheds



# Irrigation Practices

Jocelyn Bridson, Rio Farms

Mark Mason, Huntington Farms

# Irrigation Practices Objectives

- ▶ Agriculture acknowledges that we need to work towards ensuring that irrigation return flow does not cause surface water quality objectives to be exceeded in our regions surface waters.
  - ▶ How growers reach them is unique to each farm.
- ▶ Farmers must be aware of the crops' root zone so they can be more efficient in their irrigation.
- ▶ Irrigation trends show more use of BMPs that lead to less tailwater runoff and more precise timing and application
- ▶ A crop in one area may need much more water than the same crop in another area, due to salt in the water and/or evapotranspiration
- ▶ As Outliers are being determined, regional characteristics must be taken into consideration<sup>5</sup>

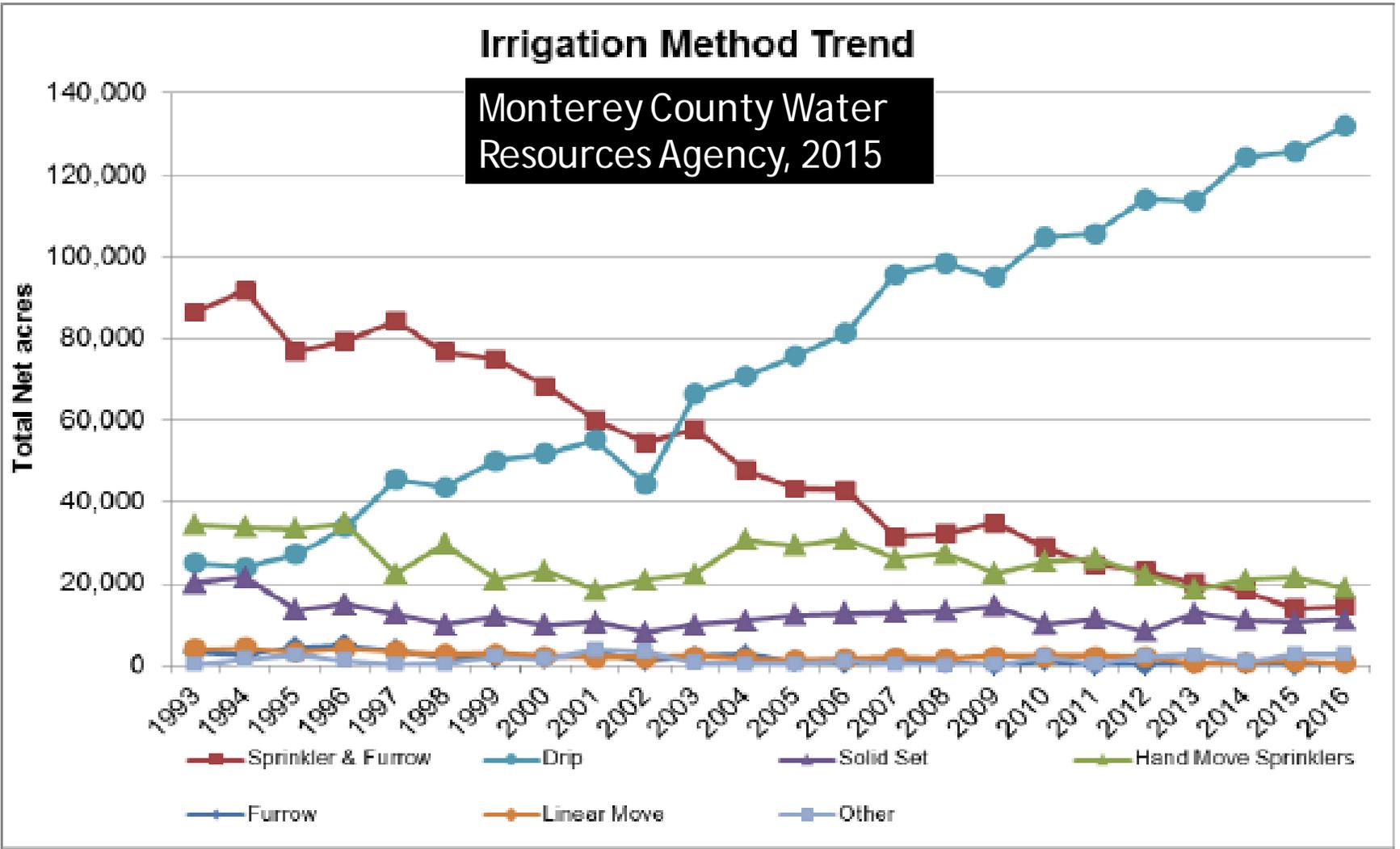


Figure 14. Changes in Irrigation Methods Used Over Time (1993 – 2016) in Zones 2, 2A, and 2B.

Source: Monterey County Water Resources Agency Groundwater Extraction Summary Report 2015

# BMPs Implemented in Monterey County

There are more than 200,000 acres in the Salinas Valley

- On more than 150,000 acres:
  - Time clock/pressure gauges
  - Water flowmeters
- On more than 100,000 acres:
  - Leakage reduction
  - Off-wind irrigation
- On more than 50,000 acres:
  - Land leveling/grading
  - Micro-irrigation systems
  - Reduced sprinkler use

# Why Do Growers Irrigate?

**Vegetable crops require irrigation for:**

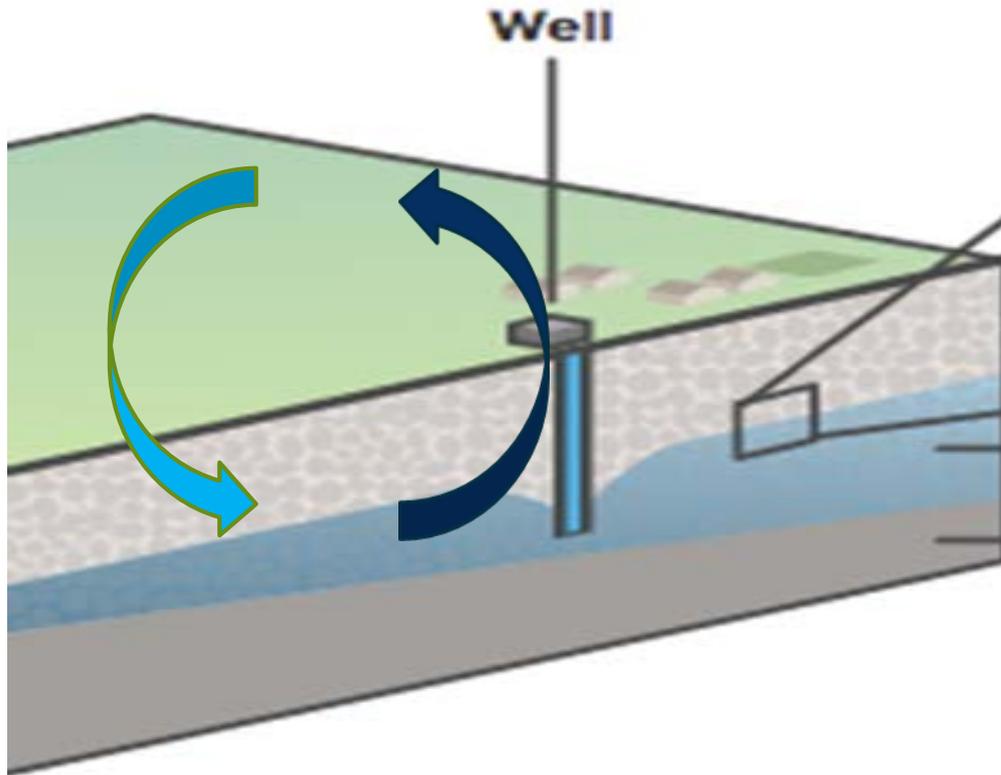
- Field preparation
- Germination
- Salt leaching fraction
- Crop growth
- Frost control
- Harvest

**N in Well Water & Soil is Important to Determine N Available for Crop Uptake**

**Not all historic N (soil and well water) is available to the plant and results in double counting previously applied Nitrogen used for:**

- Field preparation
- Germination
- Salt leaching fraction
- N in soil

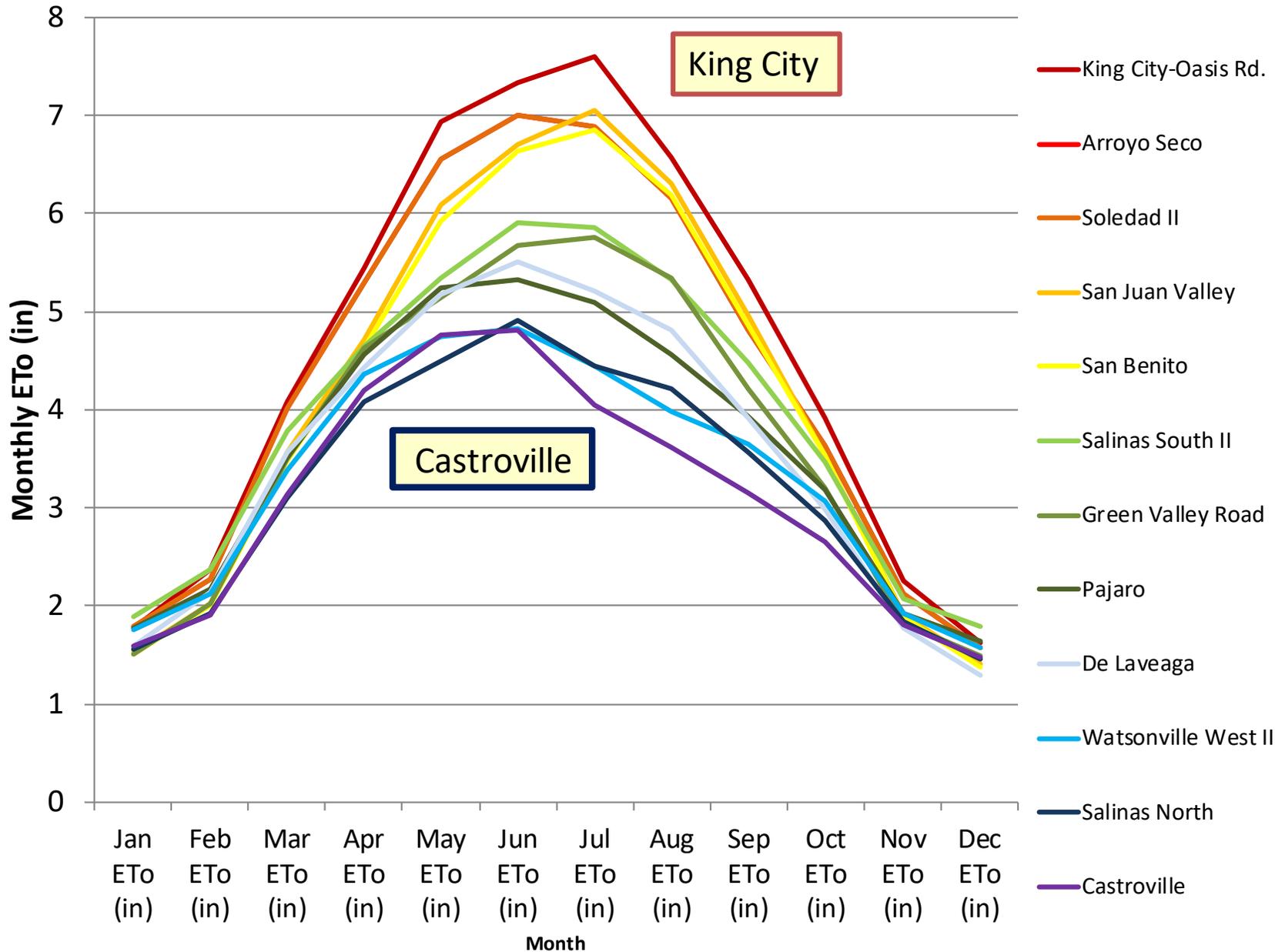
## New N vs. Well Water N (Old N)



High N groundwater pumped that percolates back

- Does not result in additional loading to the aquifer

# Average Monthly Reference Evapotranspiration for all CIMIS Stations in Monterey Bay Region



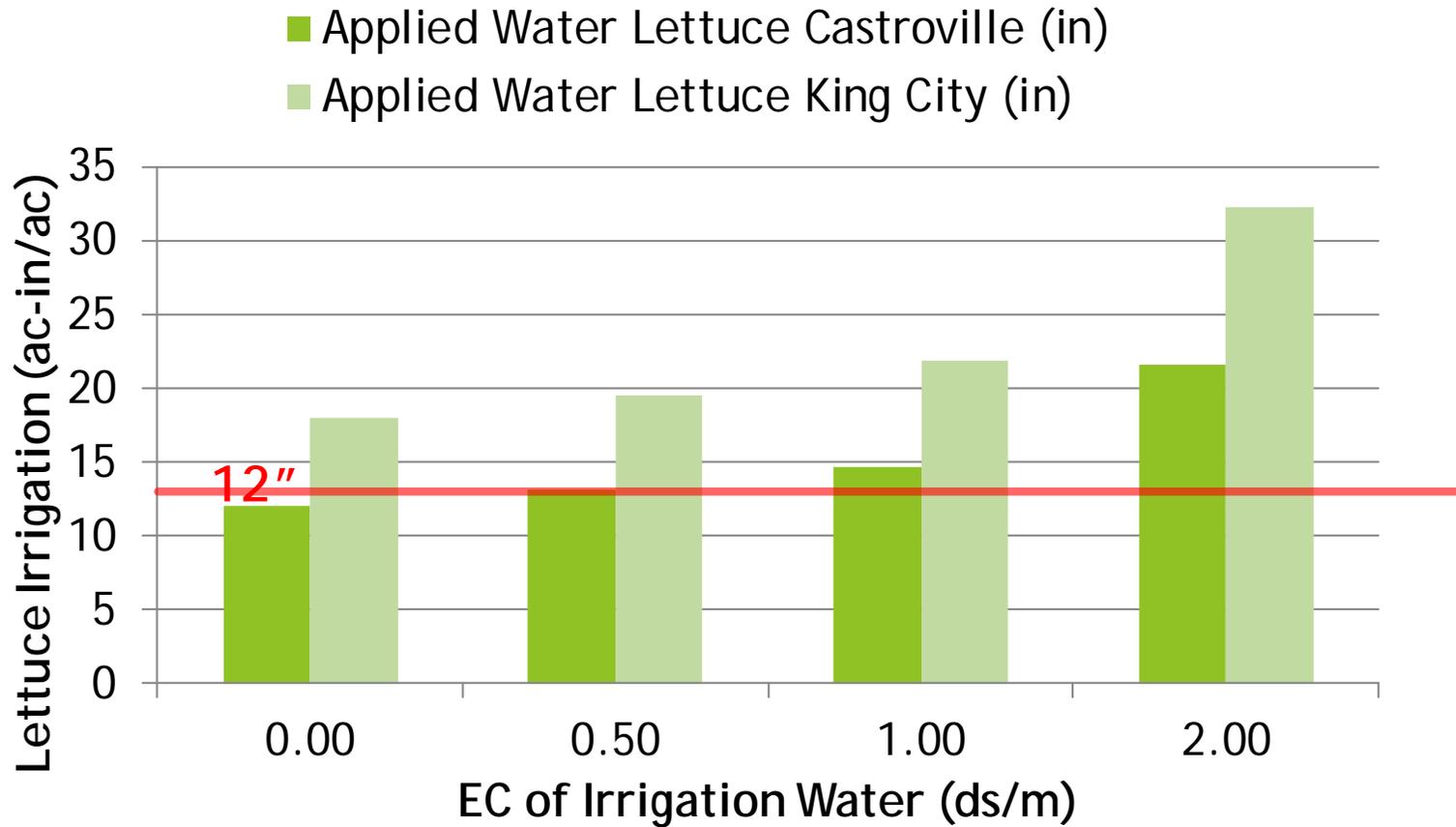
## A crop requiring

- 1.25-1.5 acre feet of water in Castroville may require 3.2 acre feet in King City

Comparisons of ranch water use should be based on geographically similar locations.

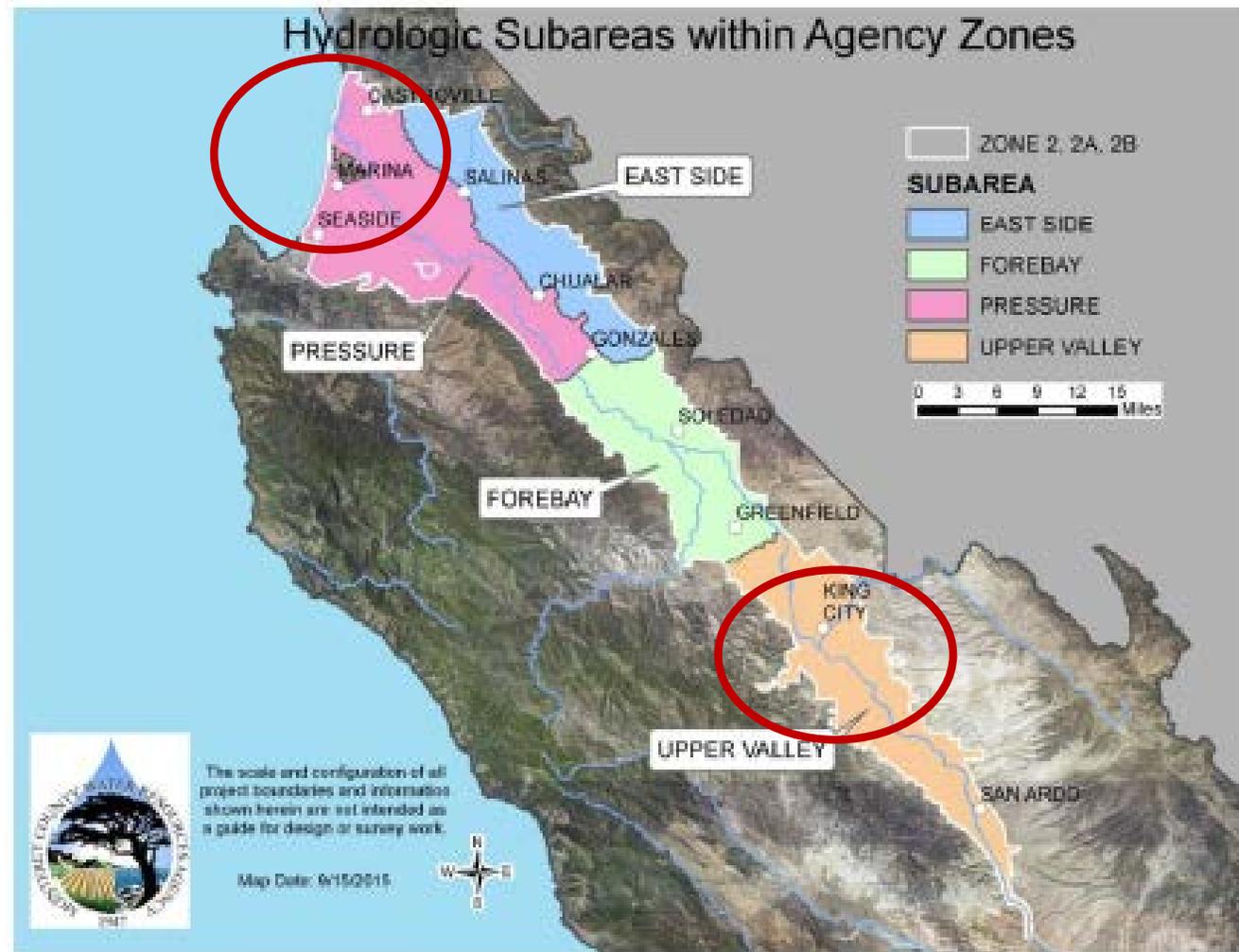
- Growers in Santa Maria could be considered as a sub-region
- Pajaro Valley could be another sub-region

# Leaching Requirement Example



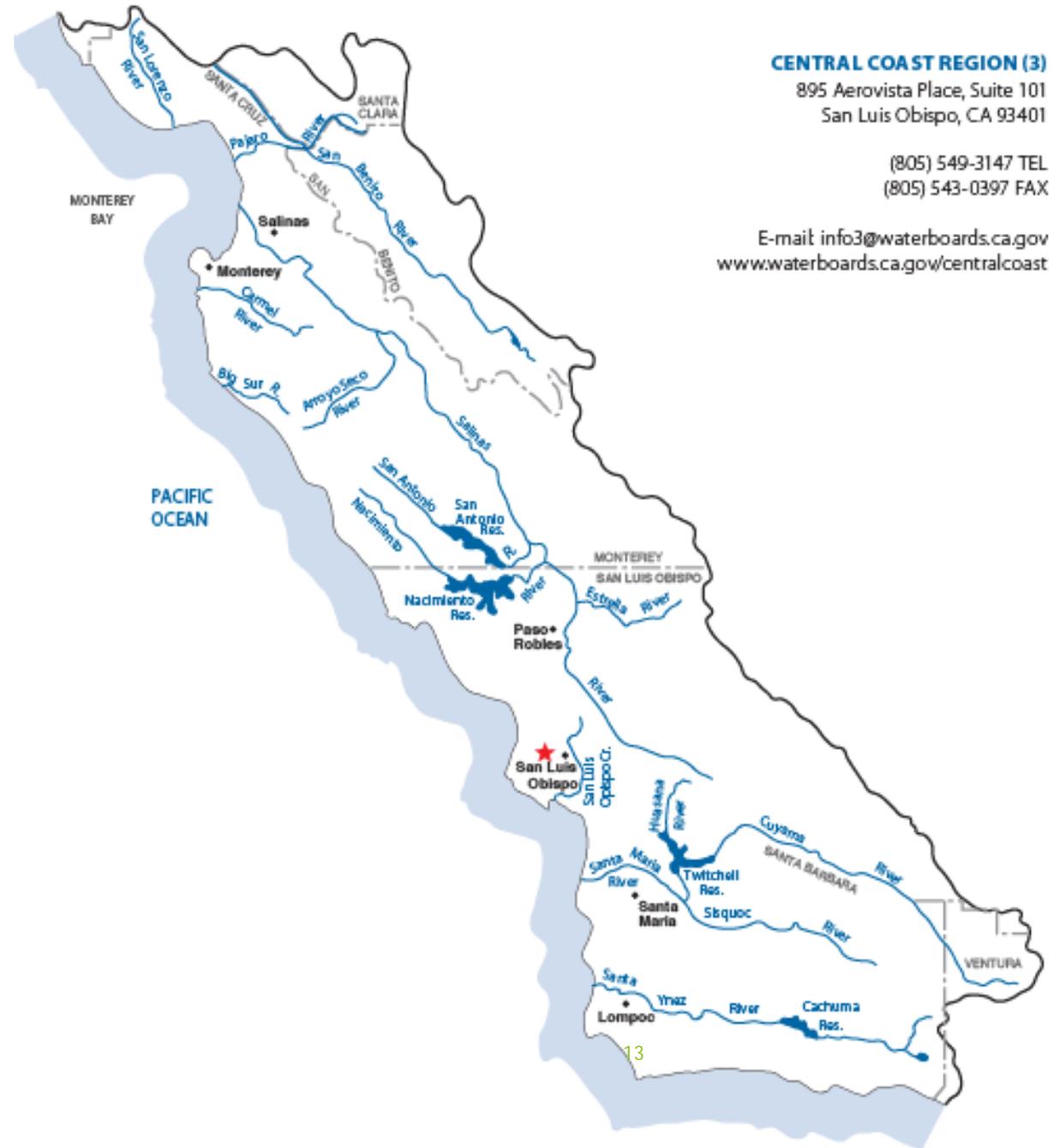
WATER E.C.w (ds/m)	Leaching Requirement	Applied Water (as % of normal Crop Etc)	Applied Water Lettuce Castrov' II (in)	Applied Water Lettuce King City (in)
0.00	0%	100%	12	18
0.50	8%	109%	13	20
1.00	18%	122%	15	22
2.00	44%	<b>180%</b>	22	32

# Location Matters When Considering Outliers



# Considerations When Establishing Potential Ag Sub-Areas

- County boundaries
- Service area boundaries (i.e. water districts)
- Evapotranspiration data
- Climatic conditions
- Soil types
- Groundwater sub-basins
- Cropping systems



# SWRCB Requires Reporting by Township

- ▶ “These data are required to be associated with the township (36 square mile area) where the farm is located. The spatial resolution by township provides a common unit that should facilitate analysis of data and comparisons between different areas.”

*Source: SWRCBESJ Attachment A, page 24*

- ▶ “With regard to the aggregated dataset, the regional water board is not limited to aggregating the data at the township level, but may choose a smaller or larger area unit based on region-specific and program-specific considerations.”

*Source: SWRCBESJ page 51*

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- ▶ Farmers must be aware of the crops' root zone so they can be more efficient in their irrigation.
- ▶ Irrigation trends show more use of BMPs that lead to less tailwater runoff and more precise timing and application
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- ▶ As Outliers are being determined, regional characteristics must<sup>15</sup> be taken into consideration



# Nutrient Management

Tim Borel, Blanco Farms

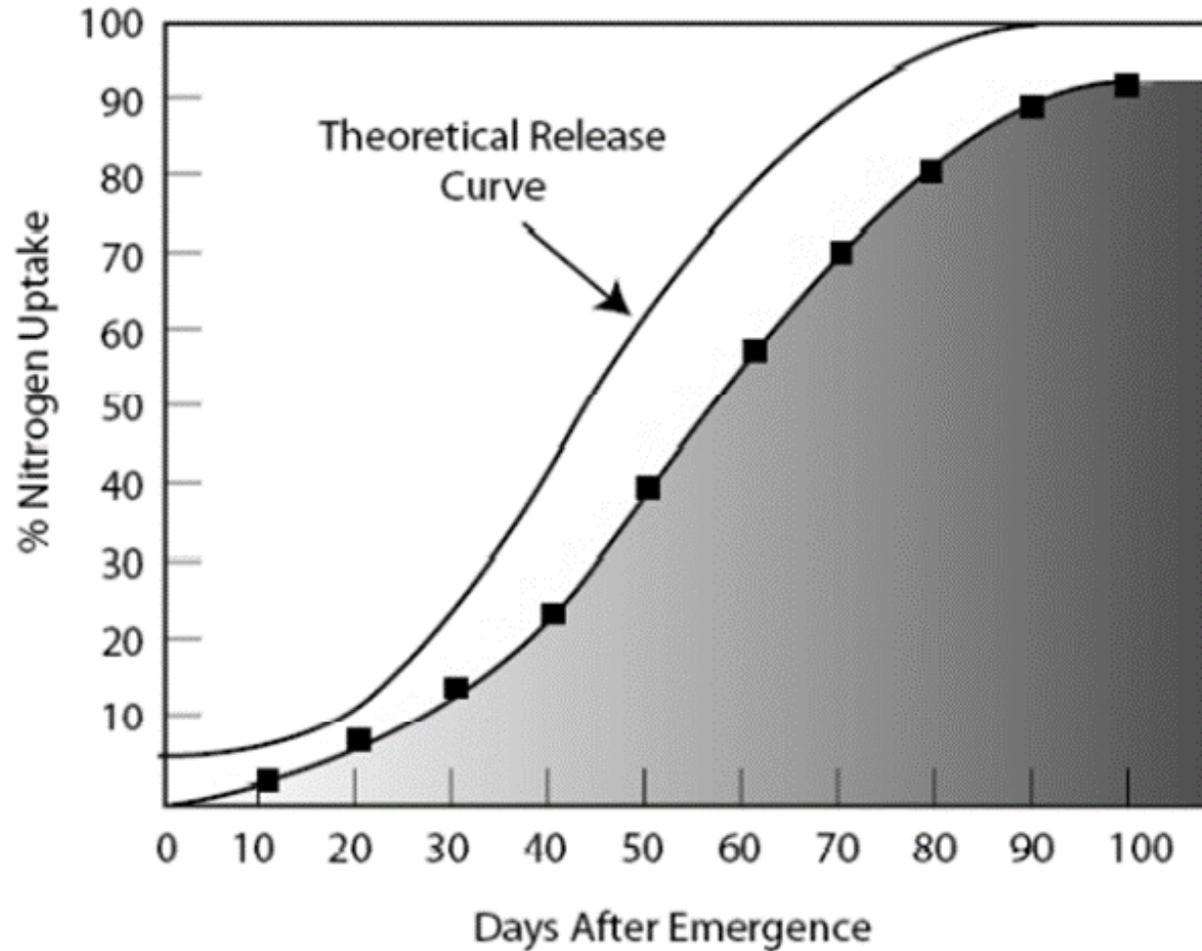
Joel Wiley, Wilbur-Ellis

Jackie Vasquez, Sundance Berry Farms

# Nutrient Management Objectives

- ▶ Reasonable methods for farmers to account for new Nitrogen
- ▶ Education must center around the 4 “R”s
- ▶ Applied and Removed data shows both have improved considerably over time on the Central Coast in a positive trend.
- ▶ There are three points of measurement to focus on.
- ▶ The diversification of crop mix on the Central Coast makes reporting different than in the Central Valley
- ▶ There are management factors that minimize loading, and Ag has a plan to address the best reporting structure that is provided for in the ESJ Order
- ▶ More research to establish R coefficients is necessary
- ▶ A public process is required for the adoption of coefficients

# The Four "R"s



Right Source  
Right Rate  
Right Time  
Right Place

# The Four “R”s: Right Source

Selecting the right source of fertilizer or the right material to deliver the nutrients is important. The right source can be related to the following questions:

- What source of nutrient(s) would be the least expensive per unit of delivered nutrient?
- Should an organic source (compost or manure) of nutrient be considered?
- When is a controlled-release fertilizer the right source?
- What sources can simultaneously deliver more than one needed nutrient?
- When should a liquid form be used instead of a dry form?
- When should the salt index of the fertilizer be considered in selecting the right source?

# The Four “R”s: Right Rate

The right rate refers to the amount of fertilizer needed for the crop production season and is based on extensive research over locations, crops, varieties, and years. The right rate also refers to the amount of fertilizer applied at one time in the growing season.

For example, the farmer needs to know, depending on the cropping system used, the right rate of fertilizer to apply in the following scenarios:

- In the pre-plant application, while the mulched bed is made for plasticulture strawberries
- As the amount to inject (fertigation) into the drip irrigation system at any one time
- In a single side-dressing during the growing season for an un-mulched crop

# The Four “R”s: Right Time

- ▶ The right timing of nutrients takes into consideration the growth pattern of the crop and, therefore, natural changes in nutrient demand during the season. Crop development begins slowing from seed germination or transplanting, then increases through fruiting, and finally slows down at maturation.
- ▶ The right timing is often interrelated with the right rate and right placement.
- ▶ Greater rates of nutrients are applied at or just before the time when the vegetative growth rate is maximal and fruits are being developed.
- ▶ Rainfall is difficult to predict; however, when possible, fertilizer application should be timed to minimize the chance of leaching of nutrients due to heavy rainfall.

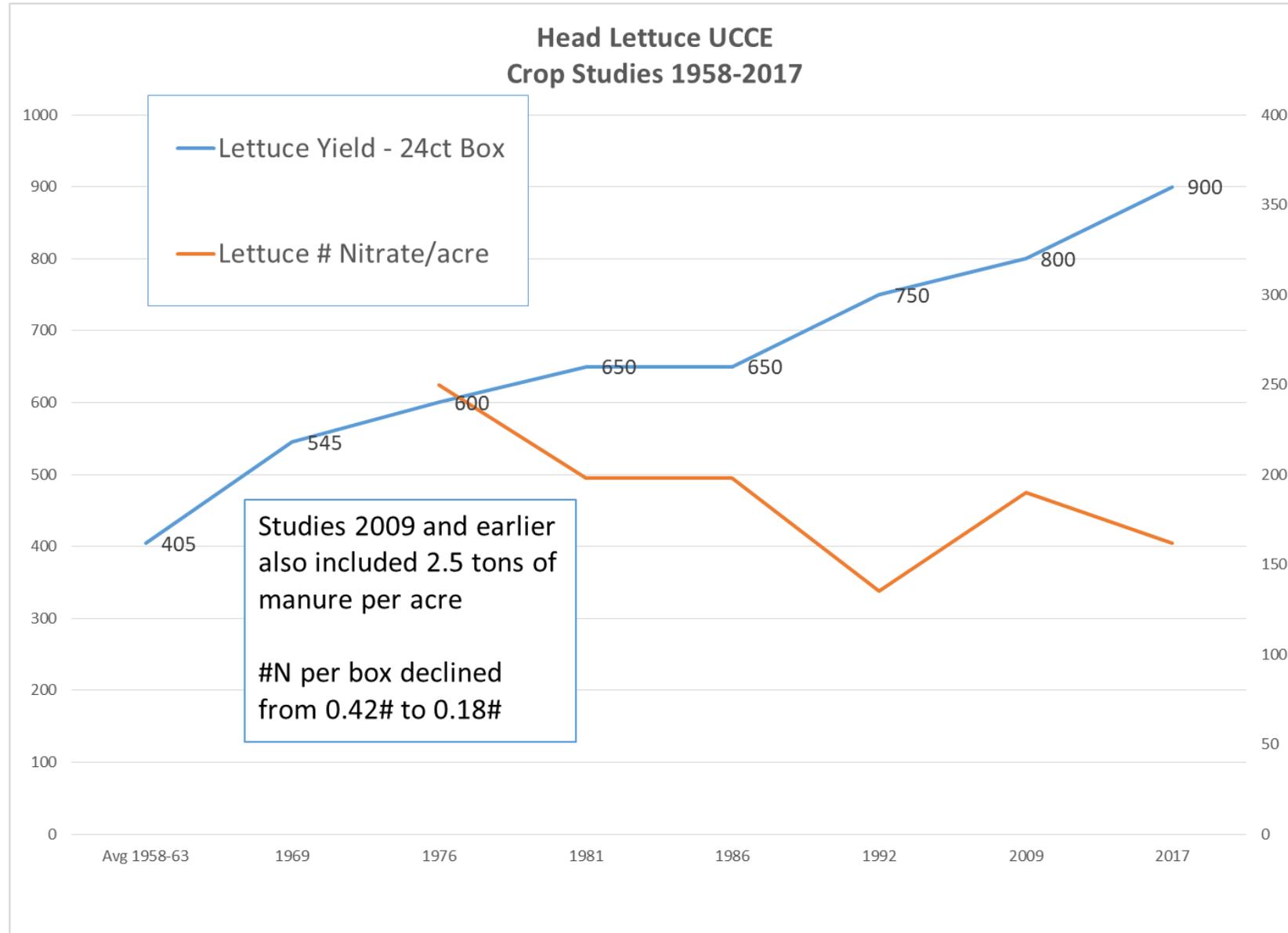
*Source: The Four Rs of Fertilizer Management, IFAS Extension, University of Florida*

# The Four “R”s: Right Place

- ▶ For maximum nutrient efficiency, nutrients need to be placed where the plant will have the best access to the nutrients. For most crops, the right placement is in the root zone or just ahead of the advancing root system. Most nutrient uptake occurs through the root system, so placing the nutrients in the root zone maximizes the likelihood of absorption by the plant.
- ▶ Placement and timing interact because as the crop develops, the root system expands.
- ▶ The right placement is also related to the nutrient in question.

*Source: The Four Rs of Fertilizer Management, IFAS Extension, University of Florida*

# Appreciating A & R Change Over Time



# Measuring Nitrogen Use on the Central Coast

## Predominant Crops:

Cool Season Vegetables

Berries

Grapes

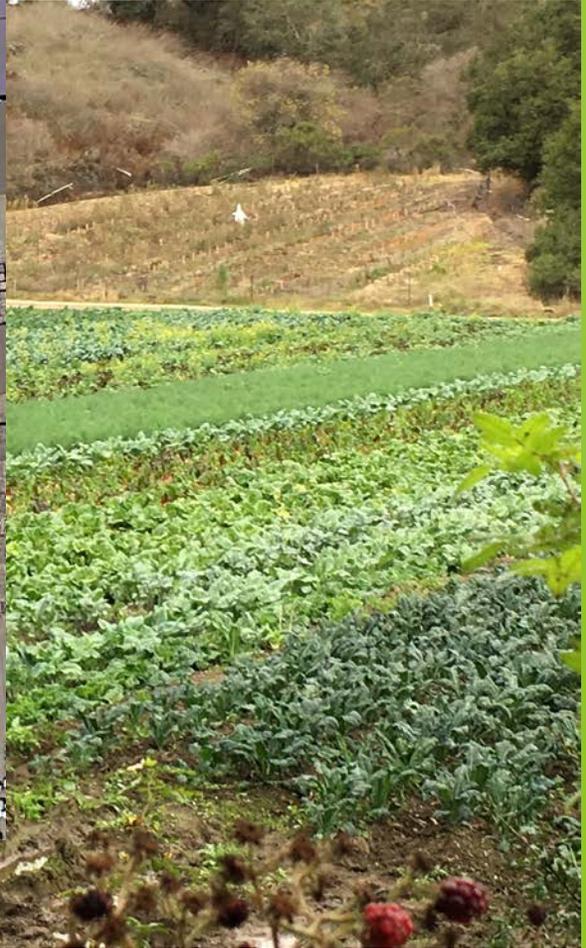
Orchards

## Three points of measurement:

- **Nitrogen applied** (new Nitrogen) (N applied or A)
- **Nitrogen uptake by the crop**  
(the minimum amount necessary for a mature crop)
- **Nitrogen removed at harvest** (N removed or R)

# Management Practices that Minimize N Loading

- Accounting for high N well water for irrigation
  - (no net N loading)
- Timing of N applications
- Matching N to crop needs
  - Crop uptake
- Denitrification
- Irrigation coordination
- Nitrogen Fixing by specialized bacteria
- Volatilization

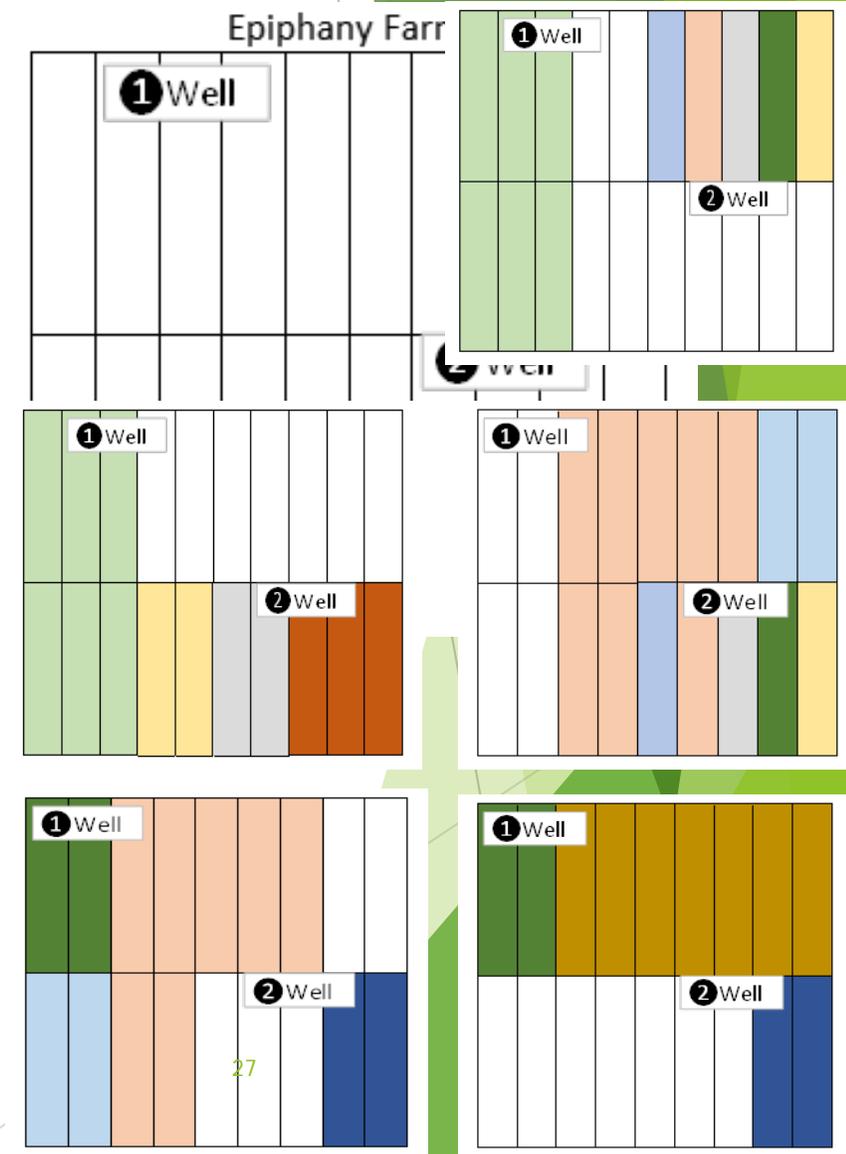


Some ranches are very diversified

# Complex Multiple Cropping Patterns

A hypothetical farm contains:

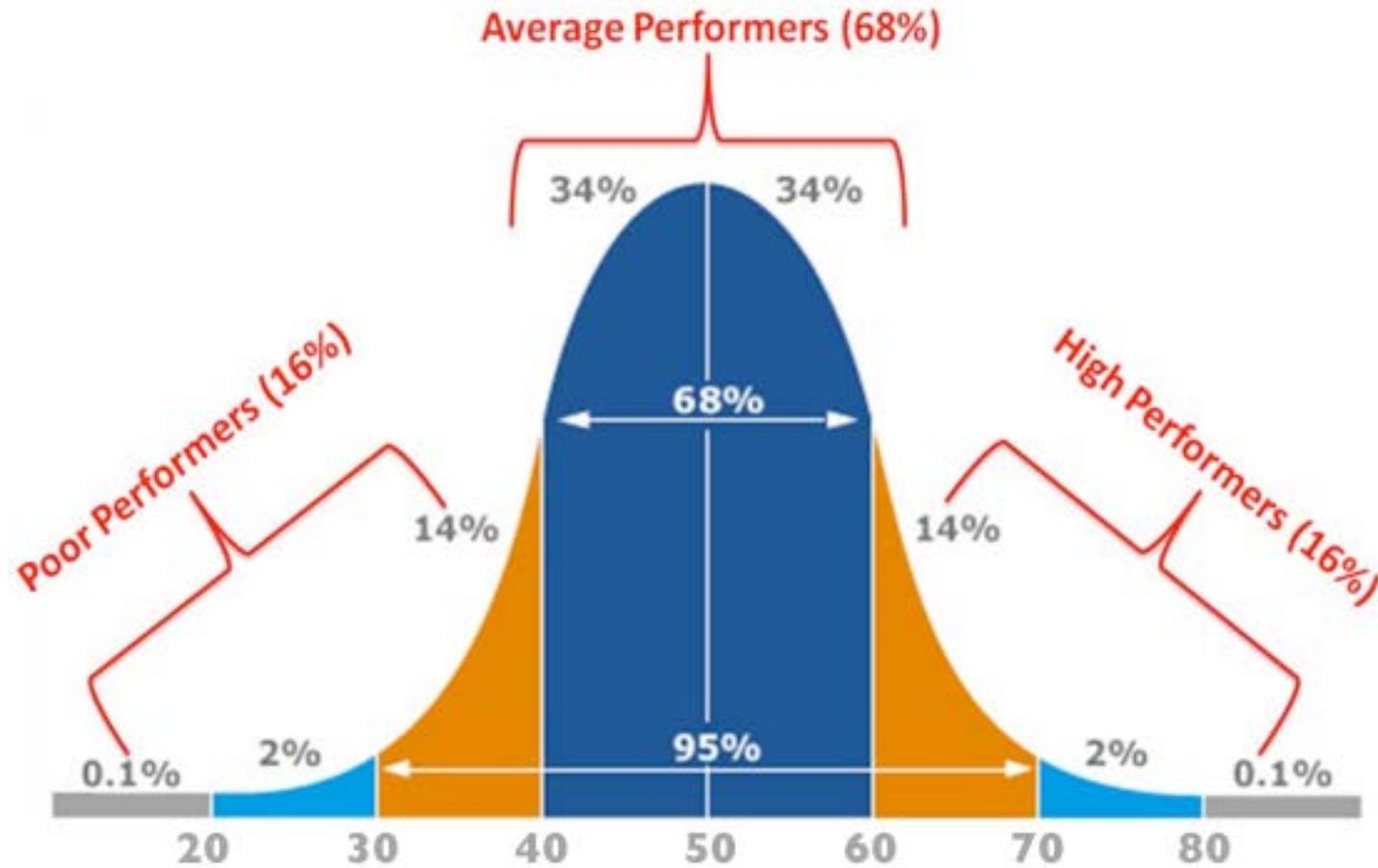
- 200 acres
- 20 blocks of 10 acres each repeated throughout the season (year)
- As many as 2.5 crops grown in each block annually
- 2 wells with N concentrations of 8 mg/l & 56 mg/l (*existing N*)
- Cross linked irrigation system, any block can be irrigated by either well or combined water from both
- The grower knows how much:
  - Water is applied to the Ranch during the season
  - How much new N was applied during the season
  - Crop harvest yield by crop type
  - N Removed coefficients are not known for most crops grown



# Tracking New N

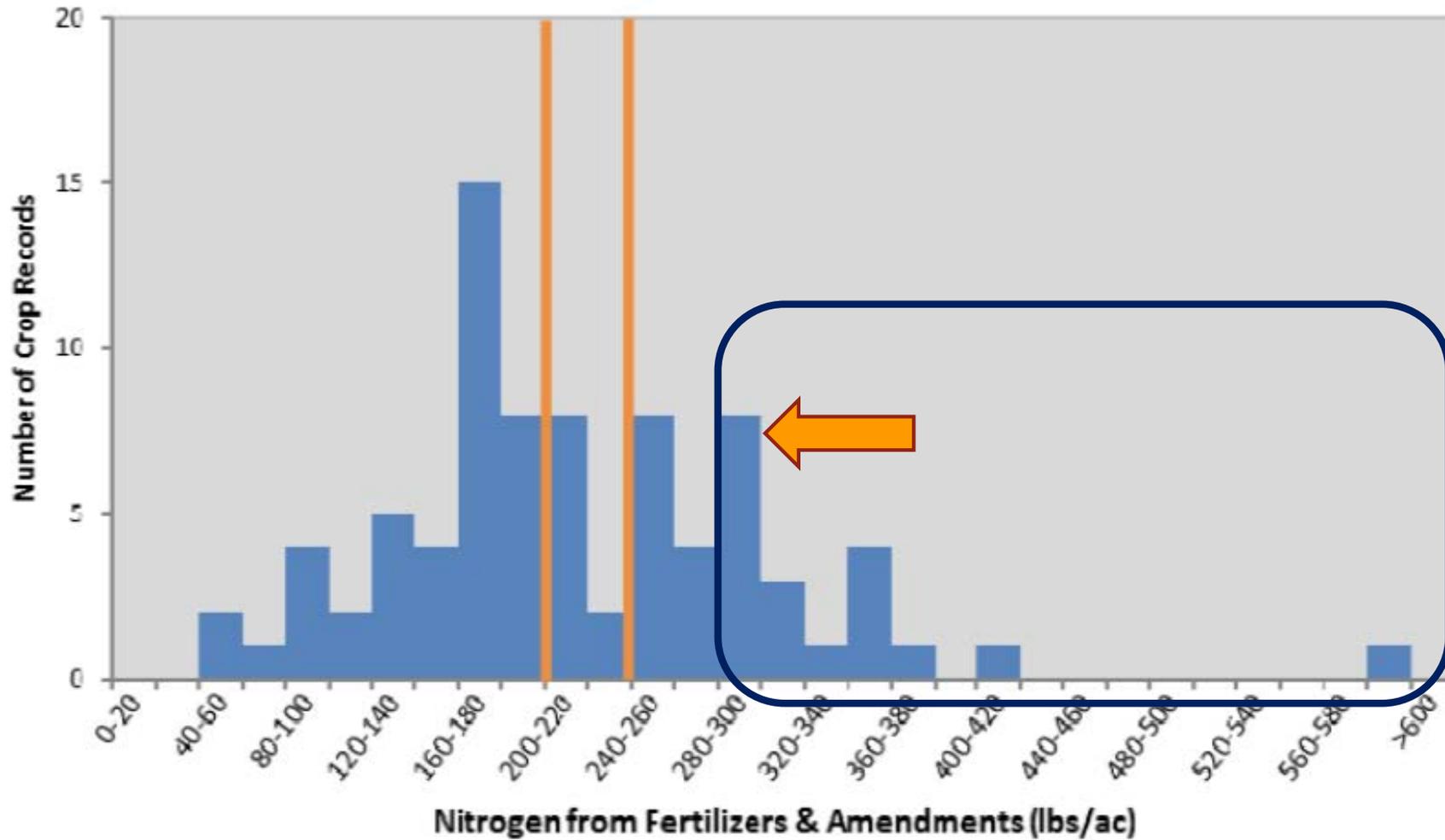
- ▶ Additional info on tracking new applied N
- ▶ Incentivize the use of high-N groundwater wells
- ▶ Pump-and-Fertilize (no penalty in calculations for high-N irrigation water use)
- ▶ Various methods used to calculate applied water by ranch, regionally

# Outliers

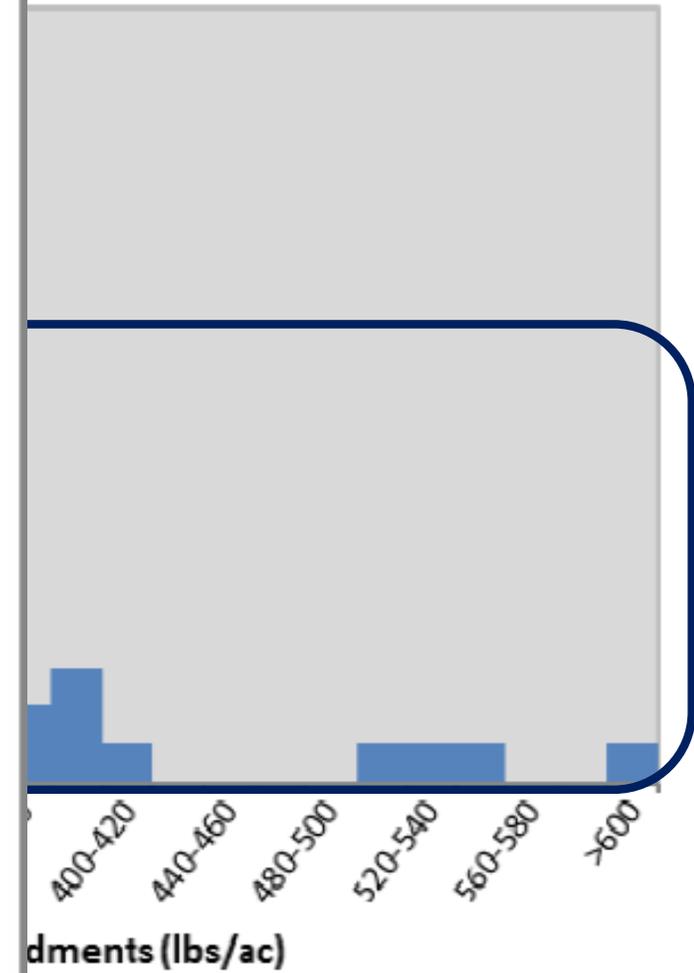


Crop	CROP "N" DEMAND			
	A - Typical N Crop Uptake Ranges (lbs./acre)		B - Harvest N Removed (lbs./acre)	
Broccoli	180	337	60	99
Cabbage	180	285		180
Cauliflower	180	355	60	70
Celery	200	250	120	160
Lettuce	120	150	50	80
Baby lettuce	70		46	
Spinach (Bunch)	120	130	78	85
Spinach (Baby)	74	85	48	55
Spinach (Tennage)	94	100	61	65
<b>Strawberry</b>	<b>200</b>	<b>260</b>	<b>92</b>	<b>100</b>
Blueberry	275	300	19	38
Bell Pepper	200	260	80	110
Mizuna (rep salad mix vegetable)	99		58	
Cilantro	104	200	57	
Tomato	240	300	120	160

## Strawberry Records 2016 Nitrogen from Fertilizers & Amendments Only



## 2015 Amendments Only



# SWRCB Mandated Outliers

- ▶ “Eventually, it is our expectation that outliers will be determined with reference to the ranges for the multi-year A/R ratio and A-R difference target values developed by the Third Party and the Central Valley Water Board.”

*Source: SWRCBESJ page 52*

- ▶ “Our view of the data collected so far by the Third Party indicates that different methods of assigning outliers may be needed as different crops are considered, as there appears to be no single approach that is appropriate across all crop types.”

*Source: SWRCBESJ page 52*

# Determining A/R Ratios

From the East San Joaquin Order:

- ▶ “The regional water boards must approve the coefficients in consultation with State Water Board staff, following an opportunity for public review and comment.” *Page 42*
- ▶ “In developing the coefficients, the regional water boards may rely on their own research, on published values, on the research of other entities, and on coefficients approved by other regional water boards.” *Page 42-43*
- ▶ “Coefficients may also be developed for use where harvest totals are measured by means other than weight, such as by box of produce, lugs, bins, bales, or other forms of volumetric measure.” *Page 42, Footnote 120*

# Research is Necessary

Research is necessary to determine:

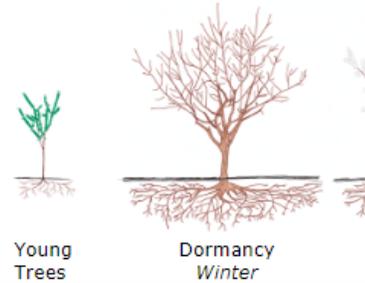
- ✦ N Removed and
  - ✦ Best rate of application to Maximize N in Harvest
- 
- Irrigation and Nutrient UCCE research has focused on maximizing harvest yield and the cost of inputs
  - New research needs to address minimizing N applied while maintaining yield and quality
  - There are concerns inherent to using a number(s) such as A/R or A-R because climatic nuances and production complexities are not being acknowledged



- Guidelines Home
- Acknowledgments
- Take a Quiz!
- Additional Information:
  - Almond Nitrogen Uptake and Partitioning
  - Almond Production in California
  - Almond Nitrogen Management Brochure
  - FREP Database
- Links:
  - UC Fruit & Nut Research and Information Center
  - The Almond Doctor
  - UC Nutrient Management Database
  - UC Integrated Pest Management
  - Almond Board of California
- UCCE Almond Newsletters:



## California Fertilization Guidelines Almonds



**Nitrogen (N)**

N

**Phosphorus (P<sub>2</sub>O<sub>5</sub>)**

Soil Test
Soil Applied

**Potassium (K<sub>2</sub>O)**

Soil Test
Soil Applied

**Boron (B)**

Soil Test

### Soil Applied Nitrogen

#### Application Rate

In a four-year study carried out at multiple sites, Brown and coworkers found that the amount of N removed at harvest with hulls, shells, leaves, debris, and kernels ranges from 50 to 75 lbs/1000 lbs of kernels, averaging 68 lbs/1000 lbs of kernels [N28]. In addition, almond trees need nutrients for the growth of perennial parts, such as roots, trunk and branches. The N in the perennial parts of 9 to 13 year old trees increased annually by 25-30 lbs/acre, with 12 year old trees containing about 450 lbs of N [N3].

Based on these and earlier trials, the team led by Patrick Brown developed a computer based N management program [N5, N9]. The annual N application rates listed in the table below do not include adjustments for cover crops, organic fertilizers, N in irrigation water and high leaf N concentrations. For a detailed calculation of N application rates and the time of application, see the **almond fertilization model**. An updated version is available on the website of the Almond Board of California.

Annual N application rates to almonds fertigated via low volume irrigation [N9]:

Kernel yield (lbs/acre)	N demand (lb/acre)	Fertilizer N required (lbs N/acre)
1000	68	95
1500	102	143
2000	136	190
2500	170	238
3000	204	285
3500	238	333
4000	272	380

**Almond Fertilizer Guidelines:**  
Years of research gives growers both per acre and per yield fertilizer guidance

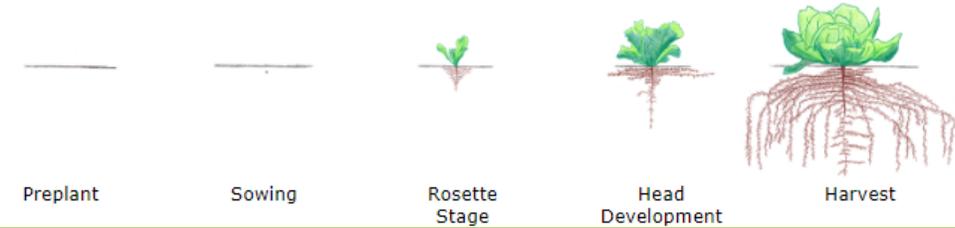
A collaboration between



- Guidelines Home
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  - Lettuce Nitrogen Uptake and Partitioning
  - Lettuce Production in California
  - Lettuce Nitrogen Management Brochure
  - FREP Database
- Links:
  - Vegetable Research and Information Center
  - CropManage
  - UC Nutrient Management Database
  - List of Vegetables Newsletters and Blogs from Counties in California



### California Fertilization Guidelines Lettuce



**Nitrogen (N)**      Soil Test      Leaf Analysis

Preplant N      Starter N      Sidedress N

**Phosphorus (P<sub>2</sub>O<sub>5</sub>)**      Soil Test      Preplant P      Starter P

**Potassium (K<sub>2</sub>O)**      Soil Test      Preplant K

**Sidedress Nitrogen**

Between heading and harvest, N demand of lettuce is high, reaching 3-4 lbs N/acre per day [N13, N32, N33]. During this period, which is generally the last month before harvest, 70-80% of total N is taken up [N21, N20, N33, N41]. A sufficient N supply between heading and harvest is crucial for obtaining a high yield.

**Application Rate**

When leaching losses are minimized, the seasonal N application rates for lettuce should not exceed 150-180 lbs/acre for winter and spring production and 100-140 lbs/acre for summer and fall production. However, the required N rate depends on the residual soil nitrate content. Crops produced from late fall through early spring generally require more fertilizer N because the residual soil N tends to be lower during this period compared to the summer months [N12].

Field studies carried out in commercial fields in the Salinas

### Application Rate

When leaching losses are minimized, the seasonal N application rates for lettuce should not exceed 150-180 lbs/acre for winter and spring production and 100-140 lbs/acre for summer and fall production. However, the required N rate depends on the residual soil nitrate content. Crops produced from late fall through early spring generally require more fertilizer N because the residual soil N content tends to be lower during this period compared to the summer months [N12].

**Lettuce Guidelines** only provide fertilization rates per acre, not harvested yield/N#. Even if a grower wanted to know what a good ratio is, the science isn't there.

# Nutrient Management Objectives

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- ▶ There are three points of measurement to focus on.
- ▶ The diversification of crop mix on the Central Coast makes reporting different than in the Central Valley
- ▶ There are management factors that minimize loading, and Ag has a plan to address the best reporting structure that is provided for in the ESJ Order
- ▶ More research to establish R coefficients is necessary
- ▶ A public process is required for the adoption of coefficients



# Pest & Toxicity Management

*Presenters:*

Mark Mason, Huntington Farms

Ed Mora, D'Arrigo Brothers

# Pest & Toxicity Management Objectives

- ▶ Pest management is complicated, has many steps, is based on science, and labels take decades to develop with many toxicologists and environmental fate scientists.
- ▶ Pest management is scrutinized and regulated by several Federal, State, and County agencies.
- ▶ Regulation is conducted by Ag Commissioner Staff who are hired by the county, have a dual function, and are authorized by law to enforce label requirements, have enforcement authority, conduct inspections, etc.
- ▶ There are MANY research needs in order to protect water quality and mitigate pesticide movement while also meeting commercial production demands.

# In the Last 14 Years, Progress Noted

- ▶ Substantial downward trends in loading
- ▶ Significant reductions in tailwater discharge
- ▶ Some CMP sites trending toward lower pesticide concentrations in sediment
- ▶ 75% of sites show increasing patterns in Ceriodaphnia survival
- ▶ Significantly reduced toxicity and impairment in many watersheds

# Research Needs

## Sediment Management

- ▶ Research on PAM applications
  - ▶ In-field applications
  - ▶ Tailwater applications
  - ▶ Containment basin applications
- ▶ More knowledge about sources and age of sediment to indicate the origin of the off-site movement
- ▶ More information on turbidity background levels in watersheds
- ▶ Commercial product development of uses of activated charcoal
  - ▶ Where and when does it work?
  - ▶ How much needs to be used?
  - ▶ What pesticides does it mitigate?
- ▶ More research and development to reduce site-specific engineering for a more off-the-shelf approach

# Research Needs

## Water Management

- ▶ Education about pesticide environmental fate and breakdown
- ▶ More detailed knowledge about uses of pesticides-of-concern to determine and address the most impactful uses
- ▶ Research methods of management practice effectiveness measurement other than expensive monitoring)
- ▶ Explore the connection between turbidity and Neonics environmental breakdown via photolysis

# Management Practices/Mitigations

## ▶ Sediment Management

- ▶ Moving tailwater through underground pipes rather than Ag ditches
- ▶ Slope away from ditches
- ▶ Containment
- ▶ Site-engineered vegetated treatments
- ▶ Sediment Treatment (PAM?)
- ▶ Check dams in Ag Ditches

Note: There are few “off the shelf” options.

# Management Practices/Mitigations

## Water Management

- ▶ Proper irrigation management
- ▶ Laser leveling slopes
- ▶ Proper storage and disposal
- ▶ Well-head protection
- ▶ Careful non-crop weed control
- ▶ Designating mixing/loading zones
- ▶ Consider row arrangement and distance to water features to manage aerial deposition

Note: There are few “off the shelf” options.

# Application Considerations

- ▶ Value (Efficacy: Economy)
- ▶ Pest population in field
- ▶ Pesticide types
- ▶ Worker safety
- ▶ Food safety
- ▶ Resistance management
- ▶ 3<sup>rd</sup> Party Contractor vs. In-House
- ▶ Rate
- ▶ Field conditions/surrounding areas
- ▶ Wind
- ▶ Irrigation coordination
- ▶ Reentry interval (REI)
- ▶ Pre-harvest interval (PHI)
- ▶ Weather
- ▶ Invasive pest infestations

# If a Material is Restricted Use:

- ▶ Restricted Materials Permit Program provides an abbreviated environmental review procedure that serves as the “functional equivalent” to a full-scale EIR required by CEQA.
- ▶ Purpose: To allow Ag Commissioner to evaluate the application site and surrounding properties
- ▶ Only issued to the operator or an authorized representative
- ▶ Requires:
  - ▶ Letter of authorization (if applicable)
  - ▶ Maps of each location
    - ▶ Permit /operator ID number
    - ▶ Company organization name,
    - ▶ Ranch name, ranch number, year, lot numbers and acreage,
    - ▶ Pesticide storage areas,
    - ▶ Section/Township and Range
    - ▶ Adjacent neighbors
    - ▶ Wells, reservoirs, north arrow
    - ▶ Ranch access/entry point
    - ▶ Cross streets or physical address
    - ▶ Landmarks (power poles, equipment yards, gates, fences, ditches, trees, etc
    - ▶ Sensitive sites within a ¼ mile

# If a Material is Not Restricted Use:

- ▶ Any property operator using a pesticide for Ag use must maintain records of pesticide use and report the use of registered pesticides
- ▶ Must have OIN to submit pesticide use report
- ▶ OIN purpose: Track pesticide use by operation and commodity
- ▶ OIN needed to: if planning to do pesticide work or purchase rodenticides
- ▶ To apply for OIN must submit:
  - ▶ Business name
  - ▶ Authorized representative
  - ▶ Contact information
  - ▶ Ranch name, size, location, maps
  - ▶ Commodity list (i.e. crops)

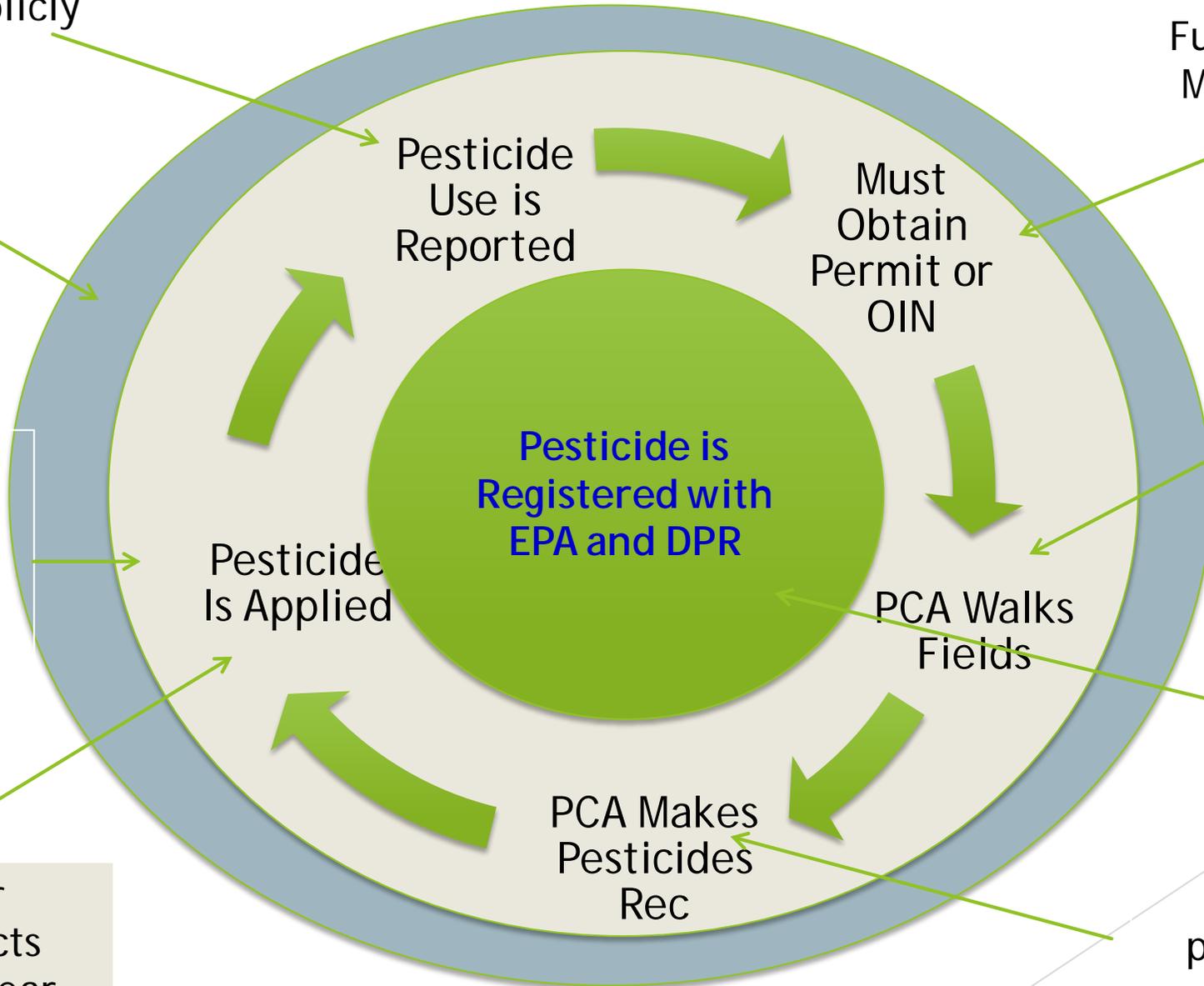
# Pest Management Cycle for PCAs

Transparent, publicly data reporting

Grower implements mitigations/practices

Application according to label by a (QAL) Qualified Licensed Applicator

Ag Commissioner audits and inspects throughout the year



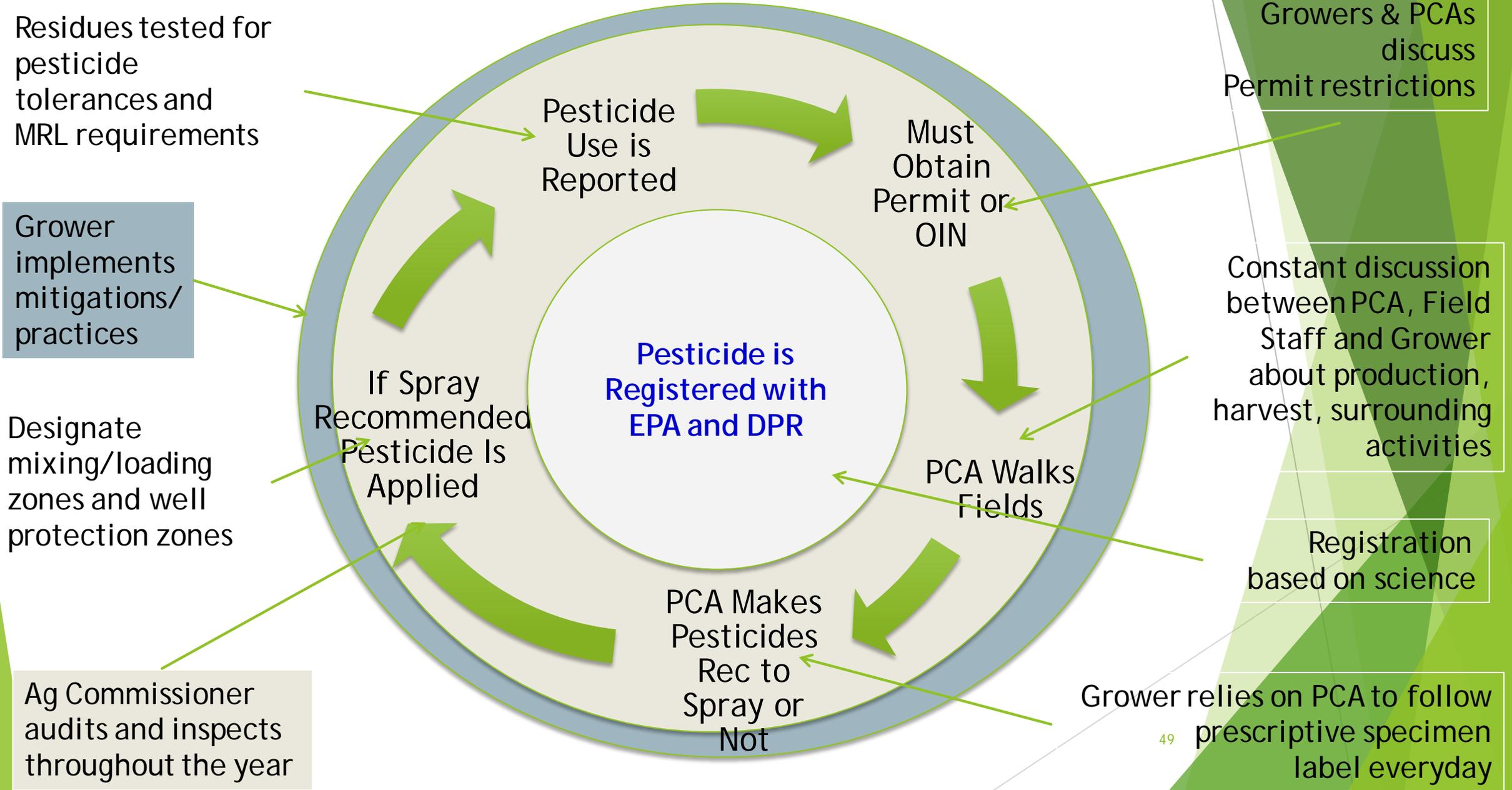
Functional Equivalent EIR - Must consider surrounding areas including water features

PCA workload is likely maxed out; there is a general rule of thumb about max # of acres a PCA can handle.

Registration based on science

PCA must follow a prescriptive specimen label everyday

# Water Quality Protection Considerations for Growers



# Research Work - Summary

- ▶ If we can't define the problem, we can't solve the problem.
- ▶ Don't confuse identifying the problem with defining the problem.
- ▶ Without doing this research,
  - ▶ Growers will not be able to produce the crops ideally suited to the Central Coast and meet quality demands AND protect water quality.
  - ▶ Ag production and water management become mutually exclusive.

# Pest & Toxicity Management Objectives

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- ▶ Pest management is scrutinized and regulated by several Federal, State, and County agencies.
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- ▶ There are MANY research needs in order to protect water quality and mitigate pesticide movement while also meeting commercial production demands.



# Farm Management Considerations

*Presenters:*

Scott Horsfall, Leafy Green Handlers Marketing Agreement

Joe Pezzini, Ocean Mist Farms

Dan Sutton, Pismo Oceano Vegetable Exchange



# Human Health & Our Food Safety Story

*Presenter:*  
Joe Pezzini, Ocean Mist Farms

# Public & Buyer Discussion

Partial List From the Marler-Clark Blog 8.30.18

## And a Bit(e) of Lettuce History

Date	Vehicle	Etiology	Confirmed Cases	States/Provinces
July 1995	Leafy Greens	<i>E. coli</i> O157:H7	74	1:MT
Sept. 1995	Romaine	<i>E. coli</i> O157:H7	20	1:ID
Sept. 1995	Iceberg	<i>E. coli</i> O157:H7	30	1:ME
Oct. 1995	Iceberg	<i>E. coli</i> O157:H7	11	1:OH
May-June 1996	Mesclun Mix	<i>E. coli</i> O157:H7	61	3:CT, IL, NY
May 1998	Salad Mix	<i>E. coli</i> O157:H7	2	1:CA
Feb.-Mar. 1999	Iceberg	<i>E. coli</i> O157:H7	72	1:NE
Oct. 1999	Salad	<i>E. coli</i> O157:H7	92	3:OR, PA, OH
Oct. 2000	Lettuce	<i>E. coli</i> O157:H7	6	1:IN



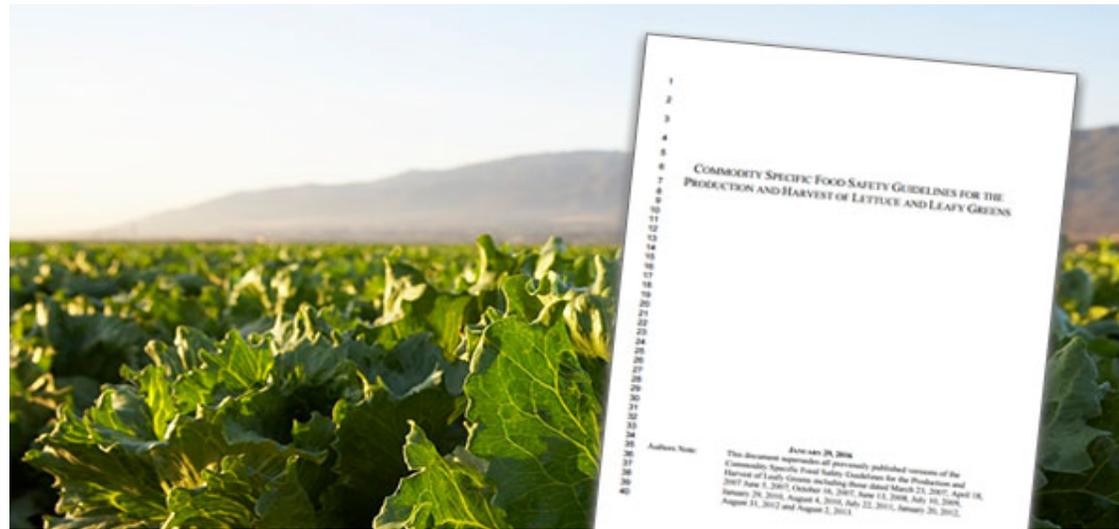
# Legal Food Safety Mandates

*Presenter:*

Scott Horsfall, Leafy Green Handlers Marketing Agreement

# Food Safety Practices / Metrics

- ▶ *They go beyond recommendations; they are specific and based on science.*
- ▶ LGMA Metrics identify potential risks during farming and harvest of leafy greens
- ▶ LGMA Metrics include:
  - ▶ Written compliance plan
  - ▶ Grower list
  - ▶ Trace back



# Food Safety Practices / Metrics



*Food Safety Metrics Are Based Upon Real Science*

# Water, Soil, Animals & Environment



## LGMA Water Metrics:

- ▶ Monthly testing for bacteria
- ▶ Standards for water used on crops
- ▶ Standards for all other water



## LGMA Soil Amendment Metrics:

- ▶ No untreated soil amendments
- ▶ Criteria for all other soil amendments
- ▶ Process verifications



## LGMA Animals & Environment Metrics:

- ▶ 3 environmental assessments for each ranch
- ▶ Buffer Zones/No Harvest of contaminated product
- ▶ Addresses flooding, human encroachment, etc.

# Health & Hygiene, Field & Equipment



## LGMA Health and Hygiene Metrics:

- ▶ Standard operating procedures (SOPs) covering worker health and hygiene
- ▶ Auditors verify that workers are trained and follow SOPs
- ▶ Policies apply to visitors



## LGMA Field and Equipment Sanitation Metrics:

- ▶ Standard operating procedures (SOPs) for harvest equipment, container storage and sanitary operation of equipment and facilities, etc.

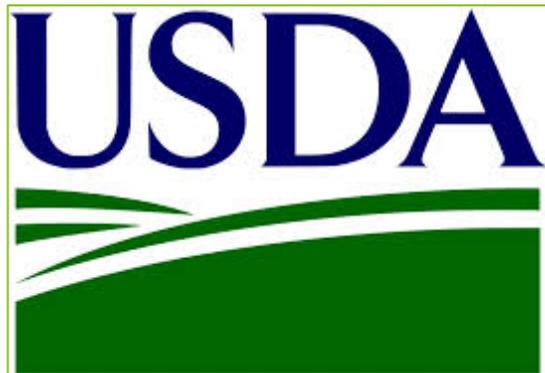
# Audits & Government Auditors

## Why USDA/AMS?

- ▶ Government
- ▶ Independent
- ▶ Transparent
- ▶ Experienced - 100 years on the farm!

## Auditor Qualifications

- ▶ Trained in auditing standards and commodity-specific programs
- ▶ HACCP
- ▶ ISO 19011 Standard
- ▶ Annual evaluation by USDA to 25 criteria
- ▶ At least 80 hours of continued education required every 3 years
- ▶ One team of trained, experienced auditors doing on-farm audits *every day*



# FDA's Produce Safety Rule Alignment

- FDA's Produce Safety Rule was implemented in January 2018.
- Reviewed needed changes with FDA
- Accepted changes to the metrics which now align with new Food Safety Modernization Act (FSMA) requirements
- Started audits April 1, 2018
- Working with CDFA to verify compliance
- All metrics continue to be based on research and sound science



FDA FOOD SAFETY  
MODERNIZATION ACT

The logo for the FDA Food Safety Modernization Act, featuring the text "FDA FOOD SAFETY" in blue above "MODERNIZATION ACT" in a darker blue, with a blue swoosh underneath.

*Providing PSR Verification adds value to the LGMA Certification  
and aligns to the new Federal Law.*



# Food Safety & Co-Management Considerations

Dan Sutton, Pismo Oceano Vegetable Exchange

# Regional Board Requirement Compared to Food Safety Requirement - Example 1

## Food Safety Requirement Realities

- Buffers may be required based upon the characteristics of a field, or by buyers.
- The presence of nearby riparian vegetation may trigger the need for a buffer zone to meet customer requirements, creating conflict with water quality regulations.

## Irrigated Lands 3.0: Minimize Bare Soil

- “Dischargers (farmers) must minimize the presence of bare soil vulnerable to erosion and soil runoff to surface waters and implement erosion control, sediment, and stormwater management practices in non-cropped areas, such as unpaved roads and other heavy use areas.”

*Source: Central Coast Ag Order 3.0*

# Regional Board Requirement Compared to Food Safety Requirement - Example 2

**Establishment of a vegetated filter strip for water quality purposes can be at odds with the need for a buffer for food safety.**

*According to California LGMA Food Safety Practices, Table 5:*

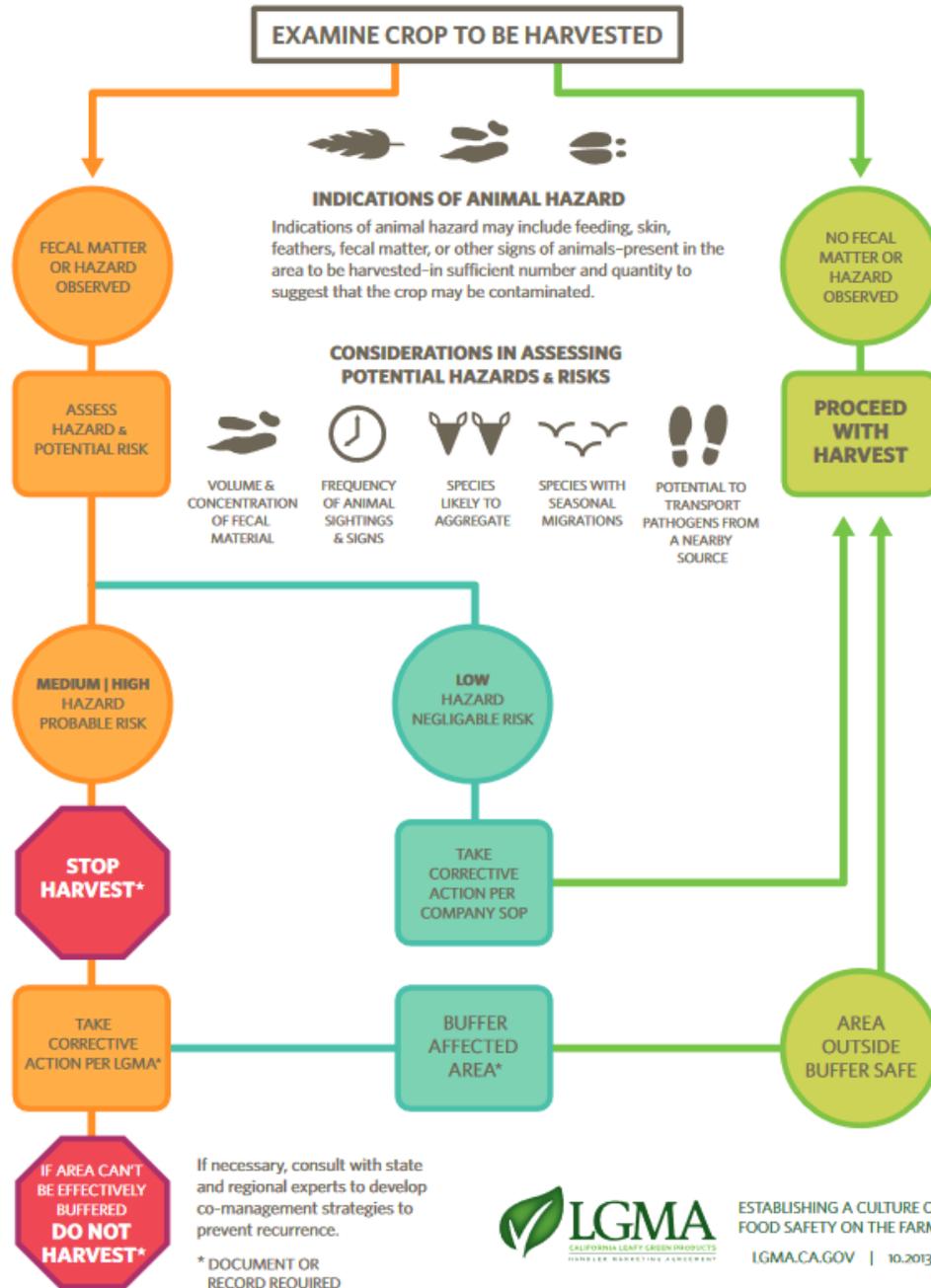
- ▶ Consider the proximity to water (i.e., riparian areas), animal harborage, open range lands, non-contiguous blocks, urban centers, etc.
- ▶ Periodically monitor these factors and assess during pre-season and pre-harvest assessments.
- ▶ If...there is the potential for microbial contamination from adjacent areas, a risk assessment shall be performed to determine the risk level as well as to evaluate potential strategies to control or reduce the introduction of human pathogens.

## **Irrigated Lands 3.0: Tier 3 Water Buffer Plans Requirement**

- ▶ "A filter strip of appropriate width, and consisting of undisturbed soil and riparian vegetation or its equivalent, shall be maintained, wherever possible, between significant land disturbance activities and watercourses, lakes, bays, estuaries, marshes, and other water bodies..."

*Source: Central Coast Ag Order 3.0*

# ASSESSING ANIMAL ACTIVITY IN THE FIELD



ESTABLISHING A CULTURE OF FOOD SAFETY ON THE FARM  
 LGMA.CA.GOV | 10.2013

# Industry Response to Conflicts

## Resources to Use when Discussing Co-Management:

- “Reconciling Food Safety & Environmental Protection: A Literature Review” - RCD of Monterey County
- “Farming with Food Safety & Conservation in Mind” - Wild Farm Alliance & CAFF
- “Co-Managing Farm Stewardship with Food Safety GAPs & Conservation Practices: A Grower’s & Conservationist’s Handbook” - Wild Farm Alliance
- “Balancing Food Safety & Sustainability” - UCCE





## Public/Private Research

Joe Pezzini, Ocean Mist Farms

# Critical Research Since 2006

- ▶ Since 2006, California Leafy Greens Research Board @ \$1.1 Million in Food Safety Research Funding and Center for Produce Safety @ \$23.4 Million
- ▶ Vertebrate study to keep tree frogs out of fields
- ▶ Coring knife pathogen transfer
- ▶ Tailwater Reuse Study
- ▶ Buffer zones being re-addressed due to recent outbreak

# Food Safety Panel Objectives

- ▶ Surface water health and safe & affordable drinking water is of utmost importance; so is every American consumer's need and expectation to consume food that is safe.
- ▶ The Regional Water Board can ensure that riparian and wetland habitat is protected by working with Agriculture to adopt practices that make sense on their farms, not mandating specific vegetative buffers for all farms.
  - ▶ Vegetative Buffers ≠ Riparian Habitat and shouldn't be treated the same
  - ▶ Consider alternatives to vegetative buffers
  - ▶ Allow for innovation
  - ▶ Give credit for practices that reach the goal



# General Farm Management

Joe Pezzini, Ocean Mist Farms

Dan Sutton, Pismo Oceano Vegetable Exchange

# General Farm Management with Dynamic Markets & Relationships

- ▶ What's the role of the Shipper vs. the Farmer?
- ▶ Who and what influences harvesting decisions?
- ▶ Influence of other regulatory agencies
- ▶ Market influences





# Generating Meaningful Data & Balancing the Level of Detail with Reporting Burden

## *Presenters:*

Claire Wineman, Grower-Shipper Association

of Santa Barbara and San Luis Obispo Counties

Sarah Lopez, Preservation, Inc.

Parry Klassen, Central Coast Groundwater Coalition

Tim Borel, Blanco Farms

George Adam, Innovative Produce

# Generating Meaningful Data and Balancing the Level of Detail with Reporting Burden

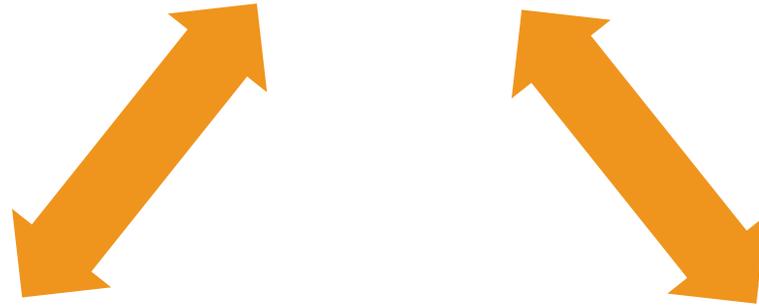
*“The Regional Water Boards have the flexibility to develop alternative reporting areas...as long as...provides meaningful data and balances the level of detail with the reporting burden”*

*(Emphasis added) - East San Joaquin Order, Page 30-31, Footnote 88*

# Improving Water Quality in Central Coast Irrigated Lands:

*What can growers and the  
Regional Water Board do to  
demonstrate quantifiable  
progress?*

**Improve Water  
Quality**



**Improve  
existing water  
quality**



**Minimize  
further  
impairment**

# ESJ Order Direction on Central Coast Reporting Areas

Recognizes areas like Central Coast:

- ▶ Highly intensive cropping practices
- ▶ Multiple rotations of different crops in the same location within a single year
- ▶ Unpredictable crop types and harvesting
- ▶ Order encourages meaningful data and balances the level of detail with the reporting burden

*Source: SWRCBESJ, page 31, footnote 88*

**Improve Water  
Quality**

**Outreach and  
assistance to  
outliers**

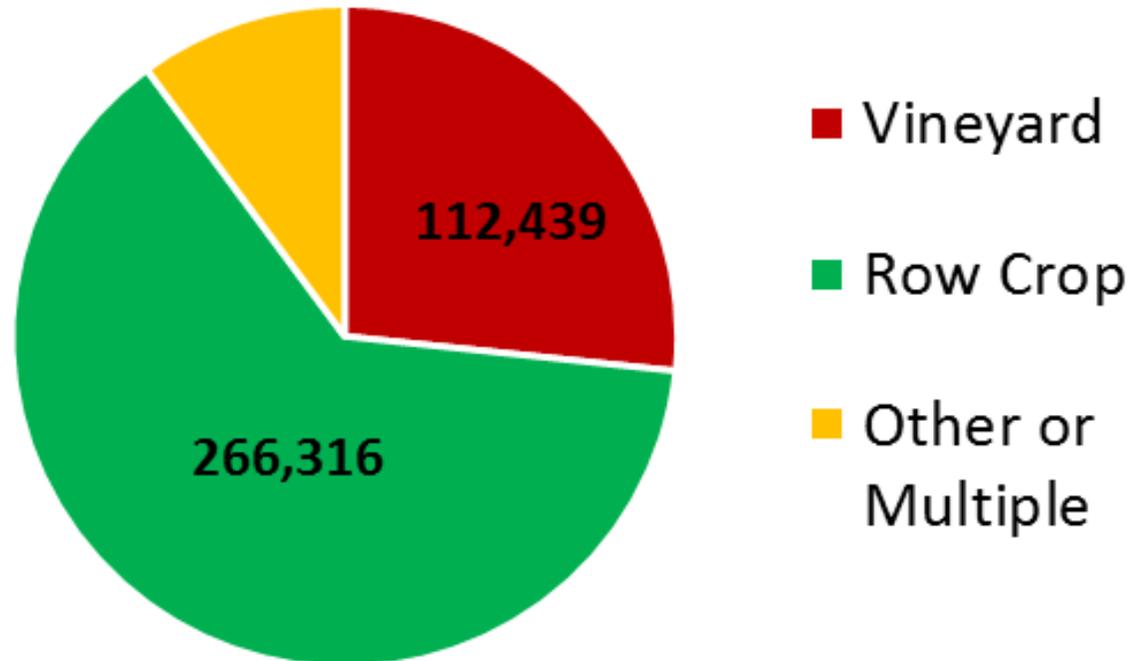
**Collect  
meaningful and  
accurate data**

**Accurately  
identify  
potential outliers**

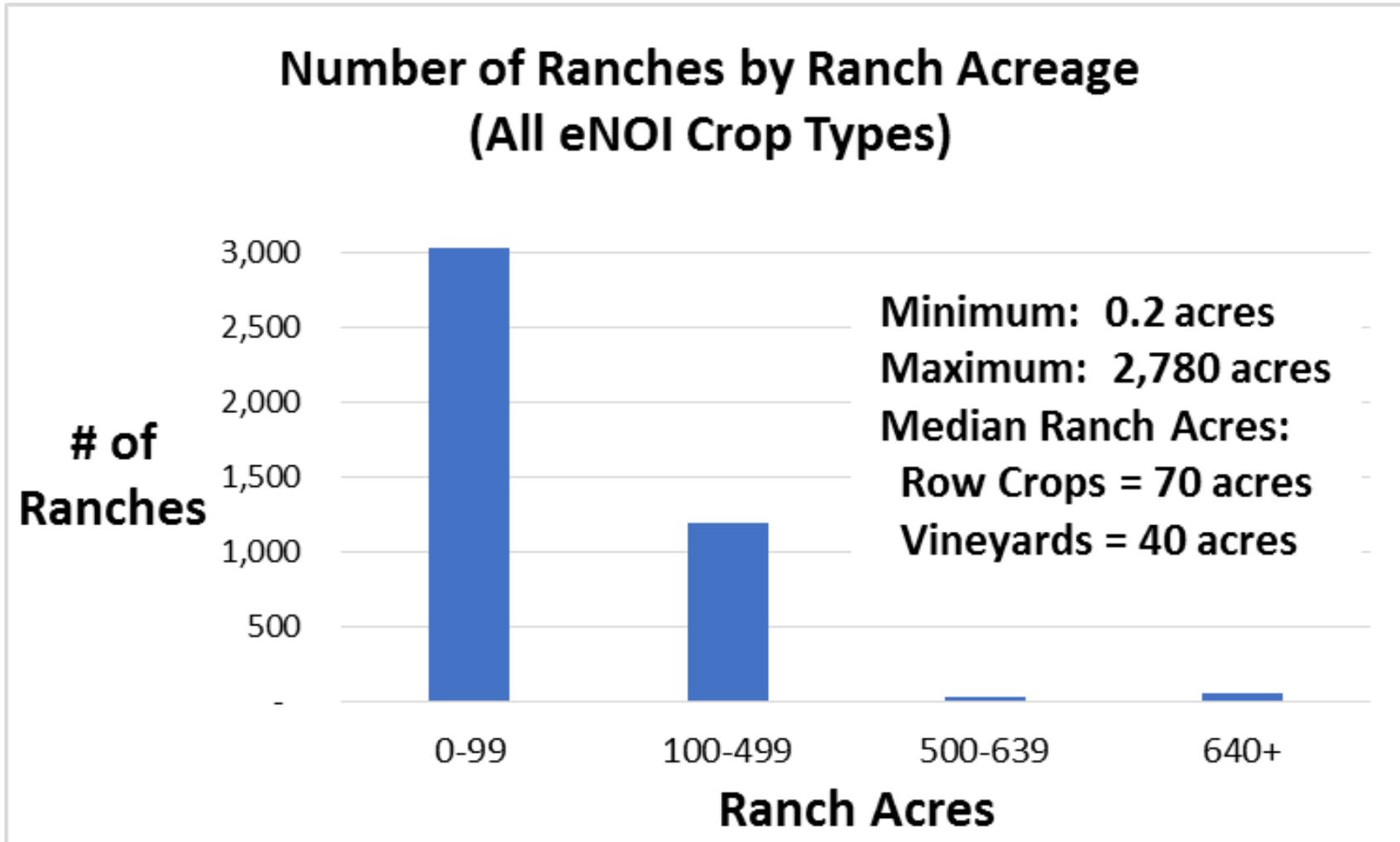
# Row Crops Account for Majority of ILRP Enrollment in Region 3

## Acres Enrolled by Crop Category

Total: 420,000 acres



# Most Ranches in Region 3 < 100 Acres



# Meaningful and Accurate Data

- ▶ Usable data for meaningful analysis
- ▶ Comparing similar ranches
- ▶ Manageable number of data points
- ▶ Reporting requirements are intuitive and reasonable
- ▶ Recognize that agricultural businesses can have changes in staffing and varying levels of expertise
- ▶ Develop regulations that are possible to achieve compliance given social, technical, and/or economic constraints

# How Many Data Points?

Growers are working with a number of data points to get to A & R number given diversity of:

- ▶ Operations
- ▶ Crop type, planting, and harvesting
- ▶ Land tenure
- ▶ Some ranches > 640 acres
- ▶ Need and ability to measure vs. estimate

Ag Order 4.0 must be thoughtfully crafted to achieve a management number of data points for both farmers and Regional Water Board that “...bears a reasonable relationship to the benefits to be obtained...”

*Source: SWRCBESJ Order page 70*

# How many data points?

Growers are working with a multitude of data points just to get to an A/R ratio.

- ▶ 420,000 acres
- ▶ 4,300 ranches
- ▶ 1,650
- ▶ Growers

# How many data points?

2016 TNA Reporting was required for only a subset of Tier 2 and 3 ranches:

- ▶ Less than 23% of total enrolled acres\*
- ▶ 14% of total enrolled ranches\*
- ▶ Yet generated 45,000 data values reported

2017 TNA Reporting after expansion to all Tier 2 and Tier 3 ranches?

\*Based on values from the 9/2016 Item 11 Staff Presentation

# Prioritizing Finite Resources: Water Board AND Growers

- ▶ WDR vs. Waiver
- ▶ Ability to understand requirements and achieve good faith compliance
- ▶ Clear and usable reporting interface
- ▶ In-house vs. commercial consultants/resources
- ▶ Possible role of coalitions and 3<sup>rd</sup> parties
- ▶ Inadequate/decreasing number of technical service providers

# Nitrogen Reporting

- ▶ Incentivize, rather than penalize, use of existing nitrates in groundwater through “pump-and-fertilize”
- ▶ Multi-crop diversity on Central Coast necessitates:
  - ▶ Manageable data load
  - ▶ Reporting conducive to accuracy
  - ▶ Flexibility that recognizes dynamic cropping systems
  - ▶ Allows adaptability in crop type and reporting scale <sup>85</sup>

# Groundwater Monitoring

Given that Region 3 Ag Order 3.0 currently exceeds the ESJ Order mandates:

- ▶ There should be a rationalization for further domestic well monitoring (once exceedances are inevitable due to high ambient nitrates)
- ▶ User notification is a priority and already becoming normal business practice for landowners and/or operators

## Free Well Testing

**If Nitrates Found,  
Free Water for  
Qualified  
Households**

Call **831-214-9125**



# Surface Water Monitoring

- ▶ Identify opportunities for improvement in load and/or concentration considering waterbody characteristics
- ▶ Support the existing Cooperative Monitoring Program managed by Preservation, Inc. and use that data as the basis of analyzing Surface Water Quality.

# Surface Water Monitoring

- ▶ Measuring Water quality change and defining “improvement”
  - ▶ Binary compliance/non-compliance vs. trends/patterns
  - ▶ What does change/improvement look like in a discharge-dominated stream?
    - ▶ The CMP is most-often detecting Change as significant reductions in streamflow
    - ▶ The most measurable Improvements are load reductions
    - ▶ “Compliance” is going to look like a dry stream bed in quite a few water bodies
    - ▶ The above are not hypotheticals. They are demonstrable facts. Preservation, Inc. has 14 years of data.
  - ▶ RWQCB has interest in seeing streams come into “compliance,” but should not ignore indicators of change and/or reduced discharge (i.e. as load/flow reductions instead of reduced concentrations)

# Surface Water Monitoring

- ▶ Monitoring study design - CMP site locations vs other studies that repeatedly sample only the most impaired sites
  - ▶ Looking at a sub-set of sites that are only highly impaired may mischaracterize the cause of impairment if unimpaired geographically related sites are not also considered.
- ▶ Metrics
  - ▶ Detection Frequencies can be high if a study limits its scope to only the most impaired sites, as can the Average Detected Concentration
  - ▶ Exceedance Frequencies are lower, and the Average of All Samples Collected will reflect many non-detects



# Looking Forward: Achieving Core Regulatory Principles

*Presenters:*

Abby Taylor-Silva, Grower-Shipper Association of Central California

Kirk Schmidt, Sustainable Agricultural Water Corporation

Kris Beal, Central Coast Vineyard Team

# ESJ Reporting

- ▶ Requirement to Participate in Outreach Events (pg27)
- ▶ Farm Evaluation (pg 28)
- ▶ Sediment and Erosion Control Plan (32)
- ▶ Nitrogen Management Plans (33)
- ▶ Recordkeeping Requirements (53)

# ESJ Reporting

- ▶ Surface Water Quality Monitoring
- ▶ Groundwater Quality Monitoring (59)
- ▶ Surface Water and Groundwater Quality Management Plans
- ▶ Monitoring and Reporting Requirements and Water Code Section 13267 (68)
- ▶ Direction to Central Valley Water Board Regarding Use of Submitted Data

# Thank You!

Central Coast Groundwater Coalition  
California Strawberry Commission  
Central Coast Vineyard Team  
Grower-Shipper Association of Central California  
Grower-Shipper Association of Santa Barbara and San Luis Obispo Counties  
Monterey County Farm Bureau  
Paso Robles Wine Country Alliance  
Santa Cruz County Farm Bureau  
San Luis Obispo County Farm Bureau  
Sustainable Ag Water Corporation

# SWRCB Requires Reporting by Township

- ▶ “These data are required to be associated with the township (36 square mile area) where the farm is located. The spatial resolution by township provides a common unit that should facilitate analysis of data and comparisons between different areas.”

*Source: SWRCBESJ Attachment A, page 24*

- ▶ “With regard to the aggregated dataset, the regional water board is not limited to aggregating the data at the township level, but may choose a smaller or larger area unit based on region-specific and program-specific considerations.”

*Source: SWRCBESJ page 51*

# SWRCB Mandated Outliers

- ▶ “Eventually, it is our expectation that outliers will be determined with reference to the ranges for the multi-year A/R ratio and A-R difference target values developed by the Third Party and the Central Valley Water Board.”

*Source: SWRCBESJ page 52*

- ▶ “Our view of the data collected so far by the Third Party indicates that different methods of assigning outliers may be needed as different crops are considered, as there appears to be no single approach that is appropriate across all crop types.”

*Source: SWRCBESJ page 52*

# Determining A/R Ratios

From the East San Joaquin Order:

- ▶ “The regional water boards must approve the coefficients in consultation with State Water Board staff, following an opportunity for public review and comment.” *Page 42*
- ▶ “In developing the coefficients, the regional water boards may rely on their own research, on published values, on the research of other entities, and on coefficients approved by other regional water boards.” *Page 42-43*
- ▶ “Coefficients may also be developed for use where harvest totals are measured by means other than weight, such as by box of produce, lugs, bins, bales, or other forms of volumetric measure.” *Page 42, Footnote 120*

# Generating Meaningful Data and Balancing the Level of Detail with Reporting Burden

*“The Regional Water Boards have the flexibility to develop alternative reporting areas...as long as...provides meaningful data and balances the level of detail with the reporting burden”*

*(Emphasis added) - East San Joaquin Order, Page 30-31, Footnote 88*

# ESJ Order Direction on Central Coast Reporting Areas

Recognizes areas like Central Coast:

- ▶ Highly intensive cropping practices
- ▶ Multiple rotations of different crops in the same location within a single year
- ▶ Unpredictable crop types and harvesting
- ▶ Order encourages meaningful data and balances the level of detail with the reporting burden

*Source: SWRCBESJ, page 31, footnote 88*

# Slides for the Record, but Removed for a Concise Presentation

# Reporting Applied Nitrogen

Q: What belongs in the N budget for reporting purposes?

A: Only NEW sources of N:

New N:

- Fertilizer
- Compost
- Other Amendments

Old (cycling) N

- Irrigation water N
- N in soil

New nitrogen application is discussed in Ag Order 3.0 MRP language under the INMP section Part 6A.5.

- *“must evaluate reduction in new nitrogen loading potential...”*
- *“New nitrogen is nitrogen from fertilizers, amendments, and other nitrogen sources applied other than nitrogen present in groundwater”*
- *...“analysis of trends in new nitrogen application”*

# Nitrate Expert Panel on AR Metrics

“The members of the Panel are not aware of readily available, easily usable information regarding harvested nitrogen/acre for a wide range of crops. This is especially true of produce crops (broccoli, lettuce, cauliflower) which have widely different pack-out rates, in which yield is expressed as boxes per acre rather than tons/acre, seasons are highly variable in duration, and the percentage of vegetative matter that is left in a field can change drastically depending upon the market. ...Reporting or accounting for harvested nitrogen is a completely new concept for farmers. This represents a much higher difficulty than what they are currently doing... The further one moves from the field into research and academia, testimony indicates that the idea of accounting for harvested nitrogen sounds more and more simple.”

*(Emphasis added): From Conclusions of the Agricultural Expert Panel: Recommendations to the State Water Resources Control Board Pertaining to the Irrigated Lands Regulatory Program in Fulfillment of SBX 2 1 of the California Legislature”, September 9, 2014, Page 22.*

<http://www.itrc.org/swrcb/Files/Expert%20Panel%20Final%20Sept%209%202014%20-%20SWRCB.pdf>

# Feasibility of AR Metrics on Central Coast

“For reporting purposes in the Central Valley, the term “field” represents a convenient and appropriate reporting area such that the data reported is meaningful and the scale of reporting balances the level of detail with the reporting burden. Some growers in other regions engage in highly intensive cropping practices, including multiple rotations of different crops in the same location within a single year, unpredictable crop types and harvesting based on rapidly-shifting market demand, and variable management practices adjusting to weather and field conditions. The regional water boards have the flexibility to develop alternative reporting areas for these types of growers, as long as the regional water board determines that the alternative reporting area provides meaningful data and balances the level of detail with the reporting burden similar to the field approach. In no case should a reported area exceed a total size of 640 acres, and different crop types must always be reported separately even if they are within the same reporting area, to allow for evaluation of the effectiveness of management practices with regard to each individual crop type grown.”

- State Water Board ORDER WQ 2018-0002 (East San Joaquin Final Order), footnote 88, Page 31

# Additional Consideration: Who & What

- ▶ In-house PCA or private applicator
- ▶ Grower
- ▶ Ag Commissioner/DPR restricted use status
- ▶ Organic or conventional crop

# EPA Approves A Material...

## What Must California Do to Approve?

Tests must be conducted to determine:

- Physical/chemical properties:
  - Color, physical state, odor, oxidation/reduction, chemical incompatibility, flammability, explodability, miscibility, corrosivity, dielectric breakdown voltage, pH, viscosity, density, shelf life.
- Acute toxicity
- Chronic toxicity
- Environmental fate
- Product performance
- Ecological effects (phytotoxicity, fish and wildlife)
- Human exposure
- Spray drift potential

# Once CA Approves, The Specimen Label Becomes That Material's Mandate

This Label Includes:

- ▶ EPA Number
- ▶ Manufacturer
- ▶ Product type (herbicide, etc.) and formulation (Granule, dry, etc.)
- ▶ The Active Ingredient, Chemical Name, Common Name
- ▶ Inert Ingredients
- ▶ Precautionary Statements:
  - ▶ Hazard to bees, wildlife, fish, etc.
  - ▶ Environmental precautions
  - ▶ Drift precautions
  - ▶ Personal protective equipment (PPE)
  - ▶ First aide/emergency numbers
- ▶ Concentration of Active Ingredient
- ▶ Signal word (indicates relative acute toxicity)
- ▶ Directions for use
  - ▶ Pests to be controlled
  - ▶ Where the product may be used
  - ▶ How to apply the product
  - ▶ How much product to use,
  - ▶ When to apply
  - ▶ How often to apply
  - ▶ Pre-harvest interval (PHI)
  - ▶ Re-entry Information (REI)
- ▶ Storage and Disposal

Is a Pesticide a Restricted Use Material?

Yes

Must obtain a  
Restricted Material  
Permit from Ag  
Commissioner

No

Must Obtain a  
Operator  
Identification  
Number (OIN) from  
Ag Commissioner

# Pesticide Use Reports

- ▶ Types of Pesticide Use Reports:
  - ▶ 100 % Production Ag
  - ▶ 100% Non-Production Ag (non-crop weed control, water disinfectant, rodenticides)
  - ▶ 100 % Urban (Pest Control Operators, Landscape Maintenance for hire)
- ▶ Note: Quarantine or invasive species sprays made by the State are reported
- ▶ Note: Municipalities and Counties report pesticide use for mosquito abatement, roadside spraying, school yard and/or park pest control, etc.
- ▶ Urban use is not reported unless applied by certified applicator.

# Pest Control Advisor (PCA)

- Any person who offers a recommendation on any Ag use holds himself as an authority on Ag use or solicits services or sales for any Ag use.
- Must be licensed by the State of California
- Must meet minimum education requirements to take the PCA exam
- Must pass the PCA exam consisting of (at a minimum) Laws, Regulations, and Basic Principles on pest control category
- Must pay a fee
- Must maintain Continuing Education Requirements of 40 hours every two years