# Kern River Watershed Coalition Authority (KRWCA)

## KRWCA Member Meeting

***Nicole Bell & John Schaap***

February 17, 2015 - McFarland

February 18, 2015 - Wasco

February 25, 2015 – Bakersfield

March 5, 2015 – Bakersfield

**www.krwca.org**

Kern River Watershed Coalition Authority

**Nicole Bell, Manager**

**Kern River Watershed Coalition Authority**

# Kern River Watershed Coalition Authority

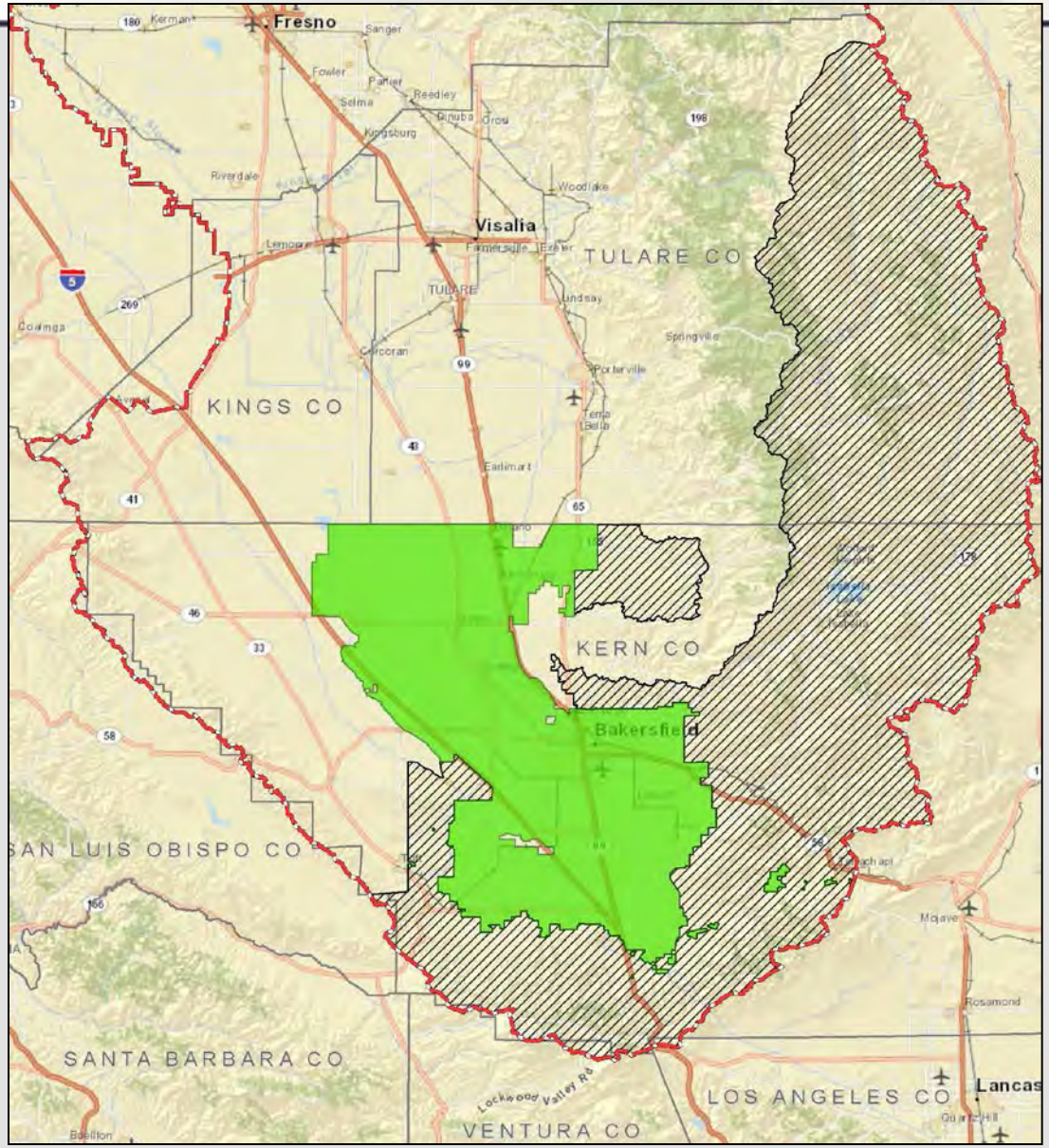
- The Kern River Watershed Coalition Authority (KRWCA) is a **joint powers authority, established to serve as the coordinator and coalition (third-party) group** under the **Irrigated Lands Regulatory Program (ILRP)** in the Kern River watershed portion of Kern County.

# Joint Powers Authority

Joint Powers Authority between:

- Arvin-Edison Water Storage District
- Henry Miller Water District
- Kern Delta Water District
- Kern-Tulare Water District
- North Kern Water Storage District
- Olcese Water District
- Rosedale-Rio Bravo Water Storage District
- Semitropic Water Storage District
- Shafter-Wasco Irrigation District
- Wheeler Ridge-Maricopa Water Storage District

# Coalition Boundaries




KRWCA Statistics:

- ~620,000 irrigated acres (potential)
- ~602,000 enrolled acres
- ~523,000 irrigated acres enrolled
- ~858 KRWCA Members

# General Order Overview

- Tulare Lake Basin **General Order** was **adopted** by the CVRWQCB on **September 19, 2013**
- Newest General Order applies to both **groundwater and surface water**
- Regional Board considers **all irrigators as potential dischargers to groundwater**

# General Order Overview, Cont'd.

- Primary objective is to **determine effectiveness of ag management practices in protecting surface and groundwater quality**
- **Requires all irrigators** who are **producing crops** for commercial purposes to **comply** either **as a Coalition Member** or under an **Individual Order**

# Role of KRWCA

**What is the role of the Third-Party/Coalition?**
The Third-Party (Coalition/KRWCA) will work directly with member growers to assist them in complying with Central Valley Regional Water Quality Control Board (CVRWQCB) requirements.

# Role of KRWCA, Cont'd.

We will:

- **Conduct education and outreach** activities to inform growers of requirements and practices to protect water quality
- **Prepare and implement regional water quality management plans** and **water quality monitoring plans**
- **Report to the Regional Board** the results of the monitoring efforts and the effectiveness of the plans
- Assess fees to cover coalition costs and State Water Board fees

# Coalition Activities

- **Conduct membership Outreach and Education** activities
- **Prepare grower templates for approval by CVRWQCB:**
  - Nitrogen Management Plan (NMP) Template (approved)
  - NMP Summary Reporting-TBD
  - Farm Evaluation Plan Template (approved)
  - Sediment & Erosion Control Plan

# Coalition Activities, Cont'd.

- **KRWCA has developed various regional water quality management plans/reports** and **water quality monitoring plans/reports.**
- **Conduct Surface and Groundwater Monitoring**
- **Prepare and submit quarterly/annual reports to CVRWQCB**

# Water Quality Reports

- Major deliverables submitted to the Central Valley Regional Water Quality Control Board (CVRWQCB) in early February.
  - Groundwater Quality Assessment Report **(GAR)**
  - Surface Water Monitoring Plan **(SWMP)**
  - Sediment Discharge and Erosion Assessment Report **(SDEAR)**
  - Comprehensive Groundwater Quality Management Plan **(CGQMP)**

# Groundwater Quality Assessment Report (GAR)

- Required study to assess the regions within the Coalition's boundaries where groundwater is more vulnerable to activities from irrigated agriculture
- Assessment of all available, applicable and relevant data to determine high and low vulnerability areas
  - Depth to Groundwater
  - Soil Types
  - Irrigation Practices
  - Cropping Patterns
  - Known Water Quality Test Results
  - * **All members received a letter providing designation of their enrolled parcels.**

# Groundwater Assessment Report (GAR)

- Provides the foundational information necessary for design of the: (future reports to be developed)
  - Management Practices Evaluation Program (MPEP);
  - Groundwater Quality Trend Monitoring Program; and,
  - Surface and Groundwater Quality Management Plan/s (SQMP/GQMP)

# Surface Water Monitoring Plan

- Monthly monitoring at selected sites
  - El Paso Creek
  - Chanac Creek
  - Tecuya Creek (Proposed)
  - Poso Creek (Proposed)
- Monitor for agricultural materials
  - Pesticides
  - Nutrients
  - Metals
- Monitor physical parameters
  - Dissolved Oxygen
  - Electrical Conductivity
  - pH
  - Temperature
  - Bacteria

# Sediment Discharge and Erosion Assessment Report (SDEAR)

- Goal of the SDEAR is to determine which irrigated agricultural areas are potentially subject to erosion and may discharge sediment that may degrade surface waters
- Identifies areas in the Coalition that need to have a Sediment and Erosion Control Plan (SECP)
- Analysis similar to approach taken in other coalition areas
- Timeline for implementation tied to approval date

# Landowner/Operator Reports

**Grower reports** that will be prepared:

- **Farm Evaluation Plan** (2016) Received a 1 year extension
- **Sediment and Erosion Control Plans** (2015)
- **Nitrogen Management Plan** (2015)

# Sediment and Erosion Control Plan

- **Impacted parcel owners** will be notified of study findings once SDEAR is approved
- Growers would need to prepare a Sediment and Erosion Control Plan and implement practices
  - Use Approved Template once available
  - Expert Certification Required for Preparation
  - Kept On-Farm (not reported to Coalition)
  - Grower will need to demonstrate practices are being implemented should an inspection occur

# Due Dates for Required Reports

| Report | Vulnerability | Farm Size | First Due Date | Renewal Frequency |
|---|---|---|---|---|
| Farm Evaluation | High | All | March 1, 2016 | Annually |
| | Low | Large (≥ 60 ac) | March 1, 2016 | Five Years |
| | | Small (< 60 ac) | March 1, 2018 | Five Years |
| Sediment and Erosion Control Plans | All locations identified in the Sediment Discharge and Erosion Assessment Report (SDEAR) | Large (≥ 60 ac) | 180 days from approval of SDEAR | As conditions change |
| | | Small (< 60 ac) | 1 year from approval of SDEAR | As conditions change |
| Nitrogen Management Plans | High | Large (≥ 60 ac) | **March 23, 2015** | Annually |
| | | Small (< 60 ac) | March 1, 2017 | Annually |
| | Low | All | March 1, 2017 | Annually |

# NMP Summary Reporting

- NMP Summary Report not yet developed. Coalitions will work with CVRWQCB to develop the Summary Report Template and Reporting requirements.
- Expert Panel and CDFA weighed in on the reporting
- State Board may take action to standardize reporting statewide

# NMP Summary Report, Cont'd.

- Regional Board initiating a Technical Workgroup through the coalitions.
- Believe NMP Summary Report will be Due, March 1, 2017.
- Future KRWCA Outreach and Education topic once Summary Report is developed and approved by the CVRWQCB.

# NMP Summary Dates

| Report | Vulnerability | Farm Size | Due Date | Renewal Frequency |
|---|---|---|---|---|
| NMP Summary Report | High | Large Farm | March 1, 2017 | Annually |
| | | Small Farm | March 1, 2018 | Annually |
| | Low | Does Not Apply | | |

Large farm = 60 acres or greater

Small farm = less than 60 acres

**John Schaap, PE**

**Provost & Pritchard Consulting Group**

# Future Reports by KRWCA

- Management Practices Evaluation Program **(MPEP)**
- Groundwater Quality Trend Monitoring Workplan
- Surface and Groundwater Quality Management Plans **(SQMP/GQMP)** if triggered by exceedance 2 out of 3 years

# Management Practices Evaluation Program (MPEP)

- Overall goal is to determine the effects, if any, irrigated agricultural practices have on first encountered groundwater under different conditions that could affect the discharge of waste from irrigated lands to groundwater.
- Coordination agreement between KRWCA, Kings, Kaweah, Tule, and Cawelo WDC signed.
- Implement as a group instead of individually to save significant costs
- Will be the most significant requirement of the WDR
- Workplan due 2 Years from GAR Approval

# Groundwater Quality Trend Monitoring Workplan

Objectives:

- to determine current water quality conditions of groundwater relevant to irrigated agriculture
- to develop long-term groundwater quality information that can be used to evaluate the regional effects (i.e., not site-specific effects) of irrigated agriculture and its practices.

# Groundwater Quality Trend Monitoring Workplan, Cont'd

- KRWCA will develop a groundwater monitoring network that will be implemented over both high and low vulnerability areas. (existing grower wells)
- Due 1 year from GAR approval

# Surface or Groundwater Quality Management Plans

- When a management plan has been triggered, the third-party shall ascertain whether or not irrigated agriculture is known to cause or contribute to the “water quality problem.”
- If the potential source(s) of the water quality exceedance(s) is unknown, the third-party may propose studies to be conducted to determine the cause, or to eliminate irrigated agriculture as a potential source.

# John Schaap, PE
# Provost & Pritchard Consulting Group

- Agricultural & Civil Engineer
- I'm NOT a
  - Certified Crop Advisor (CCA)
  - NRCS or UCCE staff member
  - Professional Soil Scientist or Agronomist
  - NRCS Technical Service Provider (TSP)
  - Certified, experienced farmer

# NMP Certification

**No certification required this year.**

Next year, high vulnerability areas will require certification by professionals listed in the WDR.

List of Certified Crop Advisors (CCA's):

https://www.certifiedcropadviser.org/certifications/professional-search/

Note that CCA's must have a CA nitrogen management specialty certification.

# Nutrient Management

4 R's:

- Right source
- **Right rate – matches amount of fertilizer to crop needs**
- Right time
- Right place

http://www.nutrientstewardship.com/what-are-4rs

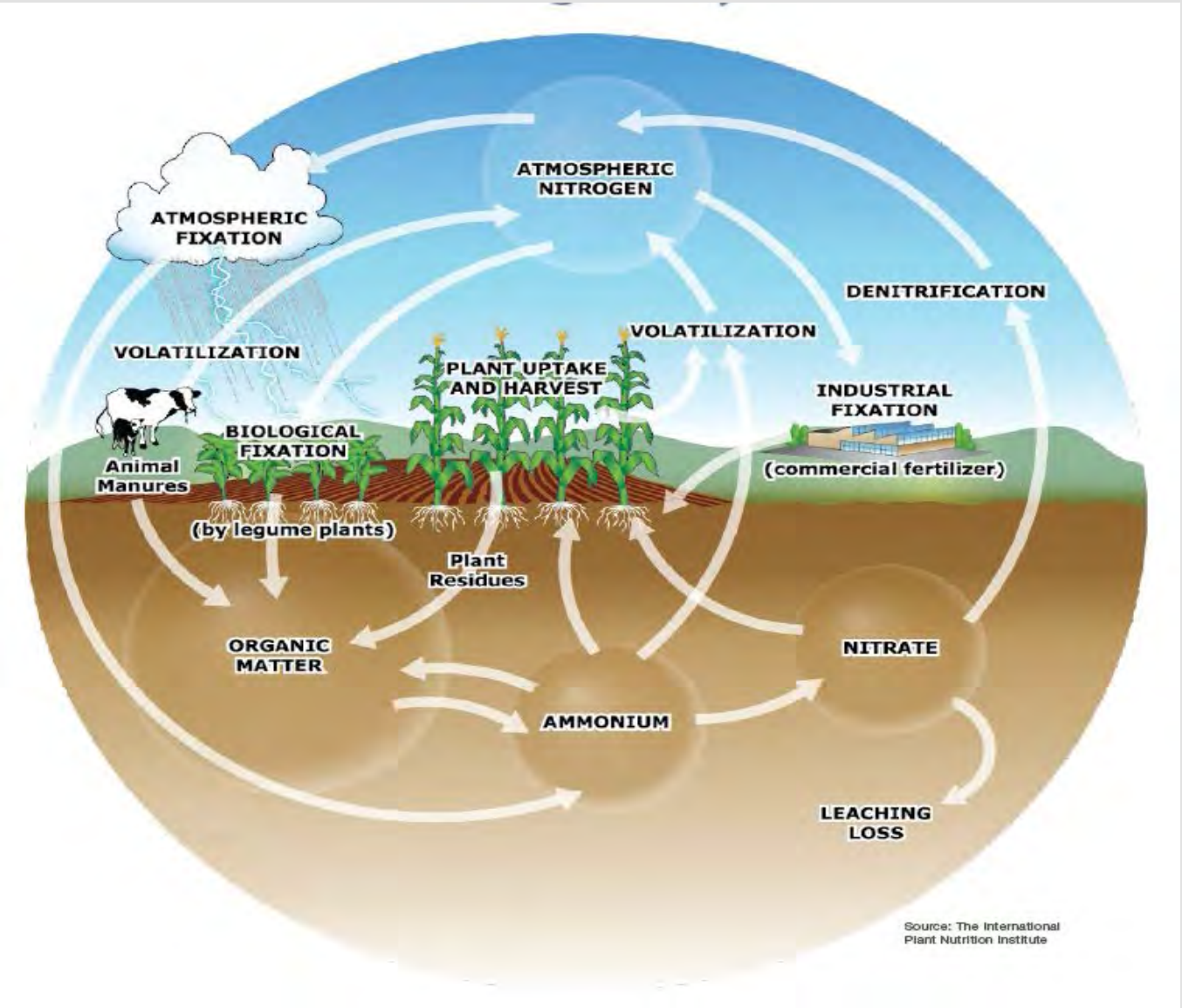
# N Budgeting

In = Out (ideally, but not quite that simple)

A = B + C + D + E + F

N Recommended = (Dry or Liquid N) + (Foliar N) + (Manure or Compost N) + (Soil N) + (Irrigation Water N)

# Nitrogen Cycle



# Definitions

**Unambiguous terms:**

- N applied
- N uptake (or consumption or absorption)
- N removed

Ambiguous terms:

Crop N requirement or demand or need can refer to either:

- N applied to achieve desired yield
- N uptake to achieve desired yield

Usually N applied > N uptake > N removed

# Definitions

N applied: Total N that is applied to a field.

N available: N forms that can be taken up by the plant.

N uptake: Amount of N taken up or absorbed by plants during a specified time period (also crop N consumption or absorption).

N removed: Amount of N in harvested parts.

# NMP Worksheet

For growers in high vulnerability areas (HVA) :

- Complete for every crop management unit in your membership.
- Management unit: any field or group of fields with the same crop and nitrogen fertilization practices.
- Must be kept on farm for all fields/parcels and available upon request for CVRWQCB inspections.
- Summary information from this NMP (yet to be determined) must be submitted to the coalition.

## NITROGEN MANAGEMENT PLAN WORKSHEET

1. Crop Year (Harvested): _____

2. Member ID# _____

3. Name:

| 4. APN(s): | 5. Field(s) ID | |
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| CROP NITROGEN MANAGEMENT PLANNING | | N APPLICATIONS/CREDITS | 26. Recommended/ Planned N | 27. Actual N |
|---|---|---|---|---|
| 6. Crop | | **15. Nitrogen Fertilizers** | | |
| 7. Production Units | | 16. Dry/Liquid (lbs/ac) | | |
| 8. Projected Yield (Units/Acre) | | 17. Foliar N (lbs/ac) | | |
| 9. N Recommended (lbs/ac) | | **18. Organic Material N** | | |
| 10. Acres | | 19. Available N in Manure/Compost (lbs/ac estimate) | | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | | |
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| | 31. Self-Certified, approved training program attended | |
| **DATE:** | 32. Self-Certified, UC or NRCS site recommendation | |
| | 33. Nitrogen Management Plan Specialist | |

# NMP Worksheet

1. Year: Based upon the calendar year a crop is harvested
2. Member ID# issued by KRWCA.
3. Name: Member name.

## NITROGEN MANAGEMENT PLAN WORKSHEET

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2. Member ID# _____
3. Name: _____

| 4. APN(s): | 5. Field(s) ID | |
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# NMP Worksheet

4. Assessor's Parcel Number (APN)

5. Field Identification (ID) for each unique management unit. Can be:
   - alpha/numeric,
   - internal field identifier, or
   - site number used on pesticide use permit.

   If the same crop and same nitrogen application is used on more than one field, enter all APN's and/or field numbers where the information applies.

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# NMP Worksheet

Projected Yield:
3 bales/ac
or 1500 lbs lint / ac

Recommended N:
45-55 lbs N/bale x 3 bales/ac
= 135 to 165 lbs N/ac

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# Setting a Realistic Yield Goal

- Maximum yield – often overestimates N
- Average yield
  - Using a rolling average
  - Adjusting the past average by dropping exceptional years
  - Adjusting the past average by a fixed percentage
- Using yields from variety trials or county averages

When multiple applications are made during the growing season, N rate can be adjusted, if needed.

# NMP Worksheet

25. Total N Applied and Available is the sum of #20 and #24. This total should be the same number as #9.

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# Credits and Adjustments

- Residual soil nitrogen (various forms)
- Nitrate-N in irrigation water
- N mineralized during growing season
  - From soil organic matter
  - From this year's cover crop, manure and compost applications

# NMP Worksheet

22. Available N carryover in the soil is typically estimated by analyzing a soil sample and/or by tracking prior applications. This estimate should be reported in pounds per acre available to the crop during the growing season.

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| 10. Acres | | 19. Available N in Manure/Compost (lbs/ac estimate) | | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | | |
| 11. Actual Yield (Units/Acre) | | **21. Nitrogen Credits (est)** | | |
| 12. Total N Applied (lbs/ac) | | 22. Available N carryover in soil; (annualized lbs/acre) | | |
| 13. ** N Removed (lbs N/ac) | | 23. N in Irrigation water (annualized, lbs/ac) | | |
| 14. Notes: | | **24. Total N Credits** (lbs per acre) | | |
| | | **25. Total N Applied & Available** | | |

| PLAN CERTIFICATION | | |
|---|---|---|
| **28. CERTIFIED BY:** | **29. CERTIFICATION METHOD** | **X** |
| | 30. Low Vulnerability Area, No Certification Needed | |
| | 31. Self-Certified, approved training program attended | |
| **DATE:** | 32. Self-Certified, UC or NRCS site recommendation | |
| | 33. Nitrogen Management Plan Specialist | |

# N Credits in Soil

| Description | mg/kg | | | Available N, lb/(ac*ft) | Available Org-N, lb/(ac*ft) | Totall N, lb/(ac*ft) |
|---|---|---|---|---|---|---|
| | NO3-N | NH4-N | % OM | | | |
| Field 6 SE 1' | 10 | 2 | 1.2 | 48 | 8 | 56 |
| Field 6 SE 2' | 5 | 1 | 0.4 | 24 | 0 | 24 |
| Field 6 SE 3' | 2 | 0.3 | 0.2 | 9.2 | 0 | 9.2 |

89 lb N/ac total

Example, 1st foot of soil:

$NO_3$ and $NH_4$-N: 10+2 = 12 mg/kg (or ppm) total

$$\frac{4\times10^6 \text{ lb soil}}{\text{ac*ft soil}} \left| \frac{12 \text{ lb N}}{1\times10^6 \text{ lb soil}} \right. = \frac{48 \text{ lb N}}{\text{ac*ft soil}}$$

Estimate 40 lb N/ac for every 1% over 1% OM:

0.2 x 40 = 8 lbs N/ac

Total = 48 + 8 = 56 lb N/ac in top 1 ft of soil

# Annual N Mineralization Rate Estimates

| Year | Oregon [1] | Appendix D [2] Table D1 - 1.5% | Appendix I [3] Table 1.1 | Western Fertilizer Handbook [4] A | B | Max | Min |
|---|---|---|---|---|---|---|---|
| 1 | 30 | 35 | 30 | 35 | 35 | 35 | 30 |
| 2 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 3 | 7 | 10 | 8 | 10 | 10 | 10 | 7 |
| 4 | 3 | 5 | 4 | 7.5 | 5 | 7.5 | 3 |
| 5 | 2 | | | 4 | | 4 | 2 |
| 6 | 2 | | | | | | |
| 7 | 2 | | | | | | |
| 8 | 2 | | | | | | |
| 9 | 2 | | | | | | |
| 10 | 2 | | | | | | |
| Total % = | 67 | 65 | 57 | 71.5 | 65 | 71.5 | 57 |

[1] Estimating Plant Available Nitrogen from Manure - Oregon State University Extension Service
Managing Dairy Manure in the Central Valley of California - UC Committee of Experts on Dairy Manure Management

[2] Appendix D - Mineralization - Conceptual Model and Field Studies

[3] Appendix I - California Biosolids Mineralization Research

[4] Western Fertilizer Handbook 7th Edition - Table 8-2 for 1.5% N

# NMP Worksheet

23. Nitrogen in Irrigation Water is estimated by analyzing an irrigation water sample to determine the nitrogen content. This estimate should be reported in pounds per acre available throughout the crop season based on the amount of irrigation water applied to the crop.

## NITROGEN MANAGEMENT PLAN WORKSHEET

1. Crop Year (Harvested): _____

2. Member ID# _____

3. Name: _____

| 4. APN(s): | 5. Field(s) ID | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| CROP NITROGEN MANAGEMENT PLANNING | | N APPLICATIONS/CREDITS | 26. Recommended/ Planned N | 27. Actual N |
|---|---|---|---|---|
| 6. Crop | | **15. Nitrogen Fertilizers** | | |
| 7. Production Units | | 16. Dry/Liquid (lbs/ac) | | |
| 8. Projected Yield (Units/Acre) | | 17. Foliar N (lbs/ac) | | |
| 9. N Recommended (lbs/ac) | | **18. Organic Material N** | | |
| 10. Acres | | 19. Available N in Manure/Compost (lbs/ac estimate) | | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | | |
| 11. Actual Yield (Units/Acre) | | **21. Nitrogen Credits (est)** | | |
| 12. Total N Applied (lbs/ac) | | 22. Available N carryover in soil; (annualized lbs/acre) | | |
| 13. ** N Removed (lbs N/ac) | | 23. N in Irrigation water (annualized, lbs/ac) | | |
| 14. Notes: | | **24. Total N Credits** (lbs per acre) | | |
| | | **25. Total N Applied & Available** | | |

| PLAN CERTIFICATION | | |
|---|---|---|
| **28. CERTIFIED BY:** | **29. CERTIFICATION METHOD** | **X** |
| | 30. Low Vulnerability Area, No Certification Needed | |
| | 31. Self-Certified, approved training program attended | |
| **DATE:** | 32. Self-Certified, UC or NRCS site recommendation | |
| | 33. Nitrogen Management Plan Specialist | |

# N in Irrigation Water

Count only the $NO_3^-$-N contained in water transpired by the crop

Cotton in Kern transpires about 36 inches (3 ft) of water:
http://www.itrc.org/etdata/irrsched.htm

If irrigation water $NO_3^-$-N is 10 ppm (or mg/l), the 'fertilizer credit' would be:

$$\frac{10 \text{ lb } NO_3^-\text{-N}}{1\text{x}10^6 \text{ lb } H_2O} \left| \frac{2.72\text{x}10^6 \text{ lb } H_2O}{\text{acre*ft } H_2O} \right| \frac{3 \text{ ft } H_2O}{} = \frac{81.6 \text{ lb } NO_3^-\text{-N}}{\text{acre}}$$

# NMP Worksheet

## NITROGEN MANAGEMENT PLAN WORKSHEET

1. Crop Year (Harvested): _____

2. Member ID# _____

3. Name:

| 4. APN(s): | 5. Field(s) ID | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| CROP NITROGEN MANAGEMENT PLANNING | | N APPLICATIONS/CREDITS | 26. Recommended/ Planned N | 27. Actual N |
|---|---|---|---|---|
| 6. Crop | | **15. Nitrogen Fertilizers** | | |
| 7. Production Units | | 16. Dry/Liquid (lbs/ac) | | |
| 8. Projected Yield (Units/Acre) | | 17. Foliar N (lbs/ac) | | |
| 9. N Recommended (lbs/ac) | | **18. Organic Material N** | | |
| 10. Acres | | 19. Available N in Manure/Compost (lbs/ac estimate) | | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | | |
| 11. Actual Yield (Units/Acre) | | **21. Nitrogen Credits (est)** | | |
| 12. Total N Applied (lbs/ac) | | 22. Available N carryover in soil; (annualized lbs/acre) | | |
| 13. ** N Removed (lbs N/ac) | | 23. N in Irrigation water (annualized, lbs/ac) | | |
| 14. Notes: | | **24. Total N Credits** (lbs per acre) | | |
| | | **25. Total N Applied & Available** | | |

| PLAN CERTIFICATION | | |
|---|---|---|
| **28. CERTIFIED BY:** | **29. CERTIFICATION METHOD** | **X** |
| | 30. Low Vulnerability Area, No Certification Needed | |
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| **DATE:** | 32. Self-Certified, UC or NRCS site recommendation | |
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# NMP Worksheet

Preliminary plan: This roughly balances numerically, but does it work considering the rest of the 4 R's?

## NITROGEN MANAGEMENT PLAN WORKSHEET

| | |
|---|---|
| 1. Crop Year (Harvested): | 2015 |
| 2. Member ID# | 123456 |
| 3. Name: | John Schaap |

| 4. APN(s): | 5. Field(s) ID | |
|---|---|---|
| 111-222-3333 | Field 6 SE | |
| | | |
| | | |
| | | |
| | | |
| | | |

| CROP NITROGEN MANAGEMENT PLANNING | | N APPLICATIONS/CREDITS | 26. Recommended/ Planned N | 27. Actual N |
|---|---|---|---|---|
| 6. Crop | Cotton | **15. Nitrogen Fertilizers** | | |
| 7. Production Units | Bales | 16. Dry/Liquid (lbs/ac) | 0 | |
| 8. Projected Yield (Units/Acre) | 3 bales/ac | 17. Foliar N (lbs/ac) | 0 | |
| 9. N Recommended (lbs/ac) | 165 lb/ac | **18. Organic Material N** | | |
| 10. Acres | 100 | 19. Available N in Manure/Compost (lbs/ac estimate) | 0 | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | 0 | |
| 11. Actual Yield (Units/Acre) | | **21. Nitrogen Credits (est)** | | |
| 12. Total N Applied (lbs/ac) | | 22. Available N carryover in soil; (annualized lbs/acre) | 89 | |
| 13. ** N Removed (lbs N/ac) | | 23. N in Irrigation water (annualized, lbs/ac) | 82 | |
| 14. Notes: | | **24. Total N Credits** (lbs per acre) | 171 | |
| | | **25. Total N Applied & Available** | 171 | |

| PLAN CERTIFICATION | | |
|---|---|---|
| 28. CERTIFIED BY: | 29. CERTIFICATION METHOD | X |
| | 30. Low Vulnerability Area, No Certification Needed | |
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# NMP Worksheet

11. Actual Yield: total crop harvested in units per acre.

12. Total N Applied: nitrogen applied in pounds per acre.

Compare Actual Yield to the total N that was available for the crop. Assess if N applications were appropriate for the yield achieved.

13. N Removed: Technical Work Group to develop tools to better estimate nitrogen removal by crop.

## NITROGEN MANAGEMENT PLAN WORKSHEET

1. Crop Year (Harvested): _____

2. Member ID# _____

3. Name:

| 4. APN(s): | 5. Field(s) ID | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

| CROP NITROGEN MANAGEMENT PLANNING | | N APPLICATIONS/CREDITS | 26. Recommended/ Planned N | 27. Actual N |
|---|---|---|---|---|
| 6. Crop | | **15. Nitrogen Fertilizers** | | |
| 7. Production Units | | 16. Dry/Liquid (lbs/ac) | | |
| 8. Projected Yield (Units/Acre) | | 17. Foliar N (lbs/ac) | | |
| 9. N Recommended (lbs/ac) | | **18. Organic Material N** | | |
| 10. Acres | | 19. Available N in Manure/Compost (lbs/ac estimate) | | |
| **Post Production Actuals** | | **20. Total Available N Applied** (lbs per acre) | | |
| 11. Actual Yield (Units/Acre) | | **21. Nitrogen Credits (est)** | | |
| 12. Total N Applied (lbs/ac) | | 22. Available N carryover in soil; (annualized lbs/acre) | | |
| 13. ** N Removed (lbs N/ac) | | 23. N in Irrigation water (annualized, lbs/ac) | | |
| 14. Notes: | | **24. Total N Credits** (lbs per acre) | | |
| | | **25. Total N Applied & Available** | | |

| PLAN CERTIFICATION | | |
|---|---|---|
| **28. CERTIFIED BY:** | **29. CERTIFICATION METHOD** | **X** |
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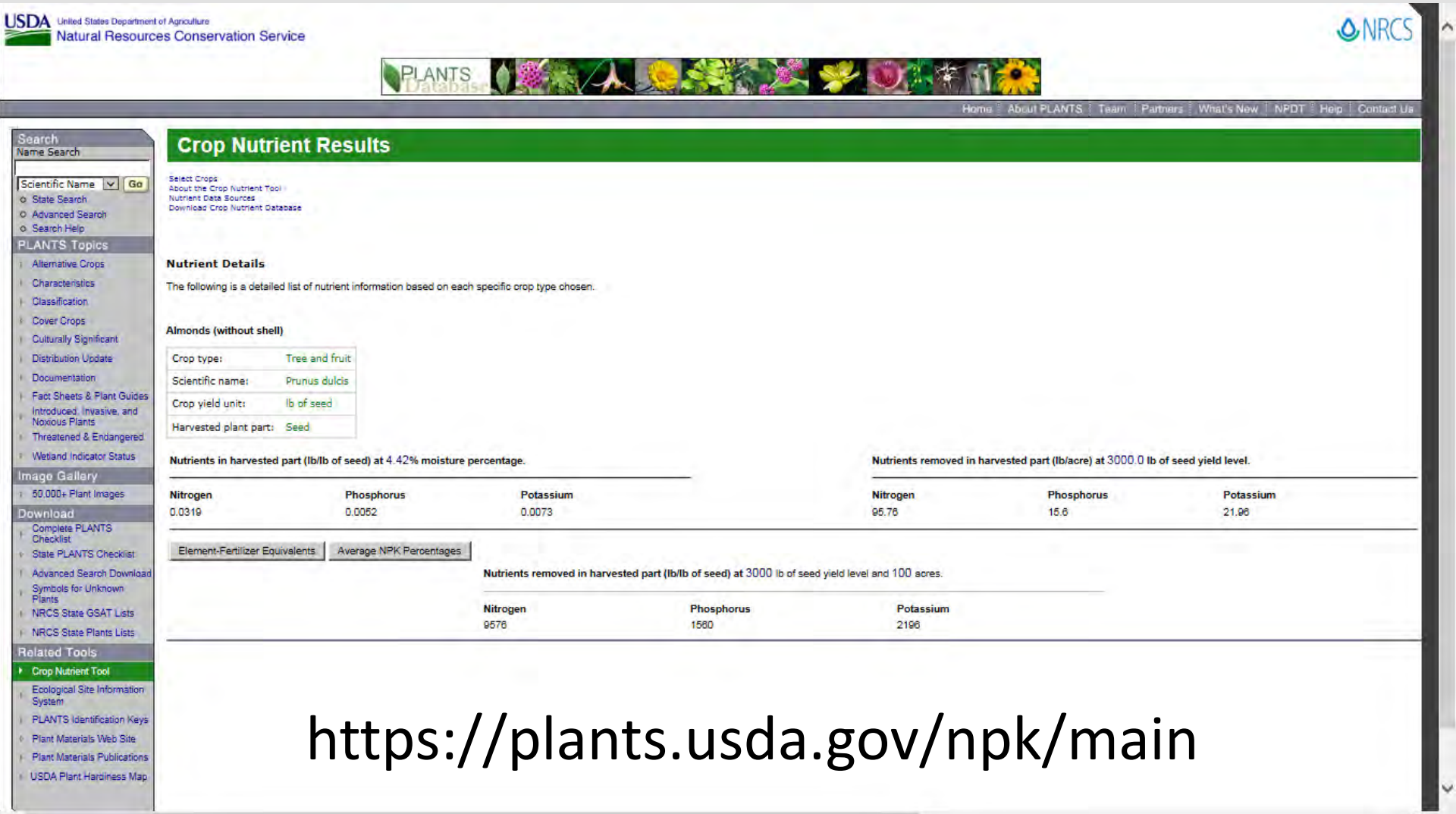
| | 33. Nitrogen Management Plan Specialist | |

# Crop N Removal – Preliminary Info




https://plants.usda.gov/npk/main

# Right Rate: Nutrient Removal

| Species | N lbs removed per 1000 lbs of fruit produced | Source |
|---|---|---|
| Apple | 0.5-0.6 | IFA, 1992;USDA,1963 |
| Citrus | 1.1-1.6 | Rocuzzo, 2013; Krueger/Arpaia 2010 |
| Cherry (Sweet) | 2-2.35 | Huguet, 1980 |
| Table Grape | 1.3-1.9 | Lohnertz, 1991; USDA 1963 |
| Wine Grape | 0.8-2 | Coombe, 1992; Mullins, 1992 |
| Kiwifruit | 1.3-1.8 | Smith et al., 1988; Pailly 1992 |
| Walnut (In-shell) | 15-20 | Weinbaum 1991 |
| Peach | 0.8-1.2 | Maragoni and Rombola 1994;USDA 1963 |
| Pistachio | 28 (CPC yield) | Siddiqui et al (2013) |
| French Prune | 3 (1000 fresh), 9 (1000 Dry) | Weinbaum, et al., 1994, USDA, 1963 |
| Olives | 8 | Angelo Rodrigues *et al.,* 2012 |
| Almond | 68 (1000 lb kernel), ≈ 16 lb per 1000 lb whole fruit | Muhammad, Saa, Brown et al (2013) |

# N Application/Removal Ratio

$$\text{A/R Ratio} = \frac{\text{Applied Nitrogen}}{\text{Removed Nitrogen}}$$

Applied N = from all sources

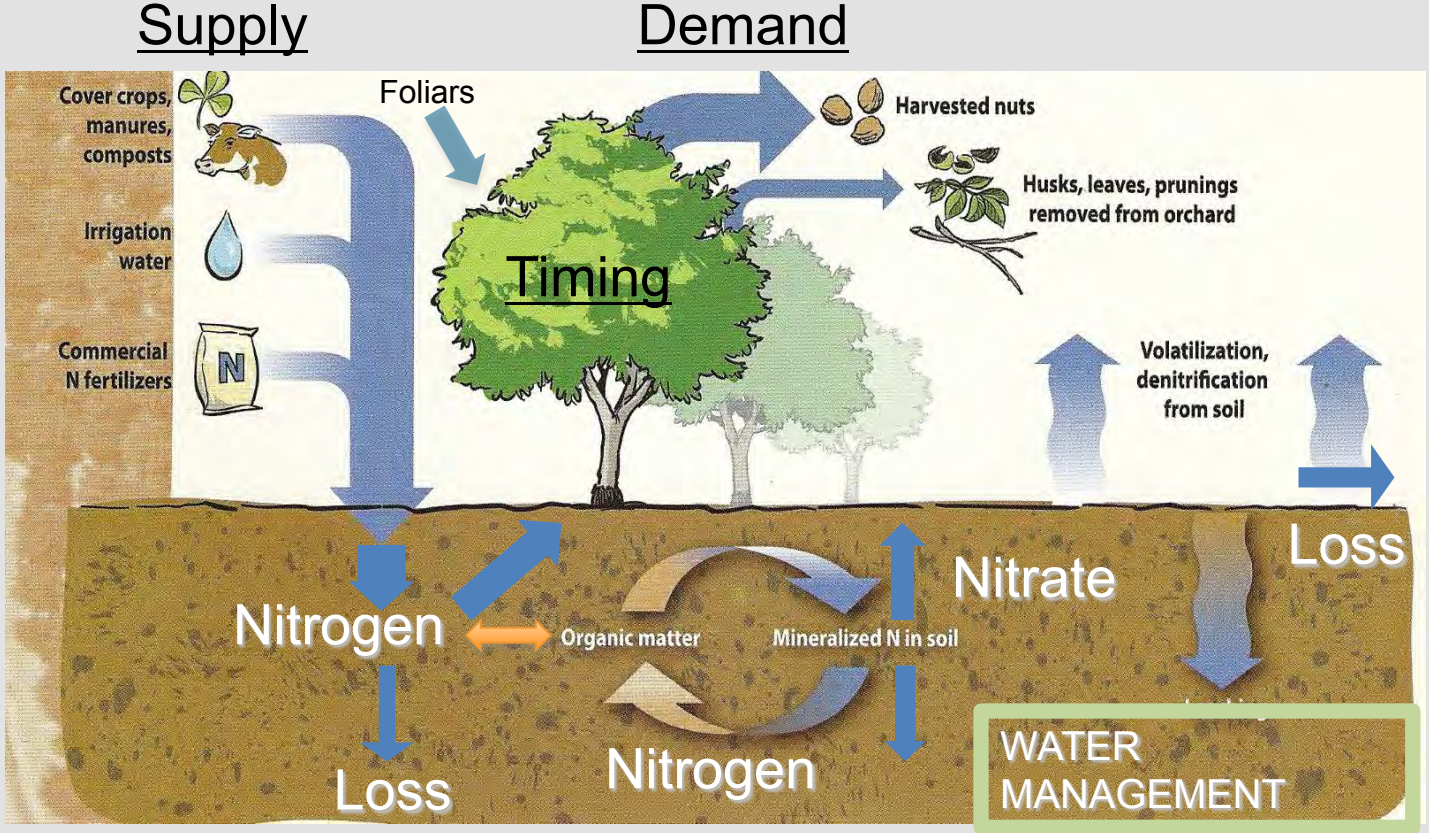
Removed N = harvest + sequestered in wood of perennial crops

Very partial mass balance:

- Focuses on a few key variables;
- Does not try to estimate the many chemical reactions, mineralization rates, changes in storage, etc.;
- Does not calculate losses below the root zone.

# Nitrogen Systems are Complex

Proxy metrics like the A/R ratio can provide good comparative estimates of N use efficiency (NUE)




Kathy Kelley-Anderson et al: ANR Pub # 21623

**Nicole Bell, Manager**

**Kern River Watershed Coalition Authority**

# Enforcement Action by CVRWQCB

- **Enforcement actions will be taken** against:
  - **landowners and operators that did not obtain regulatory coverage**, either through the Coalition or an Individual Order (field checks have been made).
  - **landowners and operators that do not effectively implement management practices** to **protect** the **quality of** both surface **water** and groundwater
- **Reminder: Enforcement action for non-compliance** related to an enrolled irrigated lands parcel **may be taken against both** the **owner** and **operator.**

# Enforcement Action by CVRWQCB

- **Failure to participate in the Irrigated Lands Regulatory Program**, either as a member of a Coalition or under the Individual Order **can subject the landowner to administrative penalties** by the Regional Board of **up to $1,000 per day** pursuant to California Water Code section 13267.
  - ***If a KRWCA member has additional parcels to enroll contact KRWCA to enroll the parcels before the CVRWQCB takes action.***

# Member Responsibilities Reminder

- **Summary of Member Requirements** (provided in recent mailing to members)
- **Renew Membership Annually** and pay fees
- **Maintain a copy of General Order at place of business** (digital copy saved on computer is acceptable)
- **Provide written notice** of the **GO requirements** to all responsible non-member parties. **Certification is required** (NOC template on website)

# Member Responsibilities, Cont'd.

- **Assist in the development of management plans**
- **Cooperate** in requested assistance for surface and groundwater quality monitoring (testing from ag wells)
- **Implement management practices** that are **protective of surface and groundwater** quality
- **Participate in grower outreach events**
- **Be familiar with member requirements**
- **Complete and submit required reports to KRWCA**

# Meeting Attendance Certification

- To receive credit for attendance, complete the ***Meeting Attendance Certification Form*** and drop in box when leaving.
- Annual attendance at a KRWCA sponsored meeting is required as a condition of membership if any of your parcels are in a designated high vulnerability (HV) area or are governed by a SQMP/GQMP.
- The member shall review outreach materials to become informed of any water quality problems to address and the management practices that are available to address those issues.

# KRWCA Website

- Updated often with ILRP information
- Forms and templates are posted on website
- Visit often to stay informed of KRWCA activities and member requirements

www.krwca.org

# Questions?

Kern River Watershed Coalition Authority

P.O. Box 151

Bakersfield, CA 93302

Tel: (661) 616-6500

Fax: (661) 616-6550

E-mail: admin@krwca.org

Website: www.krwca.org

Kern River Watershed Coalition Authority