Kings River Water Quality Coalition

2022-2023 Annual Membership Workshop

Annual Workshop Attendance

- Attendance Credit
  - Checked-in for attendance credit
  - If you did not register with all the Member IDs you represent, please see Coalition staff at the end.
- Member Portal Attendance will be updated by April 1.

Annual Membership Workshop

- Outreach Presentations Available Online and In-Person
- Webinars (Live):
  - January 12 – 2 PM
  - January 31 – 9 AM
  - February 2 – 9 AM – Well Abandonment/Destruction and Permitting
  - Webinar recording will be available online approximately mid-February
    - Member Portal under "Outreach": http://kingsriverwqc.org/account
- In-Person (RSVP Required)
  - January 19: Kings County Fairgrounds, Hanford, CA - 9 AM
  - January 26: Selma Portuguese Hall, Selma, CA - 9 AM
  - February 8: CPDES Hall, Easton, CA - 9 AM
  - February 16: Kerman Community Center, Kerman, CA - 9 AM

Annual Membership Workshop

- KRWQC Office:
  - In-person by appointment only (No Walk-ins) – 1 Hour
  - Virtual Appointment by appointment only – 1 Hour: https://kingsriverwqc.org/virtualappointment
    - Paper Templates are Located Outside KRWQC Office (4886 E. Jensen Ave Fresno, CA 93725)
    - Online Templates: https://kingsriverwqc.org/resources/#Templates
- **March 1, 2023** Submittals
  - Irrigation and Nitrogen Management Plan (INMP) Summary Report for 2022 Crop Year
    - INMP Summary Report required to be submitted ONLINE through the Member Portal: http://kingsriverwqc.org/account
    - Paper submittals will not be accepted
- Coalition Contact Information
  - Please Include Member ID(s) in all communications
    - Email: info@kingsriverwqc.org
    - Phone: **559-365-7958**
    - Member Portal Help Request

Outline

- Submittals and On-farm for March 1, 2023
- General Order Reminders and Updates
- KRWQC Activities
- Templates
- Best Management Practices\Groundwater protection

Submittals for March 1, 2023

- What to Submit by **March 1, 2023**
  - **INMP Summary Report**
    - Required for **ALL** members (high and low vulnerability areas) for previous crop year (2022)
    - Submitted to the KRWQC **Online** through the Member Portal
      - http://kingsriverwqc.org/account
    - **Paper submittals WILL NOT be accepted.**
    - **A $50 administrative fee assessed for late submittals (after March 1, 2023).**

On-Farm for March 1, 2023

- What to Complete by **March 1, 2023**
  - INMP Worksheet
    - Pre-Season Planning, Excepted, and Recommended/Planned sections
    - **Kept On-Farm (Not submitted to KRWQC)**
    - Certification required if
      - Located within a high vulnerability area or
      - Located within low vulnerability area and identified as outlier
      - Please check Self-Certification Status
    - Certification not required if
      - Located within low vulnerability area and not identified as outlier

Irrigation and Nitrogen Management Plan Online Self-Certification

- Program Description
  - The California Department of Food and Agriculture's Irrigation and Nitrogen Management Training Program allows growers to self-certify Irrigation and Nitrogen Management Plan (INMP) Worksheets for their operation(s).
- Program Requirements
  - To complete the training program, participants must take the Self-Certification Training and pass the exam with 80% or greater. Upon successful completion of the training program, participants are eligible to self-certify INMP Worksheets for a 3-year period.

Irrigation and Nitrogen Management Plan Online Self-Certification

- How to Take the Training Exam
  - Go to CDFA Website: https://www.cdfa.ca.gov/is/ffldrs/frep/training.html#grower
  - The training will take approx. 2-3 hours to complete. However, the training is self-paced and does not need to be completed in one sitting. Your progress will be saved if you decide to take a break and come back to it another day.
  - Once each module in the training has been completed, you will have access to take the exam. The exam is 30 questions multiple-choice and requires an 80% to pass. You will have 3 chances to pass the exam.
  - Once you have successfully completed the training and exam you will receive a letter via email within 2 weeks acknowledging your eligibility to self-certify INMP Worksheets for your farming operation(s).
- Renewal Requirements
  - To renew eligibility to self-certify, participants must complete 3 hours of continuing education during the 3-year eligibility period. If a participant does not obtain 3 hours of continuing education, they cannot renew and will be required to retake the Self-Certification Training and Exam to continue self-certifying INMP Worksheets.
  - For a list of current continuing education opportunities please visit:
  - https://www.cdfa.ca.gov/is/ffldrs/frep/continuing_education.html

General Order Reminders and Updates

- Enrollment
  - All commercial, irrigated farmland must be enrolled
    - Unless enrolled in Dairy Program
    - Includes Irrigated Pasture
  - Newly purchased and/or leased land must be enrolled

Drinking Water Well Monitoring

- Drinking Water Supply Well Monitoring
  - Who is required to sample?
    - All coalition members or associated landowners with active drinking water wells on parcels enrolled in the ILRP. An active well is used for human consumption. If your well is not active, you do not have to sample. Contact the Central Valley Water Board.
  - Sampling Requirements and Frequency
    - ELAP certified laboratory

    1. Nitrate + nitrite as nitrogen results are less than 8 mg/L for 3 consecutive years
       - Monitoring reduced to once every 5 years.
    2. Nitrate + nitrite as nitrogen results of equal to and between 8 to 10 mg/L
       - Annual sampling.
    3. Nitrate + nitrite as nitrogen results are above 10 mg/L. Testing Stops. Notification to Water Boards is required.
       - Alternative drinking water my can be applied for through Kings Water Alliance (KWA) at https://kingswateralliance.org/eligibilty/

Drinking Water Well Monitoring

- Drinking Water Supply Well Monitoring Resources
  - Drinking Water Webpage
    - https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/drinking_water/
  - Environmental Laboratory Accreditation Program (ELAP) labs list:
    - https://www.waterboards.ca.gov/drinking_water/certlic/labs/
  - Drinking Water Member Information Form
    - https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/drinking_water/dw_member_info.pdf
  - Drinking Water Notification Template
    - https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/drinking_water/dw_notification_temp.pdf
  - Frequently Asked Questions
    - https://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/drinking_water/dw_faq.pdf

Nitrate Control Program - Kings Water Alliance

Solving the Nitrate Problem

An Early Action Plan (EAP) to address drinking water with unsafe nitrate levels has been developed. The EAP identifies nitrate-impacted areas and proposes short-term, immediate drinking water sources for residents like bottled water.

Drinking Water Solutions

The Kings Water Alliance will provide safe drinking water at **no cost** to those impacted by unsafe nitrate levels. Two key options for impacted residents includes bottled water (delivered or non-delivered) and local fill station kiosks.

Fill Station Locations

KERMAN
15101 W Kearney Blvd
Kerman, CA 93630

DINUBA
517 W El Monte Way
Dinuba, CA 93618

HANFORD
KART Transit Center
504 W. 7th Street
Hanford, CA 93230

For more info: www.kingswateralliance.org/fillstations

Salt Control Program

- Salt Control Program
  - Notice to comply mailed early 2021 to Discharge Permit Holders
  - Path: Option 2 – Alternative Option for Salt Permitting
    - Requires participation in the Prioritization and Optimization (P&O) Study
      - Objective: Evaluate existing conditions, policies, and engineering alternatives to identify salt management projects and actions to achieve salt sustainability in the Central Valley.
      - P&O Study began in 2021; completion 10 to 15 years
      - Participants must maintain current permit performance levels; deferment of more stringent and costly permitting requirements until after completion of Phase 1 P&O Study and Phase 2 is implemented
      - Annual Fee – fees vary by Permit Type/Industry Category
  - Status Update:
    - P&O Study Workplan approved March 29, 2021

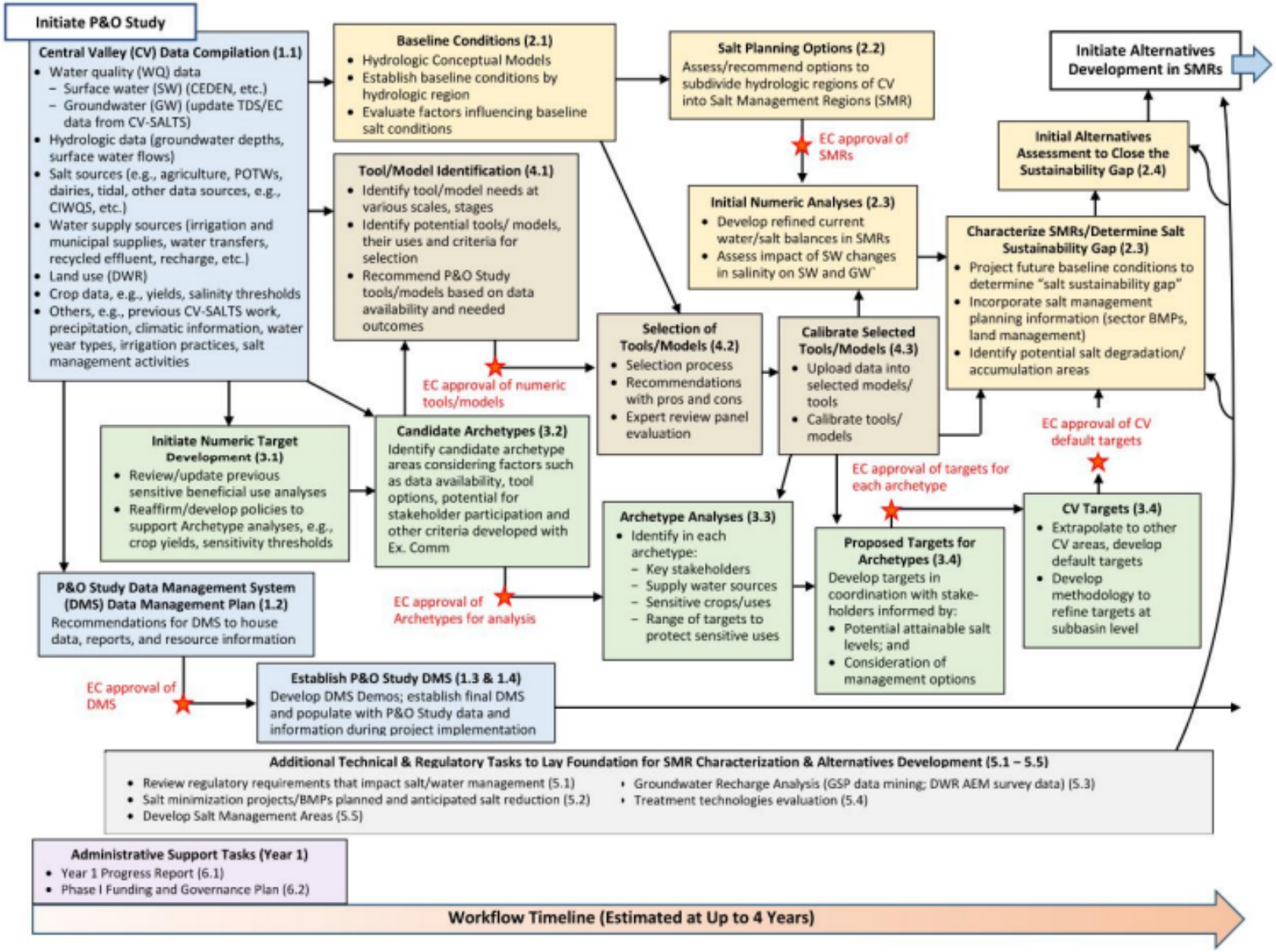
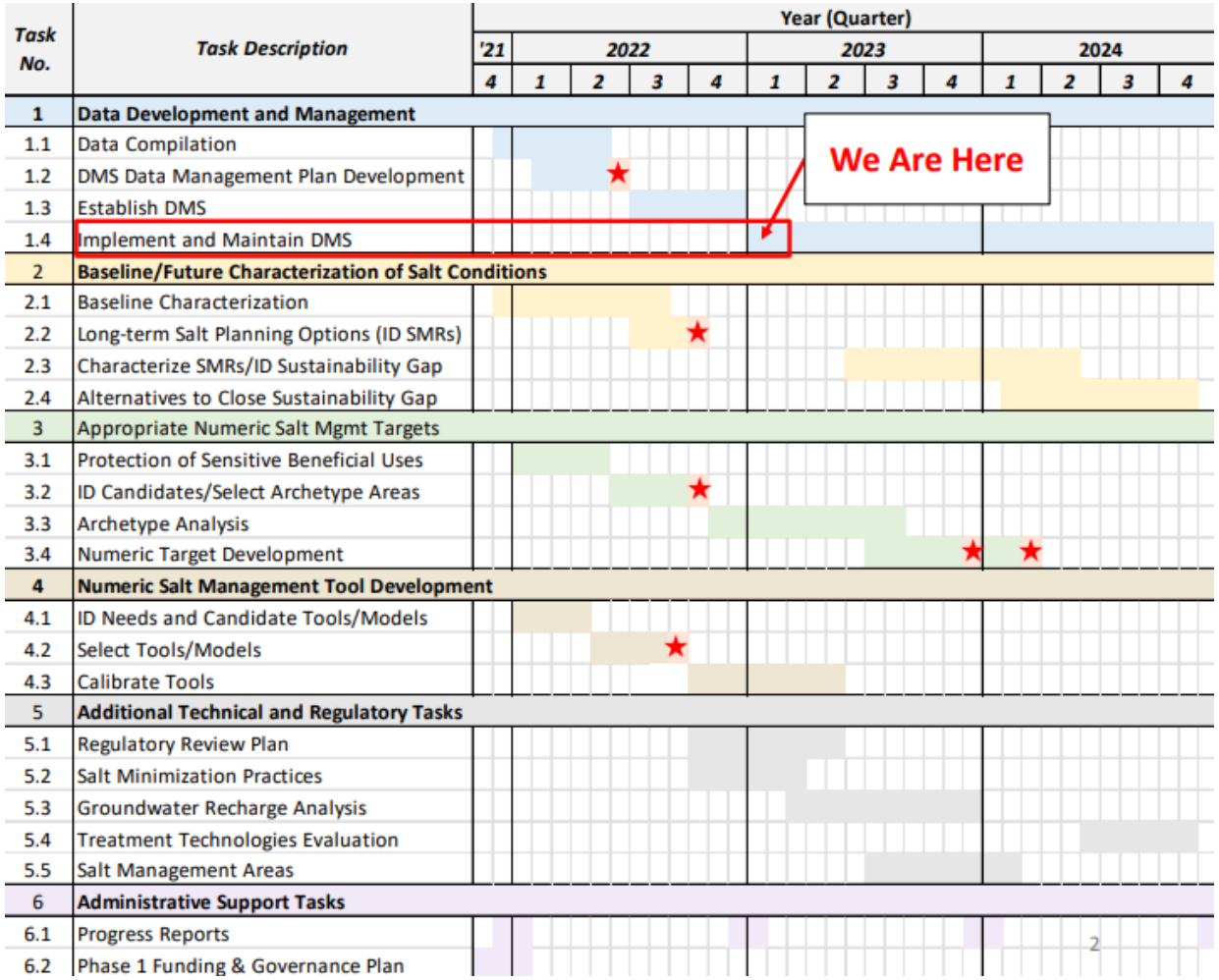
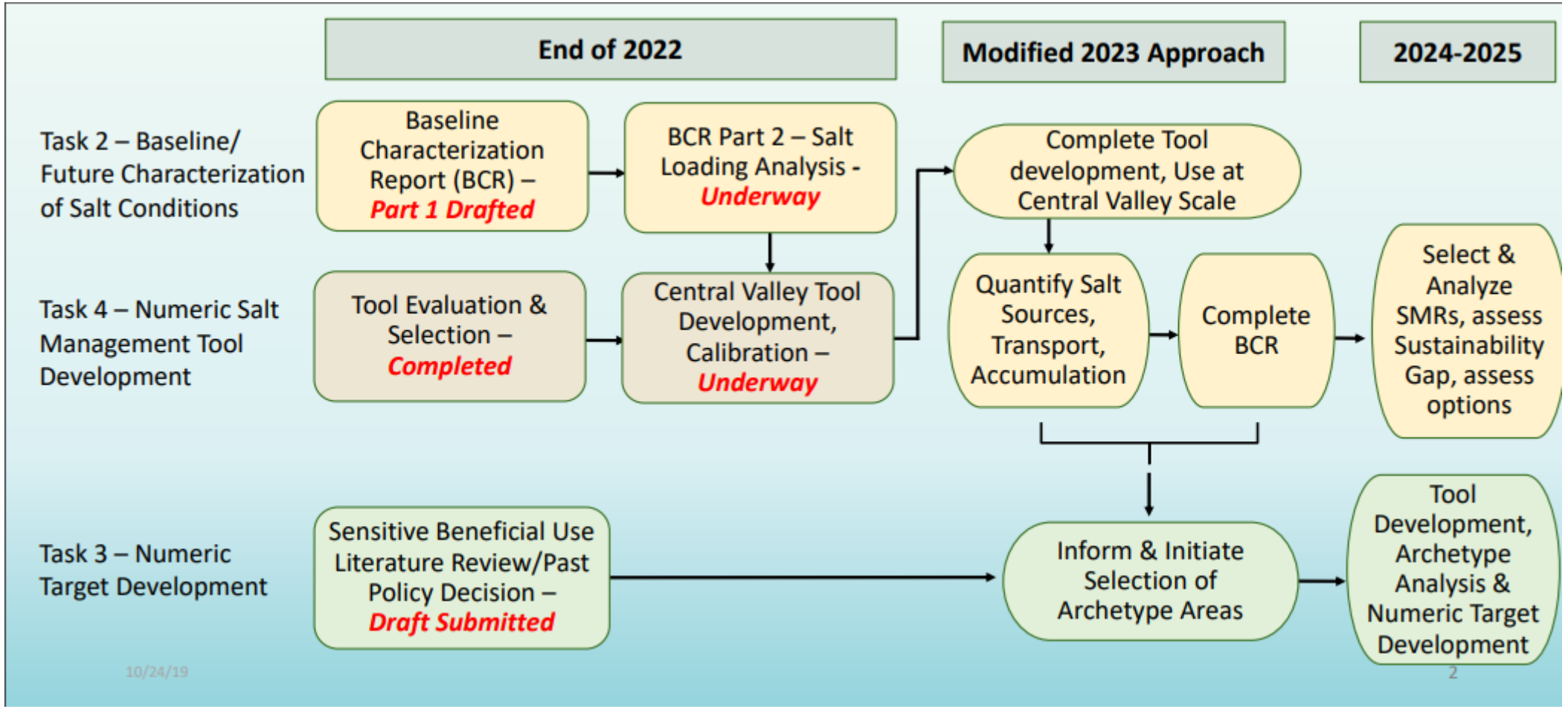


Figure 1. Integrated SOS, Interlinkages among Primary Workflow Pathways Associated with Tasks 1 through 6 (EC = Executive Committee).

Salt Control Program



Salt Control Program



Salt Control Program

2023 Key P&O Study Tasks	Big Picture Purpose; Questions and Key Issues to be Addressed
1. Utilize CV-scale modeling tools to complete BCR Part 2 with inclusion of salt load analysis	Existing surface water/groundwater conditions analysis - Key analyses: – Conditions by geographic area (hydrologic region, watershed, subbasin)? – Where is salt moving, accumulating? – What is the estimated salt load by sector/source?
2. Develop projections for future conditions using Central Valley scale modeling tools	Scenario Analysis: Assuming baseline conditions (per BCR) continue long term into the future: – How do salt conditions change in 50, 100, 200, 400 years? – Where will salt accumulate in the future and at what rate?
3. Identify and evaluate candidate archetype areas	Use results from CV-scale analysis to answer: – Where are the key areas to target for archetypes? – Conversely - what areas would not benefit from archetype development?
4. Initiate Salt Management Region (SMR) Identification	Based on BCR and CV-scale modeling results, what potential SMR regions for long-term salt management planning (incl. alternatives development) make sense?
5. Initiate Salt Management Area (SMA) Identification	Based on BCR and CV-scale modeling results, what are candidate areas for establishment of SMAs?
6. Preparation for 2024-2025 work on target development, selection of SMR/SMAs	What additional data/tool development needs must be addressed to support 2024-2025 work?

Groundwater Protection

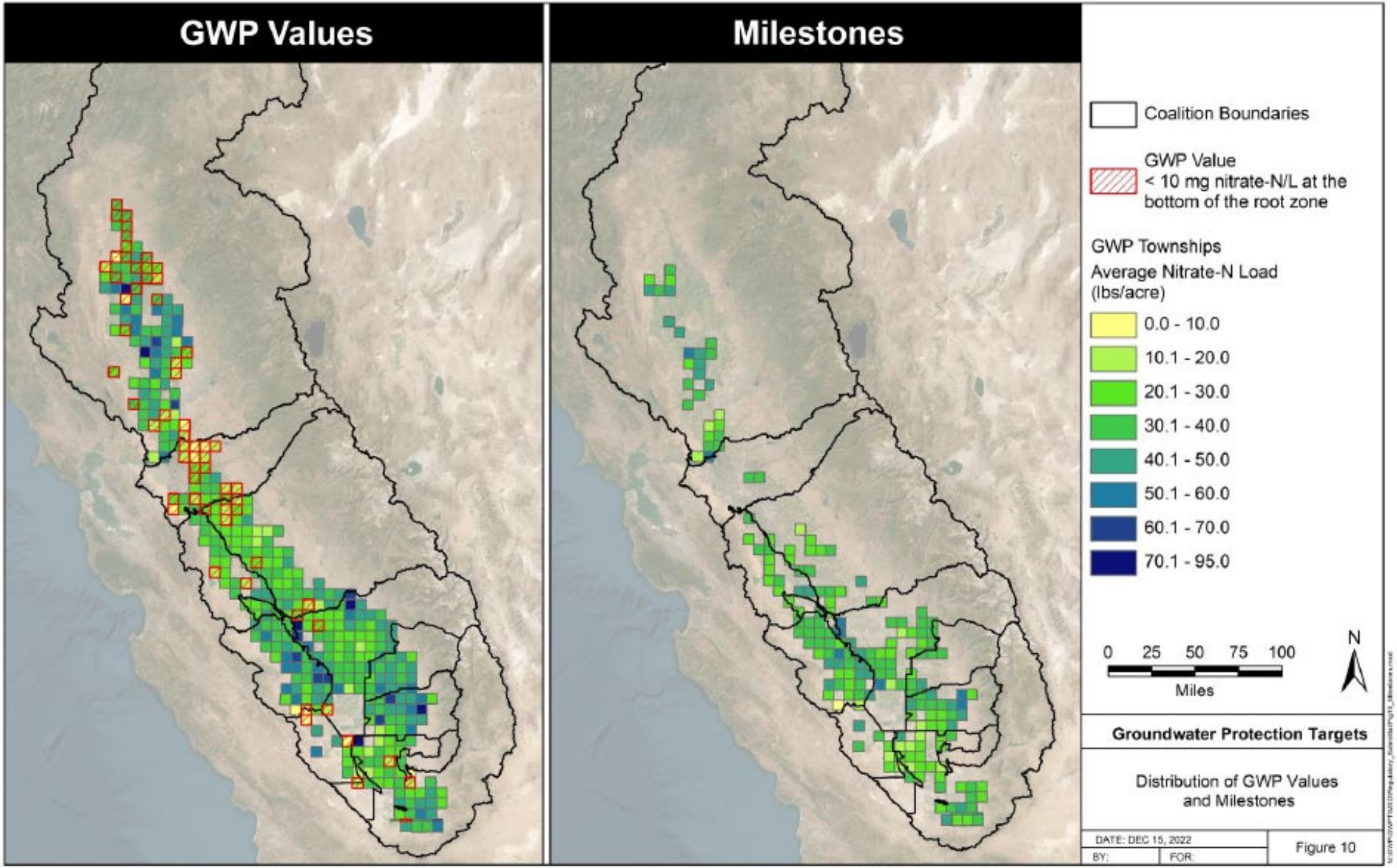
- Groundwater Protection Formulas
  - Conditionally approved on January 19, 2021
  - Purpose
    - Nitrate-N load numbers or concentrations of nitrate in water
    - Reflecting influence of
      - Total applied nitrogen
      - Total removed nitrogen
      - Recharge conditions
      - Other relevant and scientifically supported variables
  - Parcel level
  - SWAT (Soil Water Assessment Tool) Model Runs to Account for Physical Factors

Groundwater Protection

- Groundwater Protection Values
  - Conditionally approved the GWP Values on October 27, 2021
  - Calculated in Townships with > 10% Irrigated Acreage classified as High Vulnerability and/or
  - Calculated if Township has Disadvantaged Community within
  - Values reflect discharge estimates from the bottom of the root-zone
  - Values do not consider post-root-zone processes (e.g., groundwater recharge, vadose zone attenuation) that may affect the concentration of leachate that reaches groundwater
    - To be considered during GWP Targets

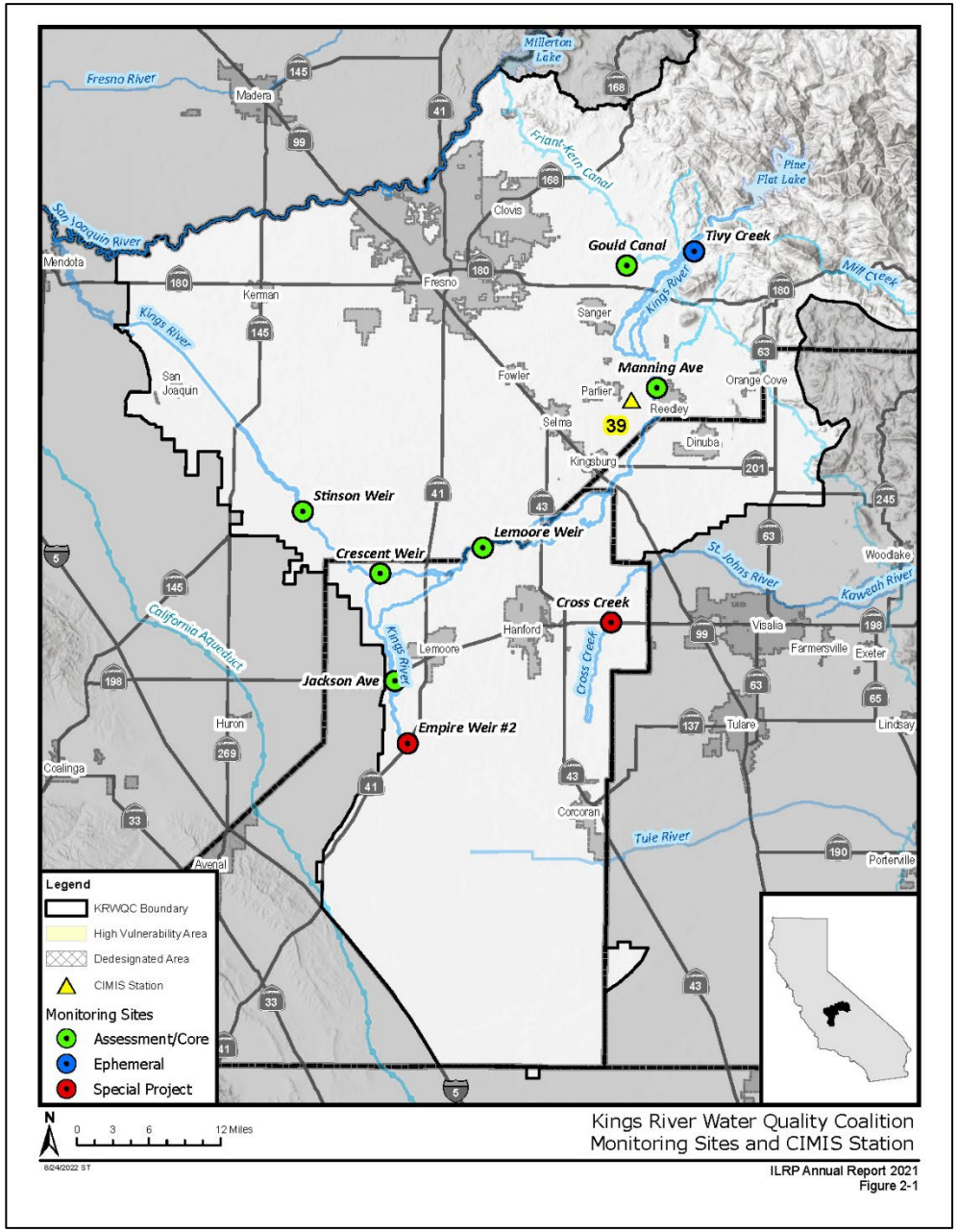
Groundwater Protection

- Groundwater Protection Targets
  - Objective: Desired loads and/or concentrations that are necessary to achieve compliance with receiving water limits for groundwater and need to be informed by available data and information
  - Submitted July 19, 2022
  - Revision submitted December 15, 2022.


GWP Values
Milestones
Coalition Boundaries
GWP Value
< 10 mg nitrate-N/L at the bottom of the root zone
GWP Townships
Average Nitrate-N Load (lbs/acre)
0.0 - 10.0
10.1 - 20.0
20.1 - 30.0
30.1 - 40.0
40.1 - 50.0
50.1 - 60.0
60.1 - 70.0
70.1 - 95.0
0 25 50 75 100
Miles
N
Groundwater Protection Targets
Distribution of GWP Values and Milestones
DATE: DEC 15, 2022
BY:
FOR:
Figure 10

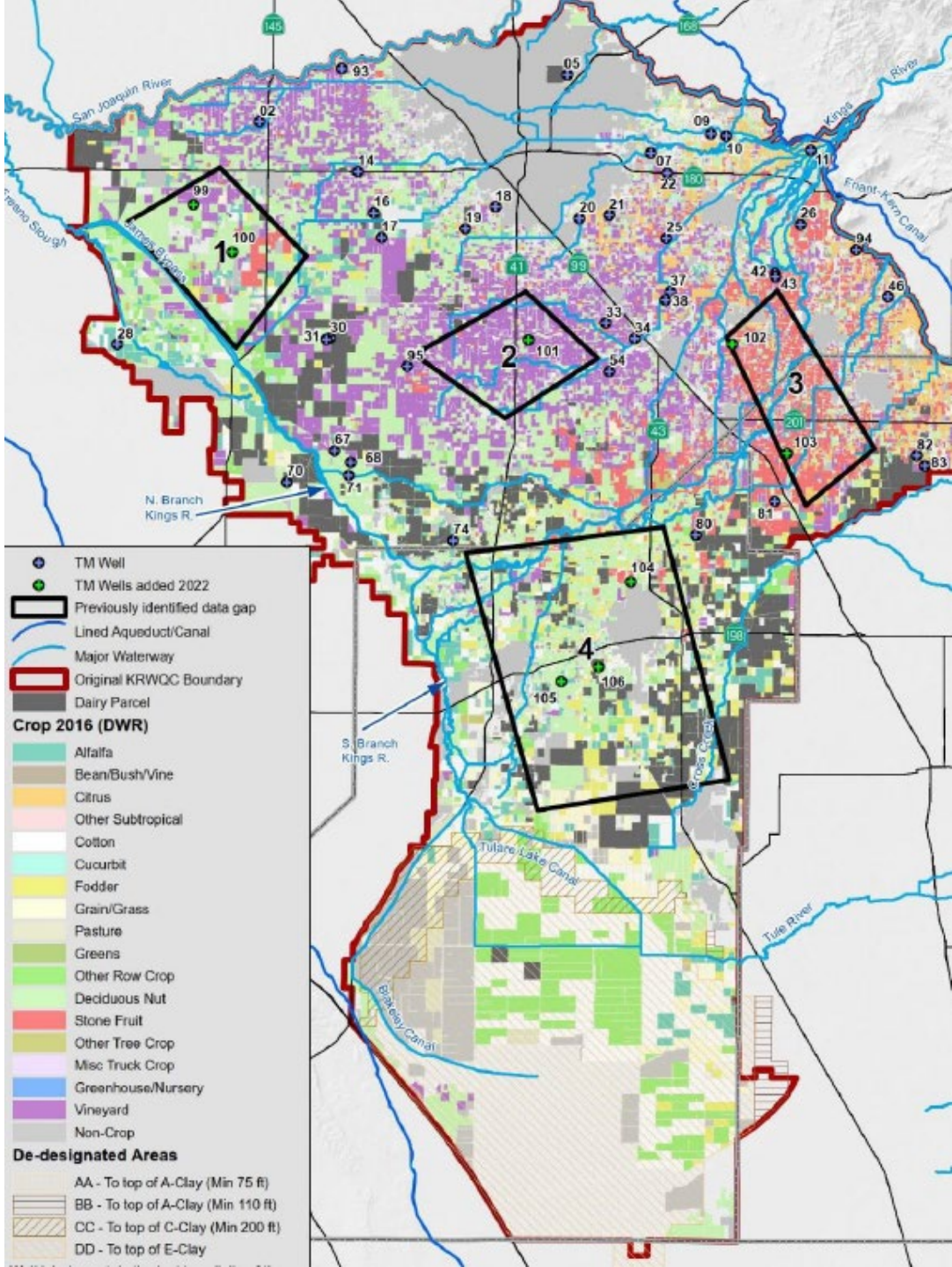
KRWQC Activities

- Surface Water Monitoring
  - 5 of 8 Surface Water Sites Monitored in 2022
- Exceedances
  - Dissolved Oxygen
  - pH
  - E.Coli
- Triggered Management Plan
  - Empire Weir #2: pH



KRWQC Activities

- Groundwater Quality Trend Monitoring
  - Network of 48 upper aquifer wells
  - Samples collected June/July/August of each year
- Workplan Methodology Update
  - Additional cooperators may be needed
  - Requirements
    - Well Construction Report
      - Need to know depth and screen locations
    - Not adjacent to non-irrigated ag dischargers



KRWQC Activities

- State Water Resources Control Board Fees
  - Water Quality Fees for ILRP increased 3.9% for FY 2022 – 2023
- Kings River Water Quality Coalition Fees
  - Reduced per acre fee by 42% for FY 2022- 2023
  - KRWQC Outreach Committee established
    - Coordinate efforts
    - Member participation
    - Quarterly Newsletter

Templates

- One Template submitted for 2022 Crop Year
  - **Irrigation and Nitrogen Management Summary Report**
    - Farm Evaluation and Management Practices Implementation Report if not received in 2021
    - Paper submittals will not be accepted.
- Paper Templates
  - Self-serve available outside KRCD Office (4886 E. Jensen Avenue)
  - Templates Available at www.kingsriverwqc.org/resources/#templates
- One template to start for the 2023
  - Complete Planning Section of INMP Worksheet and Retain On-Farm

Irrigation and Nitrogen Management Plan (INMP) Worksheet

- Applies to All Growers
- Collects Critical Information Regarding Management Practices
  - Crop Age
  - Irrigation Efficiency Practices
  - Nitrogen Efficiency Practices
  - Amount of N applied by Category
  - Yield
- Encourages Growers to Consider All Nitrogen Sources
  - Irrigation Water
  - Compost/Manure
  - Existing Soil Nitrate levels
  - Commercial Fertilizer

Irrigation and Nitrogen Management Plan Worksheet

1. Was this Management Unit Identified as a Statistical Outlier by the Coalition Last Year? (Y/N)					
Crop Year (Harvested): 2023					
Parcel Management					
Management Unit (MU) or Field	APN	County	Crop	Crop Age (years)	Irrigated Acres
Mature Grapes	000-000-000	Fresno	Raisin, Grapes	20	10
Young Grapes	111-111-111	Fresno	Raisin, Grapes	3	20
Young Grapes	222-222-222	Fresno	Raisin, Grapes	3	20
				Total Acres	30

Irrigation and Nitrogen Management Plan Worksheet

- Management Units (MUs)
  - Group your parcels into Management Units (MUs).
  - MUs include fields that are managed in the same way and are grouped together using Management Unit Description, Specific Crop, and Year Planted.

IRRIGATION AND NITROGEN MANAGEMENT PLAN (INMP) WORKSHEET

Member ID: _____ INMP Field or MU: _____ Crop: _____ Total Acres: _____

IRRIGATION MANAGEMENT

1. Irrigation Method*	Pre-Season Planning	
(check one for Primary; if applicable, check one for Secondary) Primary Secondary[1] ❑ ❑ Drip ❑ ❑ Micro Sprinkler ❑ ❑ Furrow ❑ ❑ Sprinkler ❑ ❑ Border Strip ❑ ❑ Flood	2. Crop Evapotranspiration (ET, inches)	
	3. Anticipated Crop Irrigation (inches)	
	4. Irrigation Water N Concentration (ppm or mg/L, as NO_3-N)	

5. Irrigation Efficiency Practices* (Check all that apply)

- ❑ Laser Leveling
- ❑ Use of ET in scheduling irrigations
- ❑ Water application schedule to need
- ❑ Use of moisture probe (e.g. tensiometer)
- ❑ Soil Moisture Neutron Probe
- ❑ Pressure Bomb
- ❑ Other _____
- ❑ Other _____

HARVEST / YIELD INFORMATION				
Harvest / Yield Information			**Expected (A)**	**Actual (B)**
6. Production Unit (lbs, tons, etc.)		**7. Harvested Yield***		

NITROGEN MANAGEMENT			
8. Nitrogen Efficiency Practices* (Check all that apply)	**Nitrogen Sources**	**Recommended/ Planned N (A)**	**Actual N (B)**
☐ Split Fertilizer Applications ☐ Irrigation Water N Testing ☐ Soil Testing ☐ Tissue/Petiole Testing ☐ Fertigation ☐ Foliar N Application ☐ Cover Crops ☐ Variable Rate Applications using GPS ☐ Other: _____ ☐ Other: _____	9. Soil – Available N in Root Zone (Annualized, lbs/ac)		
	10. N in Irrigation Water* (Annualized, lbs/ac)		
	11. Organic Amendments* (Manure/Compost/Other, lbs/ac estimate)		
	12. Dry/Liquid Fertilizer N* (lbs/ac)		
	13. Foliar Fertilizer N* (lbs/ac)		
	14. TOTAL NITROGEN (lbs/ac)		

Irrigation and Nitrogen Management Plan Summary Report

- Applies to all growers
- This is the Data Reported to the Coalition
- Reports N Applied by Category
  - Irrigation Water N Applied
  - Organic Amendments N Content
  - Dry/Liquid Fertilizers
  - Foliar Fertilizers
- Yield + Production Unit Used
  - In your yield units/acre (lbs, tons, boxes, bins, bales, etc.)
- Yield Info (Non-Bearing, Crop Not Harvested, Type of Harvest (silage, grain).

ILRP PARCEL AND FIELD INVENTORY

STEP 1: GENERAL INFORMATION

Member ID: _____ Crop Year (harvested): _____

Name: _____

STEP 2: FIELD AND PARCEL INVENTORY

Populate the following table with parcels for which the INMP Summary Report is being submitted. You can define a field or a "Management Unit" as a parcel or parcels with the same crop, fertilizer inputs, irrigation management practices, and nitrogen management practices.

<u>If you do not apply nitrogen fertilizer to your fields these forms are still required to be returned. Please enter a 0 (zero) for nitrogen applied on the INMP Summary Report.</u>

Field ID or Management Unit (MU)	Not Farmed*	APN	County	Crop	Crop Age *(Perennial only)*	Irrigated Acres
	☐					
	☐					
	☐					
	☐					
	☐					

IRRIGATION AND NITROGEN MANAGEMENT PLAN (INMP) SUMMARY REPORT

Refer to your Irrigation and Nitrogen Management Plan (INMP) Worksheet and Parcel Inventory for information to complete an INMP Summary. Report for each field or Management Unit.

STEP 1: GENERAL INFORMATION	STEP 2: OUTLIER NOTIFICATION RECEIPT	STEP 3: INMP CERTIFICATION METHOD
Member ID: _____ Forms Completed By: _____ Crop Year (Harvested): _____ Submittal Date: _____	On (Date) _____, the Coalition provided information about this membership's nitrogen efficiency for the previous crop year and identified management units that were considered outliers compared to other Coalition members growing the same crop. Please check the box below if you were identified as an outlier by the Coalition. ☐	☐ Certified INMP Specialist (e.g. certified crop adviser who has completed the CDFA training program) ☐ Self-Certified (CDFA training program) ☐ Self-Certified (follows NRCS or UC Cooperative Extension site-specific recommendations) ☐ Self-Certified (No fertilizers applied)

STEP 4: INMP SUMMARY REPORT

Complete the table below for each field or management unit for this membership. ***All values should be on a per acre basis.***

Field or Management Unit	Crop	Crop Age	Total Irrigated Acres	Total N Applied Lbs/acre				Yield	Prod. Unit	Yield Info*
Refer to Parcel Inventory		Perennial only (years)	(acres)	N in Irrigation Water (lbs/acre)	Organic Amendments (lbs/acre)	Dry/Liquid Fertilizers (lbs/acre)	Foliar Fertilizers (lbs/acre)	Harvested Yield (lbs/acre or tons/acre)	(lbs or tons)	

***Use this column to provide information about yield i.e. nonbearing; crop not harvested; type of harvest (e.g. silage, grain). If you harvest straw, please contact your Coalition.**

IRRIGATION & NITROGEN MANAGEMENT PRACTICES

Complete the following tables for each field or Management Unit (refer to ILRP Parcel and Field Inventory Sheet).

Field or MU	Primary Irrigation Method (Select one)						Secondary Irrigation Method (Select one)					
	Drip	Micro Sprinkler	Furrow	Sprinkler	Border Strip	Flood	Drip	Micro Sprinkler	Furrow	Sprinkler	Border Strip	Flood
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	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Field or MU	Irrigation Efficiency Practices (Check all that apply)						
	Laser Leveling	Use of ET in scheduling irrigations	Water application scheduled to need	Use of moisture probe (e.g. tensiometer)	Soil Moisture Neutron Probe	Pressure Bomb	Other
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Field or MU	Nitrogen Efficiency Practices (Check all that apply)								
	Split Fertilizer Applications	Irrigation Water N Testing	Soil Testing	Tissue/ Petiole Testing	Fertigation	Foliar N Application	Cover Crops	Variable Rate Applications using GPS	Other
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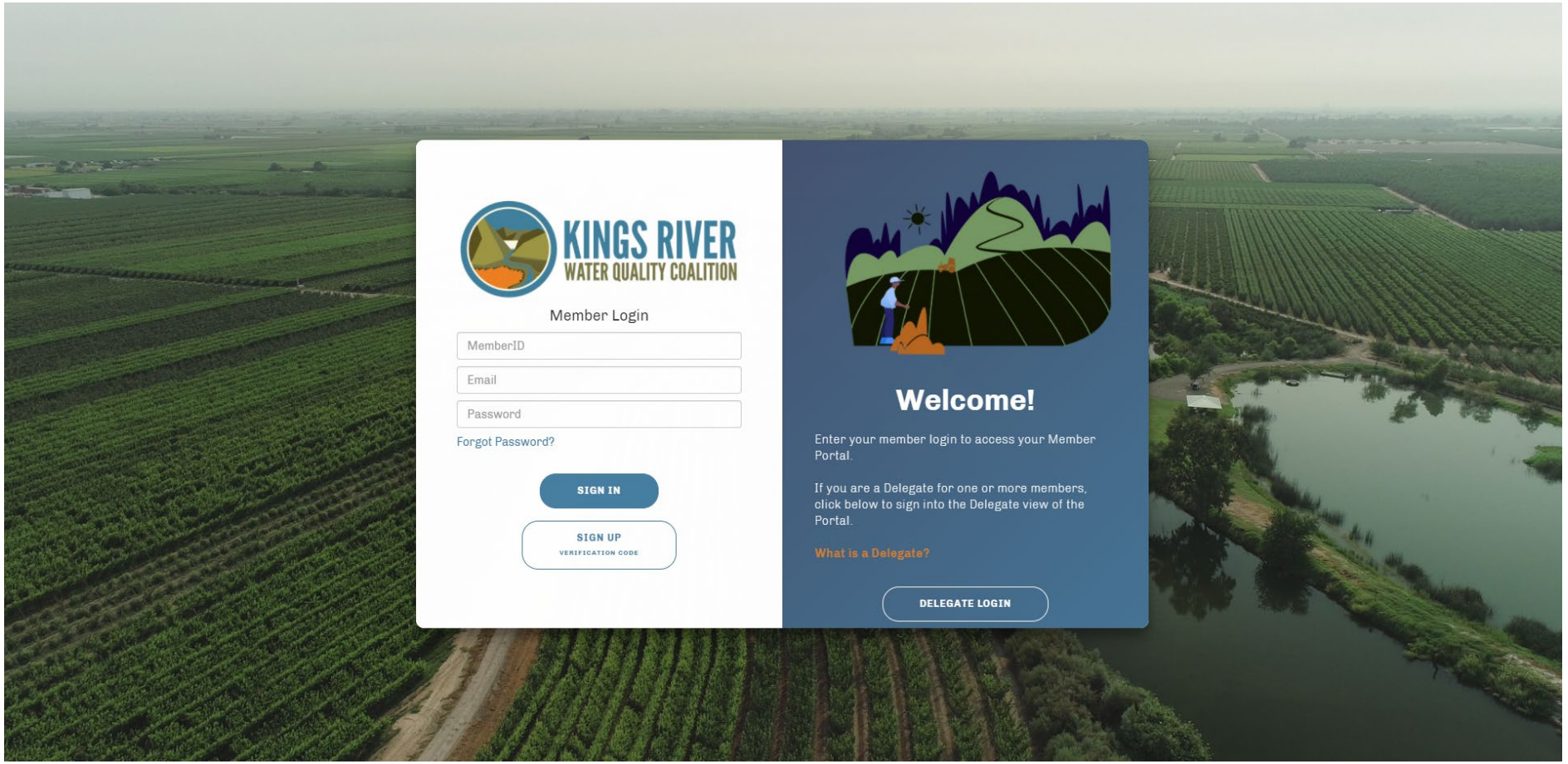
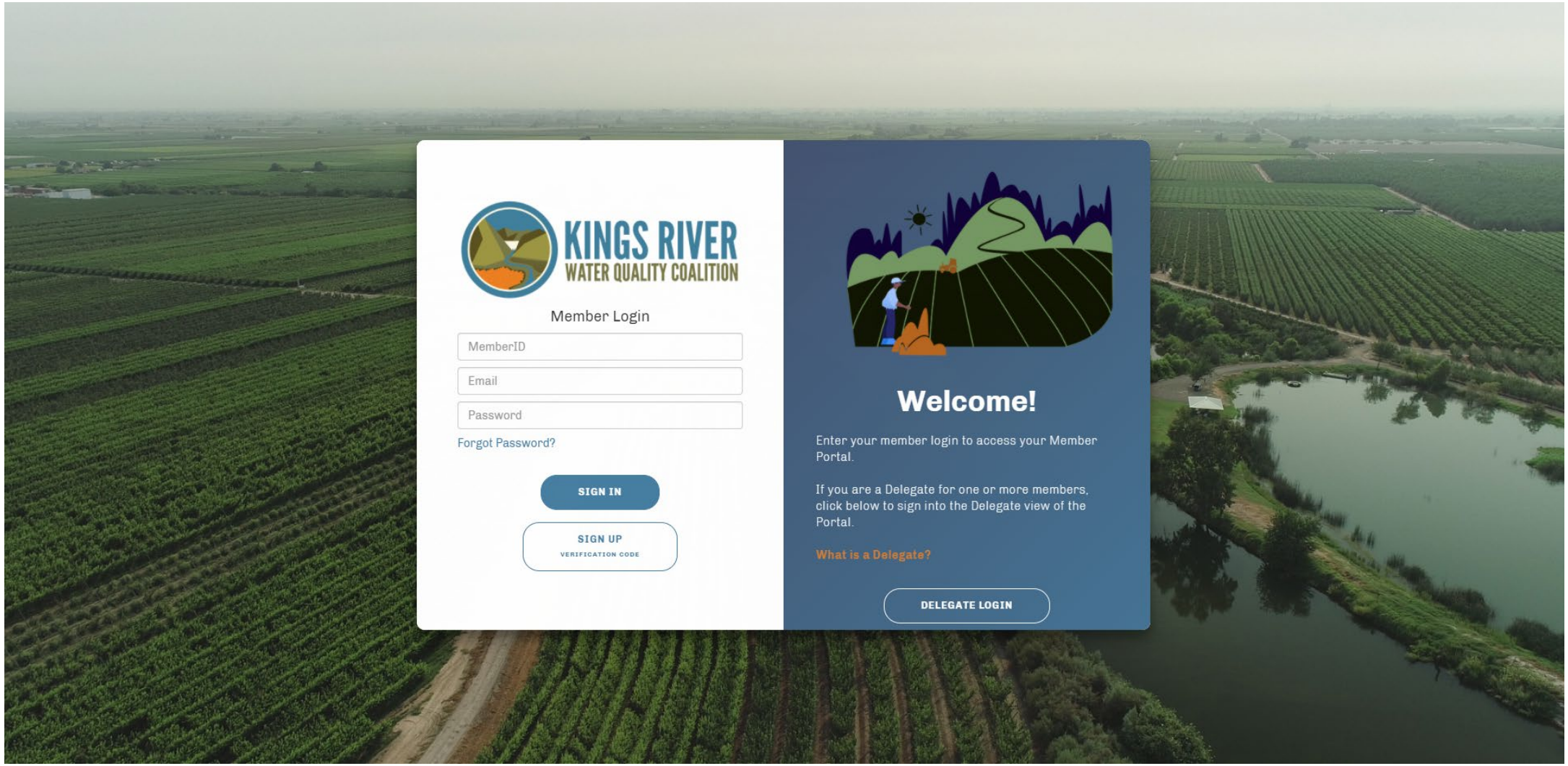
KRWQC Member Portal

Member Login

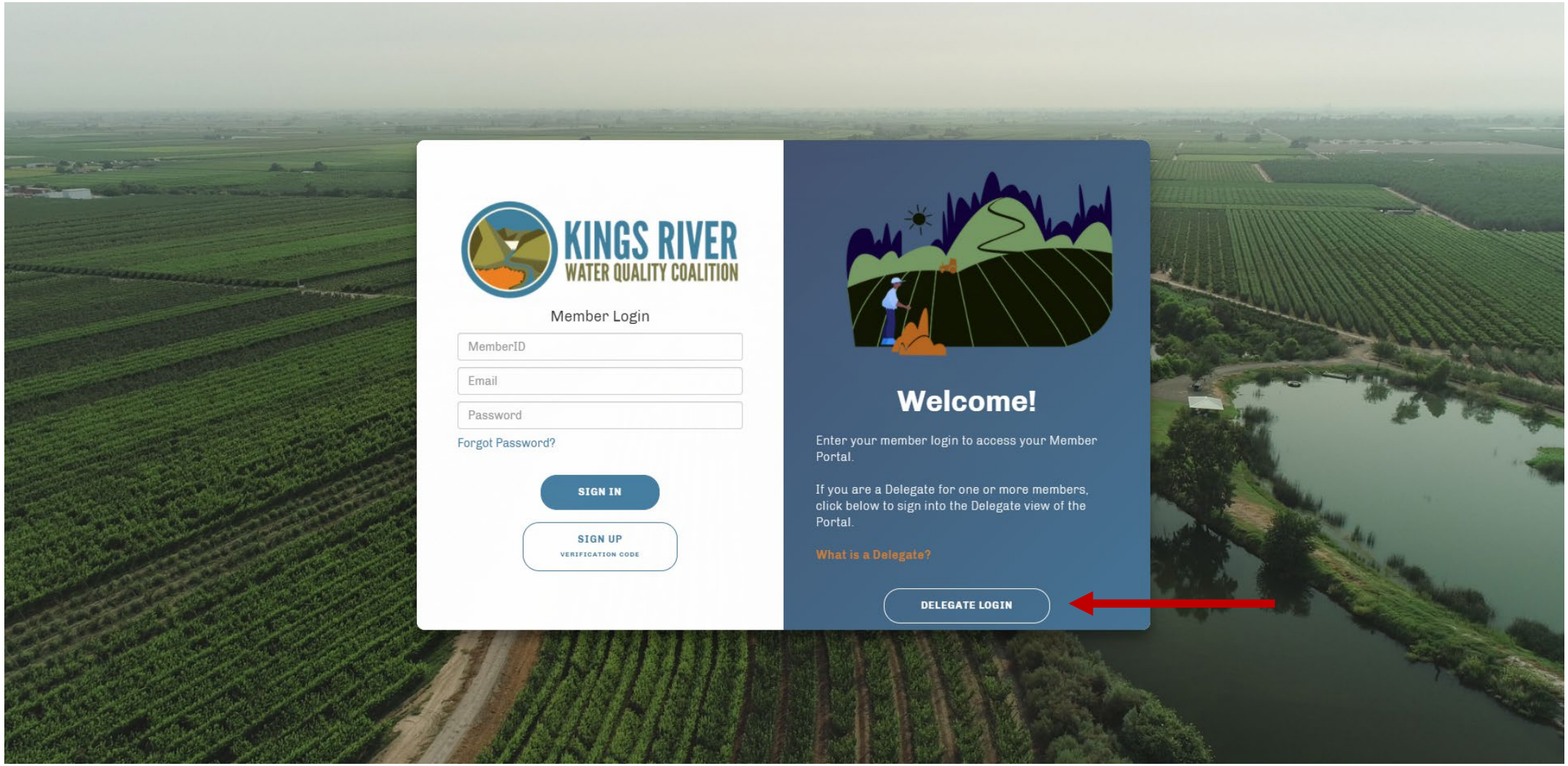
http://kingsriverwqc.org/account



Logging In


KINGS RIVER
WATER QUALITY COALITION
Member Login
MemberID
Email
Password
Forgot Password?
SIGN IN
SIGN UP
VERIFICATION CODE
Welcome!
Enter your member login to access your Member Portal.
If you are a Delegate for one or more members, click below to sign into the Delegate view of the Portal.
What is a Delegate?
DELEGATE LOGIN

Delegate Login



Delegate Login

KINGS RIVER
WATER QUALITY COALITION

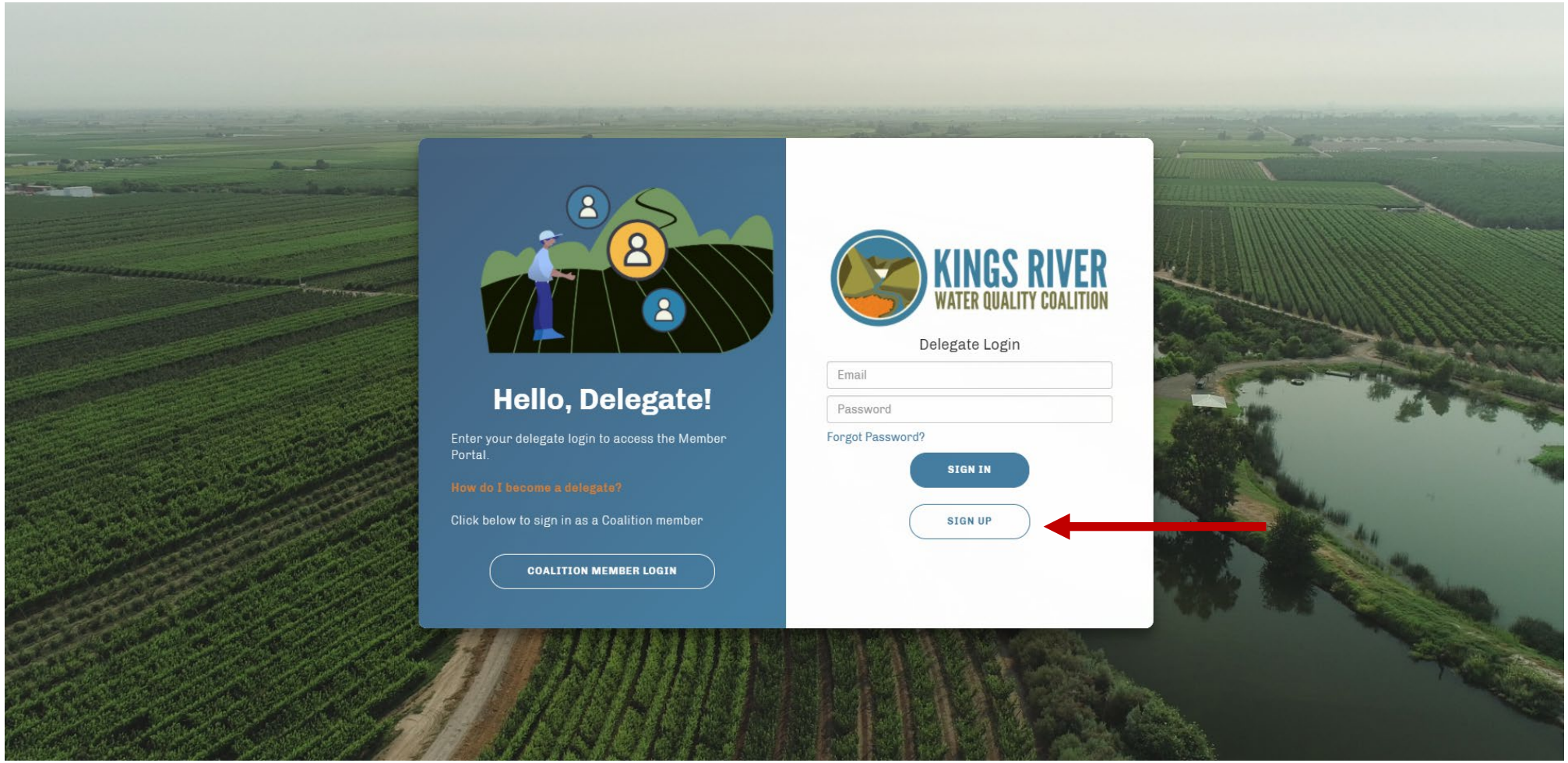
WHO IS A DELEGATE?

A DELEGATE is a person delegated the responsibility of turning in surveys for a member.
Each member can have ONE delegate per survey type. Memberships with multiple growers should take steps to consolidate survey information to allow for all responses to be submitted at one time.

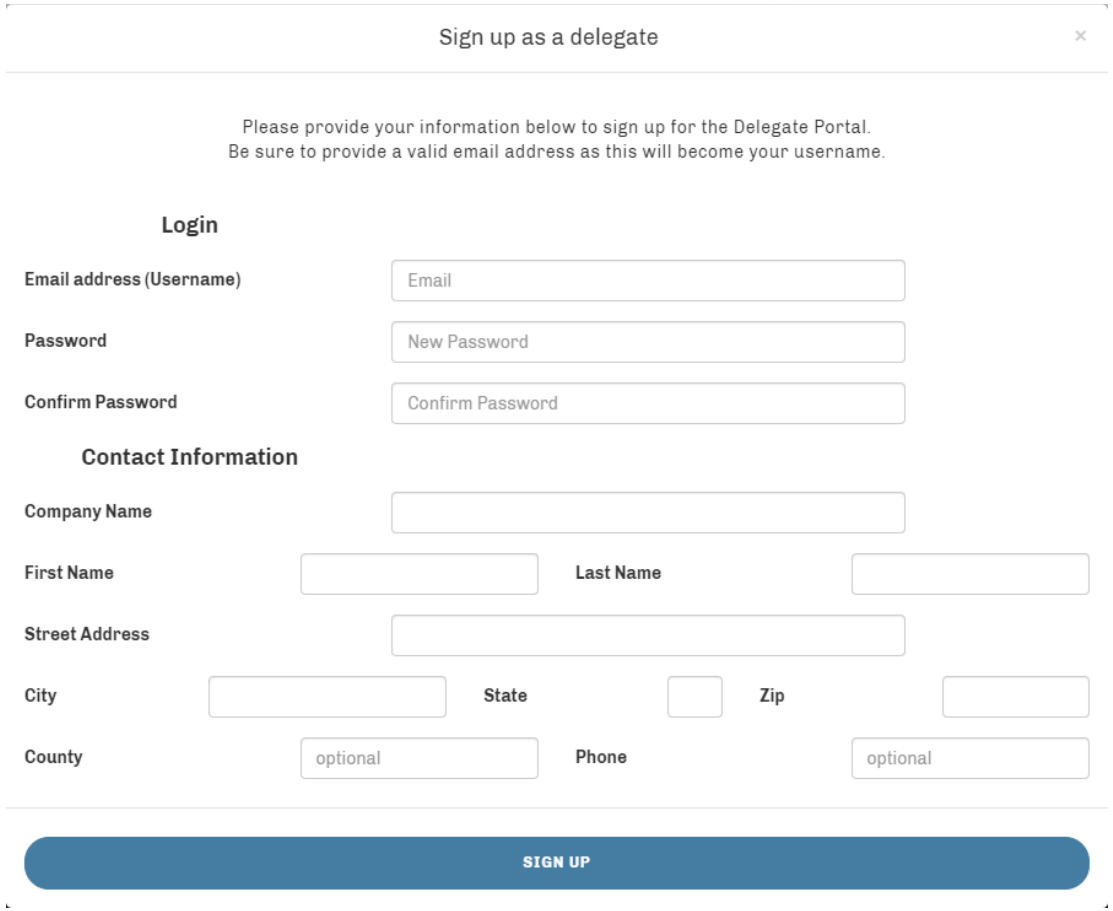
WHY ARE THERE TWO OPTIONS FOR LOGGING INTO THE PORTAL?

Logging in as a MEMBER gives you full access to all information for one membership.
Logging in as a DELEGATE allows you to view information for multiple memberships on one screen. Members grant Delegates permission to access all or some of their information.

Delegate Sign Up



Sign Up As a Delegate



- Once a delegate signs up, they can log-in and request permission to manage memberships.
- The request will be sent to the member's email to approve, if one is on file.
- If the member does not have an email on file, the request will go to the Coalition and the Coalition will contact the member for approval.

Nitrogen Evaluation

Nitrogen Evaluation

- Analysis of INMP Grower Reported Data
  - Previous crop year summary was mailed out November/December of 2022. Full Nitrogen Evaluation are available on the KRWQC Member Portal under "Nitrogen Evaluation"
- Compares Your Reported Data to Coalition-wide Data for the Same Crop
- Used to Calculate 3-Year Outlier Values
  - Based Upon Applied/Removed Ratio
- Allows Analysis of Risk Based upon Applied-Removed Metric
  - **Unused Applied N** is What is at Risk of Leaching to Groundwater
- Each Feedback Report is Specific to Each Grower
  - Analysis is Private, Only the Member Receives this Analysis
- Those Identified as Outliers May be Required to Complete Additional Outreach/Plan Certification, Regardless of Vulnerability Designation

Section 2: Outlier Analysis

3-Year Nitrogen Use Evaluation for CORN, SILAGE

The Coalition calculates and reports on the pounds of nitrogen applied divided by the pounds of nitrogen removed (A/R ratio). The A/R ratio is a representation and measure of agronomic efficiency. For example, values near or equal to one indicate the amount of nitrogen applied is the same as the amount of nitrogen removed as harvested yield (and stored in wood in perennial crops). Furthermore, an A/R ratio of two indicates that twice as much nitrogen was applied than removed by the crop.

To take into account year to year crop variability, the Coalition determines outliers based on the most recent three years of reported data. An analysis was conducted on your parcel(s) and is provided below.

Table 1. 3-Year calculation of data reported per parcel.

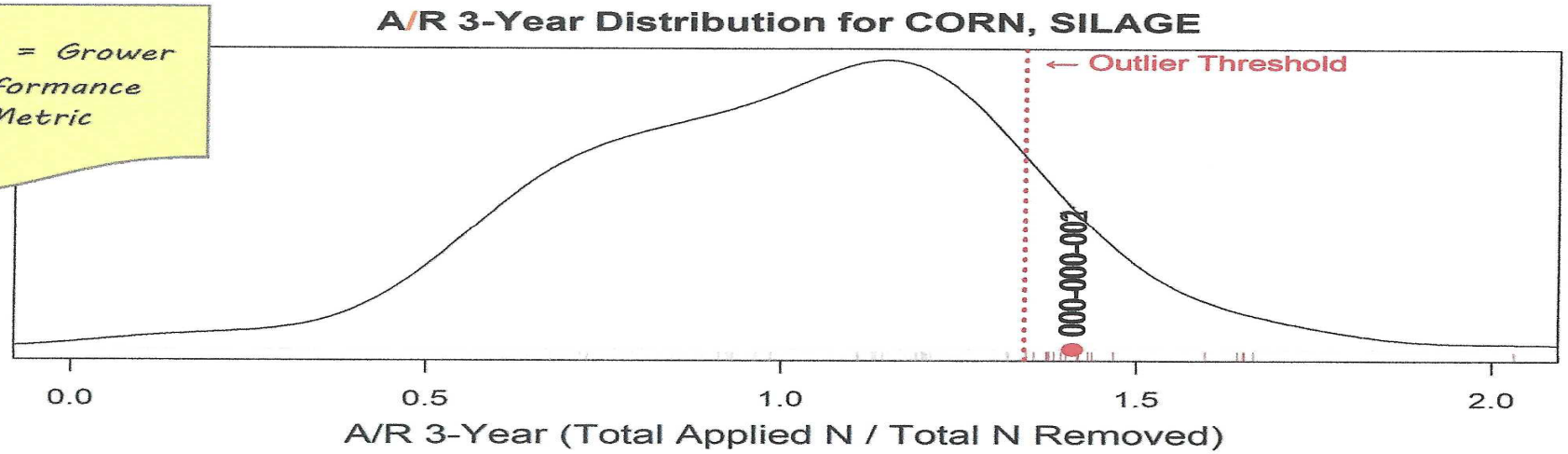
Assessor's Parcel Number	APN County	Crop Age	3-Year Applied-N/ Removed-R	3-Year Outlier Threshold	3-Year Total Applied-N (pounds/acre)	3-Year Removed-N (pounds/acre)	3_Year Applied-N minus Removed-N
APN	**County**	**Age**	**A/R**	**Outlier A/R**	**A**	**R***	**A - R**
000-000-001	Merced	>4	1.41	1.34	1185	842	343
000-000-002	Merced	>4	1.41	1.34	1185	842	343

* R estimates are based on the assumption that nitrogen removed at harvest for CORN, SILAGE is 0.00378 lbs N/lbs @ 70% moisture.

How Do Your Management Units Compare To All Other CORN, SILAGE Growers?

72 Coalition members reported on **152 parcels with 3 years of A/R data.**
Median A/R = **1.08**
Median A-R =**37.1**
Median A = **700.00**

A/R = Grower Performance Metric



Section 2: Outlier Analysis

3-Year Nitrogen Use Evaluation for WALNUTS

The Coalition calculates and reports on the pounds of nitrogen applied divided by the pounds of nitrogen removed (A/R ratio). The A/R ratio is a representation and measure of agronomic efficiency. For example, values near or equal to one indicate the amount of nitrogen applied is the same as the amount of nitrogen removed as harvested yield (and stored in wood in perennial crops). Furthermore, an A/R ratio of two indicates that twice as much nitrogen was applied than removed by the crop.

To take into account year to year crop variability, the Coalition determines outliers based on the most recent three years of reported data. An analysis was conducted on your parcel(s) and is provided below.

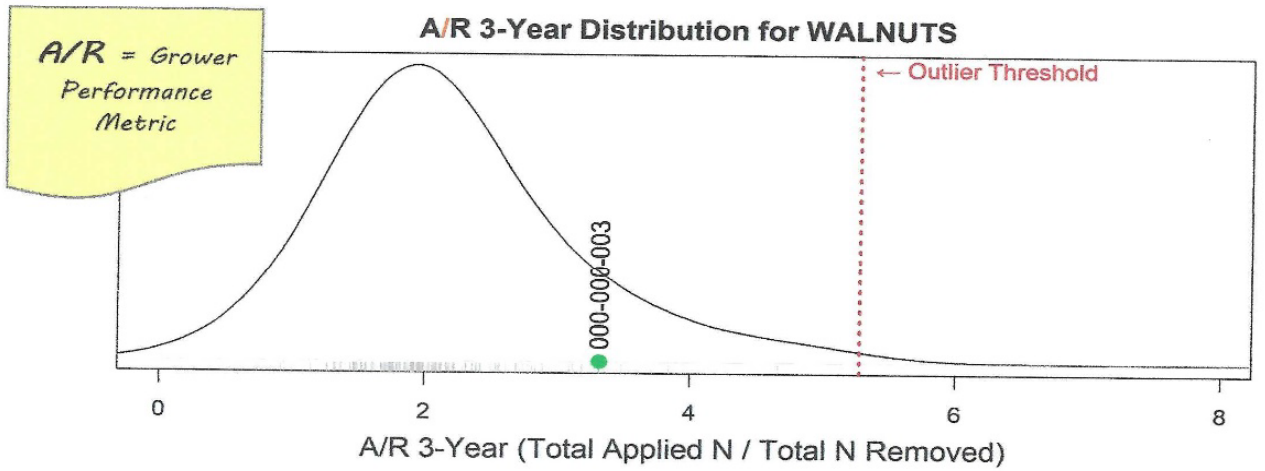
Table 1. 3-Year calculation of data reported per parcel.

Assessor's Parcel Number	APN County	Crop Age	3-Year Applied-N/ Removed-R	3-Year Outlier Threshold	3-Year Total Applied-N (pounds/acre)	3-Year Removed-N (pounds/acre)	3_Year Applied-N minus Removed-N
APN	**County**	**Age**	**A/R**	**Outlier A/R**	**A**	**R***	**A - R**
000-000-003	Merced	>4	3.32	5.28	890	268	622

* R estimates are based on the assumption that nitrogen removed at harvest for WALNUTS is 0.01595 lbs N/lbs with shells.

How Do Your Management Units Compare To All Other WALNUTS Growers?

184 Coalition members reported on **378 parcels with 3 years of A/R data.**
Median A/R = **2.005**
Median A-R =**210.15**
Median A = **439.22**



Protective Practices for Groundwater

- Goals
  - Encourage Efficient Management Practices
    - Irrigation Management
    - Nitrogen Management
  - Encourage Wellhead Protection
    - Active Wells
    - Inactive Wells
  - Encourage Proper Destruction of Abandoned Wells

Protective Practices: Irrigation Management

- Be smart with your irrigations
- Crop water use is weather dependent
  - Crop water use increases during season until peak, then declines
  - Knowledge of soil moisture levels critical (Know Your Soil!)
  - Proper irrigation management provides the right amount of water to crop at right time
    - Apply at rates that soil can absorb without runoff
    - Maintain pore space for oxygen for healthy roots
    - Manages vegetative growth-fruiting growth balance
    - Influences crop quality
  - Excess irrigation leaches nutrients below rootzone
    - Beneficial if salt control is goal
    - Major problem if nitrogen is lost
    - Uniformity of Application is critical
- Use Irrigation Scheduling Information for Current Crop Water Use
  - KRCD AgLine www.krcd.org/agline/ or other

Protective Practices: Nitrogen Management

- Use the Four "R"s
  - Right Material
  - Right Place
  - Right Time
  - Right Amount
- Example
  - Wrong Material at Wrong Time
    - Nitrate Heavy fertilizer before heavy rains in Winter
      - Roots are not actively absorbing nutrients
      - No plant need as crop is dormant
      - Material is leached out of rootzone
  - Right Material at Right Time
    - Crop Actively growing
    - Soil Moisture decreasing
    - Applied Material is rapidly taken up as crop needs water, nutrients

Protective Practices: Nitrogen Management

- Use the Four "R"s
  - Right Material
  - Right Place
  - Right Time
  - Right Amount
- Example
  - Wrong Place
    - Fertilizer Placed beyond rootzone
    - Fertilizer Placed on surface, losses from volatilization
  - Wrong Amount
    - Application of More N than Crop can Uptake
      - Split Applications (aka "Spoon Feeding") better approach
    - Application of More than Crop Need based on N Removed
      - Some excess is required to ensure proper uptake, but keep to minimum
      - Review (A minus R) value on Nitrogen Feedback Report
      - Risk of Increased Pest Pressure when over fertilized

Protective Practices: Nitrogen Management

- Know Your Input Levels
  - N in Irrigation Water
    - ***FREE*** Fertilizer
    - Can be Significant Source
  - Correct N Applied via Fertilizer Type
  - Correct Assumptions on Manure/Compost N content
- Review Nitrogen Feedback Reports
    - Updated Research on N content within Yield
    - Match N Input with Amount Removed
      - Add some extra for known losses, need for surplus in soil
- Use Cover Crops
- Use Minimum Tillage
  - Increased Organic Matter ties up excess N in soil

Protective Practices: Wellhead Protection

- Good Housekeeping Practices for Active and Inactive Wells
  - Keep Area Around Well Clean
  - Store Agricultural Materials Away from Well
  - Eliminate any Standing Water near wellhead
  - Make Sure any Backflow Prevention Devices are Operational
  - Cover any openings to well casing
- Abandoned Wells
  - Keep area around well clear
  - Place Secure Cover on Well
  - Arrange for Licensed, Professional Destruction
- Wells are Direct Conduits to Groundwater—What happens at the Surface can Impact Groundwater Quality

Questions and Contact Information

- Questions
- Slides Available at: https://kingsriverwqc.org/workshops/
- Contact Information
  - Website: http://kingsriverwqc.org/
  - Email: info@kingsriverwqc.org
  - Phone: 559.365.7958
  - Virtual Appointment: https://kingsriverwqc.org/virtualappointment

INMP Resources

Irrigation and Nitrogen Management Plan

- **Box 10**: N in Irrigation Water
  - Take Nitrate-N (in ppm) and perform the following calculation:
  - **ppm Nitrate-N x 0.227 x Annual Crop Water Use (ET, inches) = lbs N/ac**
  - Example: **10 ppm Nitrate-N x 0.227 x 30 inches = 68.1 lbs N/Ac**
  - **ppm = mg/L**
  - Online Calculator Available
    - https://agmpep.com/calc-irrn/
  - This Calculator Will Do the Following:
    - Convert ppm Nitrate-N to lbs N/ac Applied IF You Have ppm and Crop Water Use
    - Will Adjust If You Blend Two Sources (Groundwater + Surface Water, Well 1 + Well 2)
      - Must Know Split Between Sources
      - Must Know Nitrate-N ppm for Each Source

Irrigation and Nitrogen Management Plan

- **Box 11**: Organic Amendments (Manure, Compost)
  - Content is Highly Variable
  - Assuming 25 lbs Total N/ton and 3 lbs/Ton Ammonium-N, net content is 22 lbs Available Organic N/Ton
  - 17.5% of Available Organic N will be Available During Summer*
    - Assumes Immediate Incorporation into Soil after Application
  - **Final Available N = 3 lbs/Ton Ammonium-N + (17.5% x 22 lbs/Ton Organic N) = 6.9 lbs N/Ton of Manure as Plant Available Nitrogen (PAN)**
  - Remaining N Available for Soil Biota During Fall, Winter
    - Likely Gone by Next Spring
  - *UC Davis data

Irrigation and Nitrogen Management Plan

- **Box 12**: Dry/Liquid Fertilizer N
- Proper Conversion of Product Required
  - Dry Product: Multiply Weight of Dry Product by Guaranteed Analysis Percentage
    - Example: 11-52-0 contains 11% N by weight.
    - **200 lbs/ac x 11% = 22 lbs N/ac applied**
  - Liquid Product: Convert Gallons Applied to lbs N Applied. This Information Should be on the Product Label.
    - Example: 1 gallon of UN-32 Weighs 11 lbs/gal. As the Analysis is 32-0-0, it is 32% N by Weight. Therefore, **1 gallon Contains 11 lbs/gal x 32% = 3.52 lbs N/gal.**
    - The product label may even state the pounds of N per gallon.
- Most Suppliers Provide Total Delivered on Invoice. Convert as Necessary to lbs Product/ac and then lbs N/ac
- Foliar N Handled the Same Way

Irrigation and Nitrogen Management Plan

- Supporting Information Available
- Crop Water Use
  - Coalition to Publish 10-Year Average Crop Water Use Values Each January
  - 10-Year Average Eliminates Yearly Variations
  - Use Value in Calculation of Nitrogen Uptake from Irrigation Water
  - http://kingsriverwqc.org/wp-content/uploads/2022/01/10-yr-crop-water-use-2012-2021.pdf

- Anticipated Crop Irrigation
  - Take Average Crop Water Use and Factor in Inefficiencies in Irrigation System
    - Drip/Micro Systems Typically 80% Distribution Uniformity (DU)
      - Higher if Newer, Well Maintained
      - Low DU means excess irrigation in majority of field
    - Surface Systems (Furrow, Basin Flood) Typical DU of 65%
      - Assumes Short Runs, Leveled Ground
    - Include Any Water Applied Specifically to Leach Salts
    - Include Rainfall (estimate)