Item 3 LATE ADDITION

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

MEETING OF MAY 16-17, 2018
BISHOP

ITEM 3
OVERVIEW PROPOSED SCOPE OF WORK AND DEVELOPMENT OF A SALT AND NUTRIENT MANAGEMENT PLAN, FREMONT BASIN REGIONAL WATER MANAGEMENT GROUP

********Please insert after Bates Stamp**

ENCLOSURE	ITEM	BATES NUMBER
2	Fremont RWMG presentation	**3-12**

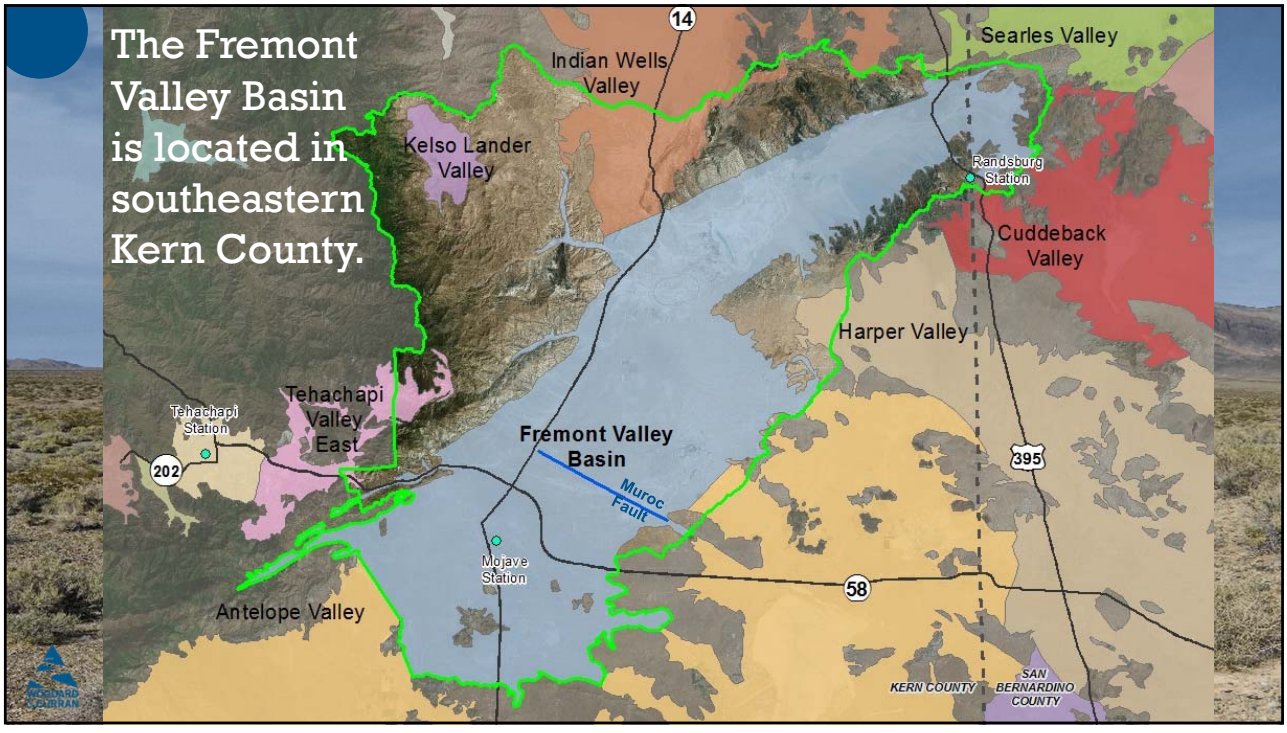
ENCLOSURE 2

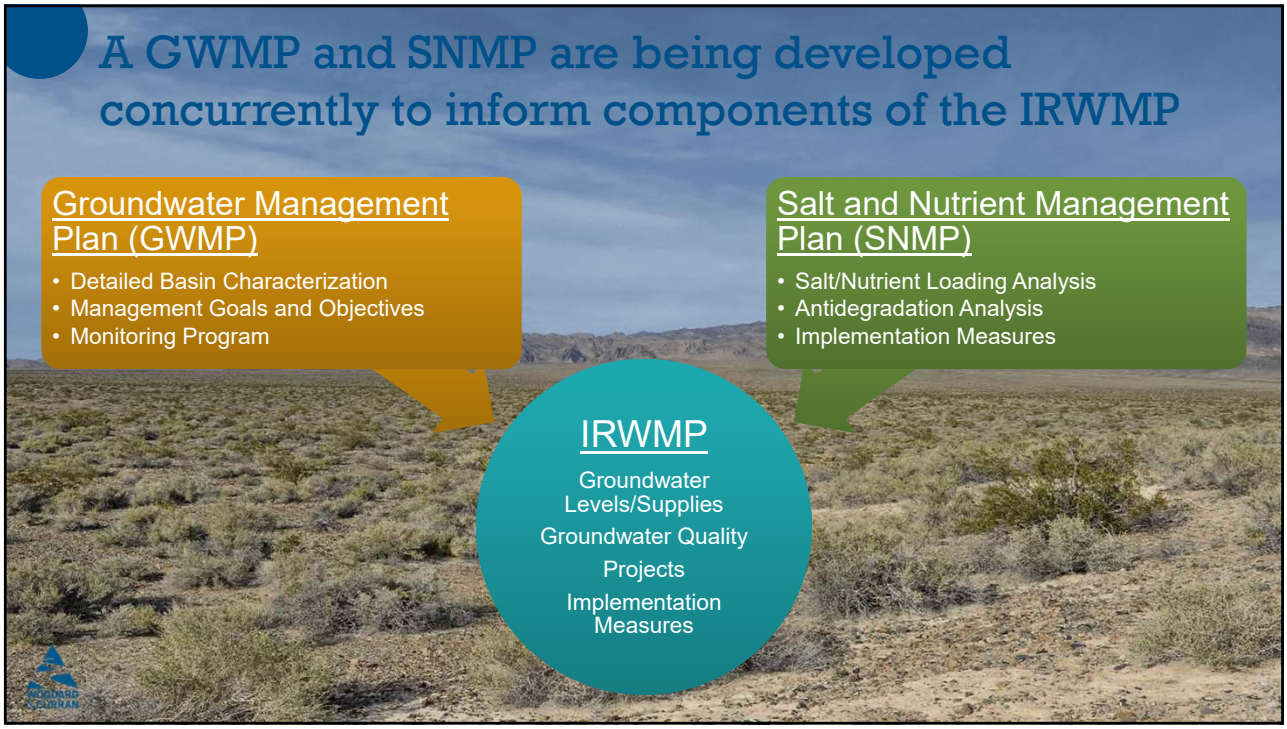

Fremont Basin IRWM Region
Salt and Nutrient Management Plan
Meeting with the Lahontan RWQCB
City of Bishop, City Council Chambers
377 West Line Street
Presenters:
Brian Dietrick, P.E.
Brenda Ponton
May 16, 2018
WOODARD &CURRAN

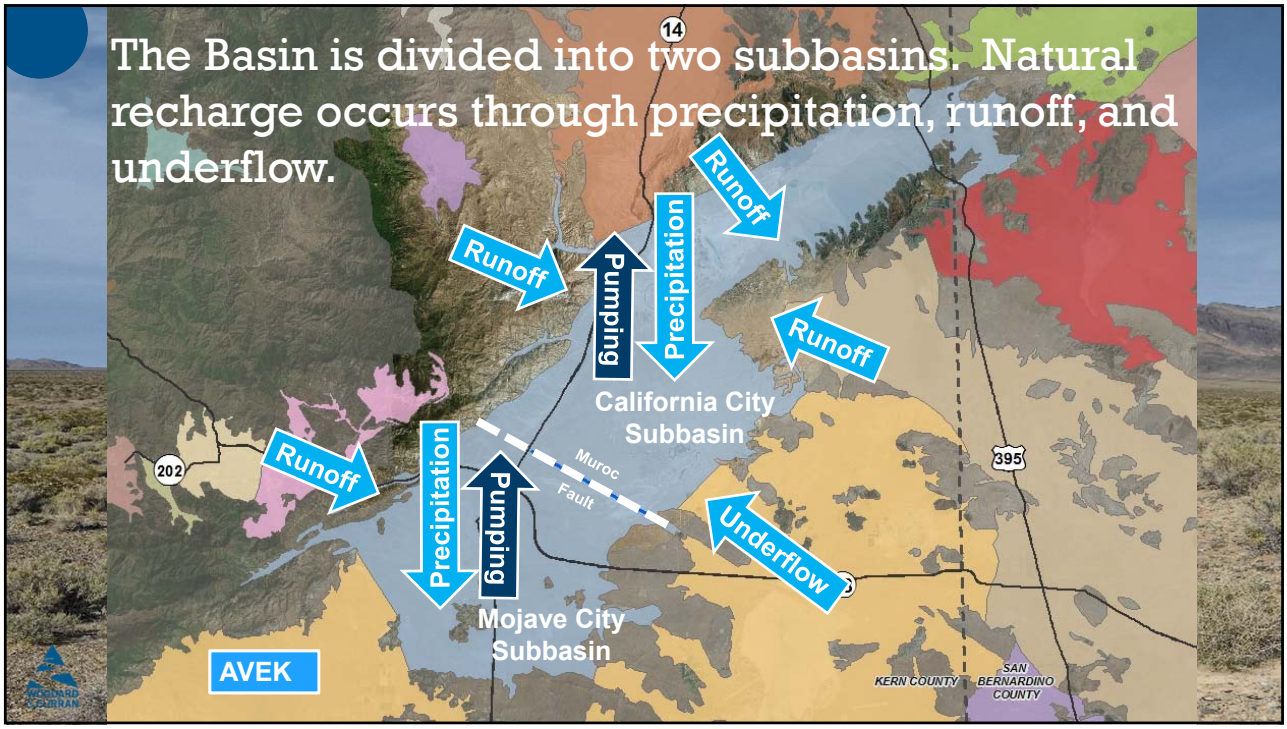

Meeting Agenda
Introductions
Key Issues for RWQCB
Role of SNMP in IRWM
Basin hydrogeology
Baseline Water Quality
Data Sources
S/N Loadings
Model Methodology
Key Assumptions
Anti-Degradation Analysis
Performance Monitoring Plan
Schedule

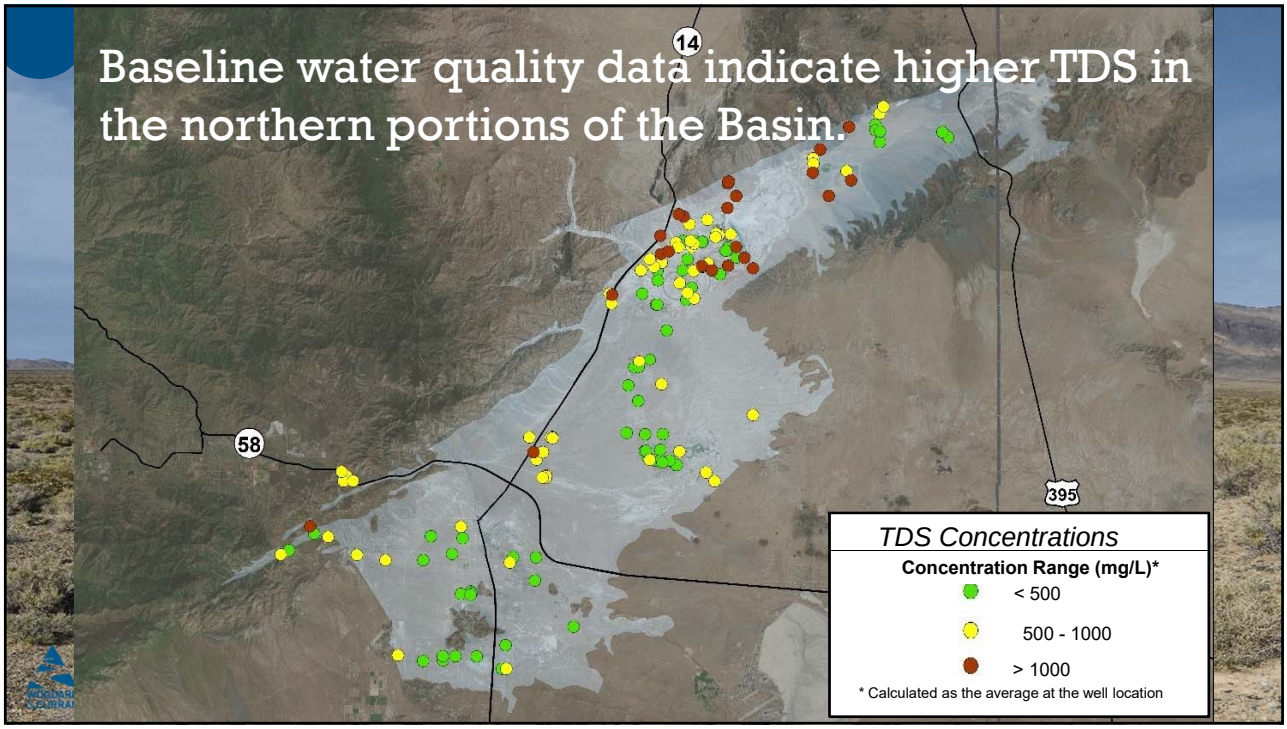
Key Issues for RWQCB Input

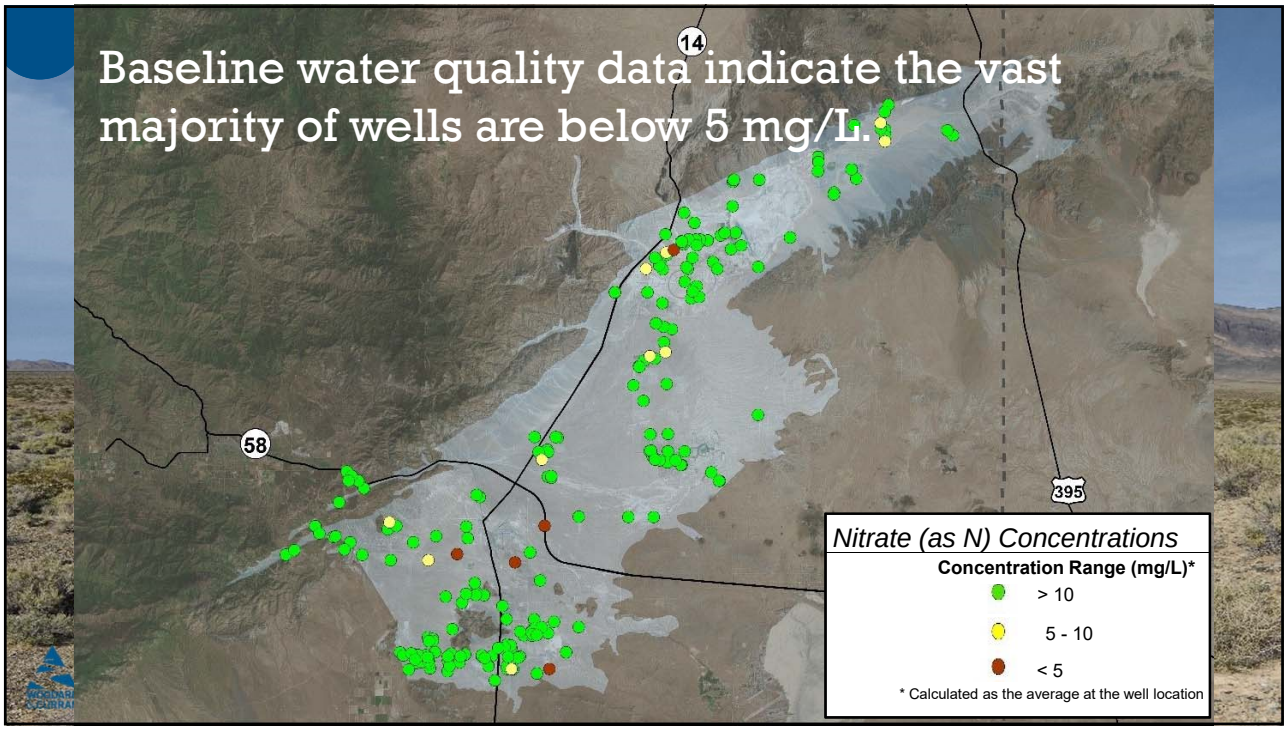
- Planning horizon (e.g., 20 yrs., 25 yrs.)
- Modeling approach
- Key assumptions (land use, source water, etc.)
- Future loading scenarios
- Performance Monitoring Plan
  - well distribution
  - Monitoring frequency
- Incorporating climate change




A GWMP and SNMP are being developed concurrently to inform components of the IRWMP
Groundwater Management Plan (GWMP)
• Detailed Basin Characterization
• Management Goals and Objectives
• Monitoring Program
Salt and Nutrient Management Plan (SNMP)
• Salt/Nutrient Loading Analysis
• Antidegradation Analysis
• Implementation Measures
IRWMP
Groundwater Levels/Supplies
Groundwater Quality
Projects
Implementation Measures


The Basin is divided into two subbasins. Natural recharge occurs through precipitation, runoff, and underflow.
Runoff
Runoff
Pumping
Precipitation
Runoff
California City Subbasin
Runoff
Precipitation
Pumping
Muroc Fault
Underflow
Mojave City Subbasin
AVEK
14
202
395
KERN COUNTY
SAN BERNARDINO COUNTY

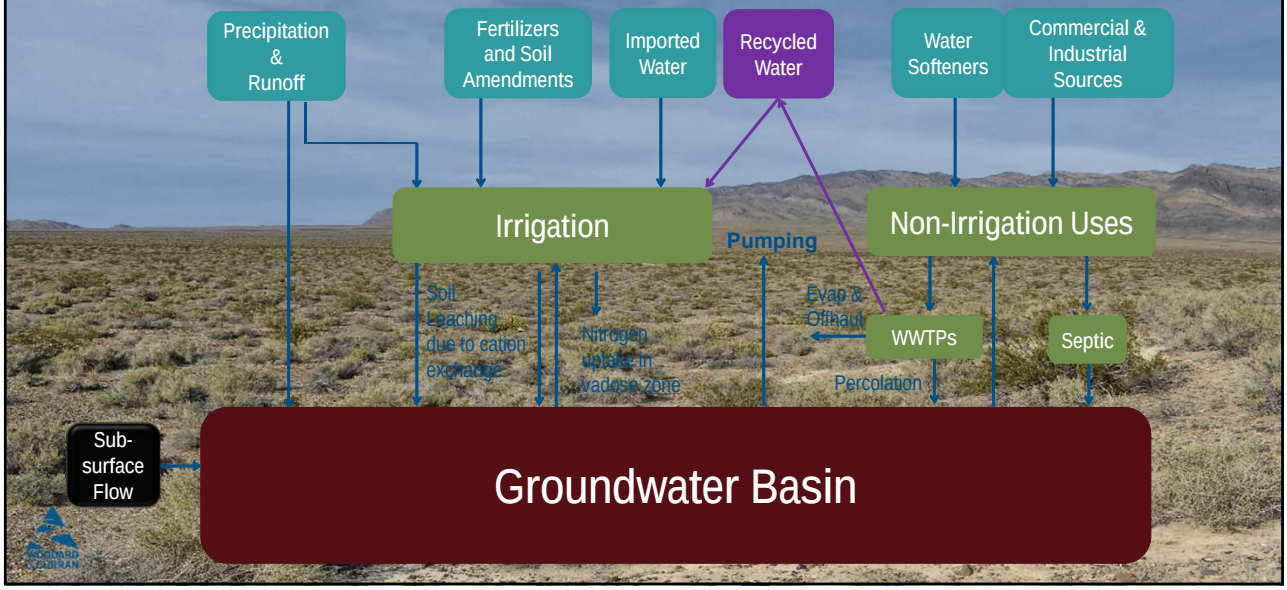

Baseline water quality data indicate higher TDS in the northern portions of the Basin.
14
58
395
TDS Concentrations
Concentration Range (mg/L)*
< 500
500 - 1000
> 1000
* Calculated as the average at the well location


Baseline water quality data indicate the vast majority of wells are below 5 mg/L.
14
58
395
Nitrate (as N) Concentrations
Concentration Range (mg/L)*
> 10
5 - 10
< 5
* Calculated as the average at the well location

Primary Data Sources

- Data request and stakeholder process:
  - Well information (locations, construction data, type etc)
  - Groundwater pumping records
  - Groundwater levels
  - Groundwater quality
  - Land Use (Assessor data, General Plans)
  - Agency water and wastewater quality testing results
  - Wastewater service areas and flows
- Publicly available sources:
  - DWR CASGEM
  - USDA Cropland Data Layer
  - SWRCB GeotrackerGAMA
  - USGS
  - DWR Bulletin 118
- Previous groundwater studies
  - Evaluation of Groundwater Resources in California City, Stetson Engineers Inc., 2008 & 2009

The 2018 SNMP will analyze all salt and nutrient loadings to the groundwater basin.

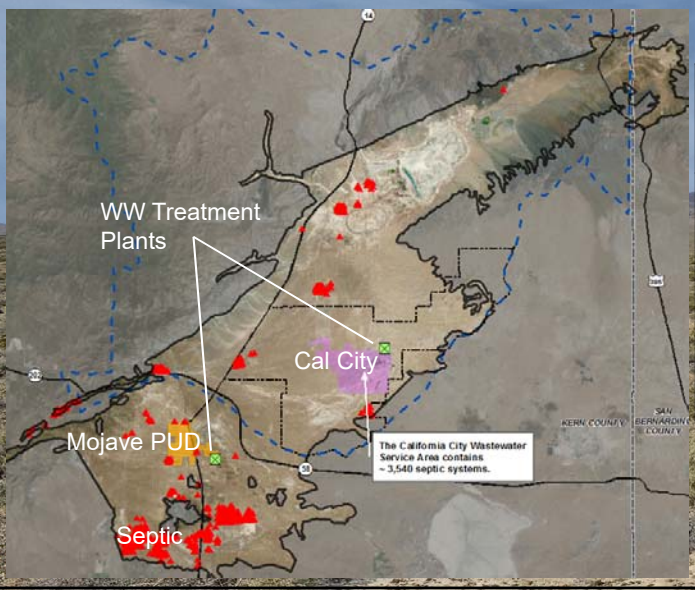


Existing land uses contribute to salt and nutrient loading

Land Uses Category	Crop Type	Acres	% Cultivated / Landscaped[1]	N Application Rates[2] (lbs/acre-yr)
Alfalfa	Alfalfa	64	100	10
Pistachios	Pistachios	95	100	155
Park / Landscape	Turfgrass	308	80	45
Rural Residential / Developed		766	5	
Urban Commercial and Industrial		12,366	5	
Urban CI Low Impervious Surface		180	25	
Urban Residential		4,174	15	
Vacant/non-irrigated	None	586,635	-	-

1. Typical, based on aerial review of land use categories
2. Based on nationwide average application rates (turfgrass), or California averages (alfalfa and pistachios)

Wastewater from septic systems and WWTP percolation ponds impact water quality in the basin



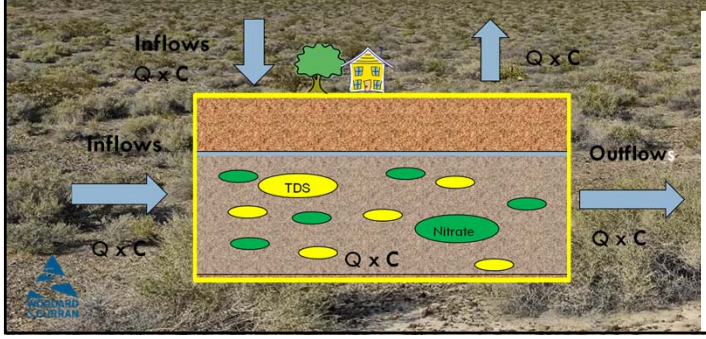
Wastewater Source/Input	Average Effluent Flows (AFY)	Effluent Water Quality	
		TDS (mg/L)	Nitrate-N (mg/L)
California City WWTP	500 AFY	640	3.94
Potential Septic Systems ~ 4,250 total	1,250 AFY	710	30
Mojave Public Utilities District WWTP	All flows are dried in a lined pond and sediment is off-hauled		

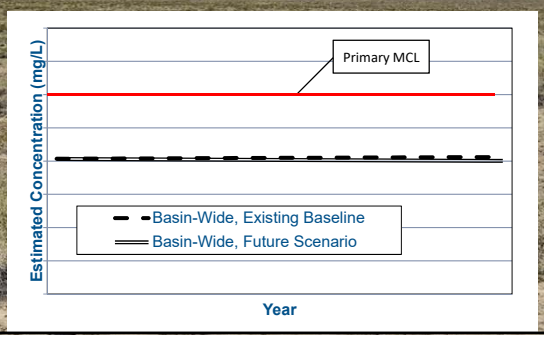
Key Assumptions and Facts:

- **Land-Use Based Assumptions**
  - Land uses assigned to parcels based on assessor categories and aerial review. Each category assigned a percent irrigated based on aerial review of typical parcels of that category
  - Irrigation requirements based on crop salt tolerance
  - Nitrogen uptake efficiency of 70% for alfalfa, pistachios, and turfgrass
  - 10% Nitrogen volatization on nitrogen applied through irrigation/fertigation
  - No significant TDS component in fertilizer
- **Source Water Quality Assumptions**
  - Water suppliers - average of previous 5 years of Consumer Confidence Reports/Drinking Water Quality Reports
  - Outside services areas - average sub-basin water quality has been assumed
- **Wastewater Assumptions**
  - Septic system loads based on 3.5 persons per household and 75 gpd per person
  - TDS and Nitrogen concentrations based on typical values.
  - Septic systems are assumed to occur at any urban parcel outside of wastewater service areas, and
  - 3,540 septic systems within California City (Local Agency Management Program)
  - Mojave PUD collects all wastewater in a lined drying pond and off-hauls to a landfill
  - California City wastewater is used for irrigation of Tierra del Sol Golf Course and maintaining water levels in Central Park Lake. Remaining irrigation water is disposed of through percolation ponds
- **Groundwater Quality Assumptions**
  - Median concentrations estimated based on the last 20 years of data for TDS and nitrate
  - Average subbasin concentrations were assumed to account for spatial variations

An antidegradation analysis (model) estimates how much loading the basin can assimilate

- Baseline from groundwater in storage and existing water quality
- Add TDS and Nitrogen loads from loading analysis
- Calculate annual water quality concentrations using mass balance
- Assume complete mixing, two subbasins, 20-year projections
- Analyze future scenarios





Potential Future Scenarios

INCREASE S/N LOADING

DECREASE S/N LOADING

1.Ag Expansion
1.Light
2.Moderate
3.Heavy

1.Septic Conversions
2.Stormwater Capture
1.Conservative
2.Aggressive

Performance Monitoring Plan: SGMA & CASGEM have similar guidelines

SGMA Draft BMP 2

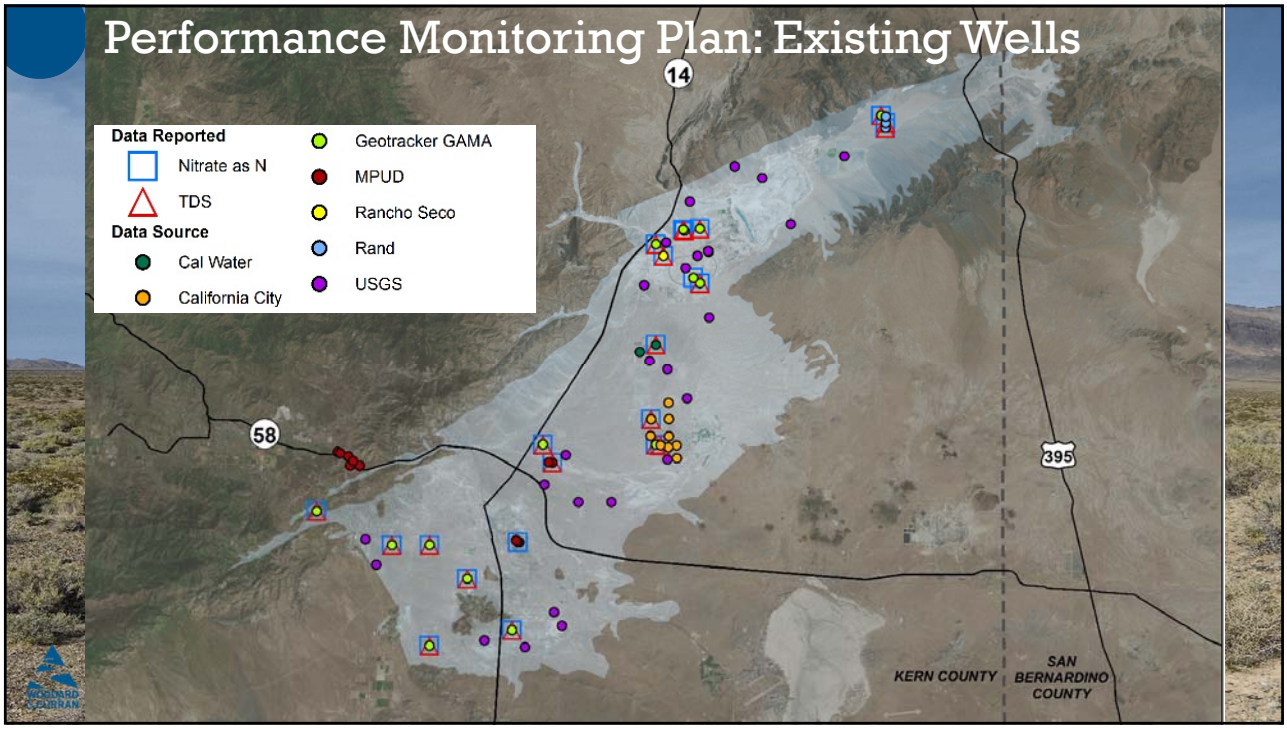
Table 1. Monitoring Well Density Considerations

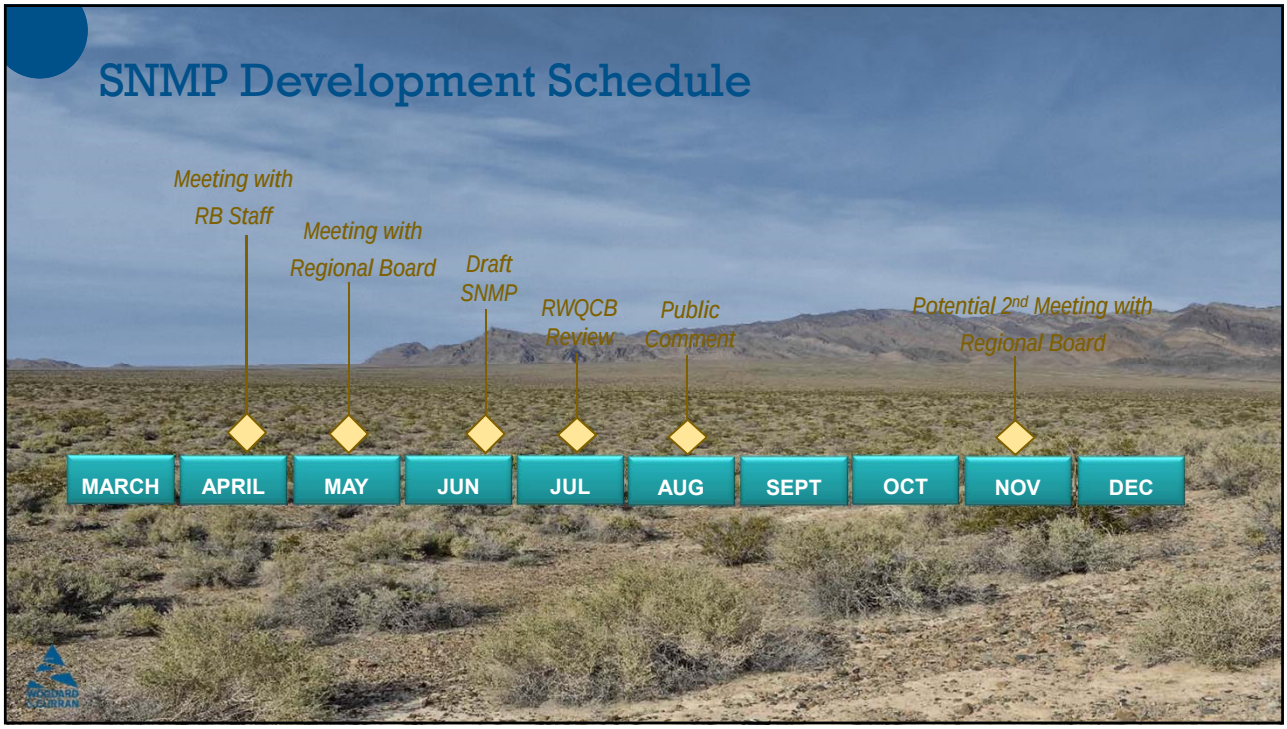
Reference	Monitoring Well Density (wells per 100 miles²)
Heath (1976)	0.2 - 10
Sophocleous (1983)	6.3
Hopkins (1984)	4.0
Basins pumping more than 10,000 acre-feet/year per 100 miles²	
Basins pumping between 1,000 and 10,000 acre-feet/year per 100 miles²	2.0
Basins pumping between 250 and 1,000 acre-feet/year per 100 miles²	1.0
Basins pumping between 100 and 250 acre-feet/year per 100 miles²	0.7

CASGEM

Program and(or) Reference	Density of monitoring wells (wells per 100 mi²)
Heath (1976)	0.2 – 10
Sophocleous (1983)	6.3
Hopkins (1994) (a) Basins with >10,000 AF/yr groundwater pumping per 100 mi² area	4.0
(b) Basins with 1,000-10,000 AF/yr groundwater pumping per 100 mi² area	2.0
(c) Basins with 250-1,000 AF/yr groundwater pumping per 100 mi² area	1.0
(d) Basins with 100--250 AF/yr groundwater pumping per 100 mi² area	0.7

Table 1. Recommended density of monitoring wells for groundwater-level monitoring programs.


Performance Monitoring Plan: Existing Wells
Data Reported
Nitrate as N
TDS
Data Source
Cal Water
California City
Geotracker GAMA
MPUD
Rancho Seco
Rand
USGS
14
58
395
KERN COUNTY
SAN BERNARDINO COUNTY


SNMP Development Schedule
Meeting with RB Staff
Meeting with Regional Board
Draft SNMP
RWQCB Review
Public Comment
Potential 2nd Meeting with Regional Board
MARCH
APRIL
MAY
JUN
JUL
AUG
SEPT
OCT
NOV
DEC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