

# Framework for a Salt and Nitrate Management Plan for the Central Valley

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# Presentation Outline

- CV-SALTS Overview
- Technical Foundation
  - Groundwater Water Quality
  - Nitrate Management (NIMS)
  - Salt Management (SSALTS)
- Implementation Framework



# Overview

CV-SALTS is in the home stretch of a 10-year stakeholder effort

- State, Federal, local agencies, discharger community, EJ and DAC representatives
- Comprehensive Salt and Nitrate Management Plan
- Environmental and Economic Sustainability



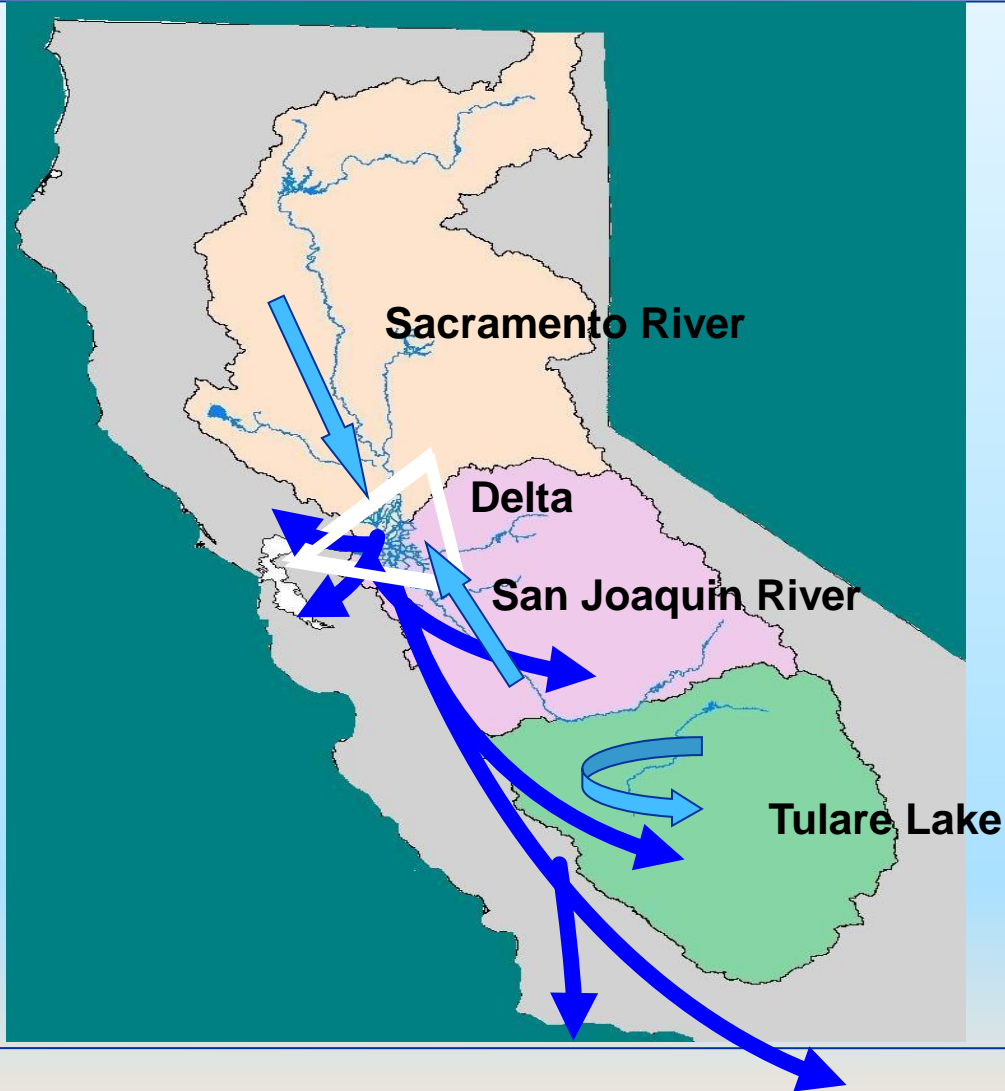


# Central Valley Nitrate Issues



- Legacy/Current Conditions
- Direct Impacts
  - Drinking Water Supplies
- Economic Costs
  - Treatment
  - Alternate Supply
- Diverse Sources

# Central Valley Salt Issues

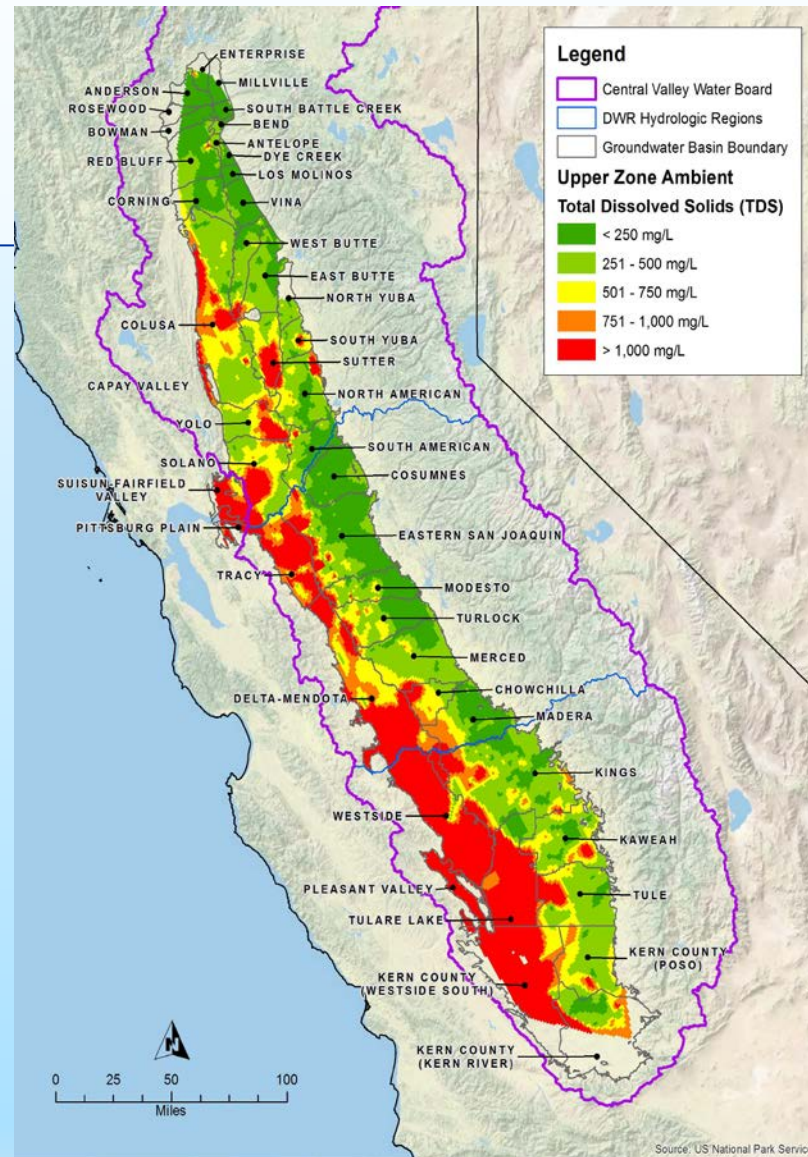


More salt enters the Central Valley Region than leaves

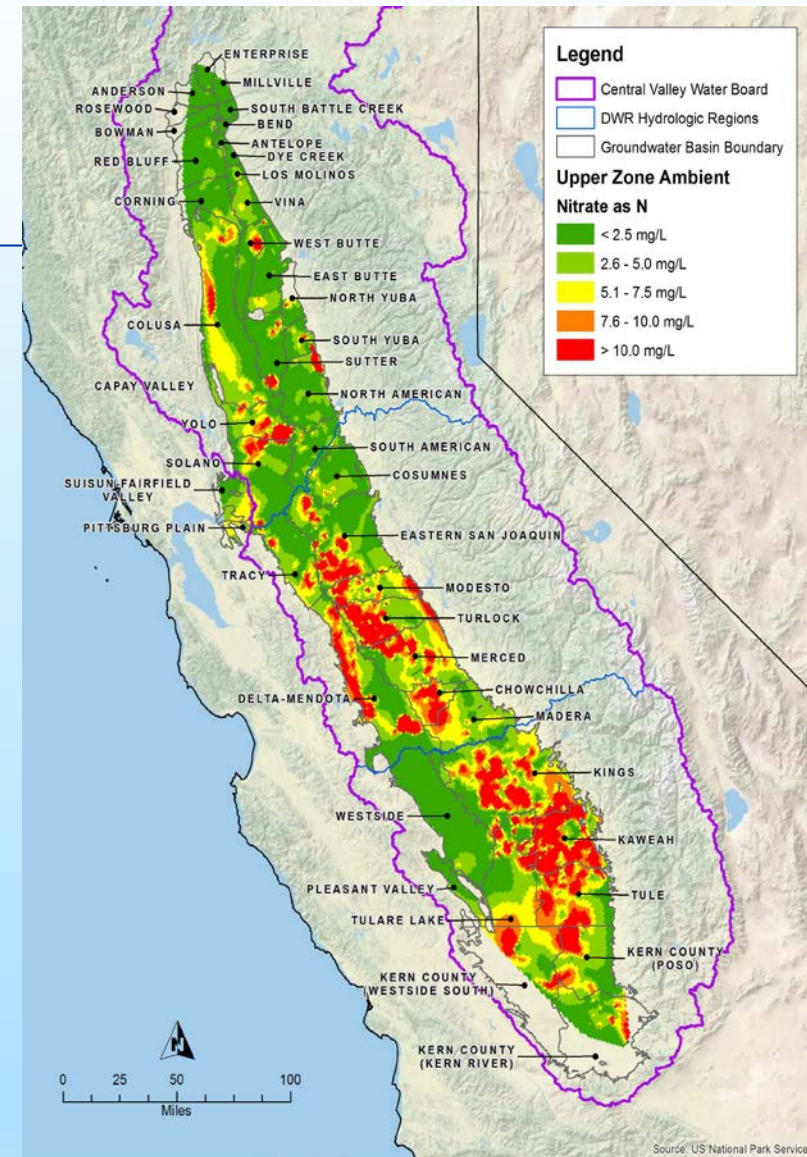
- Impacts (current/legacy)
  - Agricultural Production
  - Drinking Water Supplies
- Economic Cost by 2030
  - Direct Annual: \$1.5 Billion
  - Statewide annual income impact: \$3.0 Billion
- Diverse Sources

# Existing Water Quality

- TDS and Nitrate Ambient Conditions



TDS



Nitrate

# Salt and Nitrate Management Goals

- Management Goal 1 – Assure Safe Drinking Water
  - Short & Long-term Solutions
- Management Goal 2 - Achieve Salt/Nitrate Balance
  - Timeframe and costs vary
- Management Goal 3 - Restore Groundwater Quality
  - Where feasible and practicable

# Nitrate Management Measures

- Alternate drinking water supplies
- Source control measures
- Recharge of high quality waters/coordination with Groundwater Sustainability Plans
- Groundwater remediation



# Central Valley Salinity Problem

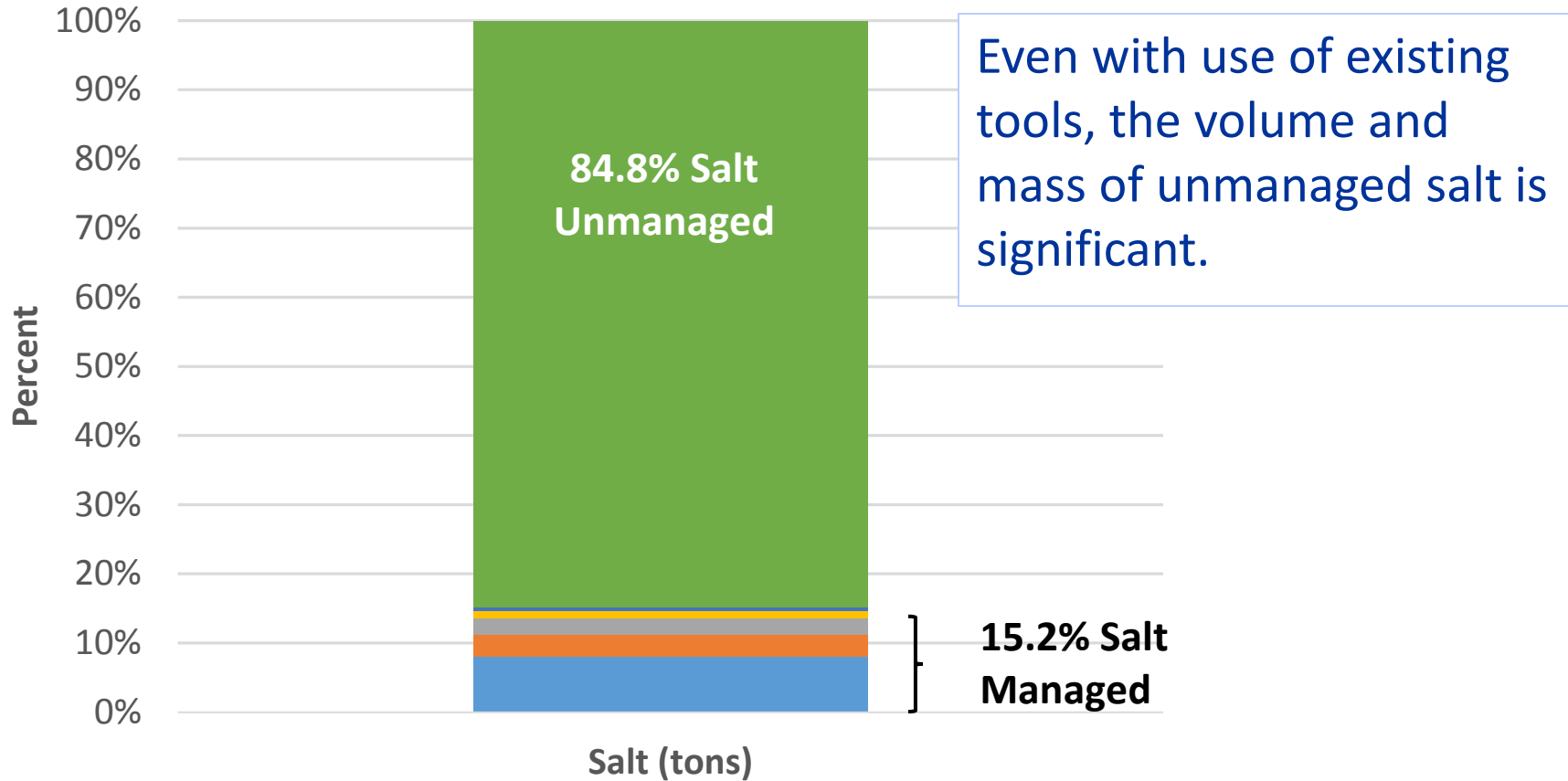
- Over seven million tons of salt are accumulating annually in the groundwater basins underlying the Central Valley floor.
- The sources of salinity in groundwater are agriculture, municipal and industrial discharges, and – in some groundwater basins – sediments of marine origin with naturally-occurring salts that can be leached out.
- In a study commissioned by the State Water Board, UC Davis economists found *“that if salinity increases at the current rate until 2030, the direct annual costs will range from \$1 billion to \$1.5 billion. Total annual income impacts to California will range between \$1.7 billion to \$3 billion by 2030.”*

# SSALTS – Identify Sustainable Salt Management Alternatives

- SSALTS investigating:
  - Magnitude of the problem
  - Requirements to achieve sustainability
  - Available salt management tools - now vs. future
  - Implementation measures for inclusion in the SNMP



# Achieving Salt Sustainability – Example Scenario from Southern Part of Central Valley



- Real Time Management (estimated)
- Tulare Lake Bed Evaporation Ponds
- SJR WQ Improvement Project
- Hydraulic Fracturing
- Deep Well Injection
- Unmanaged Salt

# Key Salt Management Alternatives

## Treatment & Salt Recovery Technology

- Mature Technologies
  - Reverse Osmosis
  - Ion Exchange
  - Lime Softening
  - Evaporation Ponds
- Emerging Technologies
  - Smart Integrated Membrane System (SIMS)
  - WaterFX Aqua4 System – Multi-effect Distillation
  - Zero Discharge Distillation by Veolia – Electrodialysis Metathesis
  - New Sky Energy – Temperature Control and Electrodialysis
  - Element Renewal – Addition of polymers to remove trace elements

## Brine Disposal and Storage

- Brine Supply for Hydraulic Fracturing
- Deep Well Injection
- Salt Management Disposal Areas
  - Landfills
  - Dedicated Disposal Sites
  - San Joaquin River Improvement Project
- San Joaquin River Real Time Management
- Transport Brine Out of Valley
  - Truck/Rail Brine
  - Regulated Brine Line
  - Bay Area WWTP
  - New, permitted Bay Area Outfall



# Achieving Sustainability Requires Having the Means to Move Salt Out of the Central Valley

- Central to all evaluated salt management alternatives is a **regulated Central Valley brine line**
- Concept level analysis completed
  - Alternative Central Valley routes
  - Preliminary Brine Discharge Alternatives
    - Via existing East Bay Municipal Utility District outfall
    - Via an alternative outfall to San Francisco Bay
  - Concept-level cost estimate – Capital and O&M



# Implementation Timeline – Regulated Brine Line Alternative

- Short-Term Implementation Activities (~20 Year Period). Key activities during this period include:
  - Prioritization and Optimization Plan – Further evaluate possible project configurations;
  - Conceptual Design – Feasibility study to evaluate the engineering approach;
  - Funding Plan – Capital and operation & maintenance costs;
  - Environmental/Permitting – Meet the requirements of CEQA/NEPA;
  - Project Design – Detailed design of key components
  - Governance Plan – Develop operational plan with roles and responsibilities defined
- Long-Term Implementation Activities (~30 Year Period)
  - Phased construction and operation over extended period

# Summary of Key Findings

- Feasibility Studies are necessary to determine the optimal economic and environmental design of a Central Valley wide salt management program.
- A key salt disposal option that can manage or dispose of the mass of salt that is accumulating annually in a sustainable manner is disposal of brine through a regulated brineline with a permitted ocean or San Francisco Bay outfall.
- The major components of this treatment system include extraction wells, desalter facilities (*e.g.*, Reverse Osmosis [RO]), injection wells, post-RO treatment for trace elements, the Central Valley Brine Line (CVBL), CVBL pump stations, and disposal costs at the wastewater treatment plant (WWTP).
- Conceptual level capital costs for the long-term regional salinity treatment system is about \$11 billion dollars. Operations and maintenance (O&M) costs would be about \$1.2 billion dollars.

# Nitrate and Salinity Management Program: Timelines

- Address nitrate/safe drinking water first
- Realistic Timelines are Necessary
  - Comprehensive Salinity Management Program : 20 years to design, permit, fund; 30-years to build necessary infrastructure
- Interim Activities: Plan/Organize/**Fund**/Implement
- Not immediate crisis; Need to motivate society to take action



# Timeline

- December 2016 SNMP Submitted
- 2017 - Basin Plan Development
- Early 2018: Regional Board Consideration Basin Plan Amendment
- Early 2018: State Board Consideration Basin Plan Amendment

