

**Item 4 LATE ADDITION**

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
LAHONTAN REGION**

**MEETING OF FEBRUARY 10 AND 11, 2016  
APPLE VALLEY**

**FINAL MOJAVE SALT AND NUTRIENT MANAGEMENT PLAN  
FOR THE MOJAVE AND MORONGO  
GROUNDWATER BASINS**

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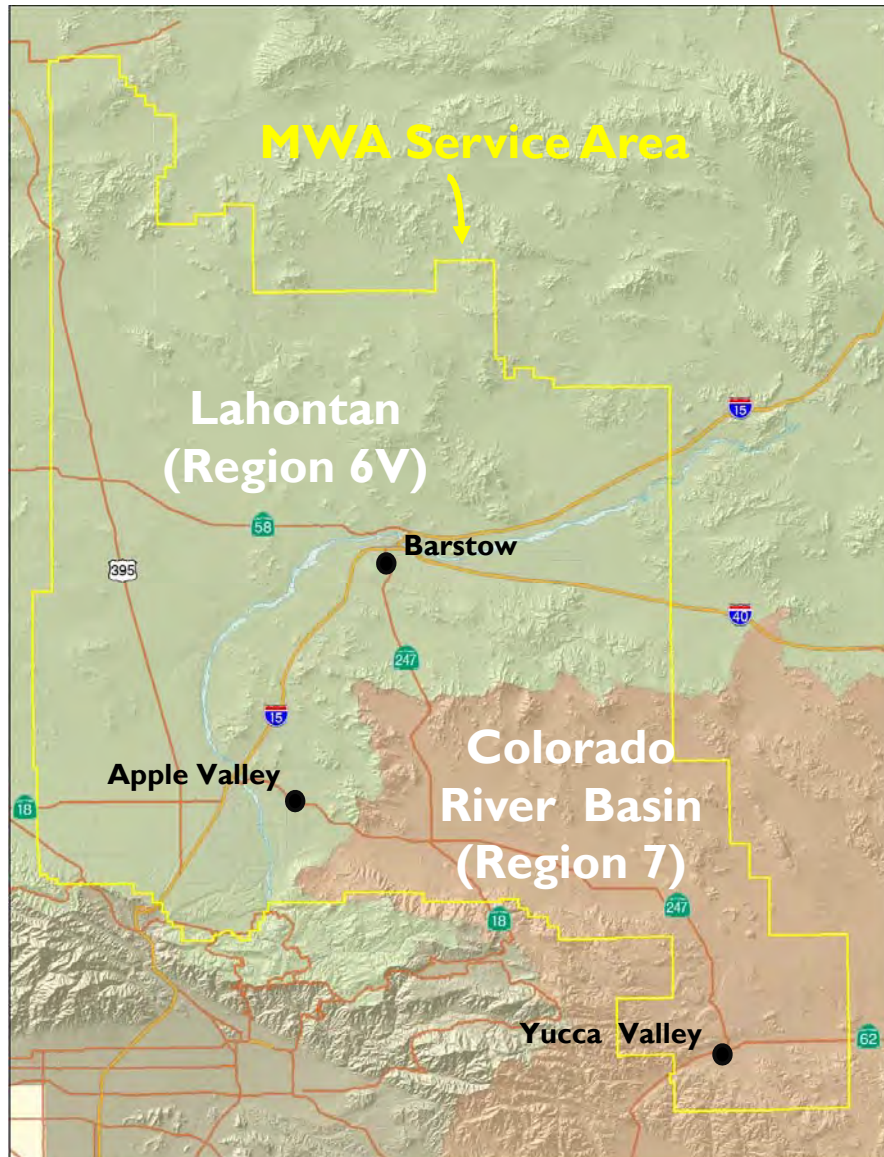
Please add the attached Power Point presentation behind the Item 4 Green Sheet.



**Mojave Salt and Nutrient Management Plan  
Lahontan Regional Water Quality Control Board  
February 11, 2016**

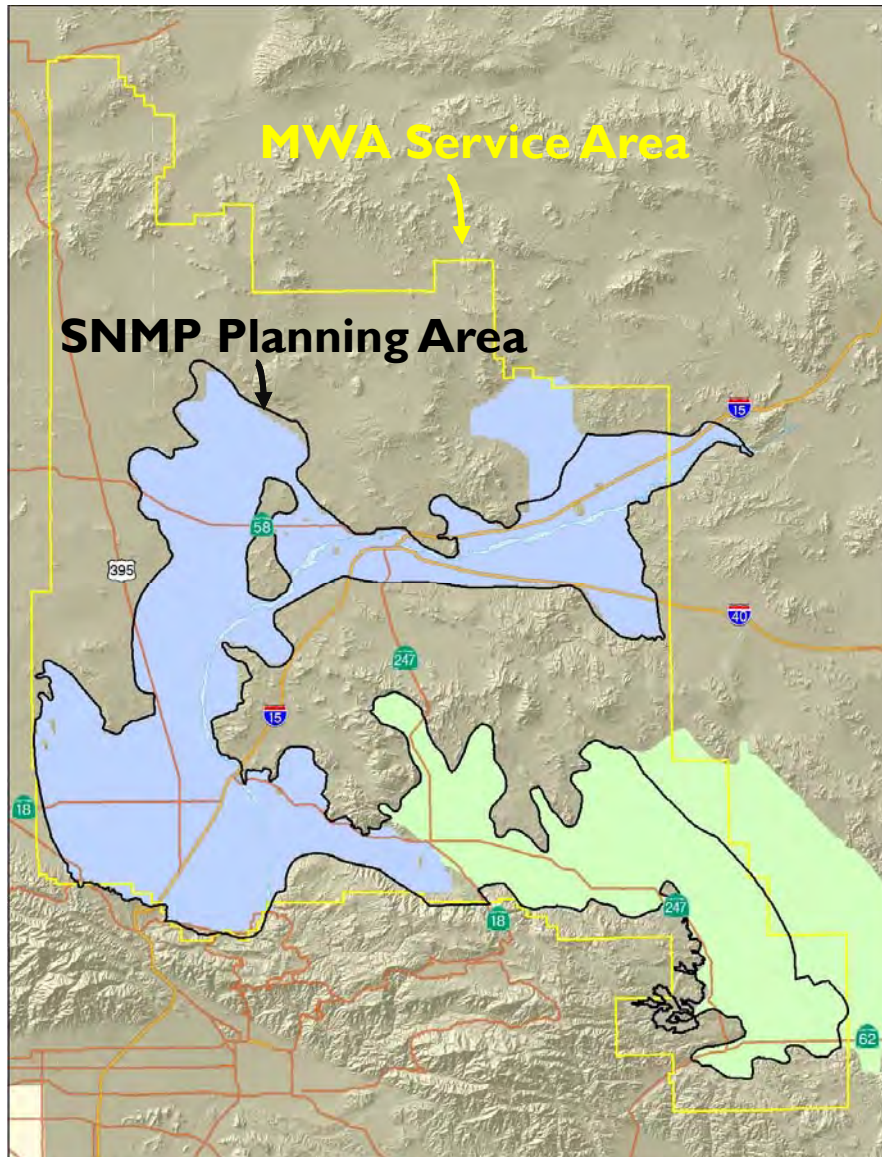
**Lance Eckhart, PG, CHG  
Director of Basin Management and Resource Planning**

# Mojave SNMP Planning Area



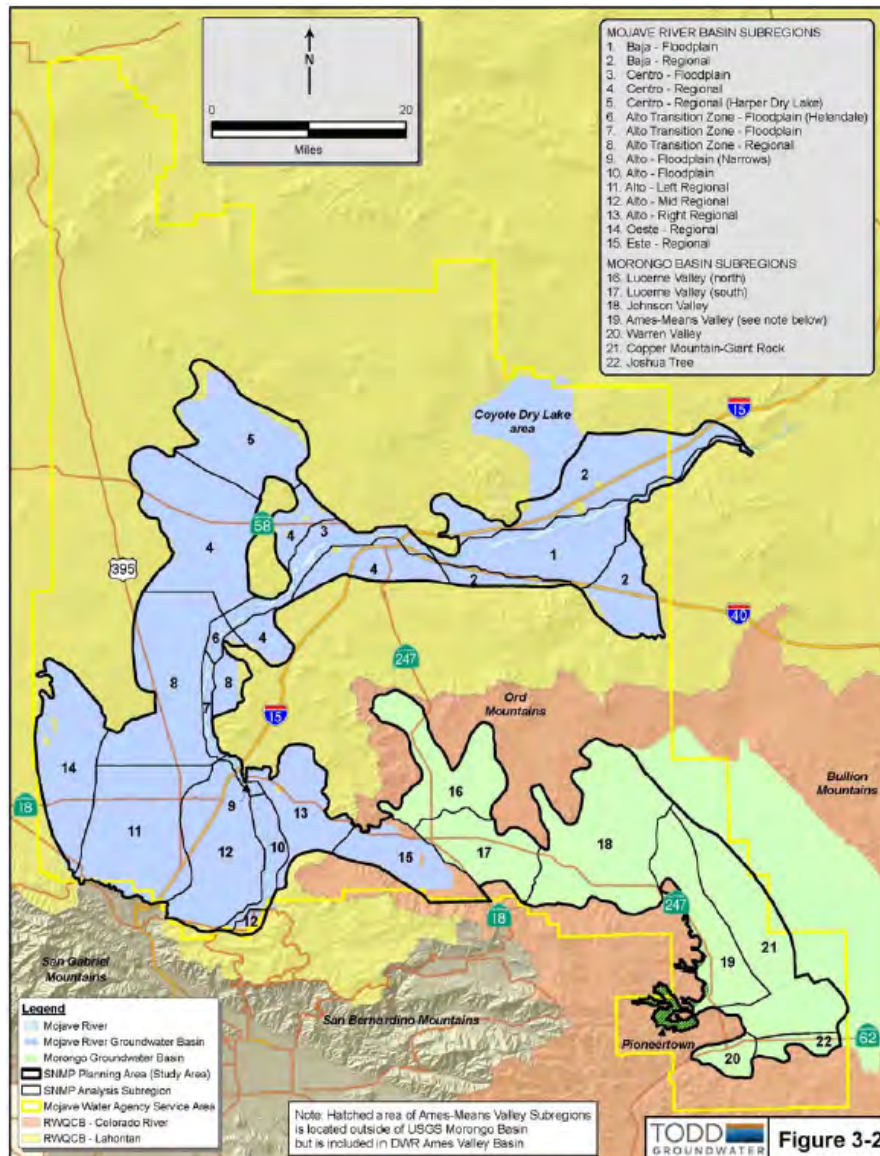
- ▶ MWA Service Area (~5,000 mi<sup>2</sup>)
- ▶ Overlaps two RWQCBs
  - ▶ Lahontan
  - ▶ Colorado River

# Mojave SNMP Planning Area



- ▶ Two major basins
  - ▶ Mojave River Basin
  - ▶ Morongo Basin
- ▶ SNMP Planning Area
  - ▶ Includes key basin areas within MWA service area
  - ▶ Based on scientifically-established basin boundaries
  - ▶ Contributing watershed areas are accounted for in estimates of recharge from storm runoff

# Mojave SNMP Planning Area



- ▶ Planning Area divided into 20 subregions for analysis
- ▶ Boundaries based on
  - ▶ Hydrogeology
  - ▶ Groundwater Quality
- ▶ Mojave River Basin: Aligned with MBA Management Subareas - floodplain and regional aquifers
- ▶ Morongo Basin: Aligned with USGS subbasin boundaries (includes Pioneertown)

# Mojave SNMP Approach

## Leveraging Foundational Technical Work

2001 – USGS Mojave River Basin MODFLOW Model

2003 – Alto Transition Zone Basin Conceptual Model

2004 – **MWA IRWMP - STELLA model (flows)**

Warren, Copper Mountain-Joshua Tree MODFLOW Models

2005 – Este Subarea Hydrogeologic Report

2007 – **STELLA model refinement (TDS transport module added)**

Ames, Means, Johnson Valley Basin Conceptual Models

2008 – R-Cubed Project (Alto Subarea) Hydrogeologic Evaluation

2009 – Oeste Subarea Hydrogeologic Report

2010 – MWA UWMP update water demand forecast model (2010-2035)

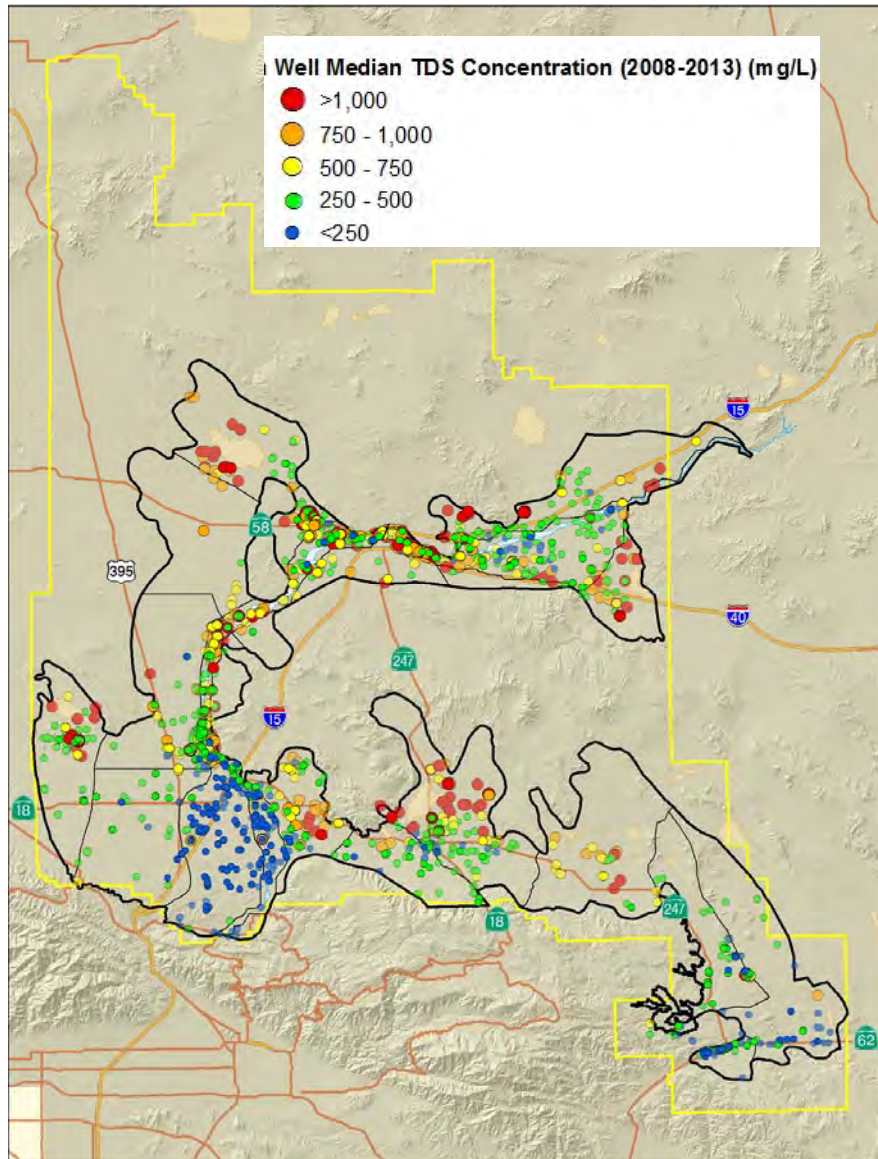
2011 – Ames Valley MODFLOW Model

2014 – Baja and Centro Subareas Basin Conceptual Model

MBA Watermaster consumptive use/return flow estimate refinement (ongoing)



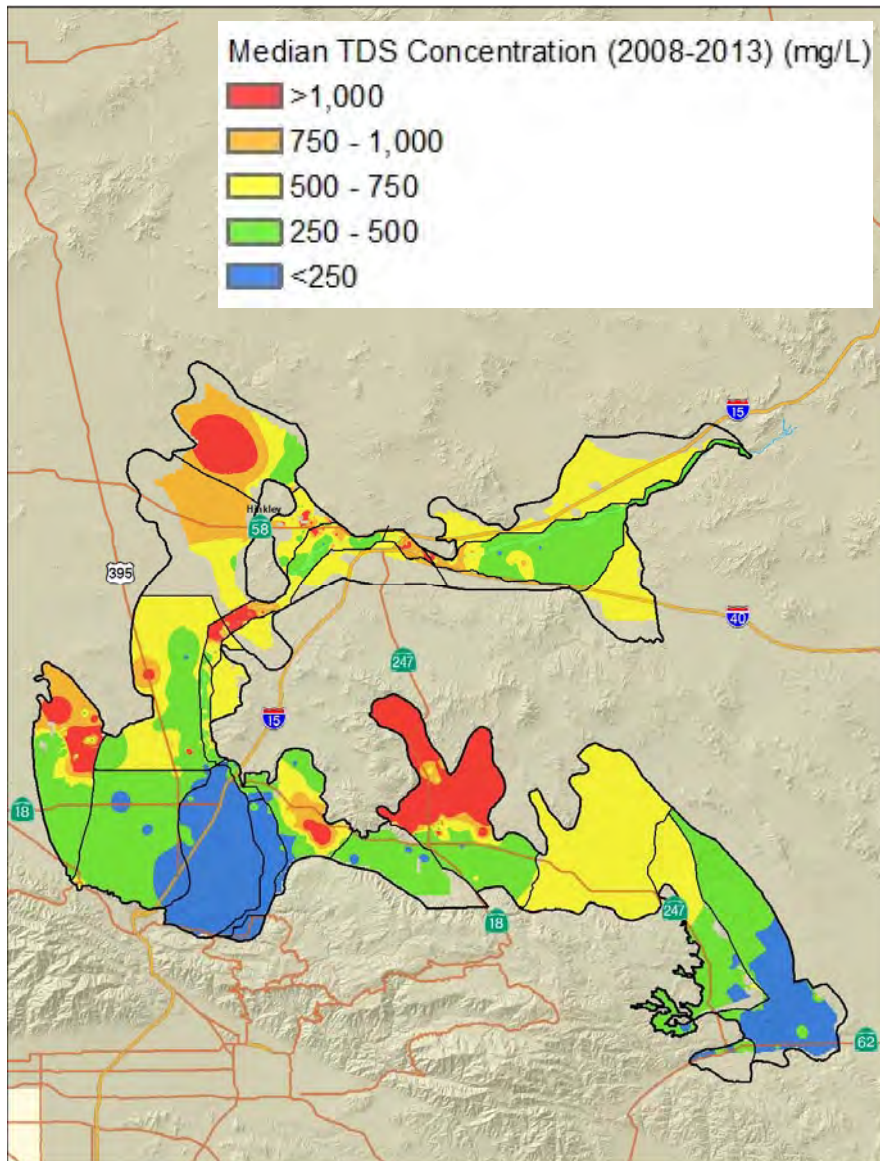
# Ambient Groundwater Quality Characterization/Mapping



- ▶ Use well medians based on last 5 years of data
- ▶ TDS

Note: pre-2008 data also shown on map

# Ambient Groundwater Quality Characterization/Mapping

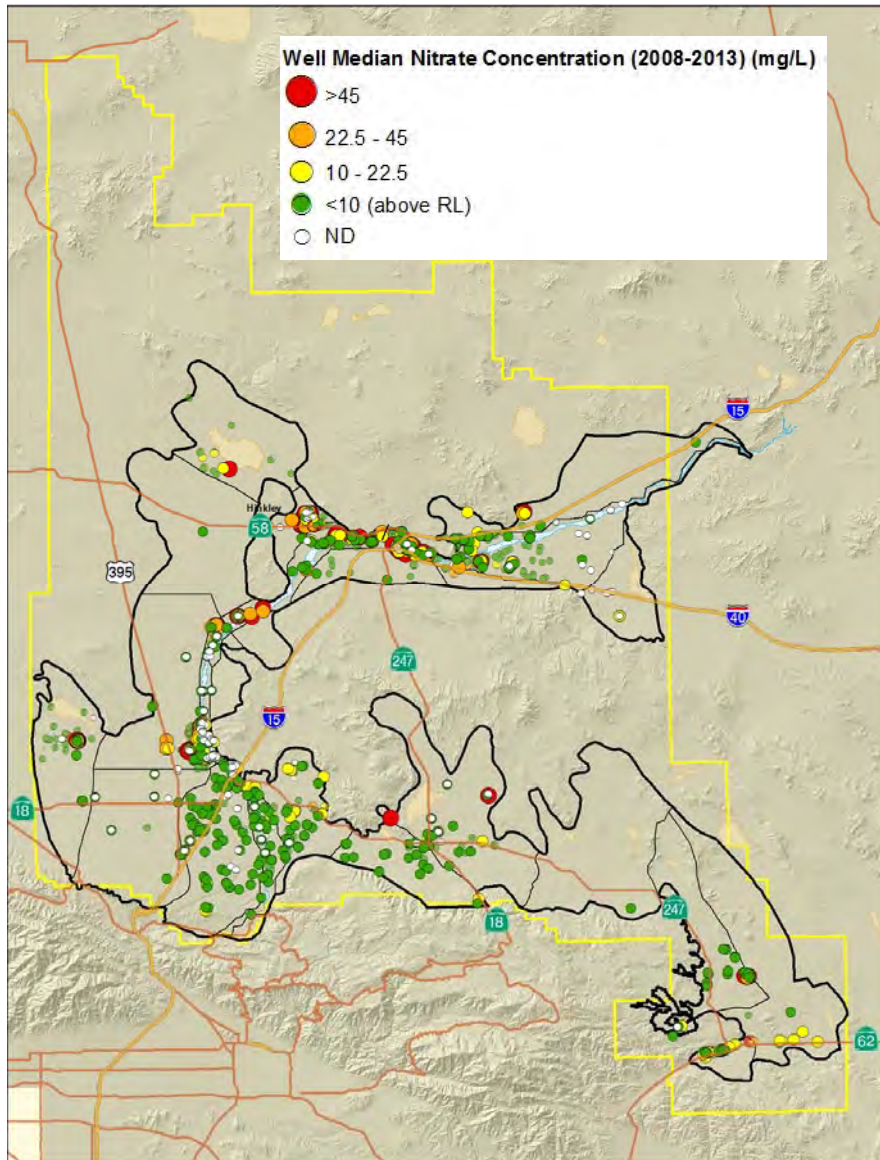


- ▶ Use well medians based on last 5 years of data
  - ▶ *Used older vintage data as necessary*
- ▶ De-cluster the data
- ▶ Contour/interpolate data

## TDS



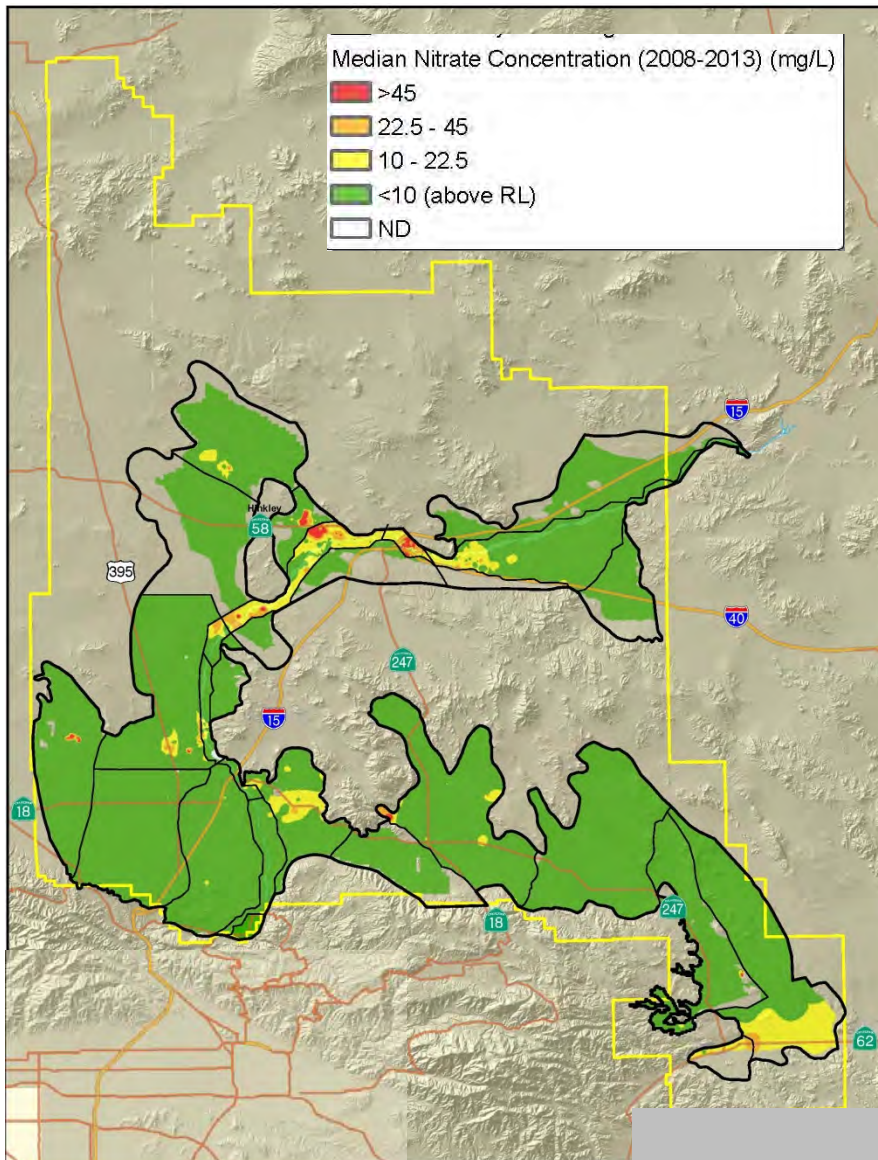
# Ambient Groundwater Quality Characterization/Mapping



- ▶ Use well medians based on last 5 years of data
- ▶ Nitrate-NO<sub>3</sub>

Note: pre-2008 data also shown on map

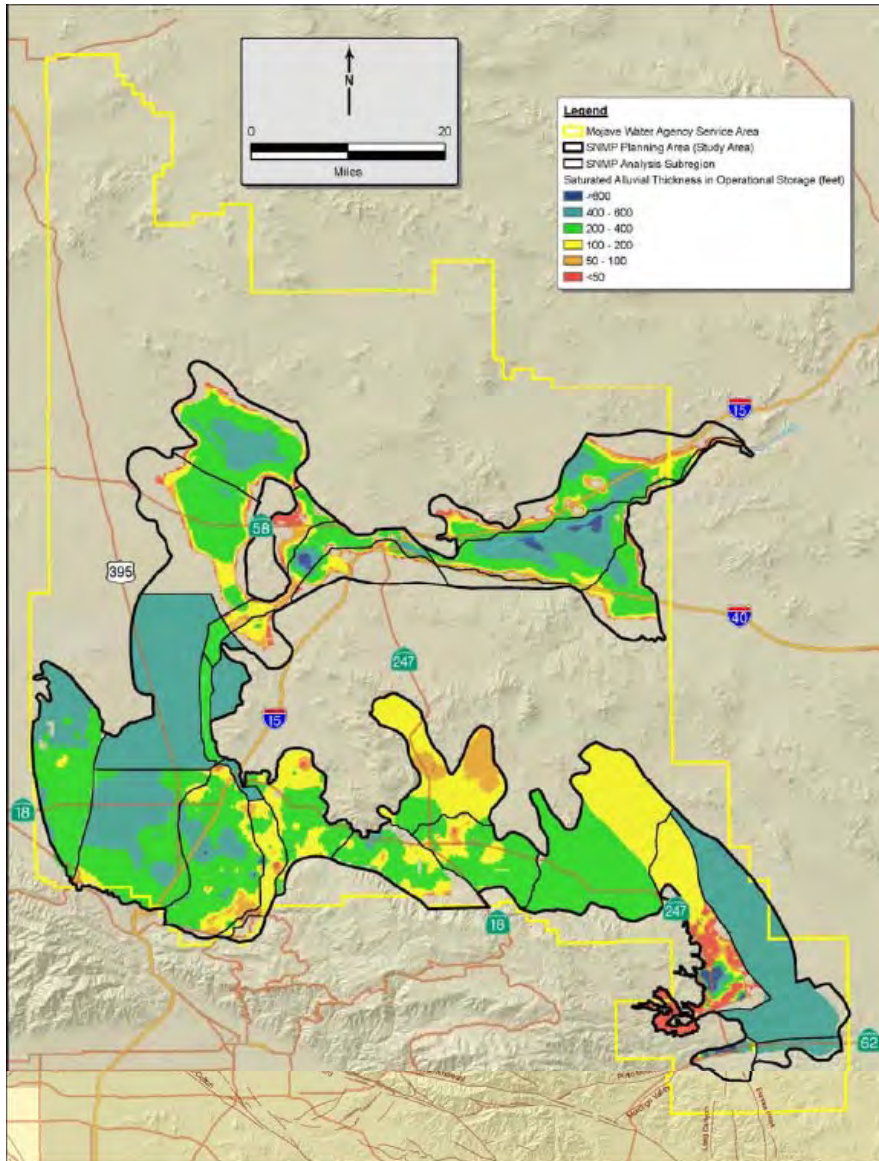
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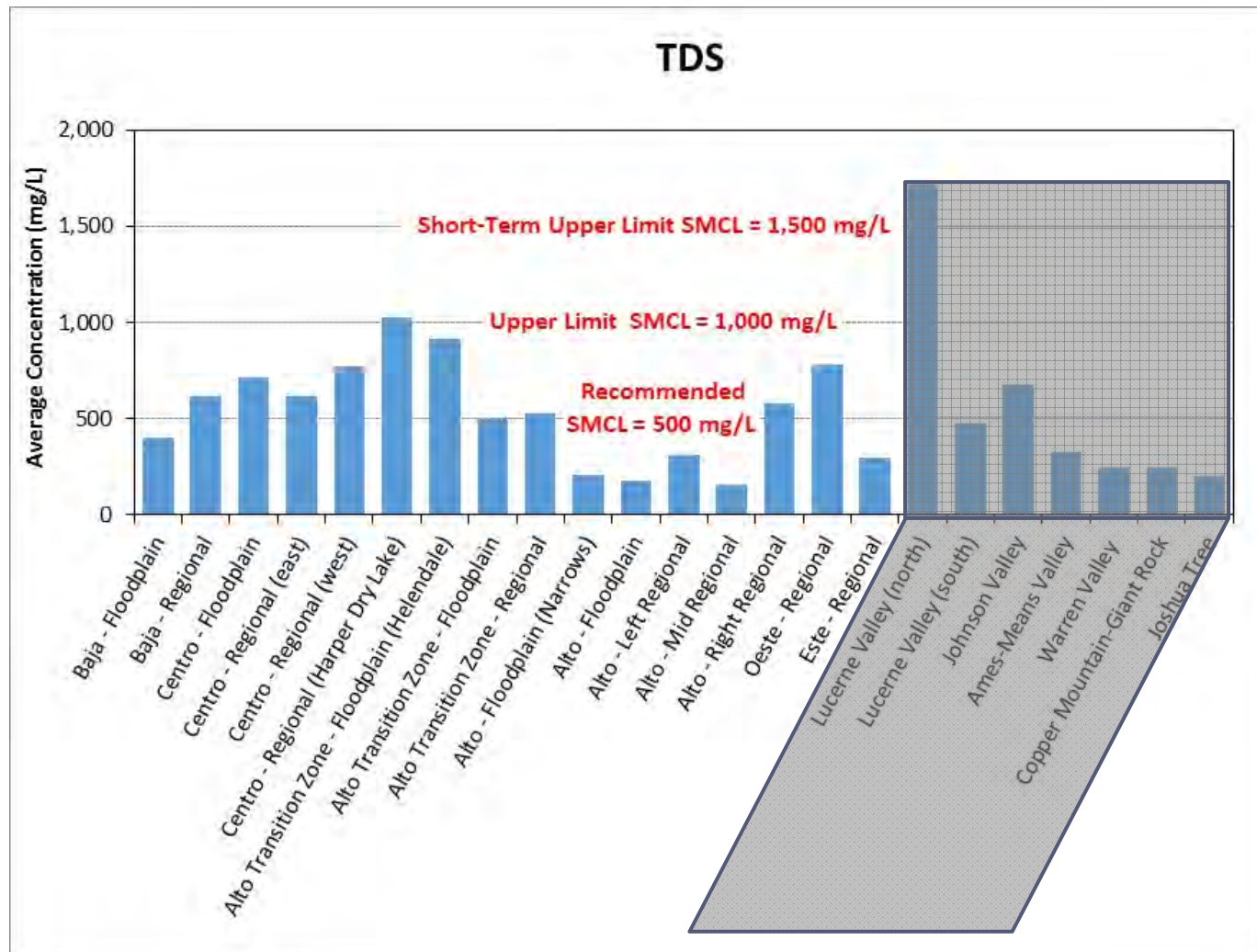
Nitrate-NO<sub>3</sub>

# Ambient Groundwater Quality Characterization/Mapping



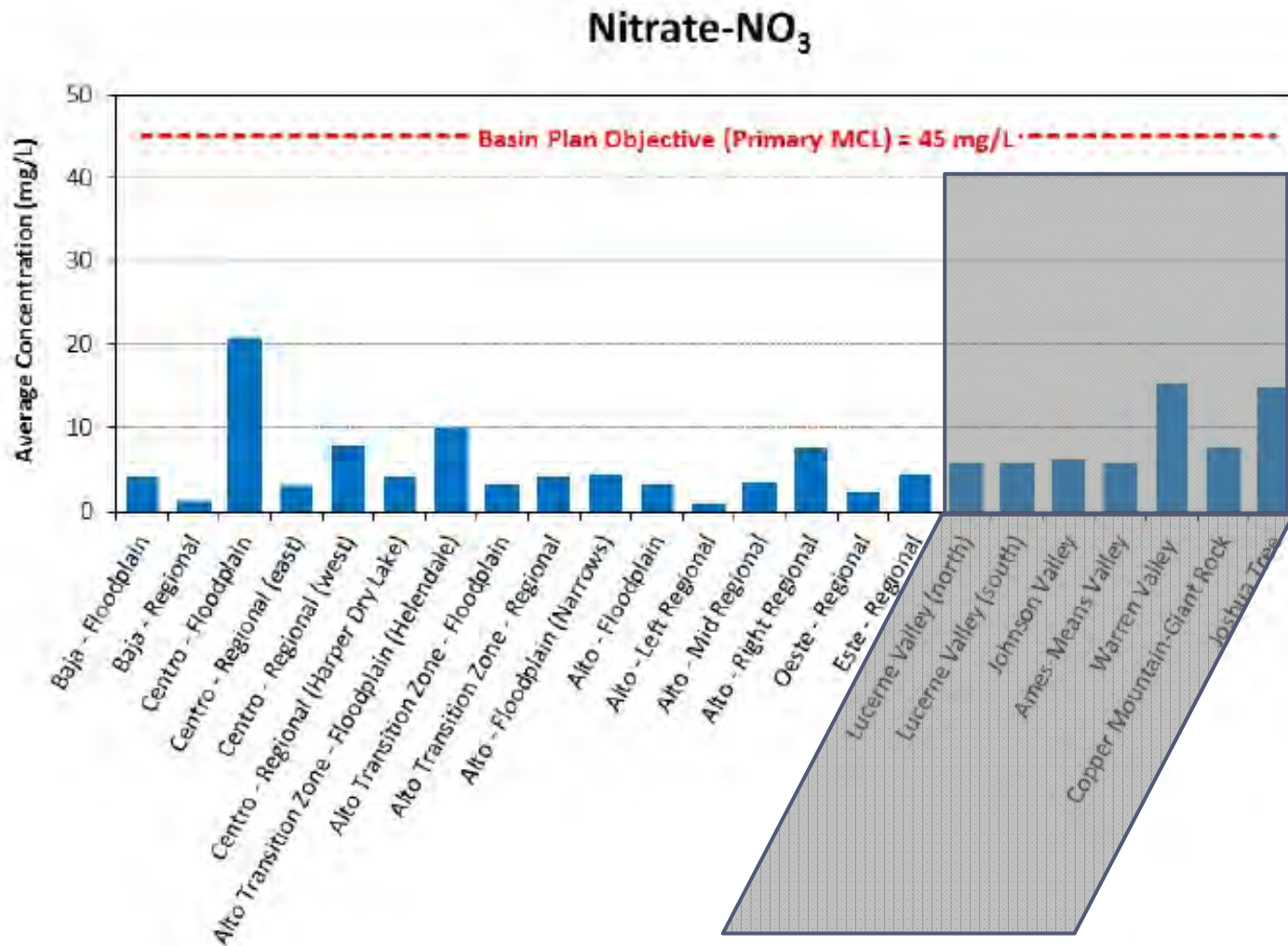
- ▶ Calculate average TDS/nitrate concentration by subregion
- ▶ Use groundwater volume in operational storage
  - ▶ Depth to base of production zone

# Ambient Groundwater Quality Characterization/Mapping



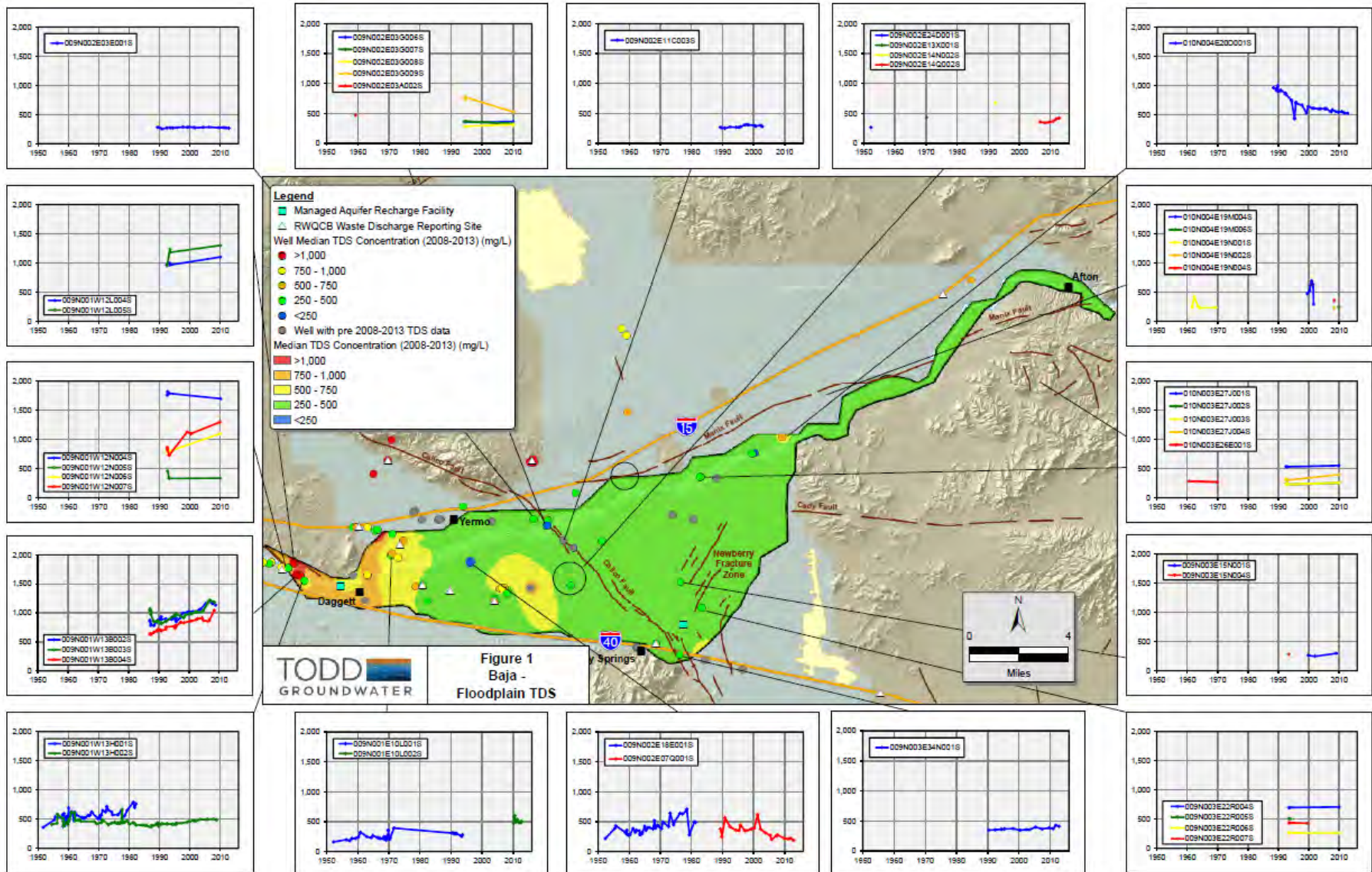
Average Existing (2008-2013) TDS Concentration

# Ambient Groundwater Quality Characterization/Mapping

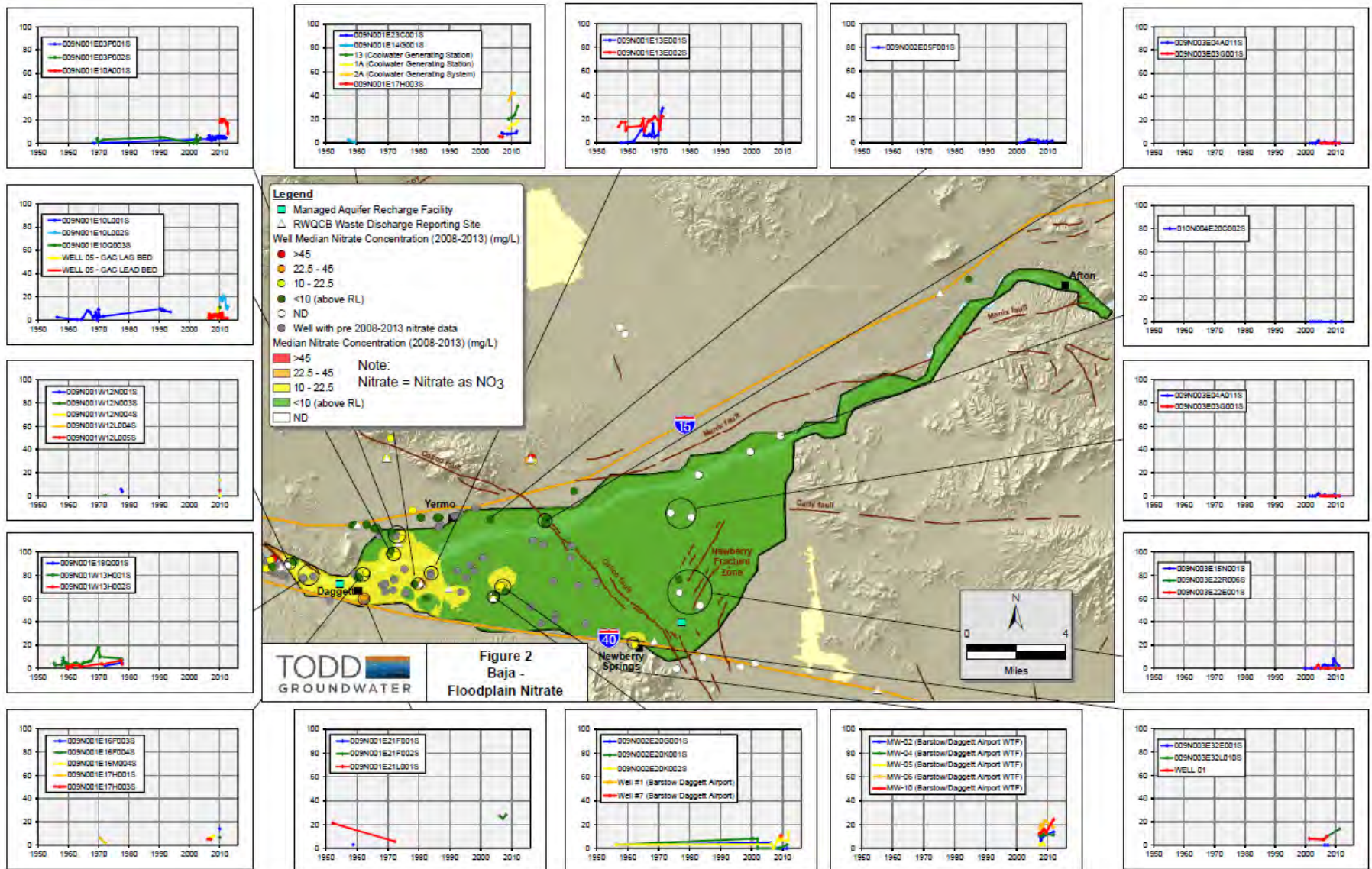


Average Existing (2008-2013) Nitrate-NO<sub>3</sub> Concentration

# Baja Floodplain TDS

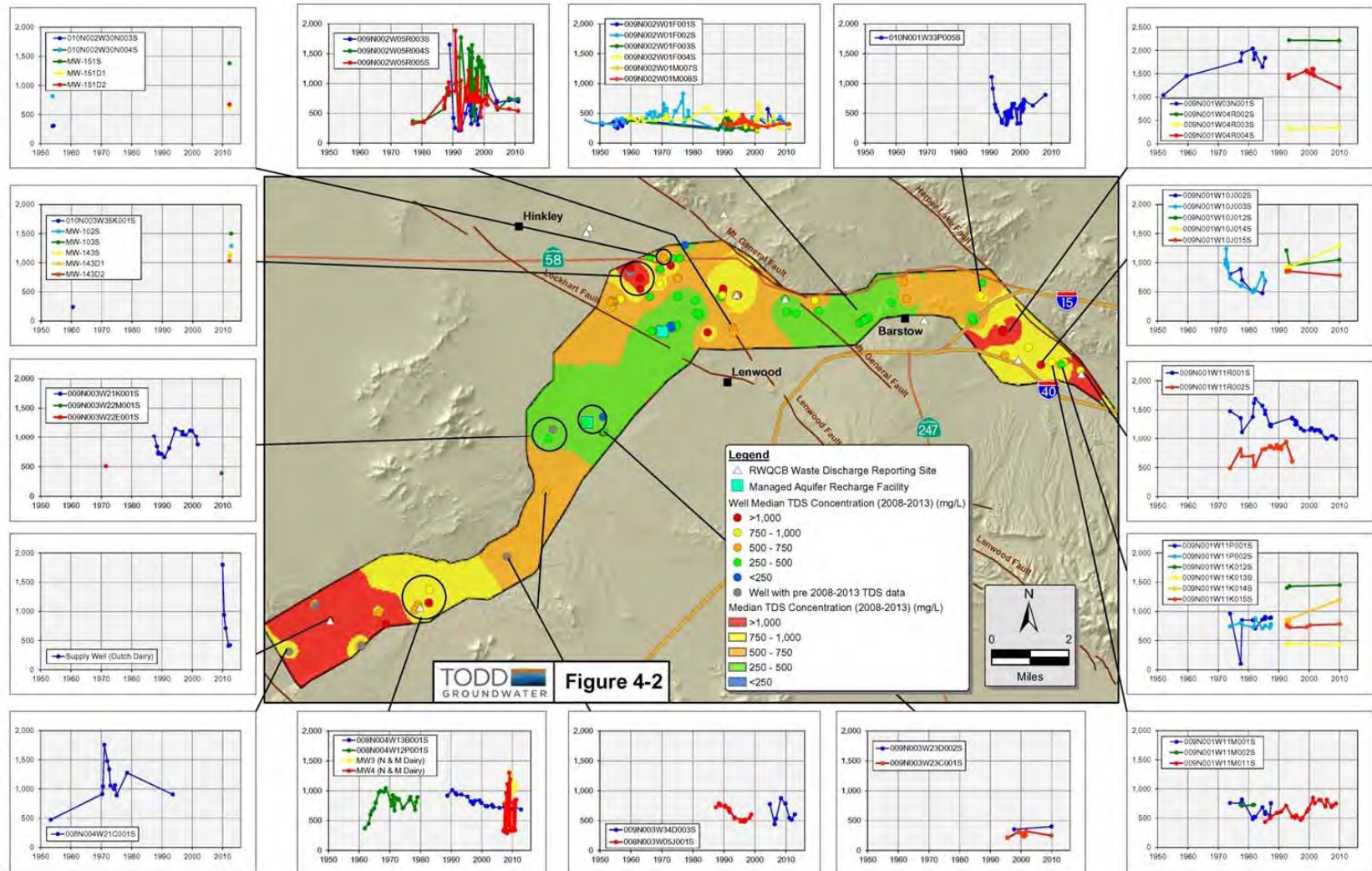


# Baja Floodplain Nitrate



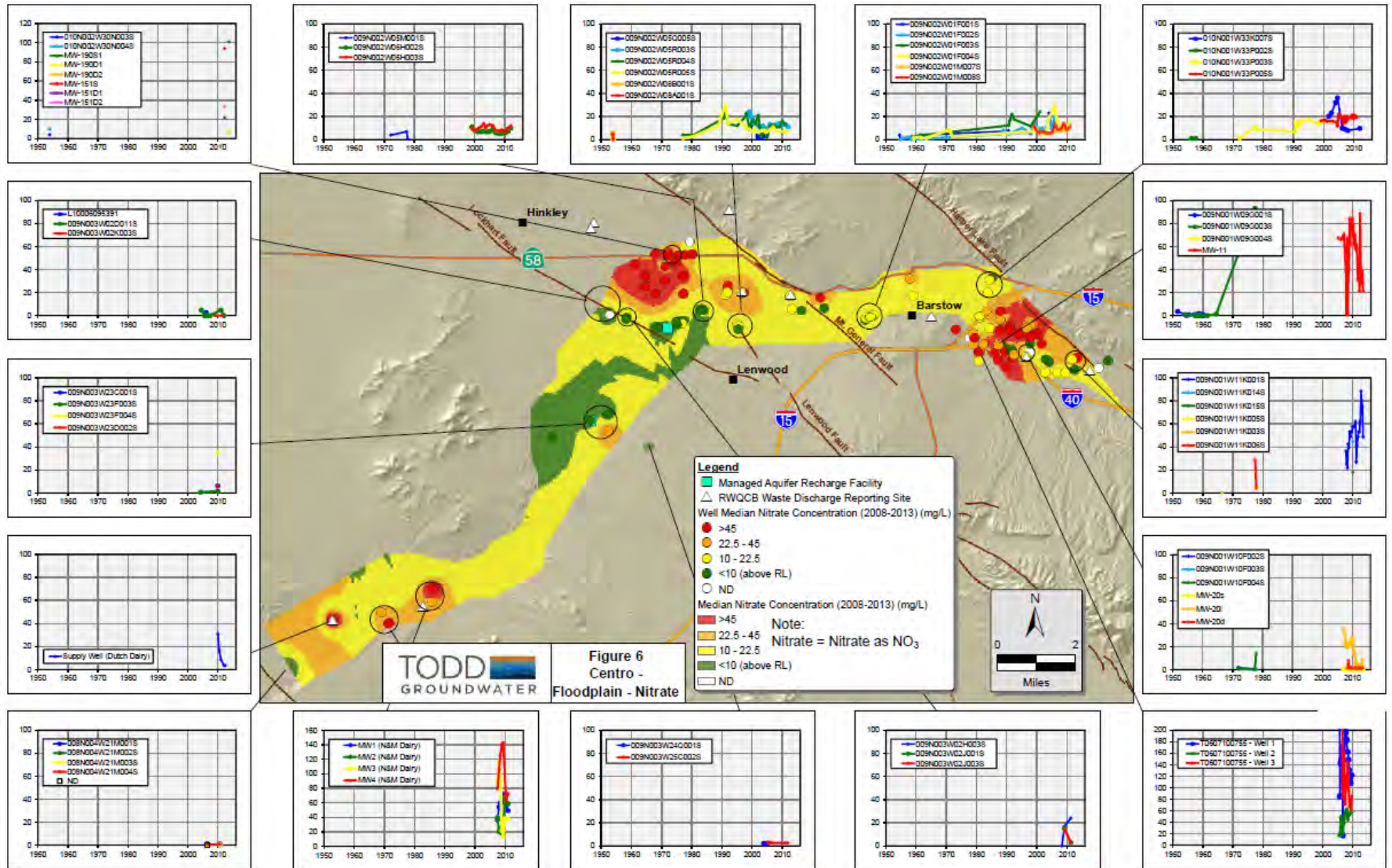
# Centro Floodplain TDS

## ▶ Example: Centro - Floodplain Time-Concentration Plot Map (TDS)

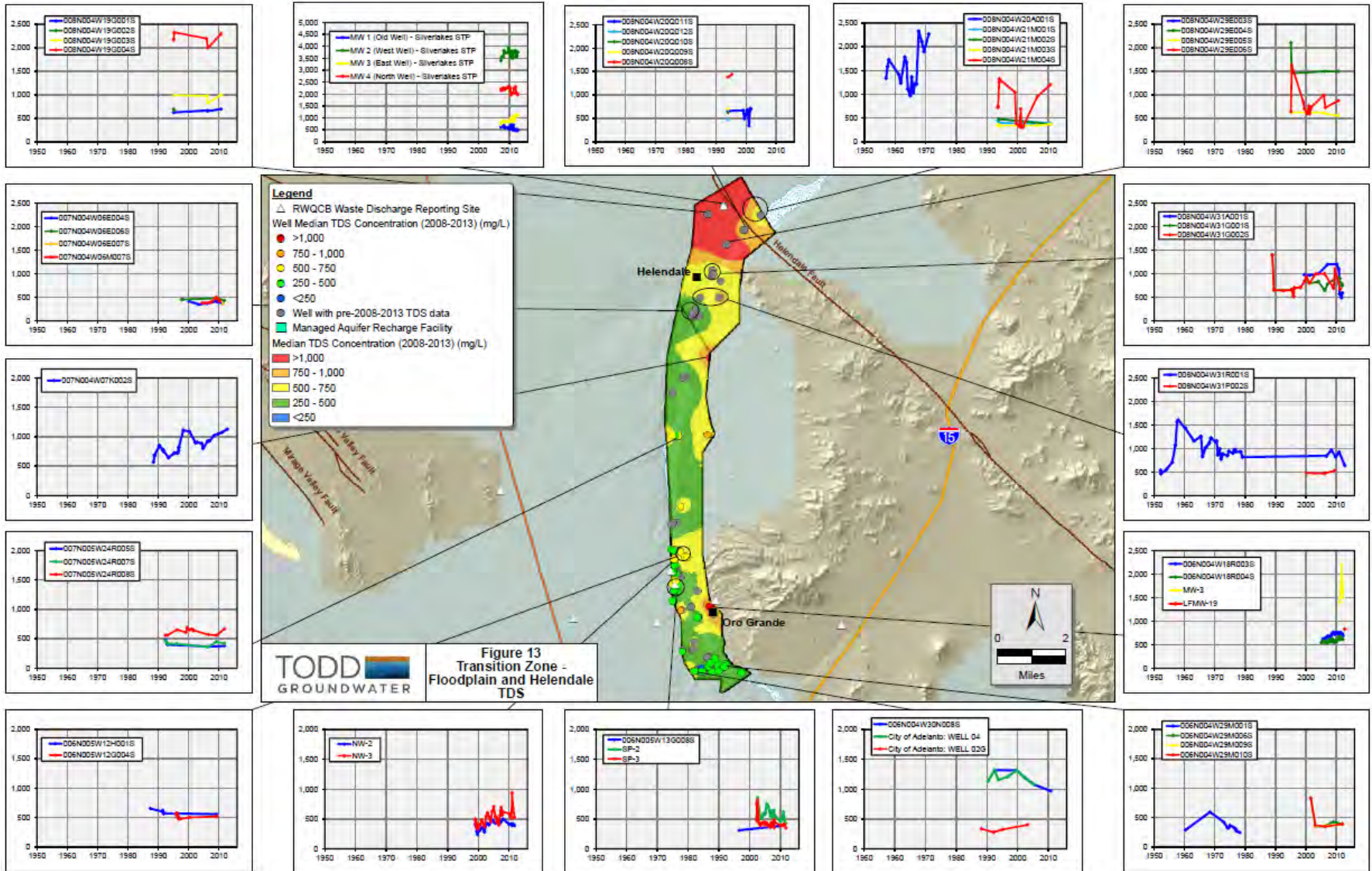




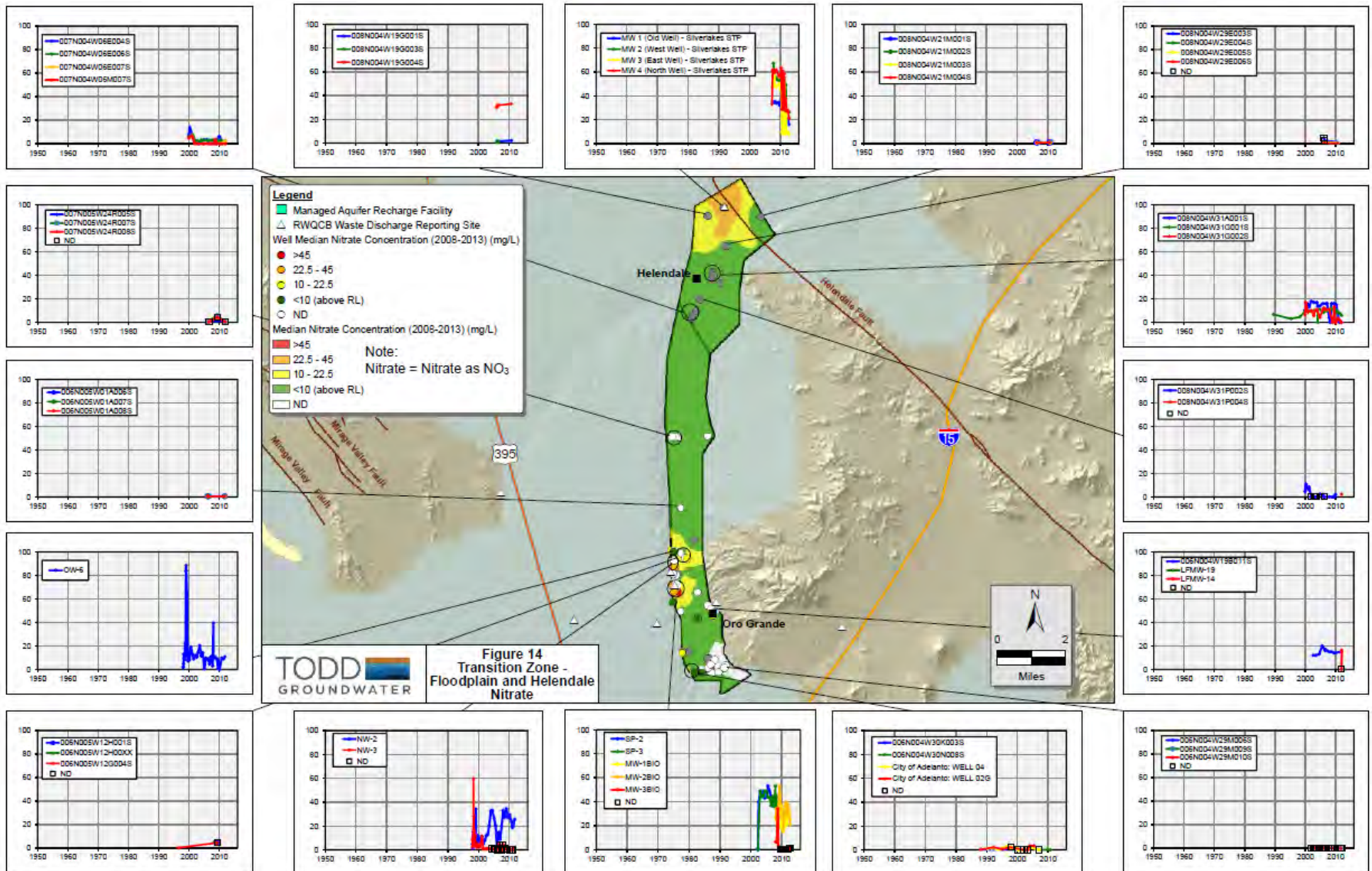
# Centro Floodplain Nitrate



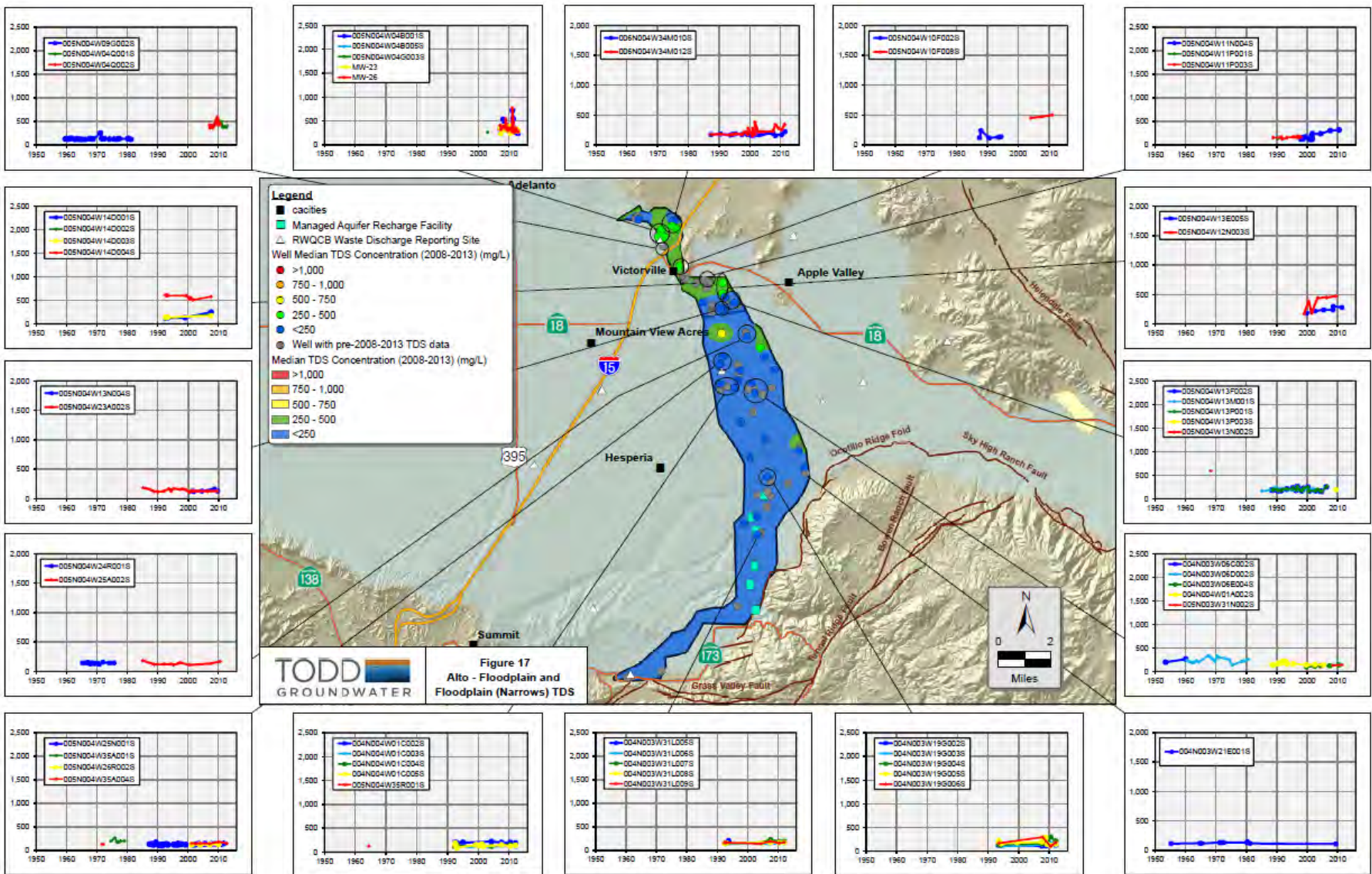
# Transition Zone & Helendale TDS



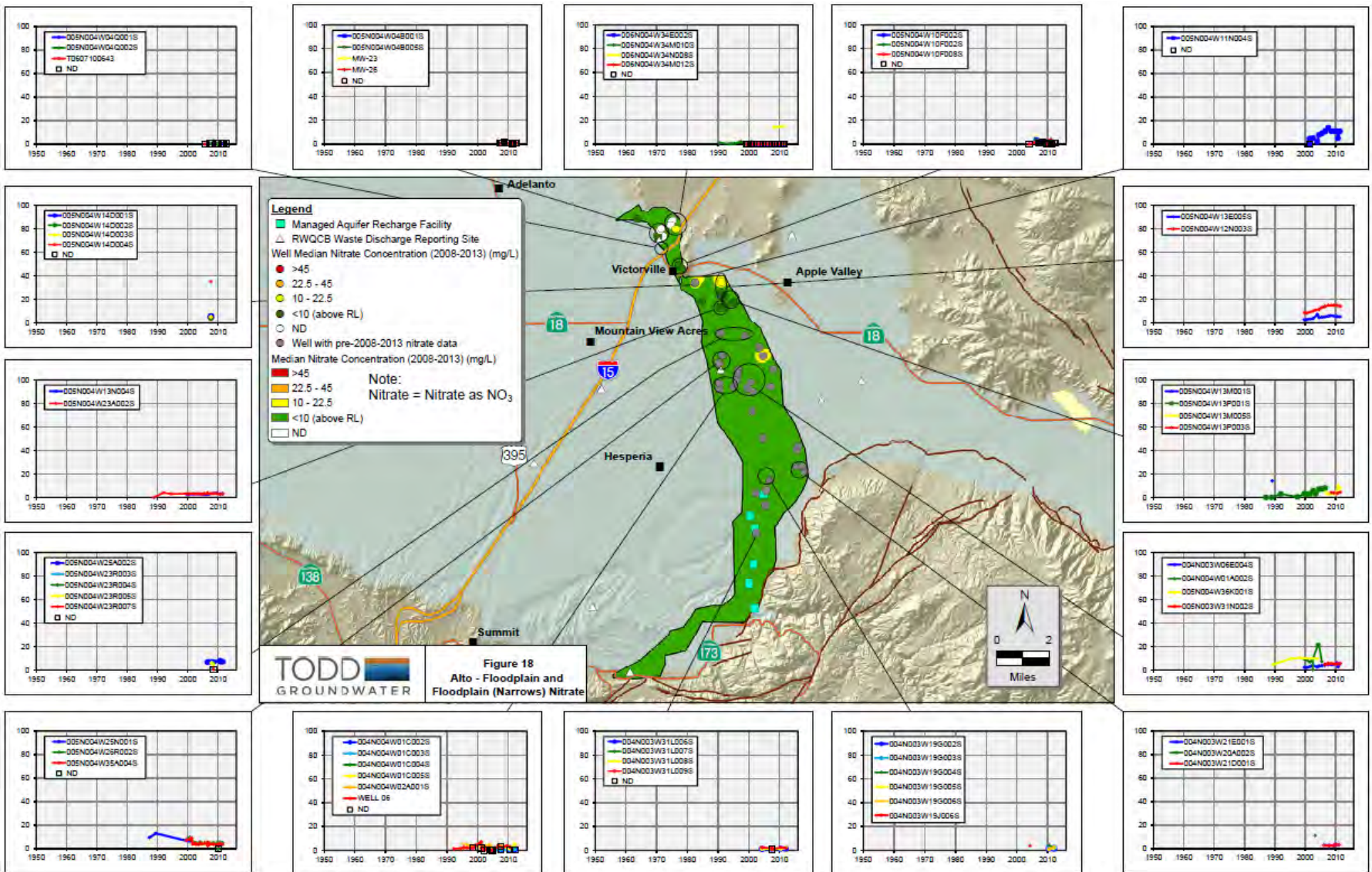
# Transition Zone & Helendale Nitrate



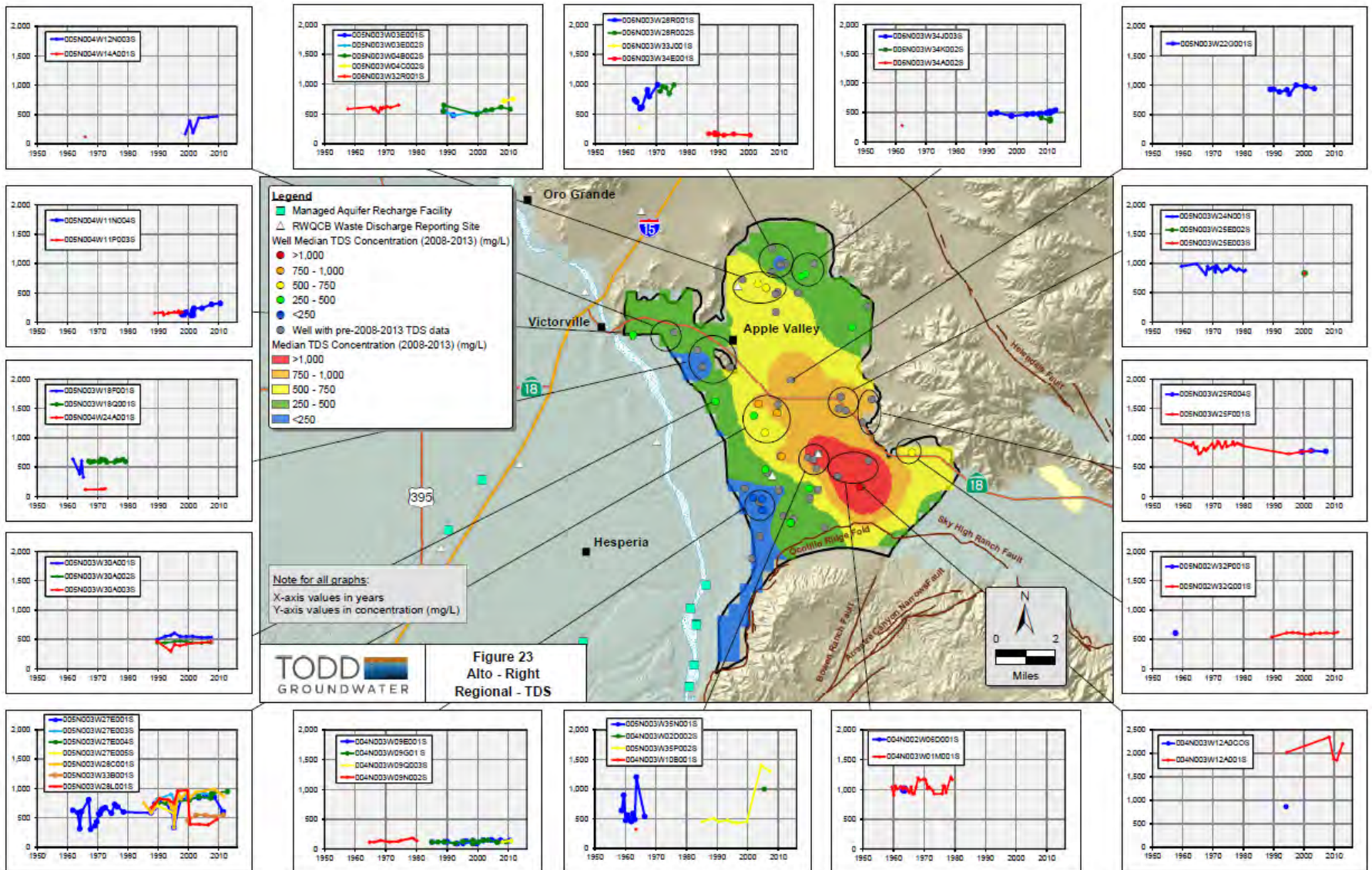
# Alto Floodplain & Floodplain Narrows TDS



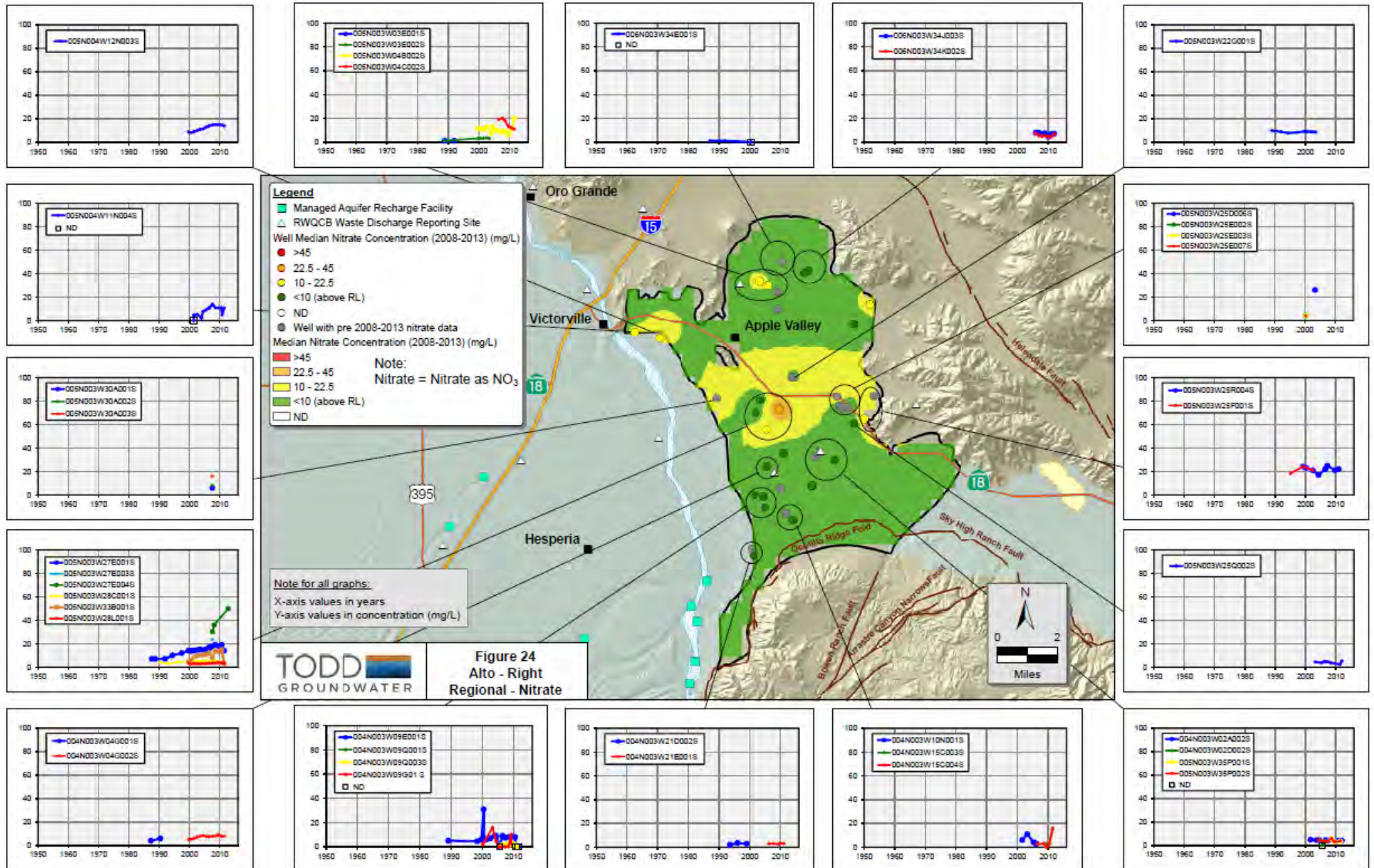
# Alto Floodplain & Floodplain Narrows Nitrate



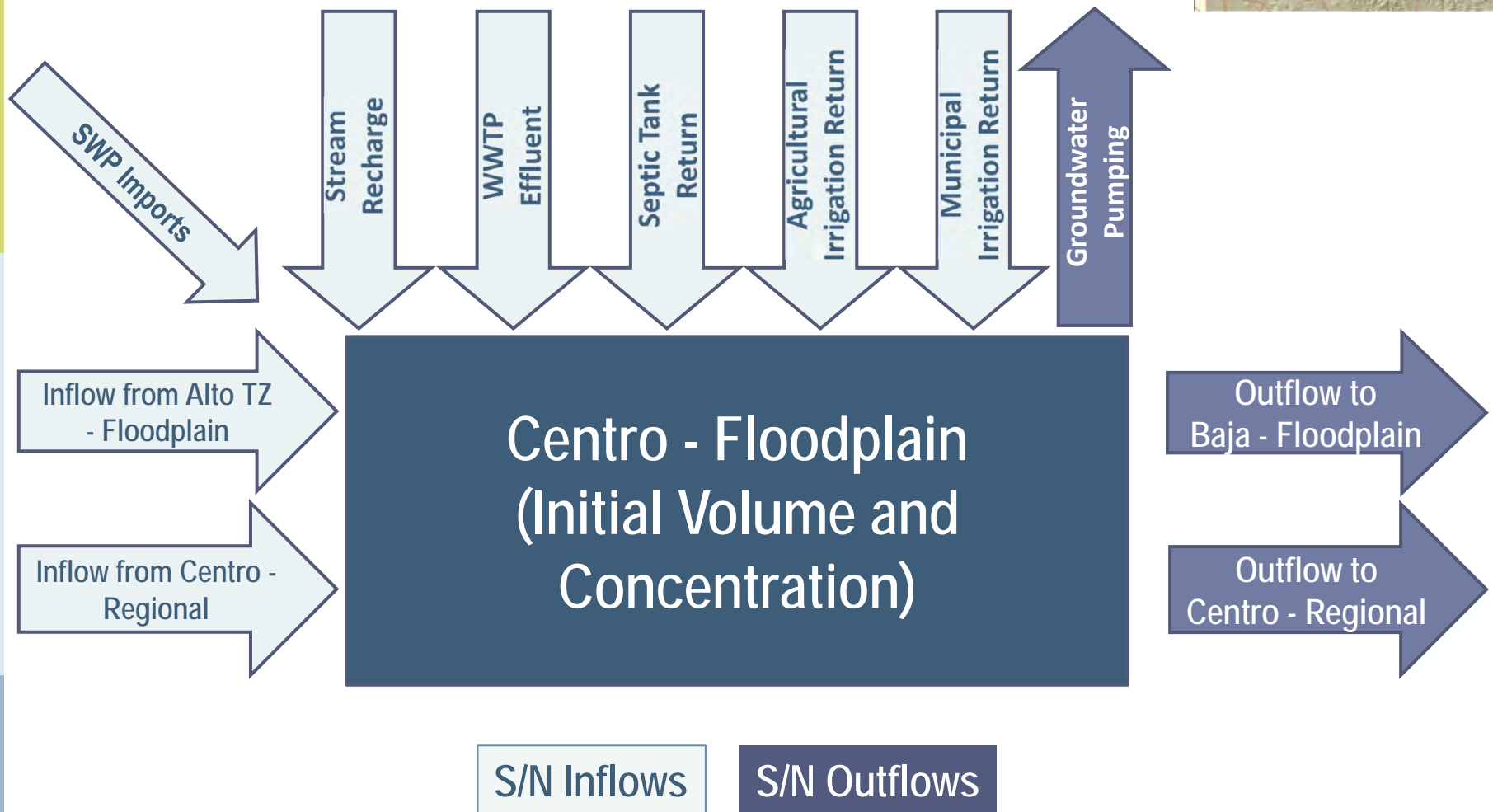
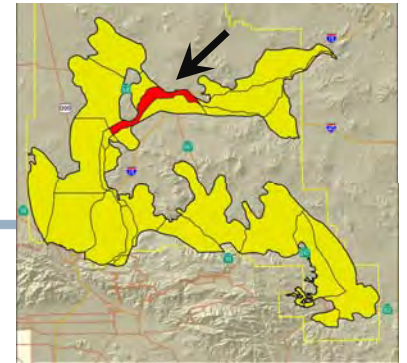
# Alto Right Regional TDS



# Alto Right Regional Nitrate



# Summary TDS Mass Fluxes - Example: Centro - Floodplain







# Salt and Nutrient Transport Model: Key Findings

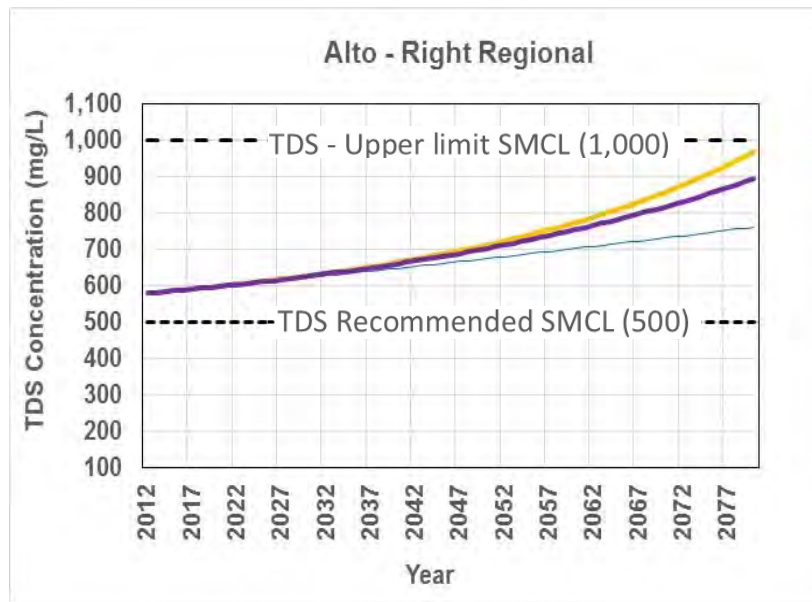
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**Example – Recycled Water Project  
in a Septic Tank-Sensitive Area**

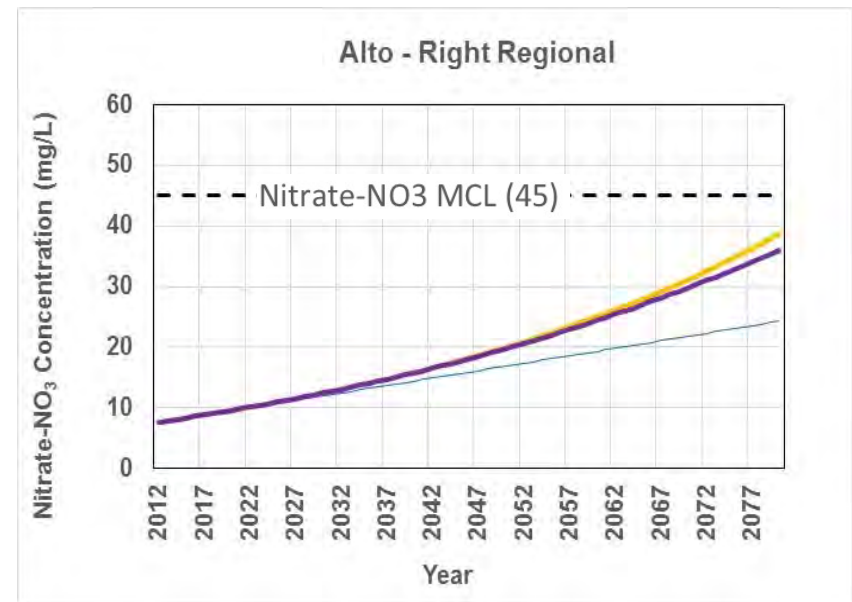
# Recycled Water Project Impact in a Septic Tank Sensitive Area

- ▶ Alto – Right Regional (i.e. Apple Valley Regional Aquifer)

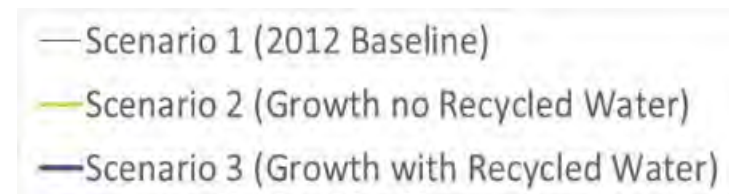
TDS



Nitrate



- ▶ -74 mg/L TDS
- ▶ -2.6 mg/L Nitrate-NO<sub>3</sub>





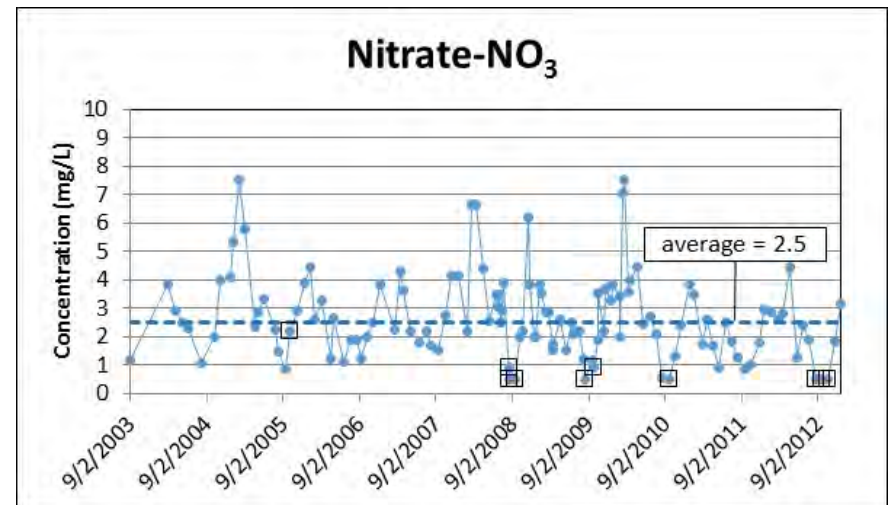
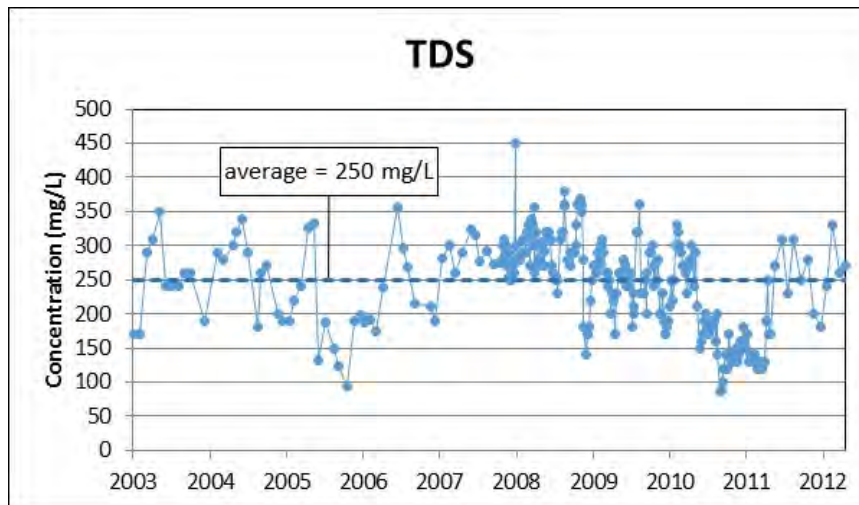
# Salt and Nutrient Transport Model: Key Findings

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Example – Benefit of SWP Water Recharge

# SWP Water Recharge

- ▶ SWP water quality (average 2003 to 2013)
  - ▶ 250 mg/L TDS
  - ▶ 2.5 mg/L Nitrate-NO<sub>3</sub>
- ▶ Average concentration applied to future years



□ = non-detect



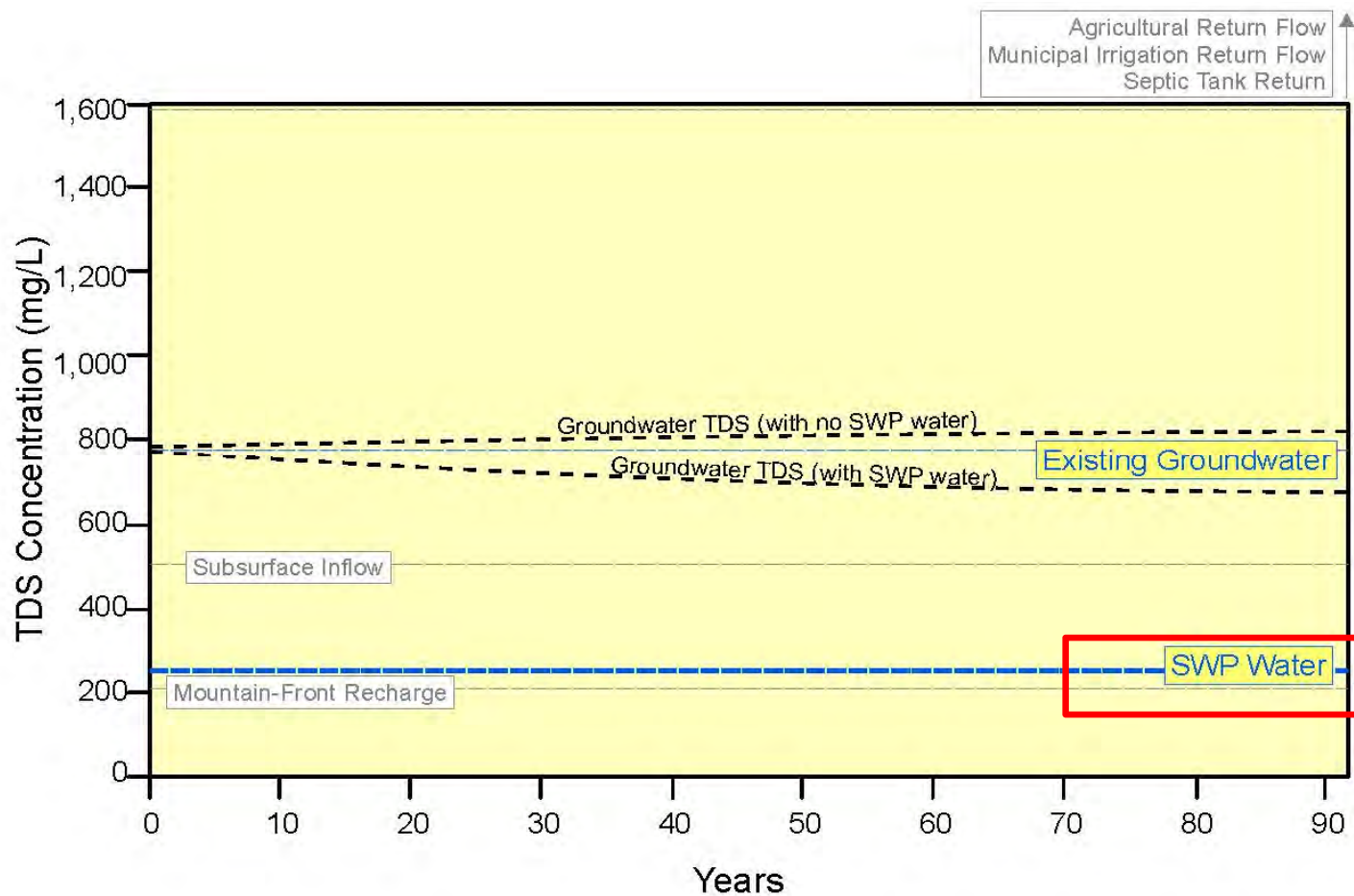
# SWP Water Recharge

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- ▶ For TDS, SWP water is of higher quality than existing groundwater in 4 of 6 subregions receiving SWP water
- ▶ Benefit of SWP water recharge is evident but dependent on time

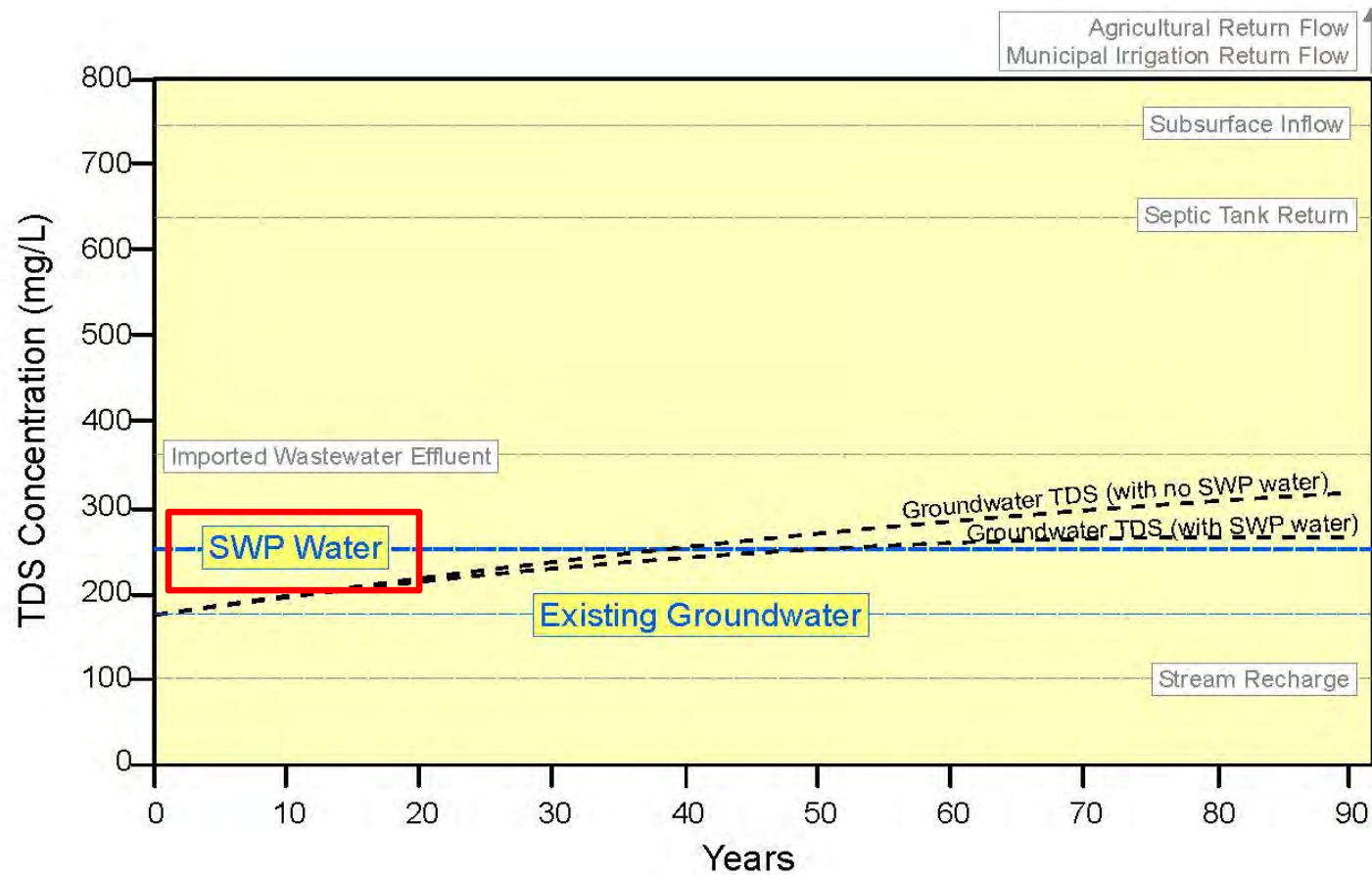
# SWP Water Recharge

## ► Oeste – Regional (i.e. Phelan and El Mirage)



# SWP Water Recharge

## ▶ Alto – Floodplain (i.e. Upper Mojave River)



# Salt and Nutrient Transport Model: Key Findings

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- ▶ Effect of recycled water projects do not result in significant assimilative capacity use in affected subregions
- ▶ The SNMP does not recommend any changes to BPOs
- ▶ Groundwater characterization and S/N modeling results provide the technical foundation to guide local planning and future Regional Board policy decisions
- ▶ *NOTE: A range of stormwater projects have been discussed by Stakeholder Group during 2014 IRWMP Update process. All relevant projects were “conceptual” in nature and therefore not included in this iteration of investigation.*



# Groundwater Monitoring Plan

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- ▶ Collaborative, multi-agency effort
- ▶ Active monitoring network is basin-wide, yet focused where S/N loading, pumping, and groundwater management occur
- ▶ Existing monitoring programs adequate for comparing concentrations of S/N loading to BPOs on subregional-scale
- ▶ Data publicly accessible; no additional reporting proposed
- ▶ MWA is committed to supporting the Regional Boards in the protection of beneficial uses and providing data to guide future policy decisions and address local issues as they arise



*Draft Final*  
**Mojave**  
Salt and Nutrient Management Plan



**Kennedy/Jenks Consultants and Todd Groundwater**

*May 2015*

- ▶ Find the Draft Final at:
  - ▶ [http://www.mojavewater.org/files/FinalDraftMojave\\_SNMP.pdf](http://www.mojavewater.org/files/FinalDraftMojave_SNMP.pdf)
- ▶ Thank you for the release of SEP funds for this regional effort!

# Questions/Discussion

