

Dissolved Solids in Major Aquifers and Major River Basins of the Southwestern United States

USGS Scientific Investigations Report (in progress)

Presented by
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at the Multi-State
Salinity Control Coalition
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National Water
Quality-
Assessment
Program
Regional Analysis



A retrospective data analysis

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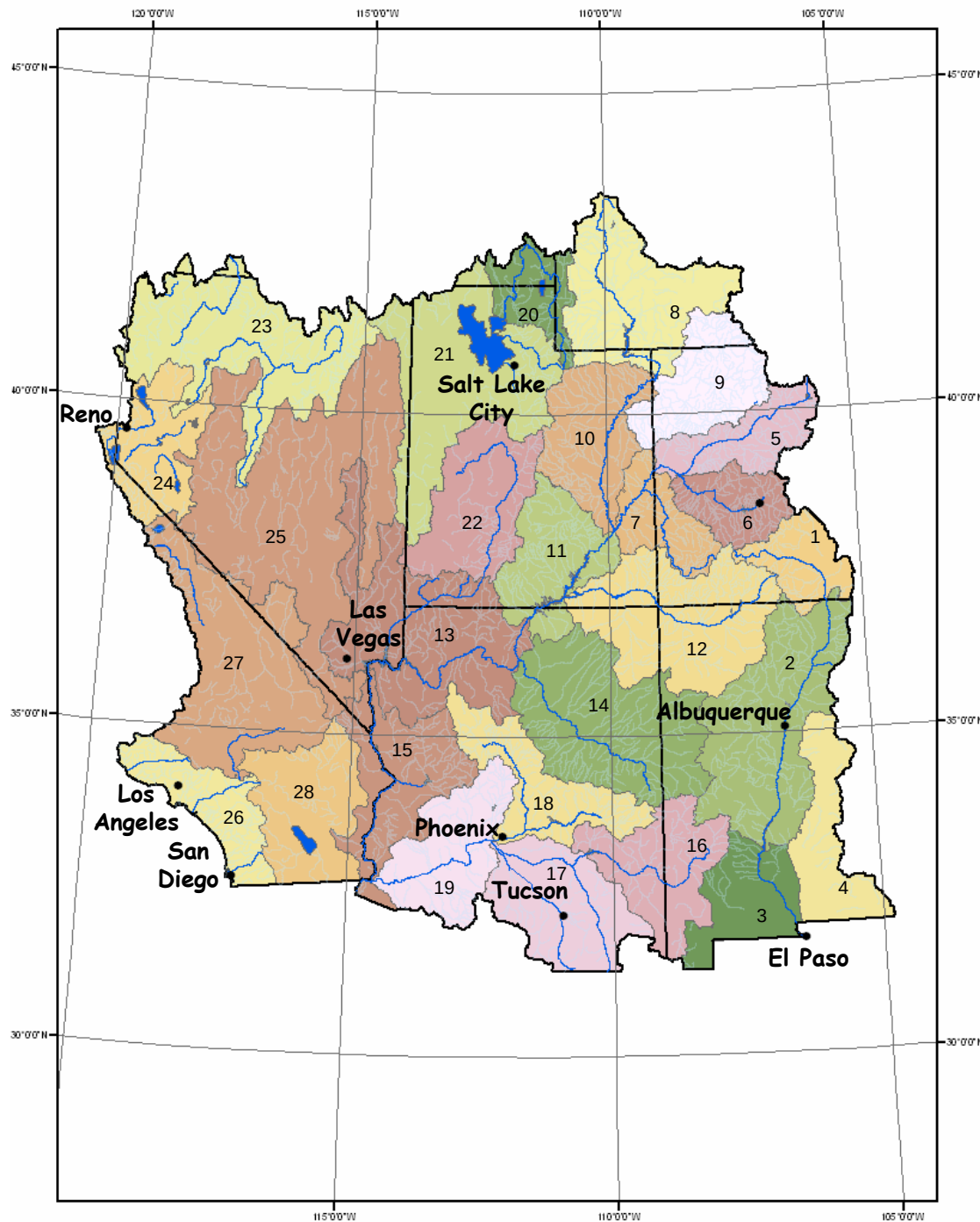


OBJECTIVES



Characterize dissolved solids in
major aquifers and major river
basins in the Southwest:

1. General spatial distribution
2. Effects of natural and human factors
3. Regional-scale sources and sinks
4. Temporal trends of dissolved-solids

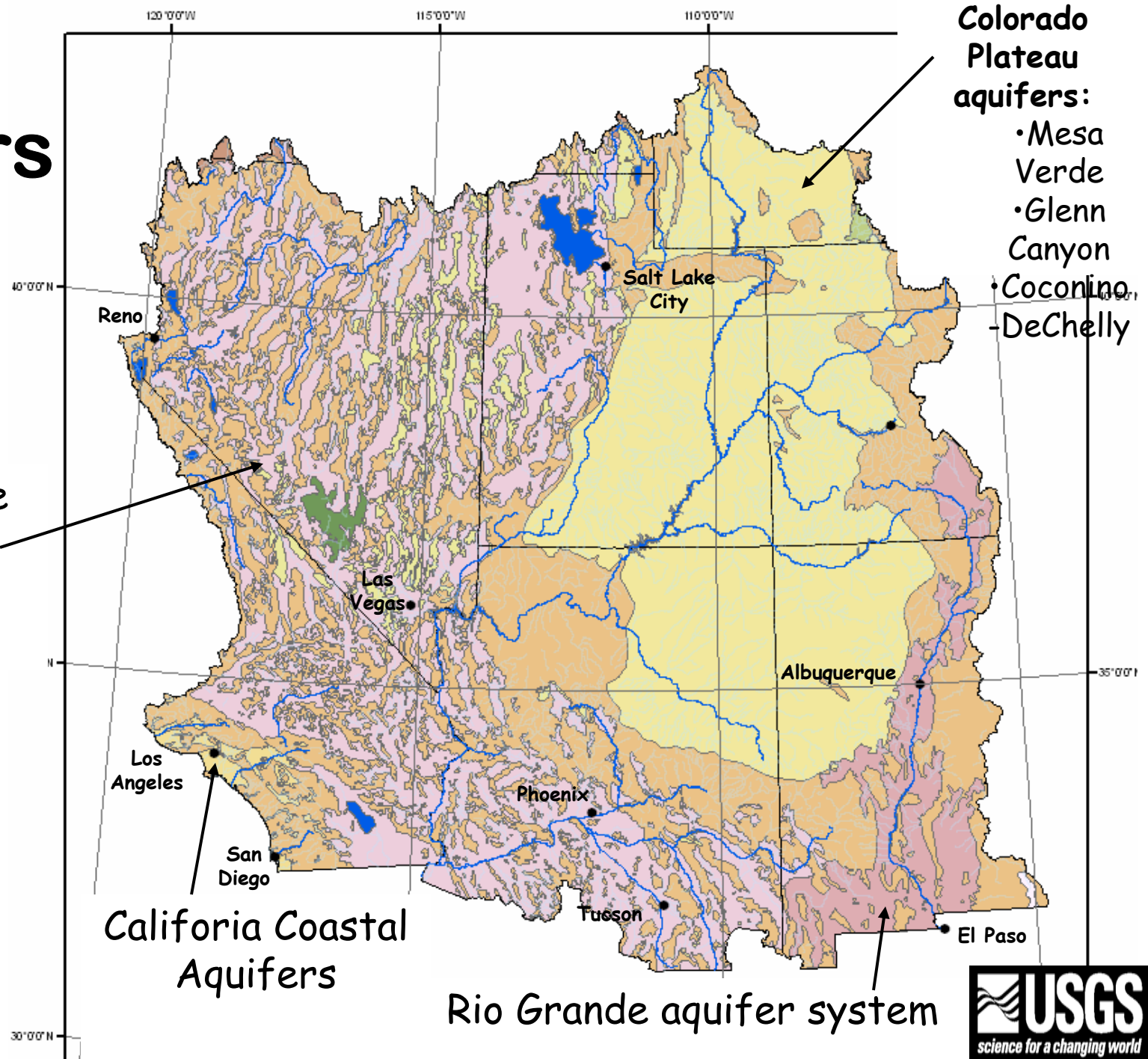


Major River Basins

1. Rio Grande headwaters
2. Rio Grande-Elephant Butte
3. Rio Grande-Mimbres
4. Rio Grande-Closed basins
5. Colorado headwaters
6. Gunnison
7. Upper Colorado-Dolores
8. Great divide-upper Green
9. White-Yampa
10. Lower Green
11. Upper Colorado-Dirty Devil
12. San Juan
13. Lower Colorado-Lake Meade
14. Little Colorado
15. Lower Colorado
16. Upper Gila
17. Middle Gila
18. Salt
19. Lower Gila
20. Bear
21. Great Salt Lake
22. Escalante Desert-Sevier Lake
23. Black Rock Desert-Humbolt
24. Central Lahontan
25. Central Nevada Desert Basins
26. Southern California Coastal
27. Northern Mohave-Mono Lake
28. Southern Mohave-Salton Sea

Major Aquifers

Basin & Range
basin-fill
aquifers

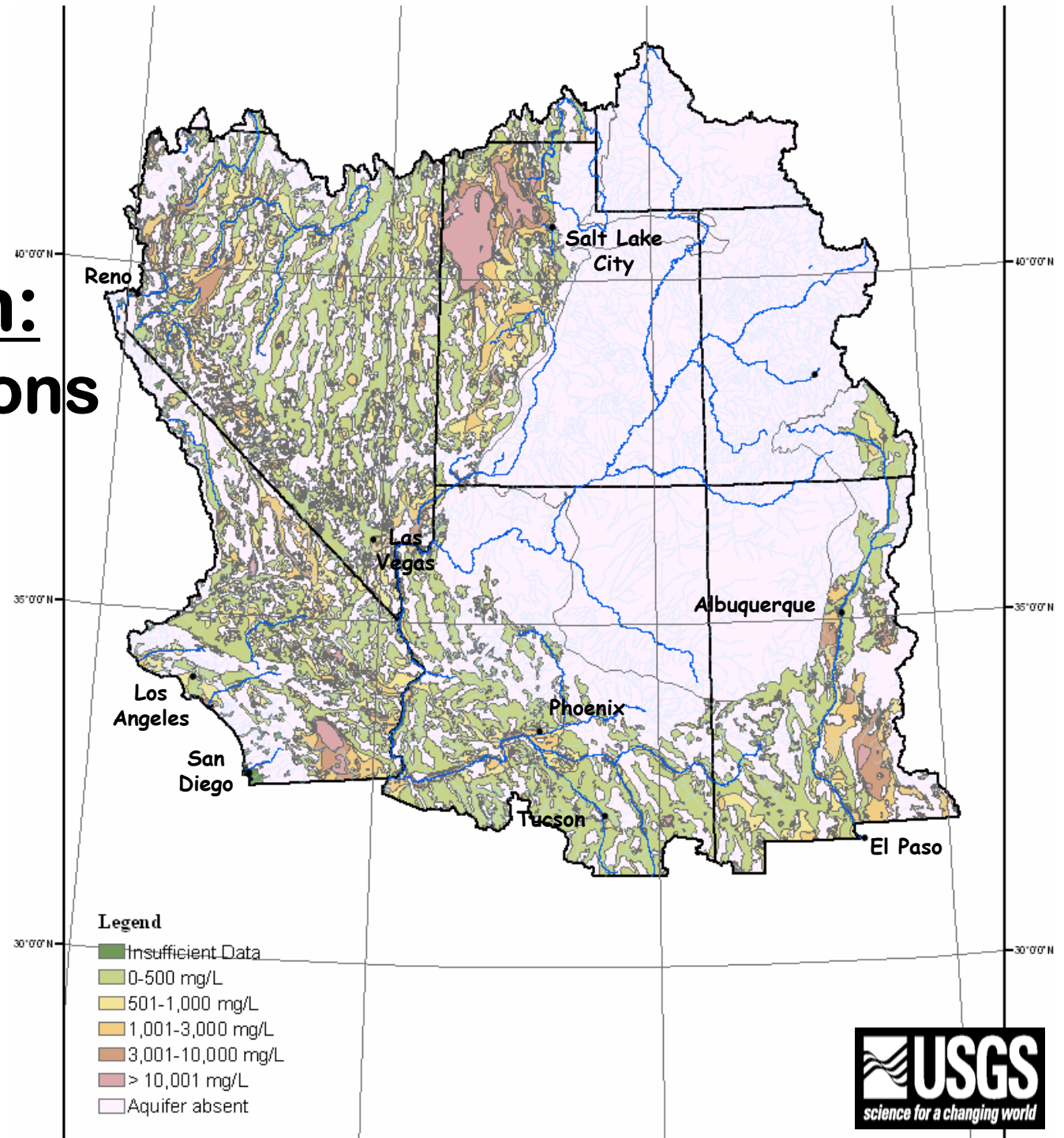


Spatial distribution in major aquifers

- Objective: describe the spatial variability of concentrations at basin to regional scales
- Scope: all basin-fill aquifers and 3 Colorado Plateau aquifers

Spatial distribution: Concentrations in basin-fill aquifers

(preliminary
results)

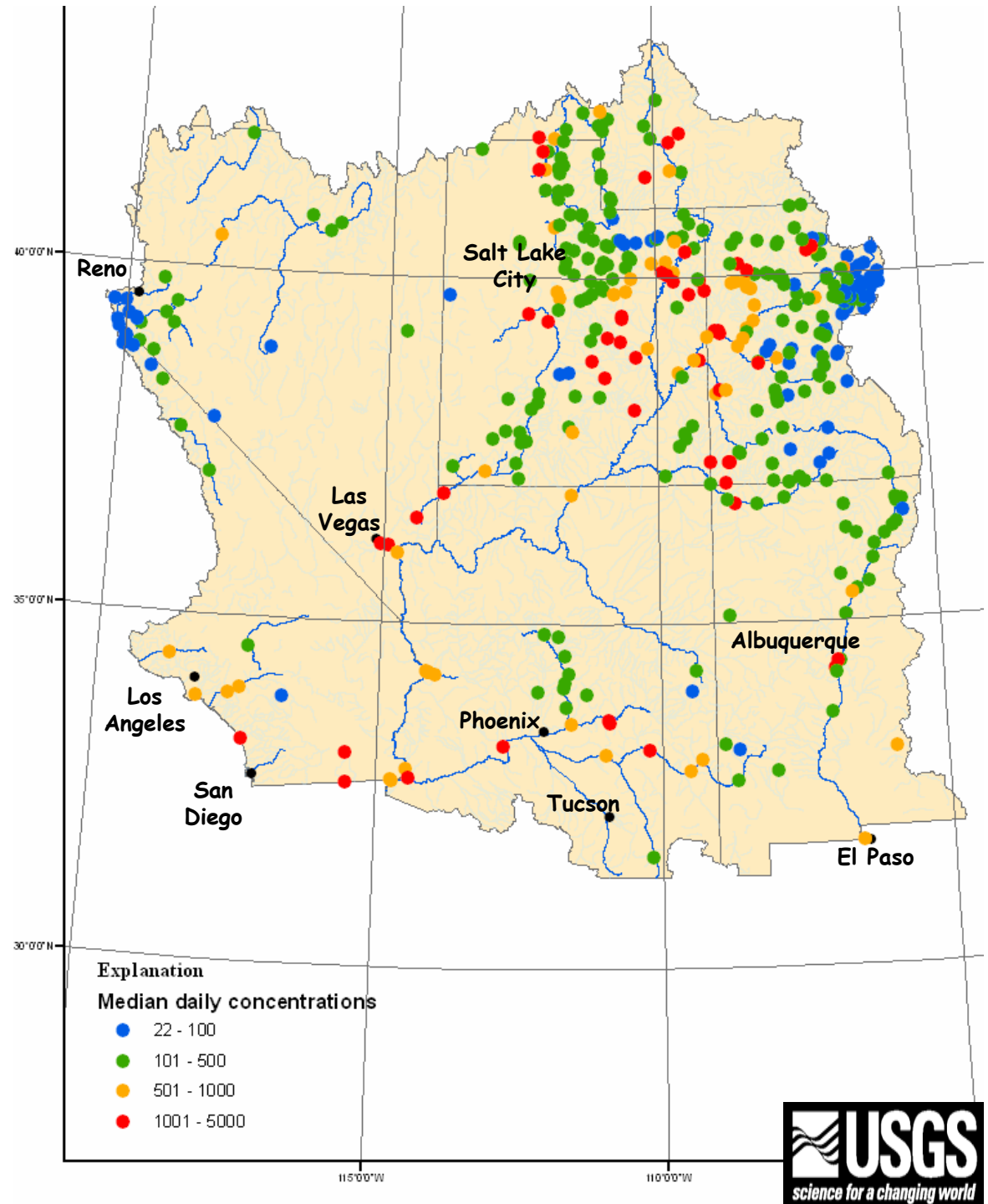


Spatial distribution in major river basins

- Objective: describe the spatial variability of major rivers and tributaries at basin to regional scales
 - Concentrations
 - Loads (mass/time)
 - Yields (mass/time/area)
- Based on sample and discharge data for 420 sites
 - Minimum 40 samples
 - Samples must span at least 10 years since 1974
 - Daily discharge data also available

Spatial distribution in major river basins

(preliminary
results)



Natural & human factors

Objective:

Illustrate with concrete examples how natural and human sources and processes affect dissolved-solids concentrations in the Southwest

Natural & human factors: approach



- Select 12 basins within the NAWQA study units
 - Important water supplies
 - Diverse environmental conditions
 - Availability of data & information
- Describe changes in concentration along surface-water & groundwater flow paths
- Relate changes to natural and human factors

Regional-scale sources and sinks

Objectives:

- Identify areas that are major sources or major sinks of dissolved solids in the Southwest. Rank most significant areas
- Determine what are the major sources of dissolved solids. Rank most significant sources.

Regional-scale sources and sinks: Approach

- Use mass balance approach (input vs. output) on about 300 basins to identify sources & sinks
- Use USGS SPARROW model to determine source loadings, losses, and river transport of dissolved solids
 - These fluxes define the inputs and outputs needed in the mass balance

Temporal trends of dissolved solids

- Objectives:
 - Identify general trends (increasing/decreasing) in the Southwest
 - Identify spatial patterns in trends, if present
 - Where possible, relate trends to natural or human causes
- Three time periods analyzed for major aquifers and major river basins:
 - 1974 through 1988
 - 1989 through 2003
 - 1974 through 2003

Temporal trends of dissolved solids

- Major aquifers
 - Concentrations
 - Data availability
 - 1974-1988: ~100 wells
 - 1989-2003: ~200 wells
 - 1974-2003: ~50 wells
- Major rivers & tributaries
 - Flow-adjusted concentrations & loads
 - Data availability
 - 1974-1988: ~160 sites
 - 1989-2003: ~168 sites
 - 1974-2003: ~74 sites

Status

2005 goal: complete draft report

- Spatial distribution ~ midway
- Natural & human factors ~ nearly complete
- Regional sources & sinks ~ early phase
- Temporal trends ~ midway

2006 goal: review & publish report

Thanks

- For your interest
- For your cooperative funding support over the last 3 decades that has provided the millions of dollars worth of data used in this project

Questions?



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