

# Desalination Concentrate Management Policy Analysis for the Arid West



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Project No. 11-09

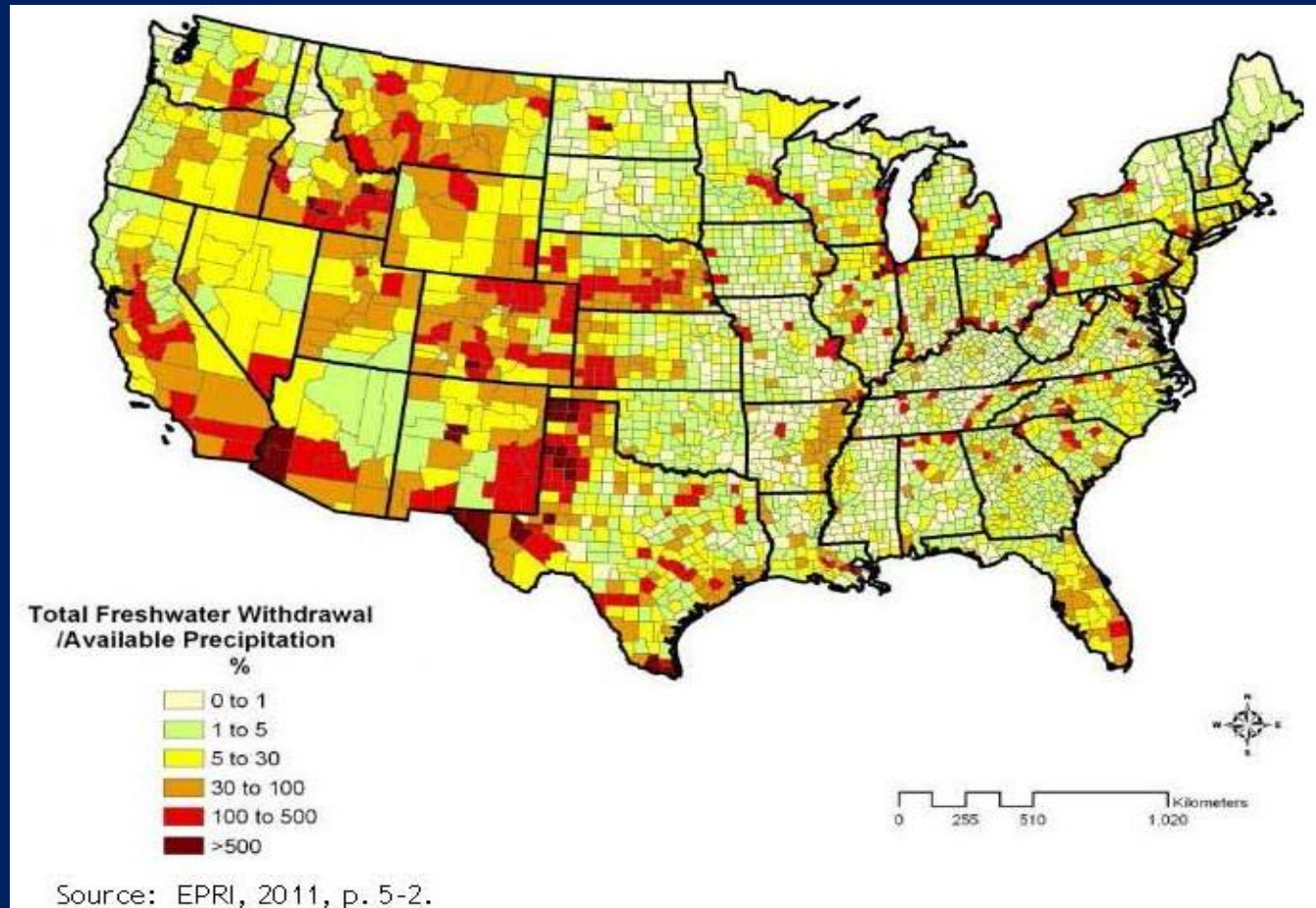
# Project Background/Orientation:

- Critical need for potable water in “Arid West”
- Massive, available resource in form of brackish water
- Reduction in costs for membrane treatment

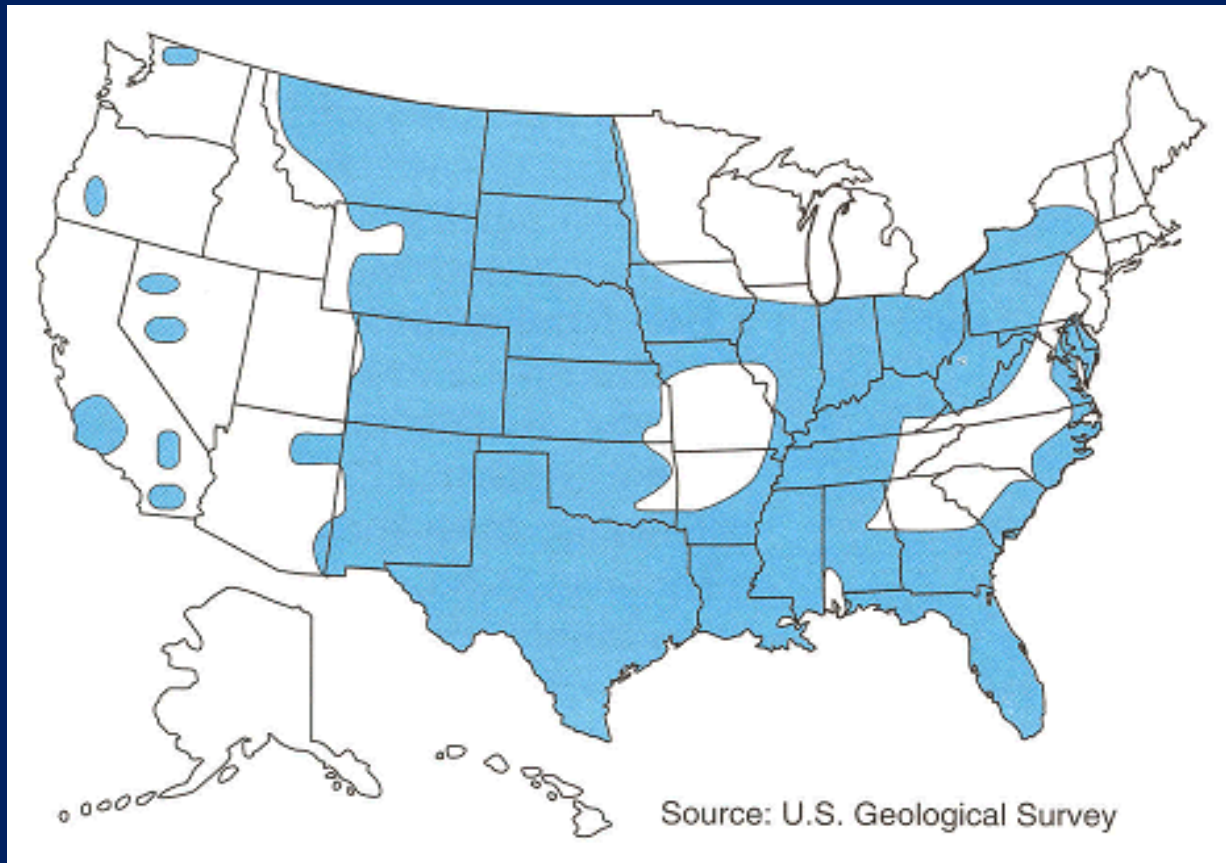


# Freshwater Withdrawals as a Percent of Available Precipitation (2005)

Map Source: Electric Power Research Institute

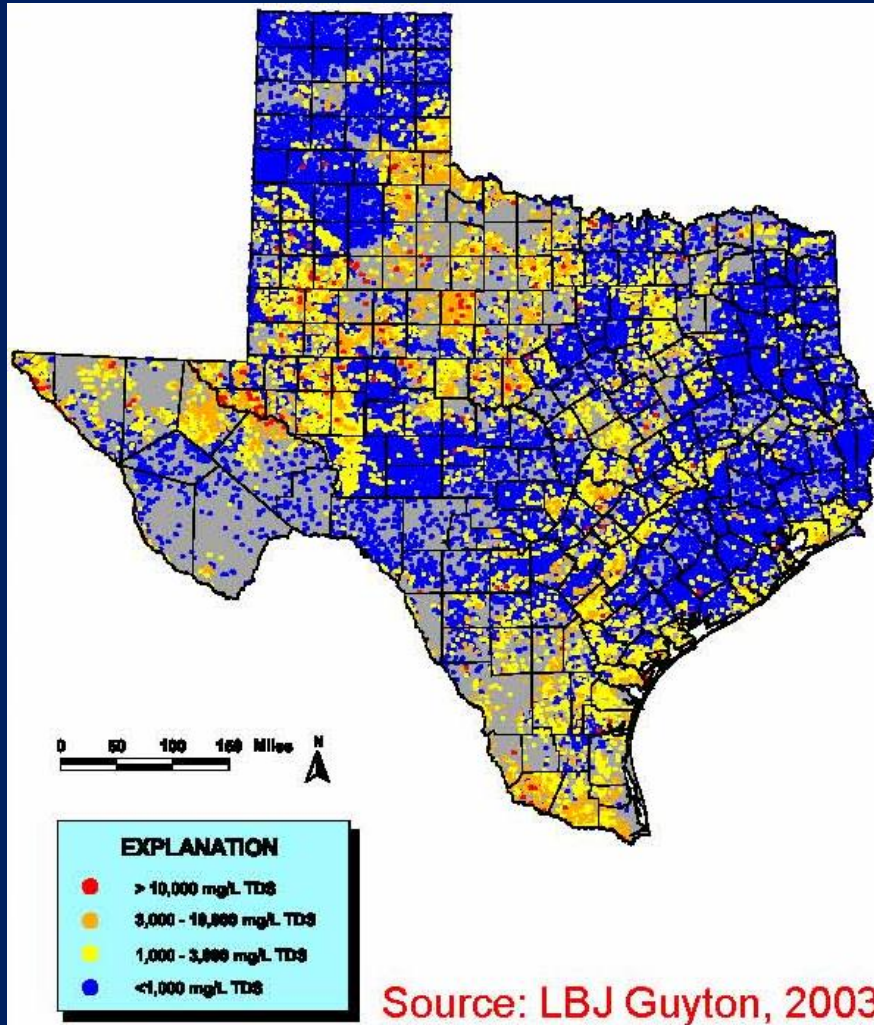


# Availability of Brackish Groundwater Resources in the United States (TDS < 3,000 mg/L)



# Considerable Brackish Water Available in TX

(Yellow & Orange indicates Brackish Groundwater)



Abundant resource throughout the state often at shallow depths with reasonable well yield

- Bureau of Economic Geology

# Research Objectives

- Identify key concentrate management barriers with a focus on the arid west
- Recommend potential policy solutions that protect public health and the environment yet enable broader development of brackish water desalination



# Policy Barriers

- Regulatory and permitting practices vary from state to state, and are sometimes vague and uncompromising
- Legal and institutional policies are often biased against some disposal options
- Testing and permitting requirements may not be economical nor pertinent to proving site suitability
- Not all states are amenable to some disposal options

# Overview of Tasks

- Task 1:** Identify national, state policies (completed)
- Task 2:** Develop case studies, issue papers defining CM practices (completed)
- Task 3:** Define, evaluate existing regulatory policy barriers to sound management (in progress)
- Task 4:** Plan/Conduct project workshop (completed)
- Task 5:** Define potential solutions for Report (in progress)
- Task 6:** Final report due -June 2013





# Primary Project Team Members

- CHIWAHA Members - Project Research Investigators: (EPWU, UTEP, NMSU, TX-AgriLife Research of TAMU, City of Alamogordo, NM)
- Stratus Consulting, Inc.-Lead Project Consultant
- Mike Mickley & Associates-CM Technical Specialist
- Bickerstaff, Heath Law Firm-Primary Legal Consultant



# Options for Inland Concentrate Management (CM)

- Surface water discharge
- Wastewater treatment plant/sewer
- Land disposal (land application)
- Evaporation ponds
- Deep well injection (DWI)
- High recovery (e.g., zero liquid discharge) and beneficial use

# Options Not Generally Viable for Inland Desalination in Arid West: (unless *very small scale*)

- Surface water and sewer discharge
  - Inadequate dilution for NPDES permits
- Land application
  - Brine concentrations too high
- Evaporation ponds
  - Land area requirements and costs
  - Ultimate removal and disposal of solids
- Same constraints faced, to lesser degrees, in Florida and elsewhere (not just arid West)

# Background Information on Deep Well Injection (DWI)

- Regulated under Underground Injection Control (UIC) program, per SDWA:
  - State primacy (the case for most States),  
or
  - Regional EPA



# Deep Well Injection: Class I

## (Background Information cont'd)

- Municipal and Industrial wastes-generally fall into this Class, (as hazardous or non- hazardous categories)
  - *including desalination concentrate and other Drinking Water Treatment Residuals*
- Stringent requirements
  - including public hearings and participation
- There are less than 600 nationwide



# Other Classes-Deep Well Injection

(Background Information cont'd)

- Class II: Oil and Gas
- Class V: Miscellaneous, non-hazardous  
(EPWU's choice, reduced public participation requirement)
- Class VII-?? (possibly a new class for membrane concentrate-?)

# Key UIC Barriers to DWI

(Background Information cont'd)

- Underground Source of Drinking Water (USDW)
  - Defined by TDS < 10,000 mg/L
- Lengthy and expensive permit process
  - Procedural and technical requirements
- Aquifer Exemption (AE) process
- Cost to EPWU for Entire Class V Permit and
  - AE Process = Approx. \$1.5 million



# High Recovery and Volume Reduction

*(most methods are still experimental)*

- Advantages:
  - Increases water yield
  - Reduces volume of concentrate
- Challenges and barriers:
  - High energy demand
  - High cost
  - Increases final brine concentration
  - Solids (and near solids) require disposal
    - Precipitation potential in DWI wells
    - Possible hazardous or radioactive waste



# Primary Recommendations

## Priority No. 1:

Define a New Subcategory for DWI under Class V; improve definitions of USDW's, and aquifer "endangerment"

## Priority No. 2:

Develop Uniform Guidance Tools to Issue Class I Permits addressing suitable geologic, injection, containment, chemical composition, public information and other concerns



# Primary Recommendations (cont'd)

## Priority No. 3:

Develop a “General Permit” under Class I of UIC using Texas’ Model for States with Primacy; streamlined process-shorter public participation, limited State signature requirements

## Priority No. 4:

Provide Primacy to States for Aquifer Exemption Program; avoids a second level EPA review



# Primary Recommendations (cont'd)

## Priority No. 5:

Encourage advances in Concentrate Disposal, Beneficial Reuse using Incentive Processes; Competitions for Concept Designs and Pilot Demonstrations



# Additional Recommendations

## The Path Forward

- Due to many site-specific hydro-geologic features and other factors, there is rarely a “one site fits all” solution to facilitating desal CM
- Under the UIC program it would be valuable to develop a category for water utility desalting concentrate that separates the “industrial” category under Class I



# Additional Recommendations

## The Path Forward (cont'd)

- The challenges faced by utilities with CM extend beyond inland desalting. Similar challenges exist for wastewater reuse and aquifer storage and recovery
- Improve databases to characterize potential disposal sites and respective groundwater and concentrate qualities



# Additional Recommendations

## The Path Forward (cont'd)

- To facilitate the use of evaporation ponds in arid regions, it may be suitable to establish arid area exemptions from the double-liner requirement
- Address current limitations in regulatory capacity at state and federal regulatory agencies
- Identify and organize a broad coalition of interested stakeholders with a common interest in desalination and CM policies to work together on proposed solutions





# Questions?