Lower Rio Grande/Rio Bravo Salinity Study (LRG/RBSS)

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TCEQ Environmental Trade Fair

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Introduction: David Eaton

- Four members of the binational team involved in the lower Rio Grande/Rio Bravo Salinity Study
- José Luis Fernández Zayas of Universidad Nacional Autónoma de México (UNAM)
- Dan Sheer, Miguel Pavon and David Eaton of The University of Texas at Austin (UT-Austin)

Sponsoring Government Agencies

- The two teams of consultants from UNAM and UT-Austin are cooperating under the guidance of three Mexican and three US government agencies:
- Comisión Internacional de Limítes y Aguas (CILA)
- International Boundary and Water Commission, U.S. Section (IBWC)
- Comisión Nacional del Agua, Mexico (CONAGUA)
- U.S. Environmental Protection Agency (USEPA)
- La Secretaría de Desarrollo Urbano y Medio Ambiente de Tamaulipas (SEDUMA)
- Texas Commission on Environmental Quality (TCEQ)

Progress to Date

- The two consultant teams (UNAM/UT-Austin) have agreed to share data in an open and transparent manner
- The two consultants have agreed on how to manage the data to assure quality assurance and quality control
- The two consultants have agreed on the methods and techniques they will use to organize and analyze the data
- The two consultants have agreed on together providing all six sponsoring agencies with all the data and the analysis in an open and transparent way
- The consultants have formally submitted a Quality Assurance Project Plan to the U.S. Environmental Protection Agency

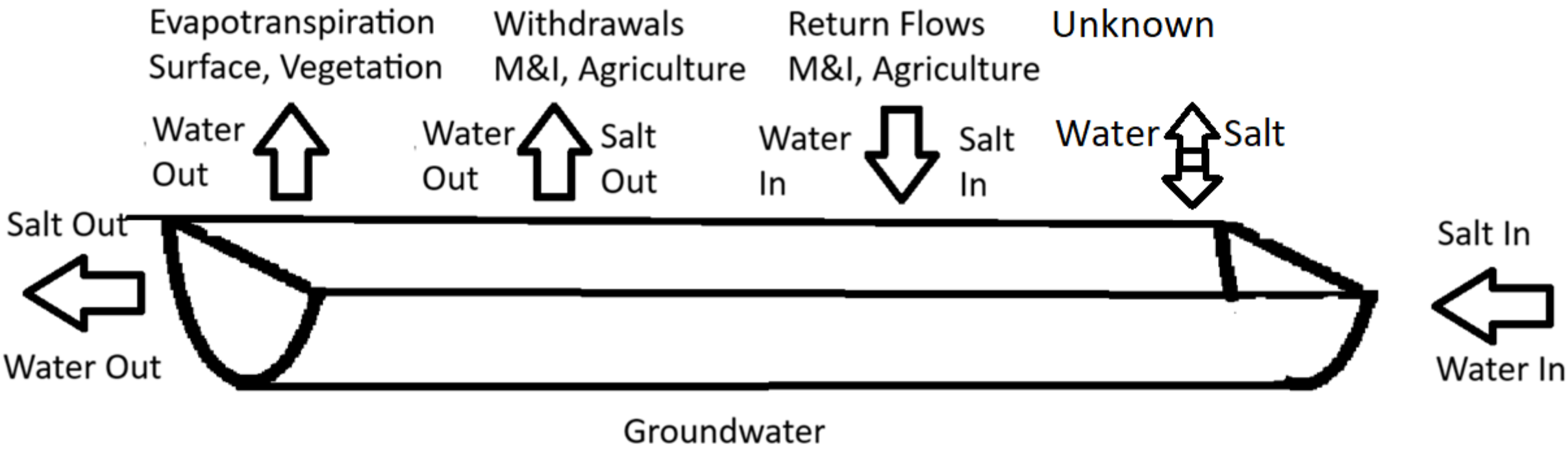
Basic Strategy: A Salinity Mass Balance

- The two consultants (UNAM and UT-Austin) are collecting data from Mexican and US sources on the flows and salinity within the RG/RB basin to explain changes and fluctuations in river salinity
- The approach is to include all sources of water/salinity that can enter the river and all withdrawals of water/salinity that can leave the river
- Based on an understanding of the factors that affect salinity concentrations, the six sponsoring agencies can take action to prevent or control salinity
- An initial mass balance has been developed and will be improved as more data are collected and analyzed

Study Objectives

- Identify location and possible causes of increasing salinity
  - Preliminary analysis by Dr. Eaton's Policy Research Project (PRP) UT Austin
  - Shows a small upward trend in overall salinity over the past decade
- Identify causes of salinity spikes
  - Salinity sometimes spikes to undesirable levels for public consumption
  - Cause of the spikes is unclear
- Possible Discussion of Soil Salinization Issues

Reach Mass Balance



Expected Methods

- No new in situ data will be collected
- Mass Balance Accounting
  - Salt In = Salt Out for each reach
  - Reaches defined by monitoring stations with proximity and concurrent measurements of flow and specific conductivity (proxy for salinity) gives salt in (upstream) and salt out (downstream)
  - Additional diversion, discharge with flow and TDS, Salinity, or Specific Conductivity (Sp.C) will be used to augment the mass balance
  - Information on agricultural return flows will be used
  - Estimates of reach evaporation and phreatophytic water use will be used to augment mass balance
  - Unaccounted for loads will be calculated

Daily Analytical Time Step

- In some cases, 15 minute data are available
  - Converted to daily using flow weighting as possible
- Daily time step will eliminate much noise and facilitate tracking of what is going on during transient events
- Transients may be related to the timing of:
  - reservoir releases,
  - runoff peaks,
  - large diversions,
  - discharges and
  - return flows.

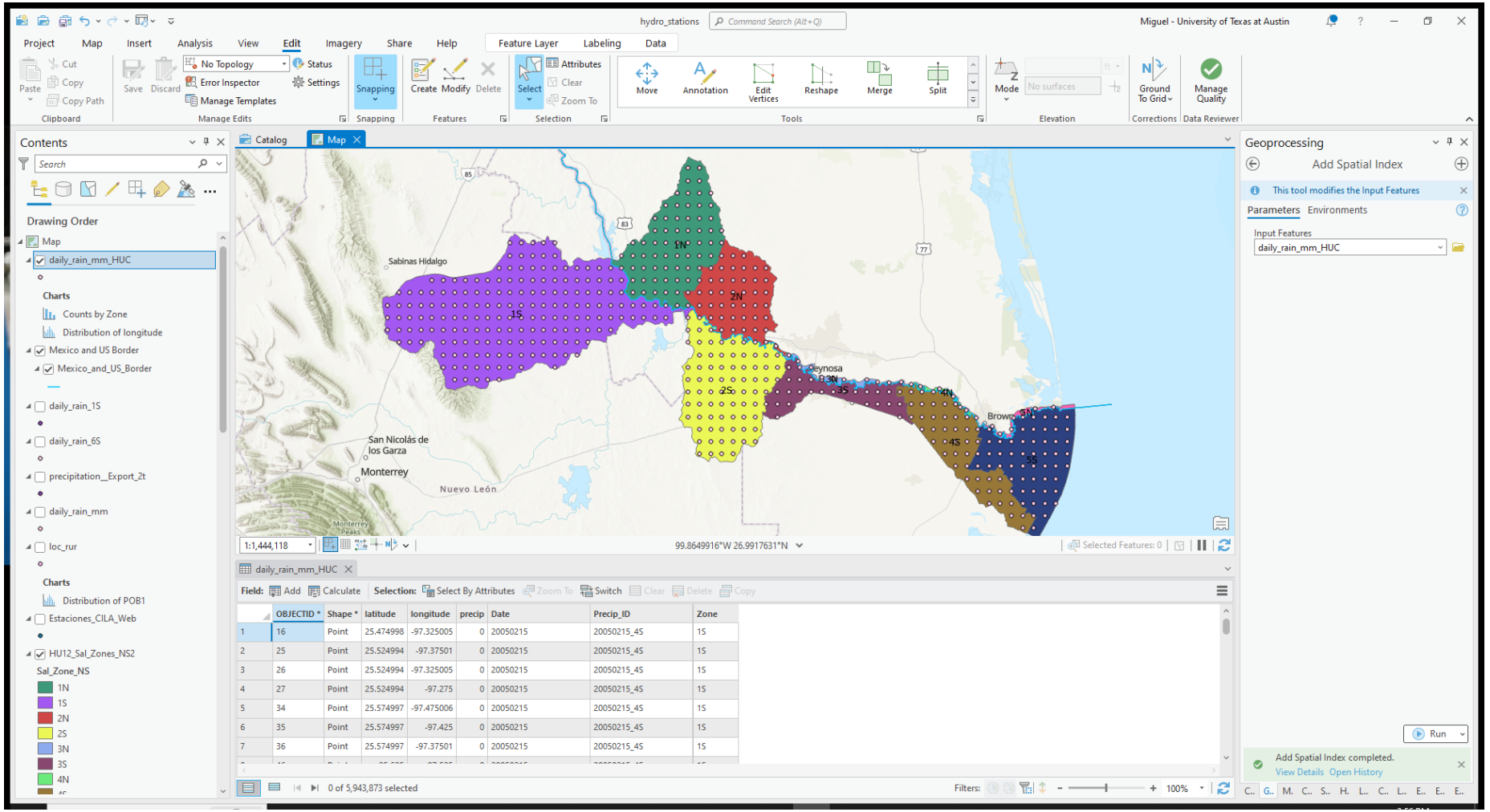
Relevant Mass Balance Data Collected by Current and Past PRPs at UT Austin

- River Reach inflow/outflow and salinity (concurrent time series)
  - sufficient for analysis of some transients, not enough for continuous analysis
  - Largest problem is sensor outages
- Tributary Inflow and salinity for larger tributaries, both sides
- Inflow and salinity from agricultural drains, south side (most returns on north side go to Arroyo Colorado
- Agricultural Withdrawals, both sides – in progress
- M&I withdrawals, both sides – in progress
- M&I return flows and salinity, north side – progress
- M&I return flows and salinity, south side – unknown at this time
- Evapotranspiration (ET)
  - sufficient meteorological data open water and vegetation area can be derived from satellite and aerial photos
  - ET rates from riparian vegetation must be found
  - time of particle travel must be found

Additional Relevant Data

- Rainfall
  - Not a mass balance direct input
  - Will be used to examine if rainfall seems to be a driver of salinity spikes
- Groundwater Modeling Results
  - TCEQ models indicate quite modest groundwater gains and losses by reach on an annual basis
  - Groundwater data are scarce

Daily Rainfall From Doppler Radar



International Coordination

- The project includes consultants hired by Mexico and the US
- Wherever possible, conclusions will be reached by consensus
- Data exchange and analytical collaboration have begun
- Data Management Plan has been drafted and reviewed and confirmed in principle by consultants from both Mexico and Texas, and reviewed by Mexican and US government sponsoring agencies

Data and Analytical Sharing Principles

- All data sets utilized in evaluations on either side should be available to both sides. This could be accomplished with a shared data base.
- All data sets should be stored in a commonly accessible data base.
- Each side is free to utilize tools or analytical methods of choice
- Each side will make available any tool or analytical method to the other side