INTERNATIONAL BOUNDARY AND WATER COMMISSION

UNITED STATES AND MEXICO

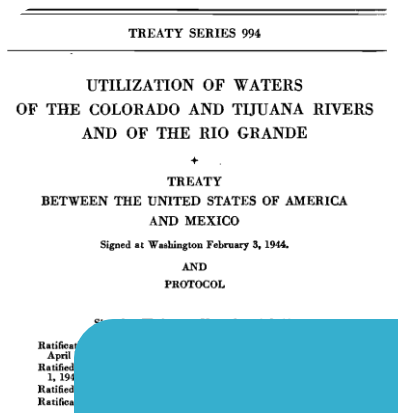
Understanding the Transboundary Aquifer Assessment Program (TAAP) and Advances in Harmonizing Data Across Borders

Gilbert Anaya, United States Section

Blanca Cabello, Mexican Section

May 20, 2024

IBWC AND THE TRANSBOUNDARY AQUIFER ASSESSMENT PROGRAM (TAAP)



TREATY SERIES 994

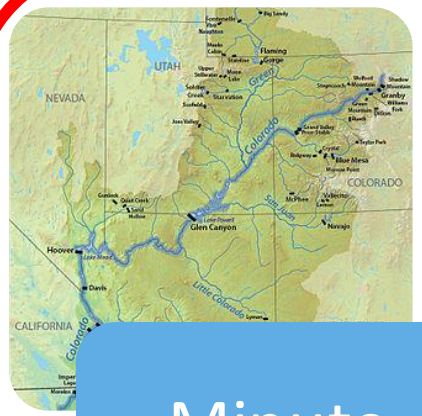
UTILIZATION OF WATERS
OF THE COLORADO AND TIJUANA RIVERS
AND OF THE RIO GRANDE

TREATY
BETWEEN THE UNITED STATES OF AMERICA
AND MEXICO

Signed at Washington February 3, 1944.

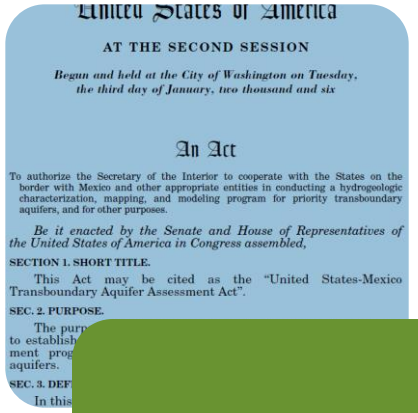
AND
PROTOCOL

1944 Water Treaty



Minute 242

1973



United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the third day of January, two thousand and six

An Act

To authorize the Secretary of the Interior to cooperate with the States on the border with Mexico and other appropriate entities in conducting a hydrogeologic characterization, mapping, and modeling program for priority transboundary aquifers, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

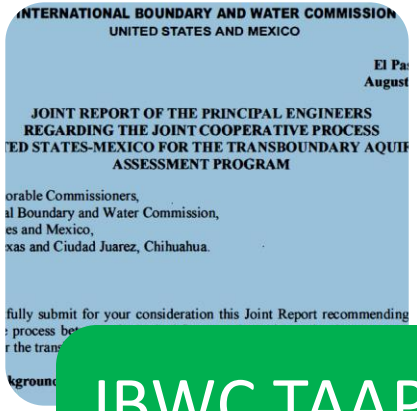
SECTION 1. SHORT TITLE.

This Act may be cited as the "United States-Mexico Transboundary Aquifer Assessment Act".

SEC. 2. PURPOSE.

TAAP

2006



INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

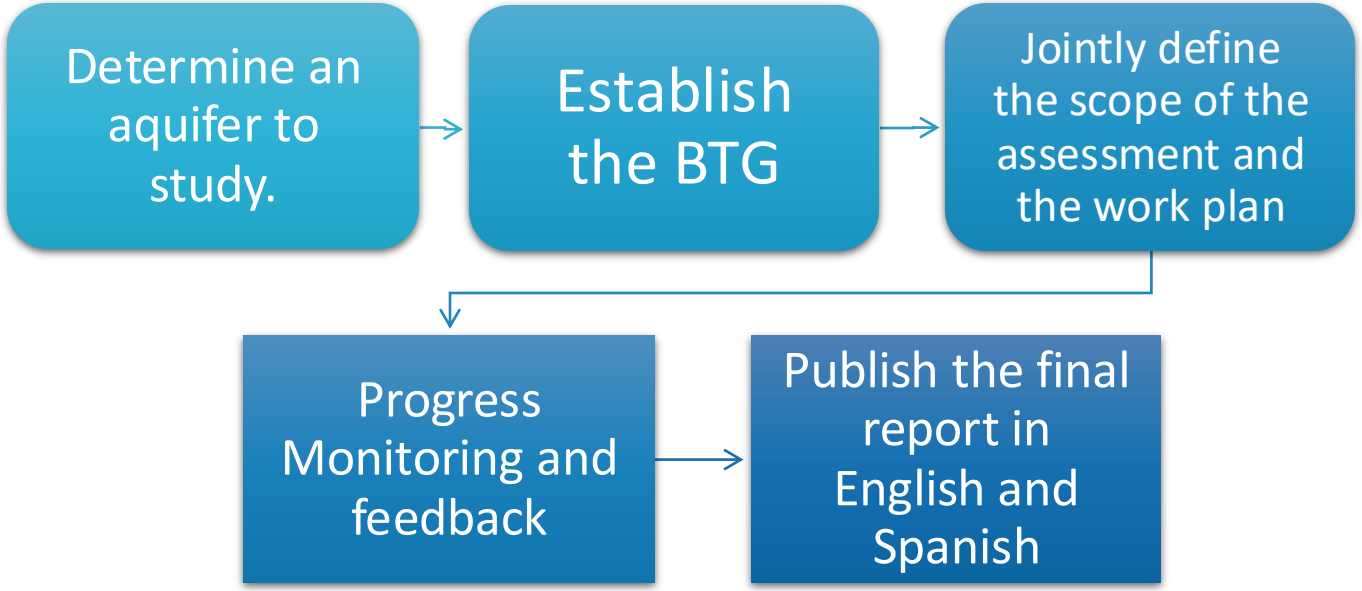
JOINT REPORT OF THE PRINCIPAL ENGINEERS
REGARDING THE JOINT COOPERATIVE PROCESS
ASSESSMENT PROGRAM

IBWC TAAP Joint Report 2009

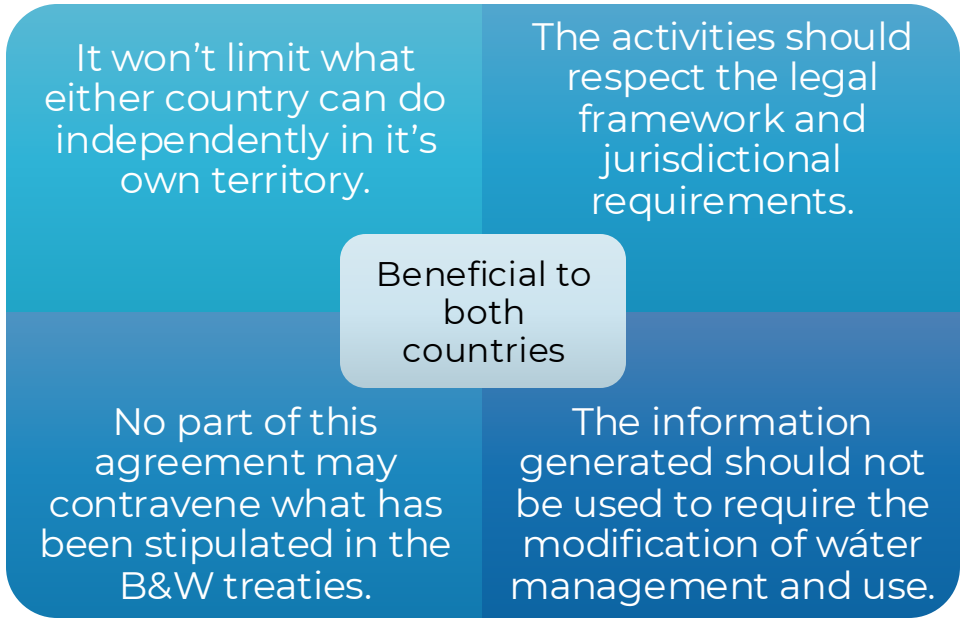
TAAP JOINT REPORT

Objective: To improve the knowledge base of Transboundary aquifers between the United States and Mexico.

Framework/Process:

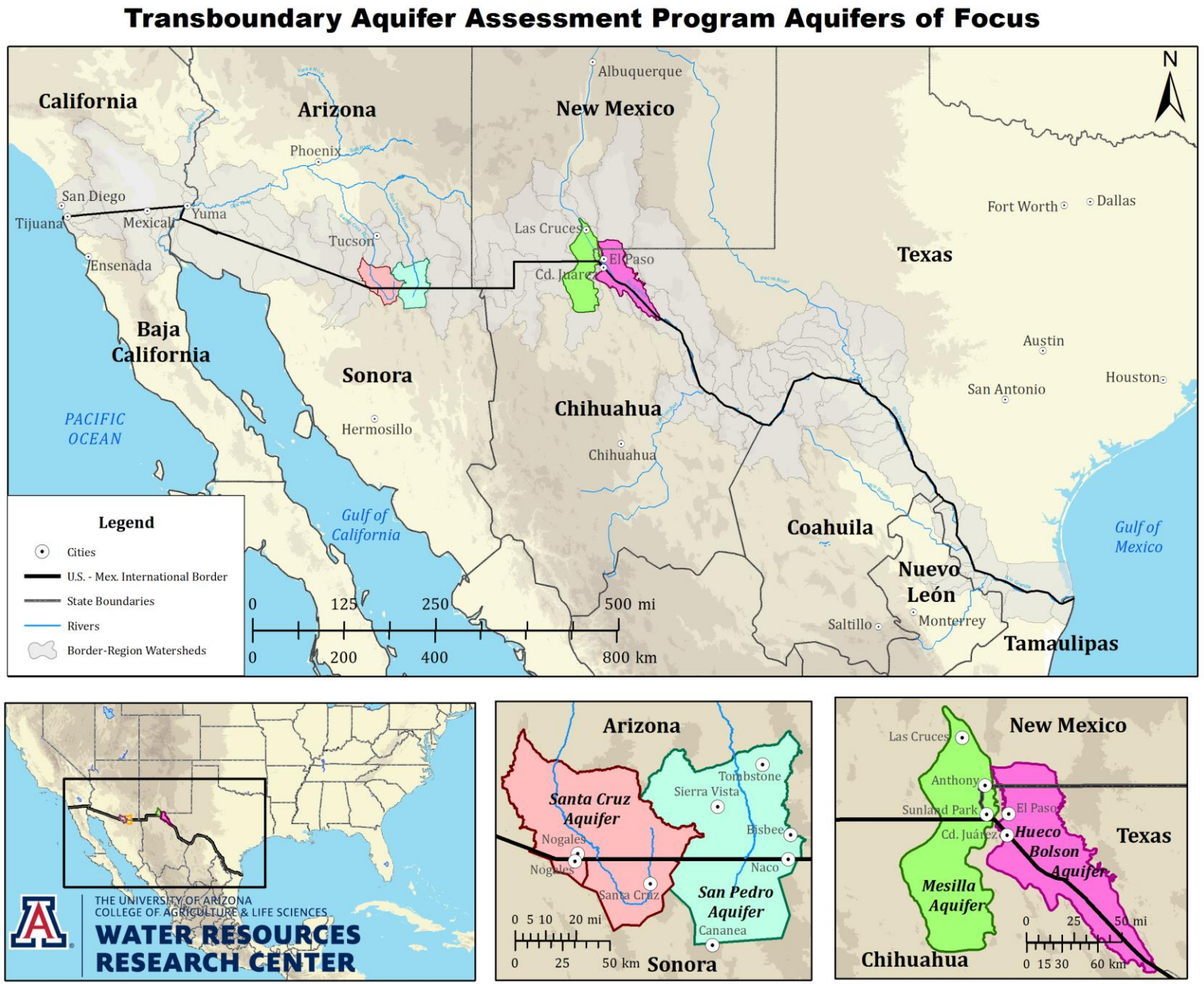


Principles:



United States-Mexico Border

TAAP Priority Aquifers



Binational Joint Studies

- 1998- Transboundary Aquifers and Binational Ground Water Database for the City of El Paso/Ciudad Juarez Area
  - IBWC, Environmental Protection Agency, Texas Water Development Board (TWDB), New Mexico Water Resources Research Institute (NMWRRI), National Water Commission (CONAGUA), Municipal Council for Water and Sanitation of Ciudad Juarez
- 2011- Hydrogeological Activities in the Conejos-Medanos/Mesilla Basin Aquifer, Chihuahua
  - NMWRRI, Texas Water Resources Institute (TWRI), IBWC, Mexican Geological Survey, U.S. Geological Survey (USGS)
- 2016- Binational Study of the Transboundary San Pedro River Aquifer
  - University of Arizona Water Resources Research Center (UAWRRC), IBWC, CONAGUA, USGS, University of Sonora (UNISON)
- 2025- Binational Study of the Transboundary Santa Cruz River Aquifer
  - University of Arizona Water Resources Research Center (UAWRRC), IBWC, CONAGUA, USGS, University of Sonora (UNISON)

Transboundary Aquifers and Binational Ground Water Database for the City of El Paso/Ciudad Juarez Area

- Exchange of hydrogeological information
- Development of a binational database
- Development of a mathemathical Flow model
- Final report in both languages

Binational data included:

- ✓ Land use
- ✓ Well data
- ✓ Groudwater levels
- ✓ Groundwater quality analysis
- ✓ Pumping records

Mx Participants:

- Mexican Section of IBWC (CILA)
- CONAGUA
- JMAS

US Participants:

- US IBWC
- TWDB
- NMWRRI
- EPA

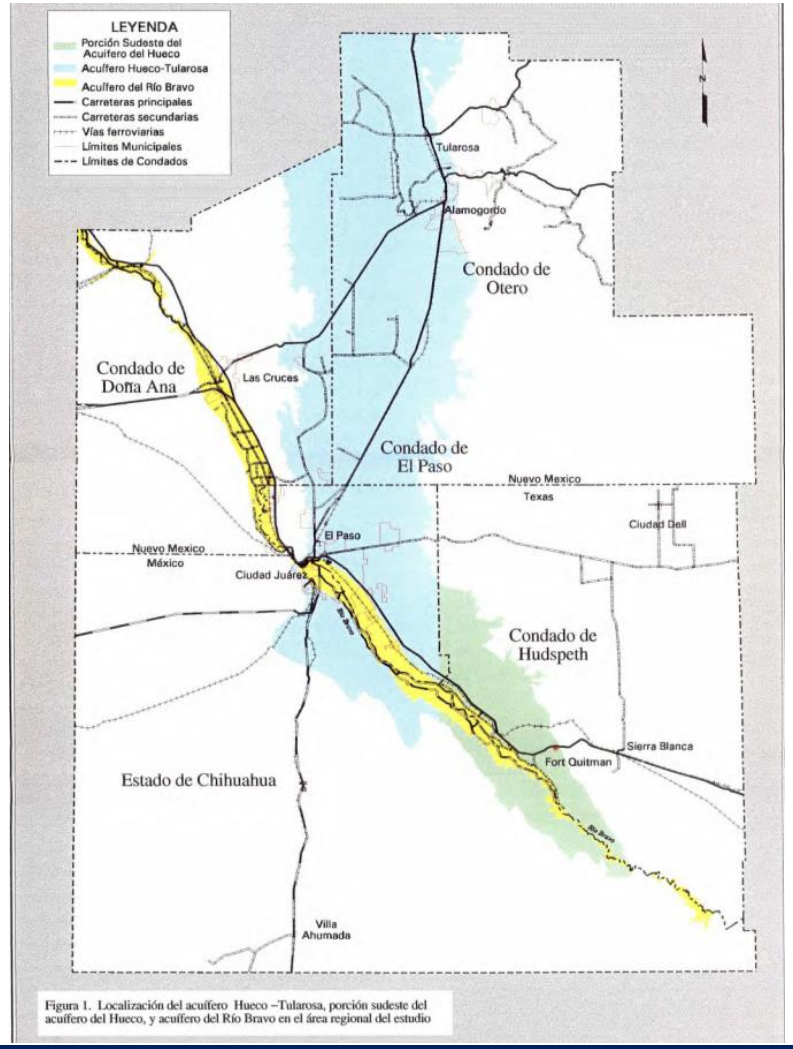


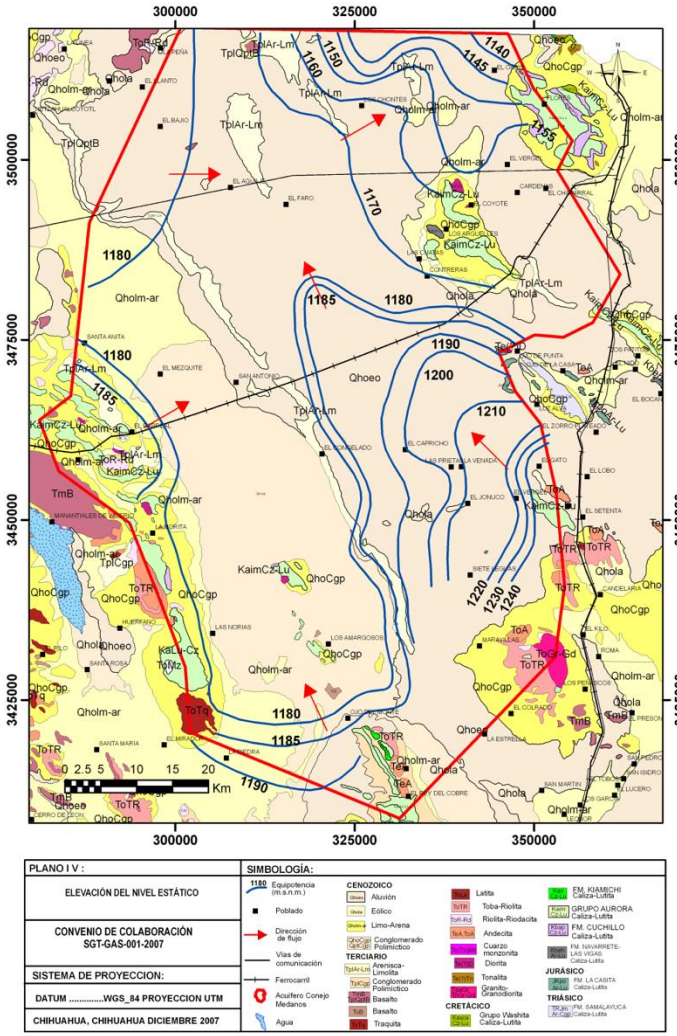
Figura 1. Localización del acuífero Hueco –Tularosa, porción sudeste del acuífero del Hueco, y acuífero del Río Bravo en el área regional del estudio

CHIHUAHUA-NEW MEXICO-TEXAS
CONEJOS MEDANOS/MESILLA BOLSON-2010

UNITED STATES – MEXICO
TRANSBOUNDARY AQUIFER ASSESSMENT PROGRAM
UPDATED JOINT WORK PLAN
April 1, 2010

References cited:

- Creel, B.J., Hawley, J.W., Kennedy, J.F., and Granados-Olivas, A., 2006, Groundwater resources of the New Mexico-Texas-Chihuahua border region: New Mexico Journal of Science, v. 44. p. 11-29.
- Hawley, J.W., and Kennedy, J.F., 2004, Creation of a digital hydrogeologic framework model of the Mesilla Basin and southern Jornada del Muerto Basin



San Pedro Transboundary River Aquifer Study- 2016

BINATIONAL INFORMATION

Topics Covered in Report

- Physical Geography
- Surface-Water Hydrology and Hydrometeorology
- Conceptual Geologic Model
- Hydrogeology
- Piezometry and Hydraulic Parameters
- Hydrogeochemistry
- Conceptual and Numerical Groundwater Models

Recommendations from the Technical Team

- Monitor water use and groundwater extractions
- Measure piezometric levels
- Measure surface flows
- Expand climate observation network
- Measure evapotranspiration and vegetation change
- Monitor water quality and sample for stable isotopes
- Use of geophysical and remote sensing methods
- Research drilling
- Generate a binational soils map
- Create a standardized database
- Update the existing binational groundwater flow model

INFORMACIÓN BINACIONAL

Temas Cubiertos en el Reporte

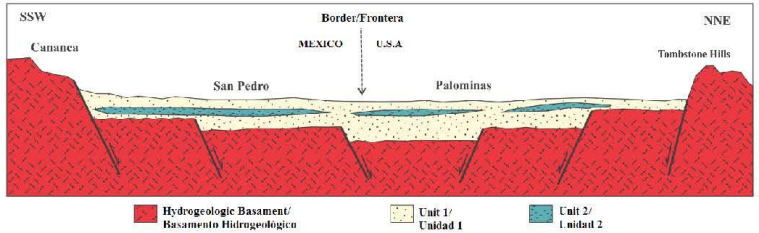
- Geografía Física
- Hidrología de Agua Superficial y Subterránea
- Modelo Geológico Conceptual
- Hidrogeología
- Piezometría y Parámetros Hidráulicos
- Hidrogeoquímica
- Modelos de Agua Subterránea: Conceptual y Numérico

Recomendaciones del Equipo Técnico

- Monitoreo de uso y extracción de agua subterránea
- Medir niveles piezométricos
- Medir el flujo superficial
- Expandir la red de observación climatológica
- Medir evapotranspiración y cambios de vegetación
- Monitoreo de calidad de agua y muestreo de isótopos estaber
- Utilización de métodos geofísicos y de sensoría remota
- Perforación investigativa
- Generar una carta binacional de suelos
- Crear una base de datos estandarizada
- Actualizar el modelo binacional de flujo de agua subterránea existente

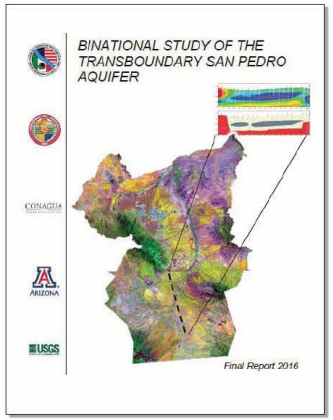
Schematic Interpretation of the Binational San Pedro Basin
Interpretación Esquemática de la Cuenca Binacional San Pedro

For more information on the schematic cross section please see Section 4.6 in the report.
Para mas información, vea sección 4.6 en el reporte.



BINATIONAL COLLABORATION

The San Pedro Report is the first-ever binational aquifer study prepared and released simultaneously in English and Spanish by the International Boundary Waters Commission.



Mapping Efforts

- 20 binational maps about climate, hydrology, geology, land use, soil distribution, vegetation, etc.
- 12 binational water quality maps
- 2 binational maps with information on depth and surface groundwater level for the year 2011

Binational Efforts

18 binational meetings between 2010 and 2016

COLABORACIÓN BINACIONAL

El Reporte Binacional San Pedro es el primer estudio de acuífero binacional preparado y publicado simultáneamente en inglés y español por la Comisión Internacional de Límites y Aguas.

Esfuerzos Cartográficos

- 20 mapas binacionales acerca del clima, hidrología, geología, uso y tipo de suelo, vegetación, etc.
- 12 mapas binacionales de calidad de agua
- 2 mapas binacionales con información de profundidad y elevación de agua subterránea para el año 2011

Esfuerzos Binacionales

18 reuniones binacionales entre 2010 y 2016

BINATIONAL COLLABORATION

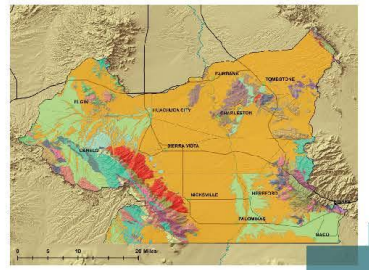
Harmonization Efforts

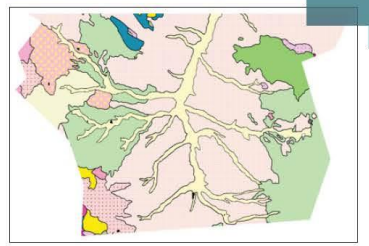
Merging different classification systems to create unique and harmonized maps for the U.S. and Mexico for geology and hydrostratigraphic units

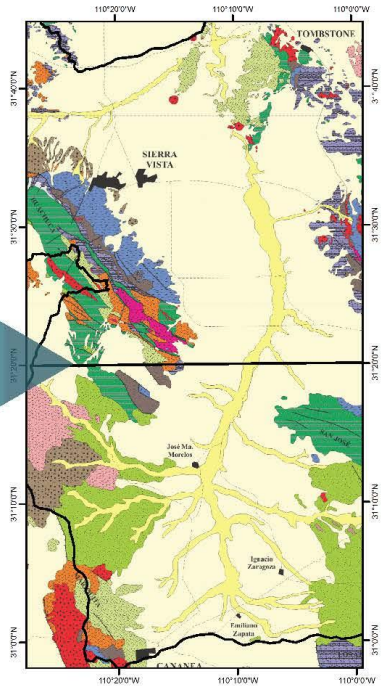
COLABORACIÓN BINACIONAL

Esfuerzos de Armonización

Combinar diferentes sistemas de clasificación para crear mapas únicos y armonizados para los Estados Unidos y México para geología y unidades hidroestratiagráficas







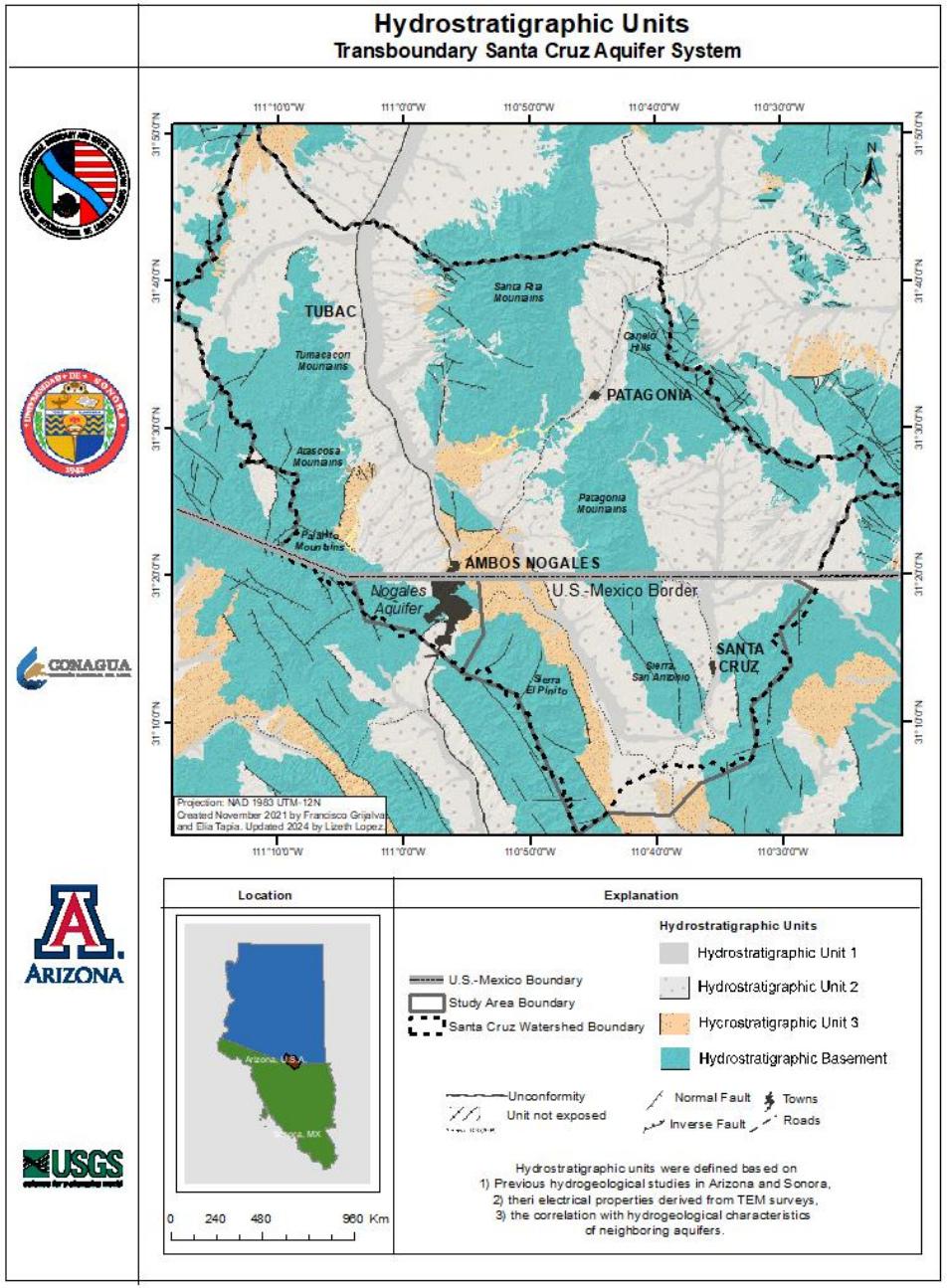
Version reviewed and approved by the USGS

Date: April 20, 2017 4:41 PM

SONORA-ARIZONA

BINATIONAL STUDY OF THE TRANSBOUNDARY SANTA CRUZ RIVER AQUIFER- 2025

- 2025 Binational Report
  - In draft, will be made final later this year
- Similar in scope and information as San Pedro report
- Data is also being harmonized, and data will be made available through IBWC



BINATIONAL GROUNDWATER GEOPORTAL

Objective:

An interactive web mapping application will be created to support the understanding and exploration of transboundary aquifers by decision makers, natural resource managers, and private citizens.

Products:

- Data catalog: A compilation and organization of public data of the priority transboundary aquifers.
- Atlas: A GIS platform displaying the georeferenced information on priority transboundary aquifers generated by TAAP efforts.

Mx Participants:

- CILA
- CONAGUA

US Participants:

- US IBWC
- OTWSC
- NMWSC

Scope of work still in development.

Schedule (tentative):

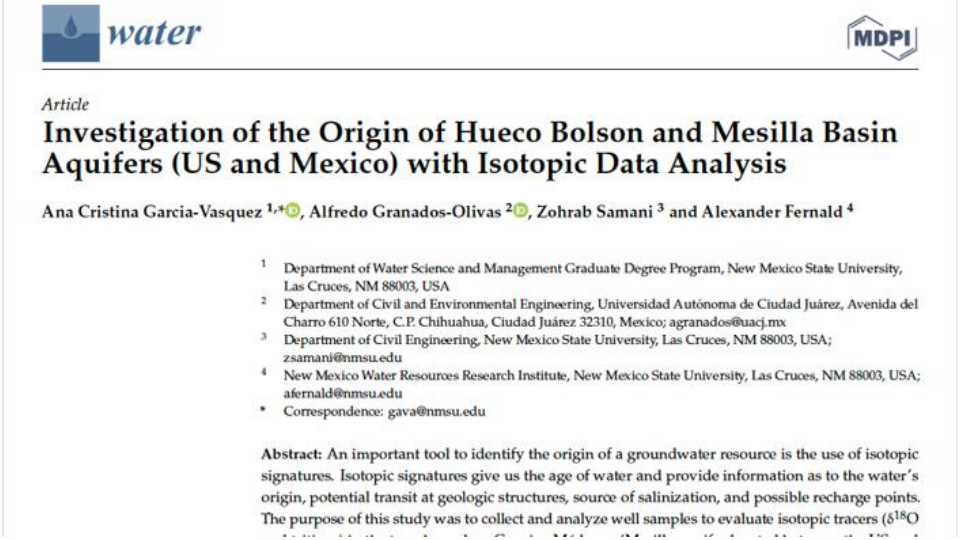
- 2025-2027

New Mexico-Texas-Chihuahua 2019

New Mexico Water Resources Research Institute:

- Building connections with Mexican partners from governmental institutions such as CONAGUA, CILA, JMAS, SGM, and universities like UACJ, UACH, and UNAM.

- Foment collaboration with our US based partners, including our TAAP partners at the USGS, IBWC, and the Water Research Institutes of Arizona and Texas, as well as other state and non-state partners.



water

MDPI

Article

Investigation of the Origin of Hueco Bolson and Mesilla Basin Aquifers (US and Mexico) with Isotopic Data Analysis

Ana Cristina Garcia-Vasquez [1,*], Alfredo Granados-Olivas [2], Zohrab Samani [3] and Alexander Fernald [4]

[1] Department of Water Science and Management Graduate Degree Program, New Mexico State University, Las Cruces, NM 88003, USA
[2] Department of Civil and Environmental Engineering, Universidad Autónoma de Ciudad Juárez, Avenida del Charro 610 Norte, C.P. Chihuahua, Ciudad Juárez 32310, Mexico; agranados@uacj.mx
[3] Department of Civil Engineering, New Mexico State University, Las Cruces, NM 88003, USA; zsamani@nmsu.edu
[4] New Mexico Water Resources Research Institute, New Mexico State University, Las Cruces, NM 88003, USA; afernald@nmsu.edu
* Correspondence: gava@nmsu.edu

Abstract: An important tool to identify the origin of a groundwater resource is the use of isotopic signatures. Isotopic signatures give us the age of water and provide information as to the water's origin, potential transit at geologic structures, source of salinization, and possible recharge points. The purpose of this study was to collect and analyze well samples to evaluate isotopic tracers ($\delta^{18}O$

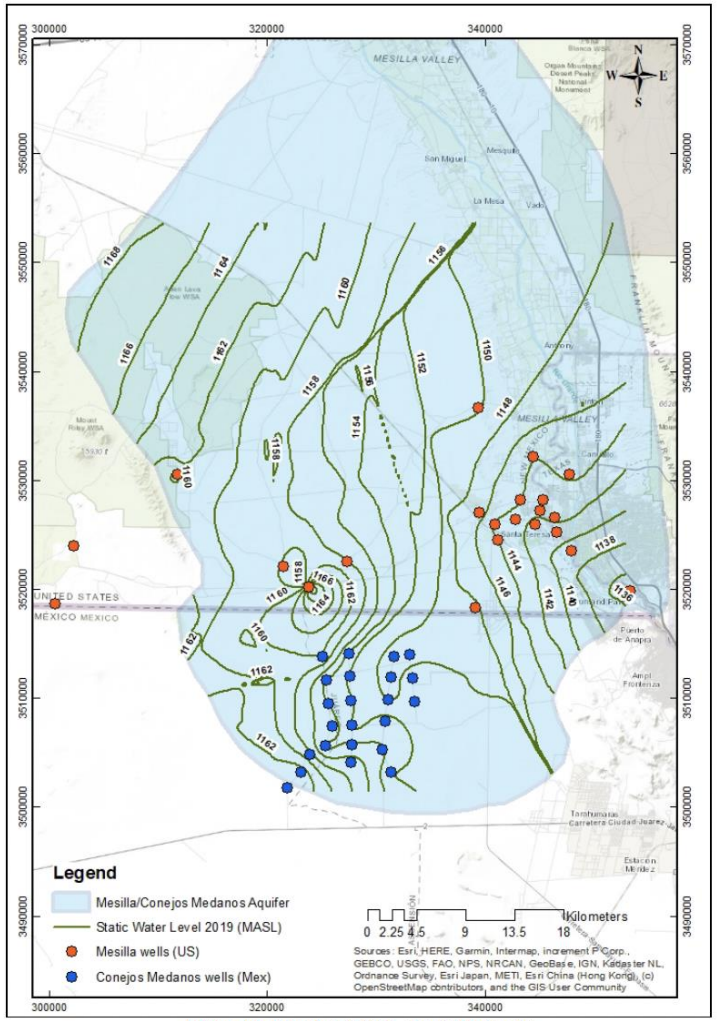
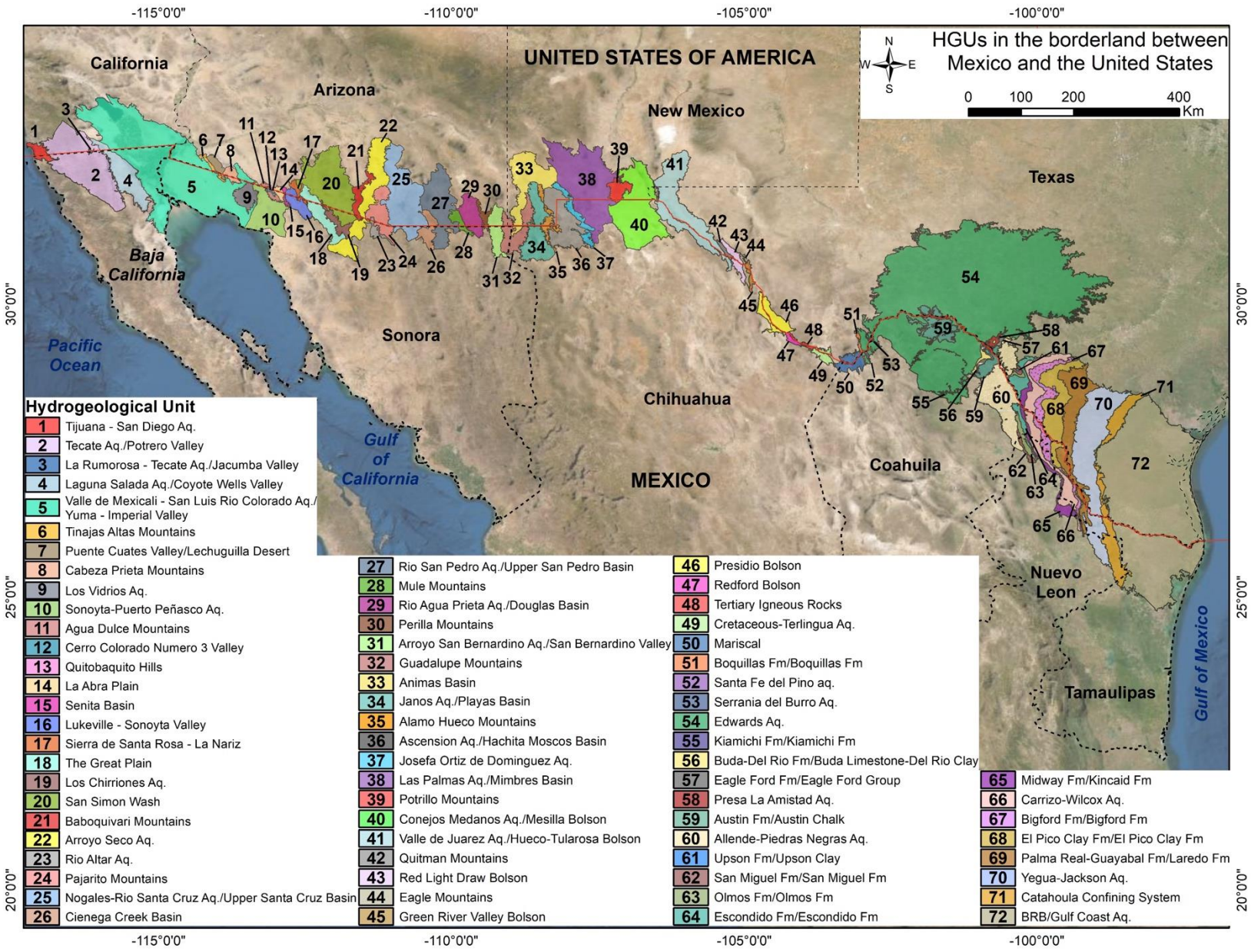


Figure 11. Binational SWL for 2019 (masl)

TEXAS –MEXICO TRANSBOUNDARY AQUIFERS ALONG THE BORDER



Map citation and author(s):
Sanchez & Rodriguez (2022). Transboundary Aquifers between Mexico and the United States: the Complete Map. In Transboundary Aquifers: Challenges and the Way Forward, UNESCO 2022 (Sanchez, Rosario Ed)

Data via the Web

- IBWC
  - https://cila.sre.gob.mx/cilanorte/index.php/boletin/11-doctos/76-aguas-subterraneas
  - https://www.ibwc.gov/water-data/ Transboundary Aquifers
- USGS
  - https://webapps.usgs.gov/taap/index.html
- UAWRRC
  - https://wrrc.arizona.edu/programs/taap-transboundary-aquifer-assessment-program
- NMWRRI
  - https://nmwrri.nmsu.edu/applied-research/more-info-pages/transboundary-aquifer-assessment-program.html
- TWRI
  - https://transboundary.tamu.edu/

SUMMARY

- Characterizing transboundary aquifers
- Harmonizing data on both sides of the border
- Public access via partner websites
- Data repository through IBWC
- Get the word out to support water use