TEXAS A&M UNIVERSITY

TRANSBOUNDARY AQUIFERS BETWEEN MEXICO AND THE US

Identification, Classification and Priorization

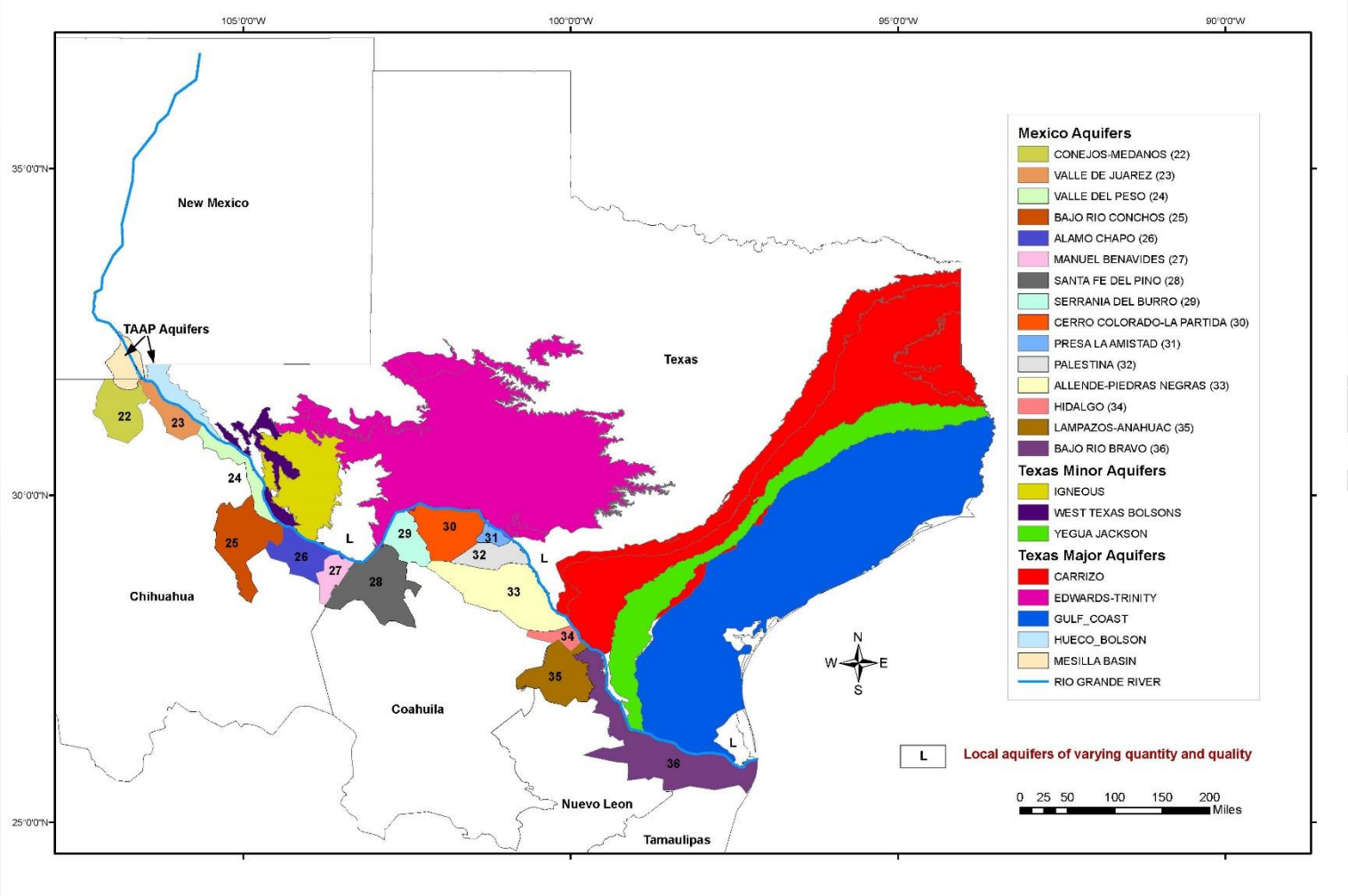
Rosario Sanchez & Laura Rodriguez
Texas Water Resources Institute, Texas A&M University

Acknowledgement: UGSG TAAP, Texas Agrilife Research, Texas A&M University

CURRENT RESEARCH

1. Identification
2. Delineation
3. Classification
4. Priorization

Of transboundary aquifers

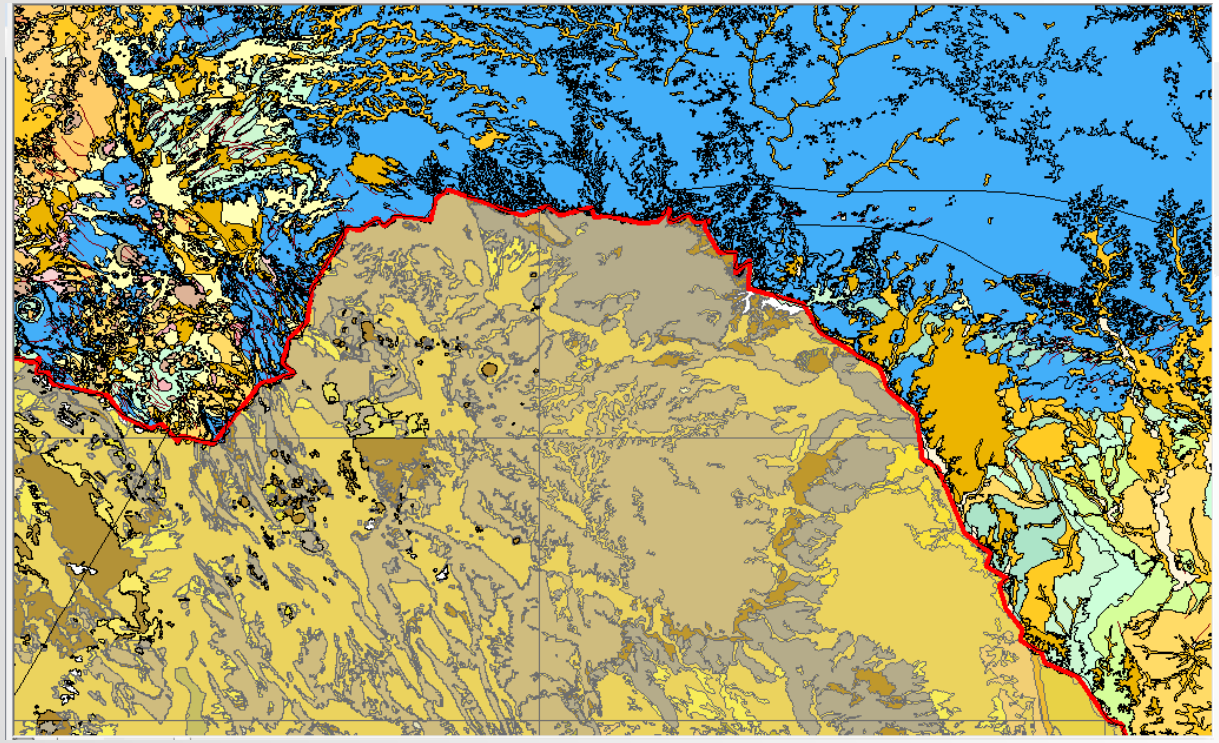


TEXAS A&M UNIVERSITY

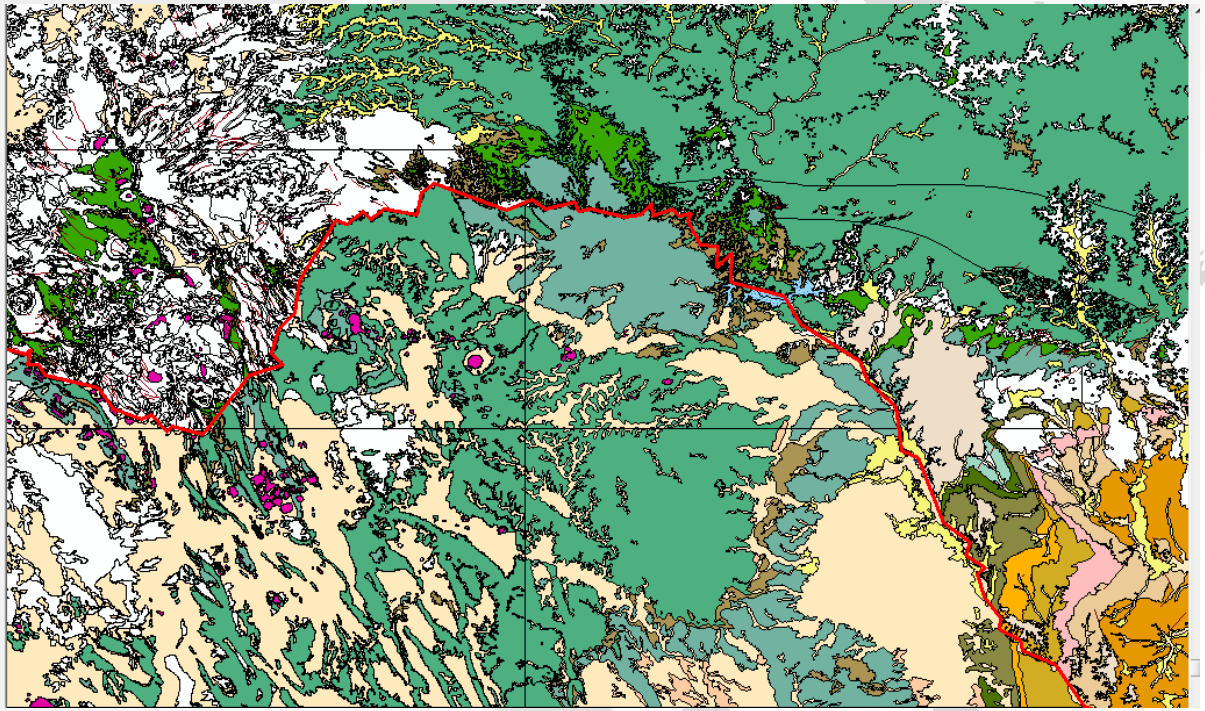
Current Research

Transboundary Aquifers between Mexico and Texas

Before…

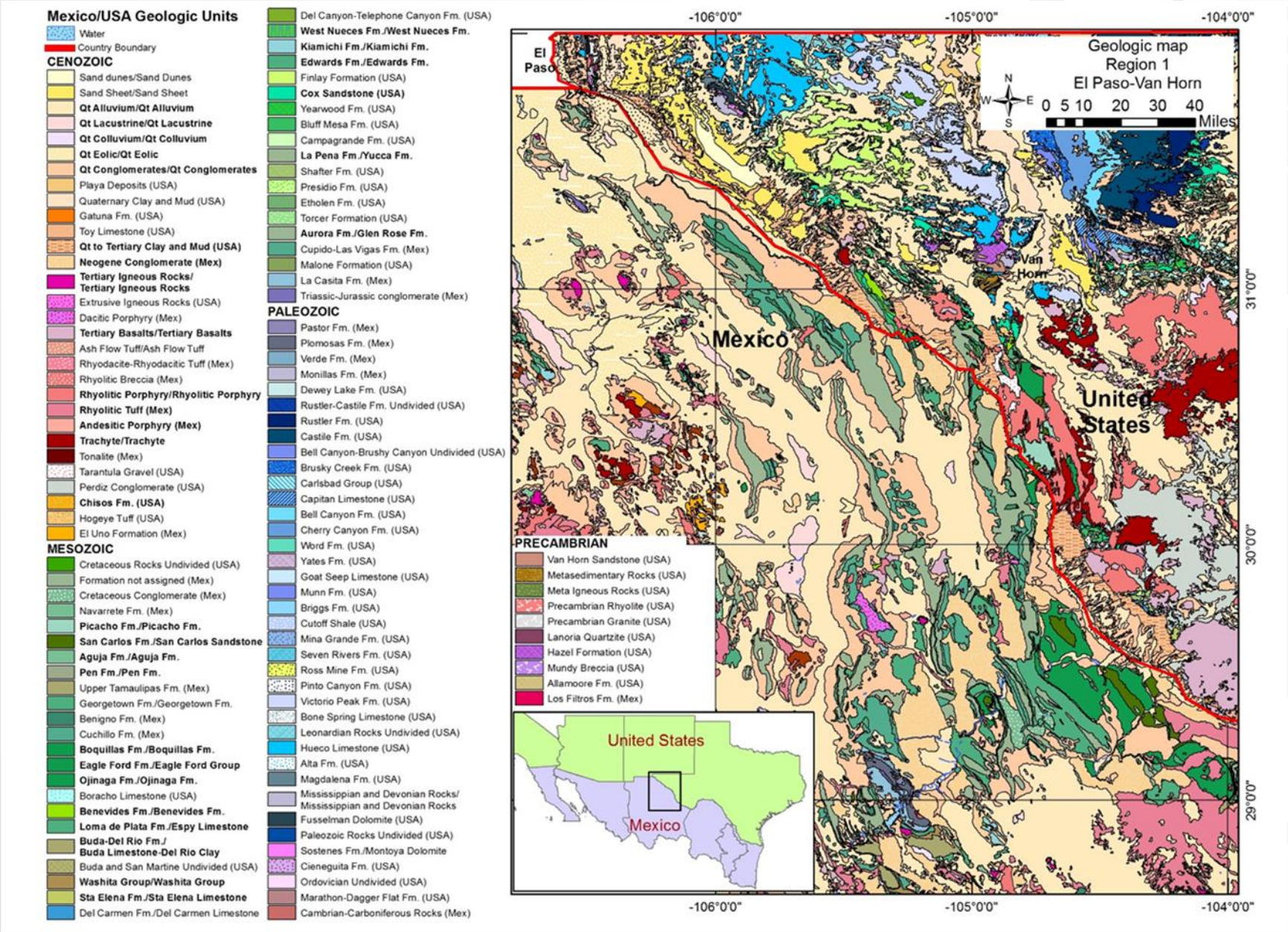


After



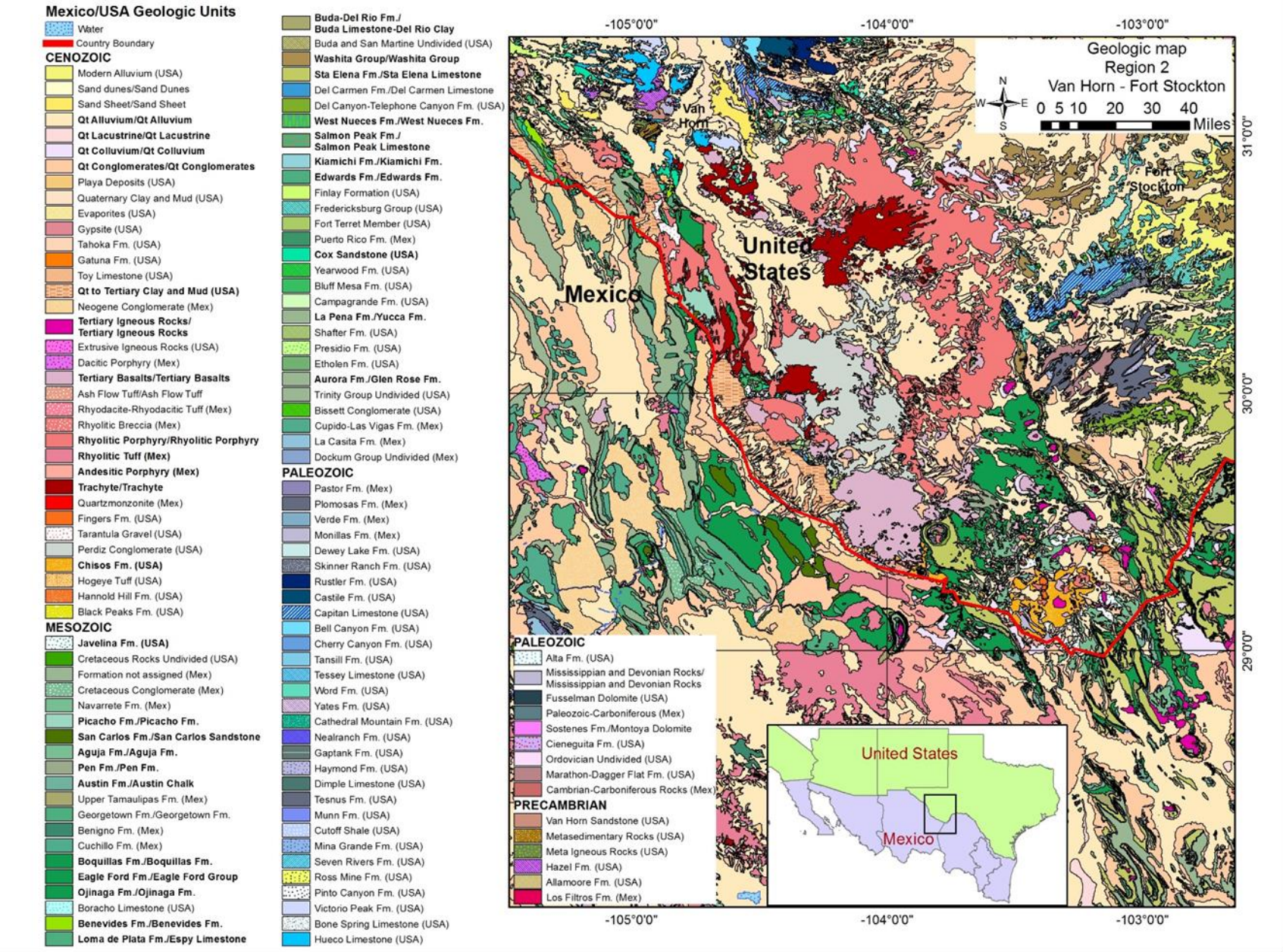
TEXAS A&M UNIVERSITY

GEOLOGICAL CORRELATION



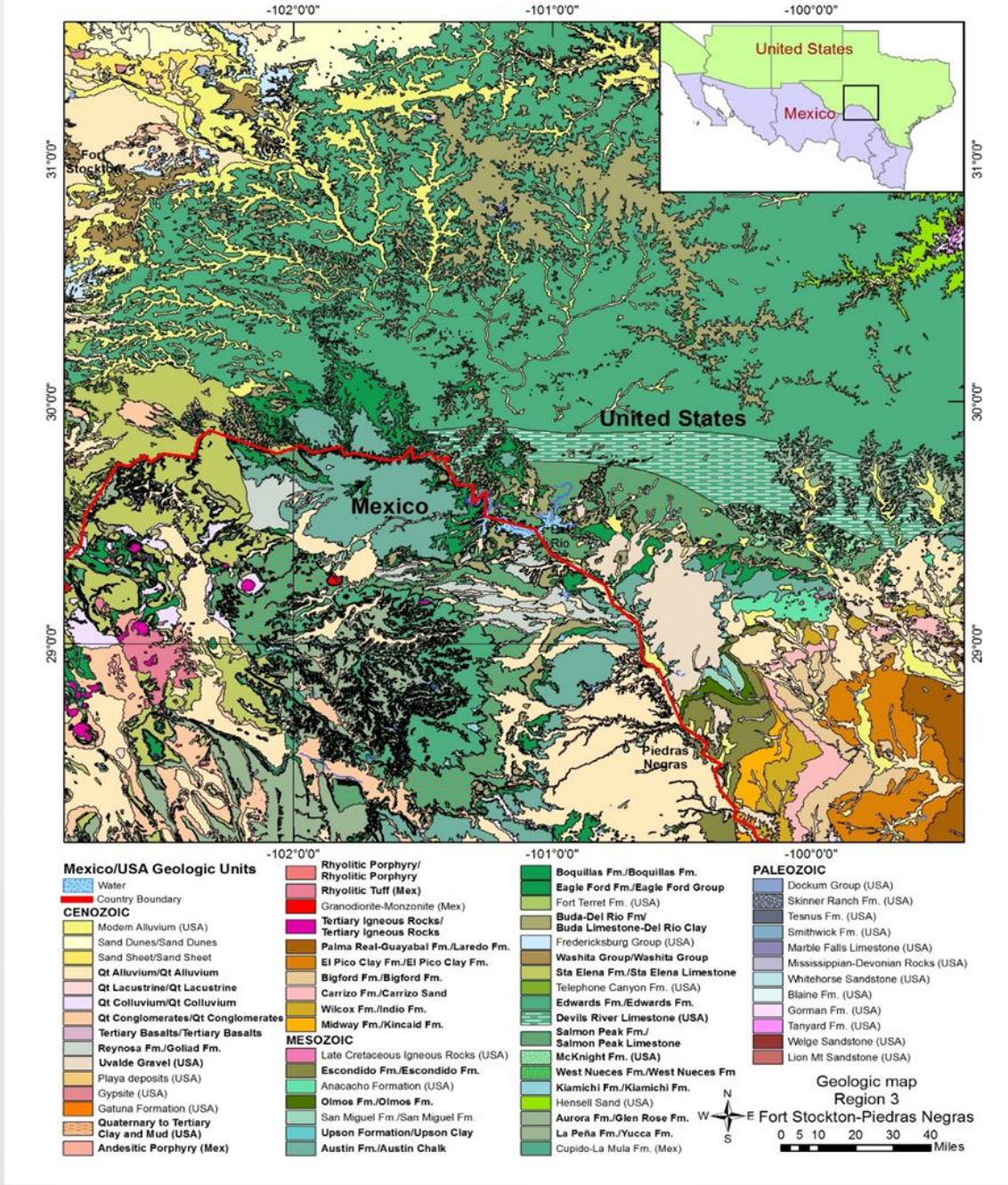
TEXAS A&M UNIVERSITY

GEOLOGICAL CORRELATION



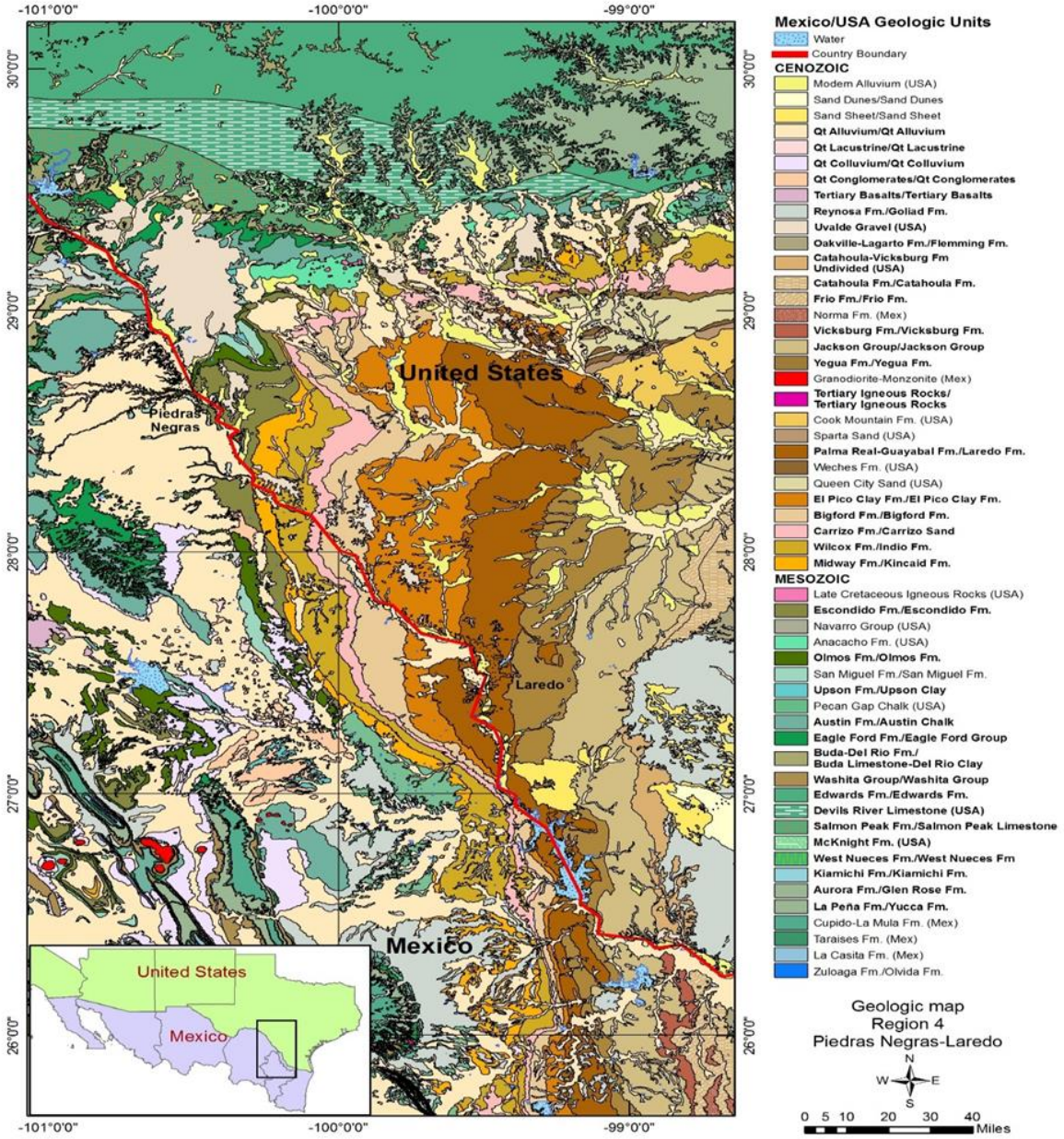
TEXAS A&M UNIVERSITY

GEOLOGICAL CORRELATION



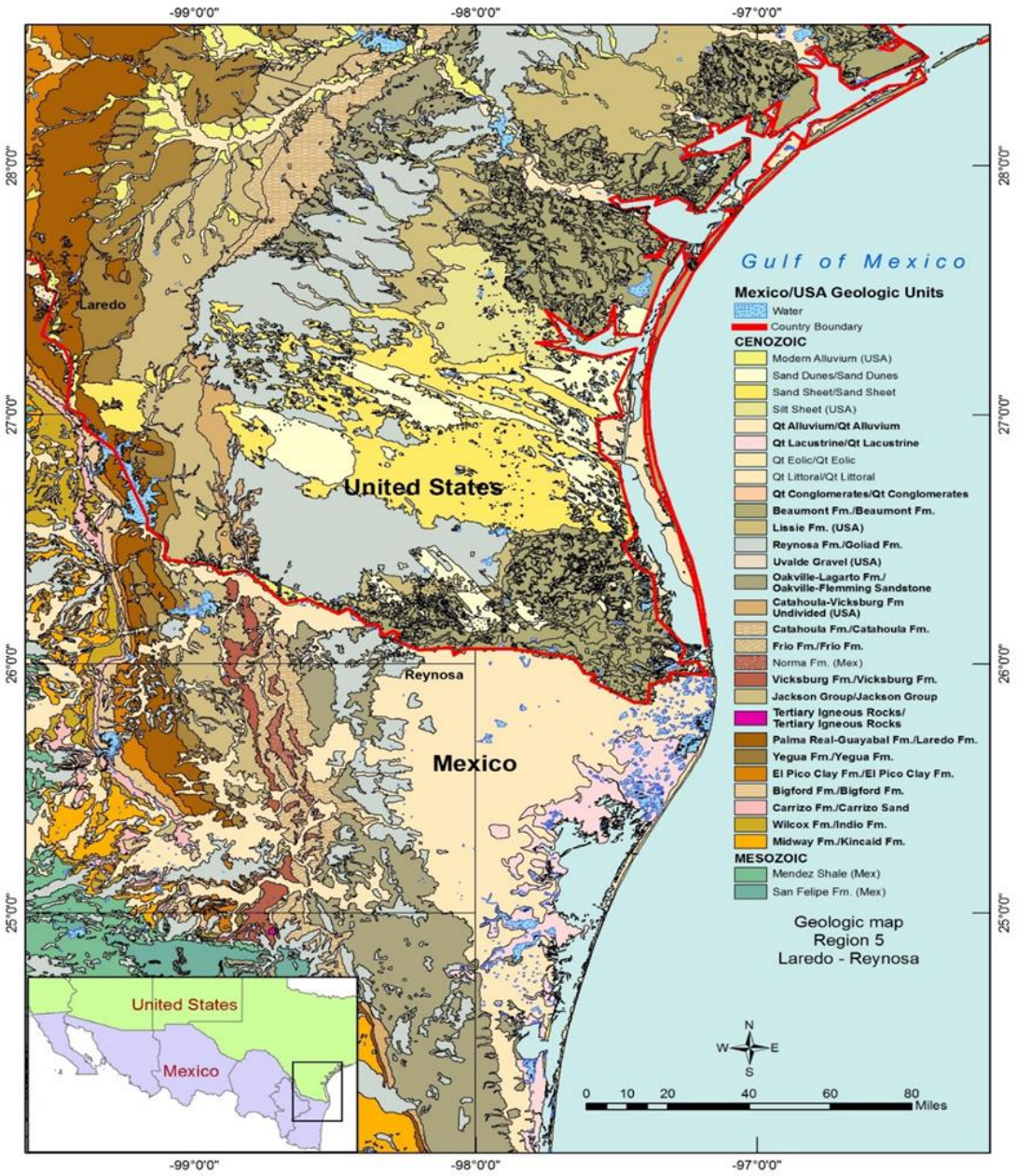
TEXAS A&M UNIVERSITY

GEOLOGICAL CORRELATION



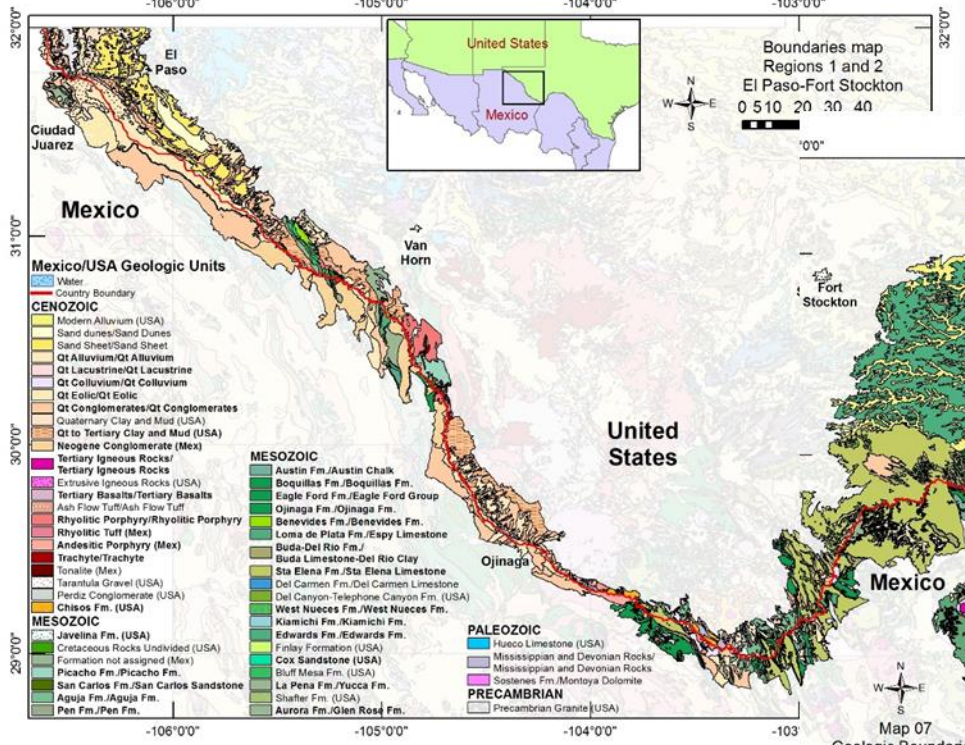
TEXAS A&M UNIVERSITY

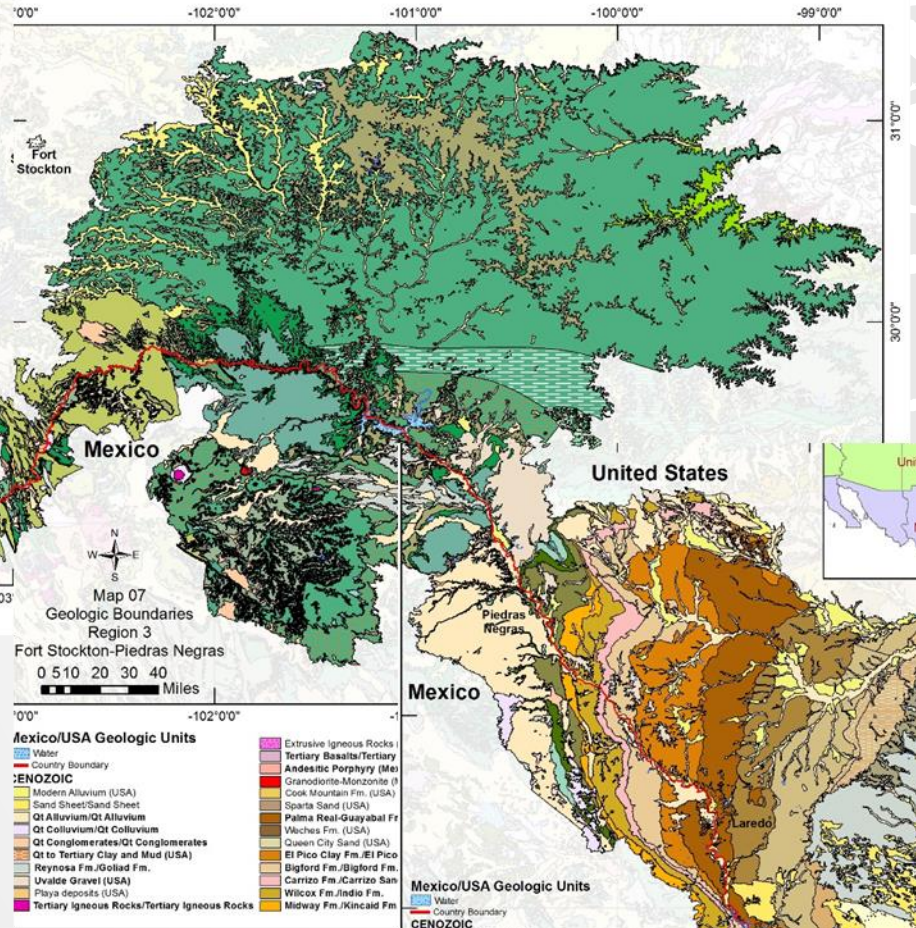
GEOLOGICAL CORRELATION

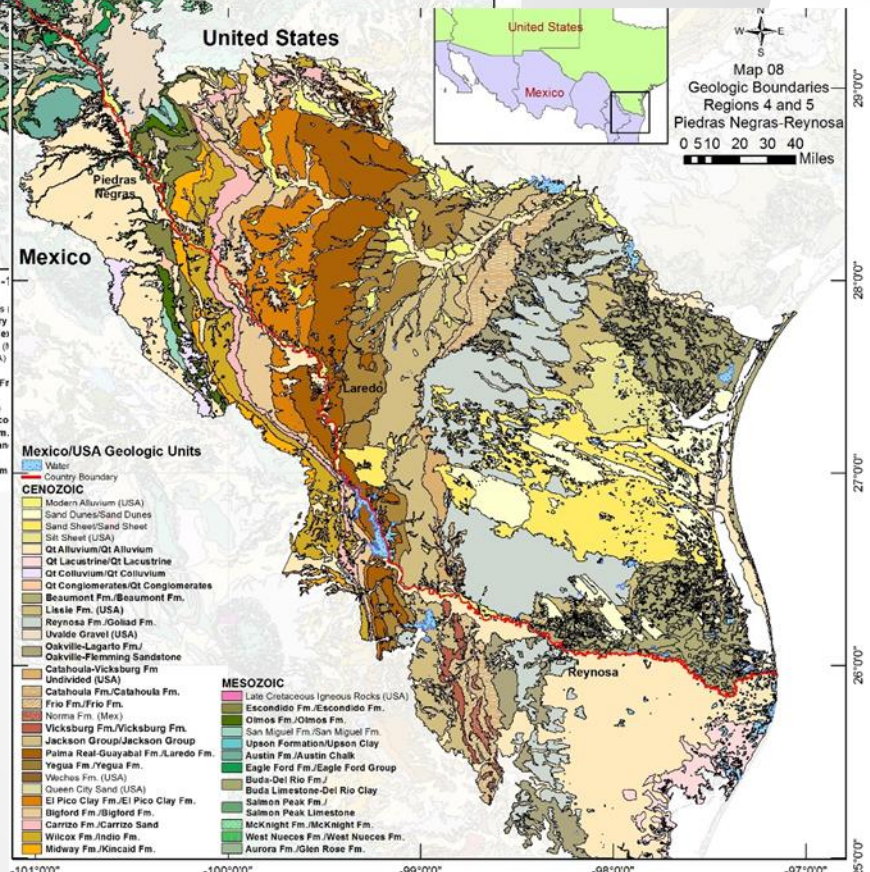


TEXAS A&M UNIVERSITY

IDENTIFICATION OF TRANSBOUNDARY FORMATIONS

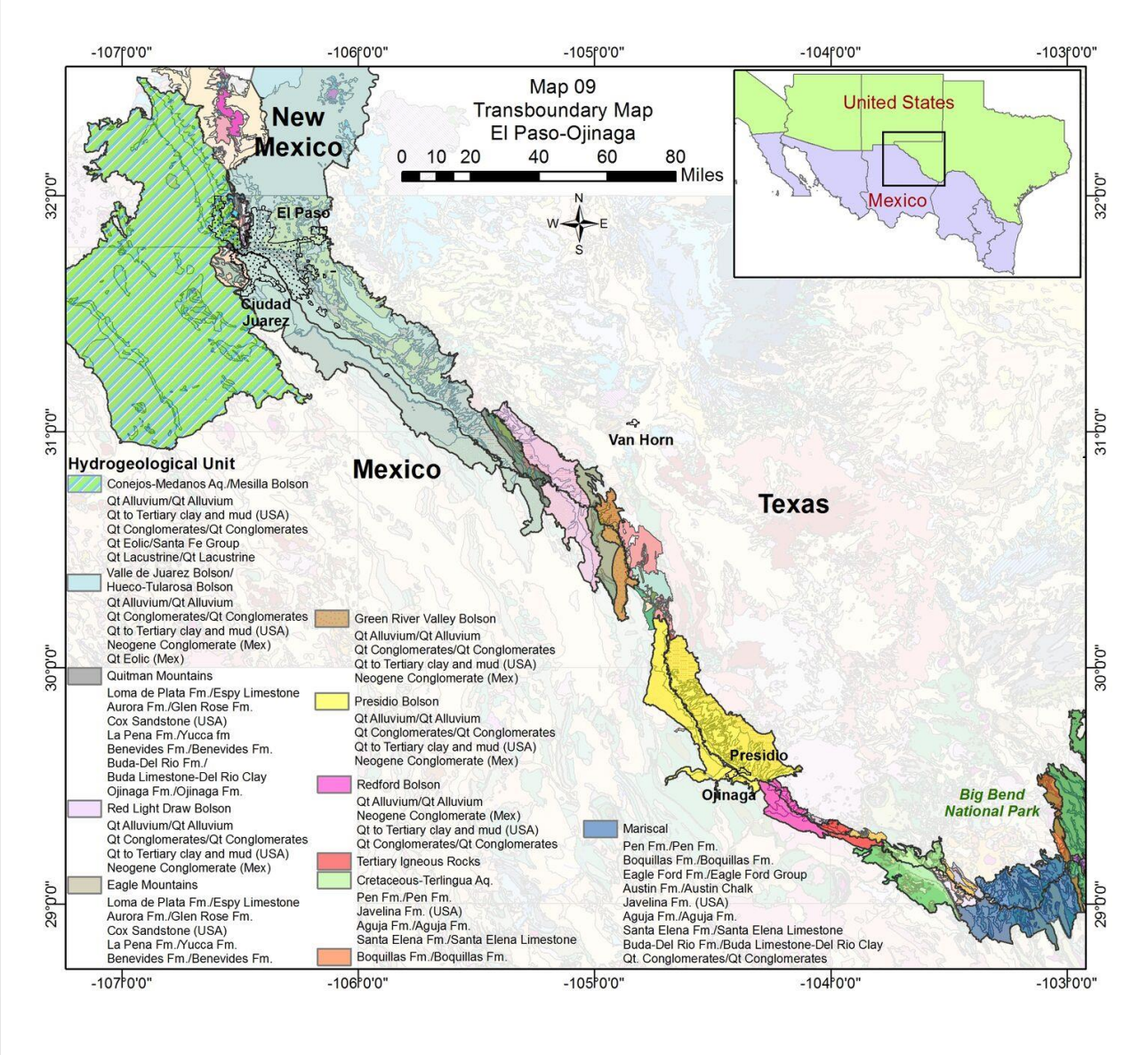






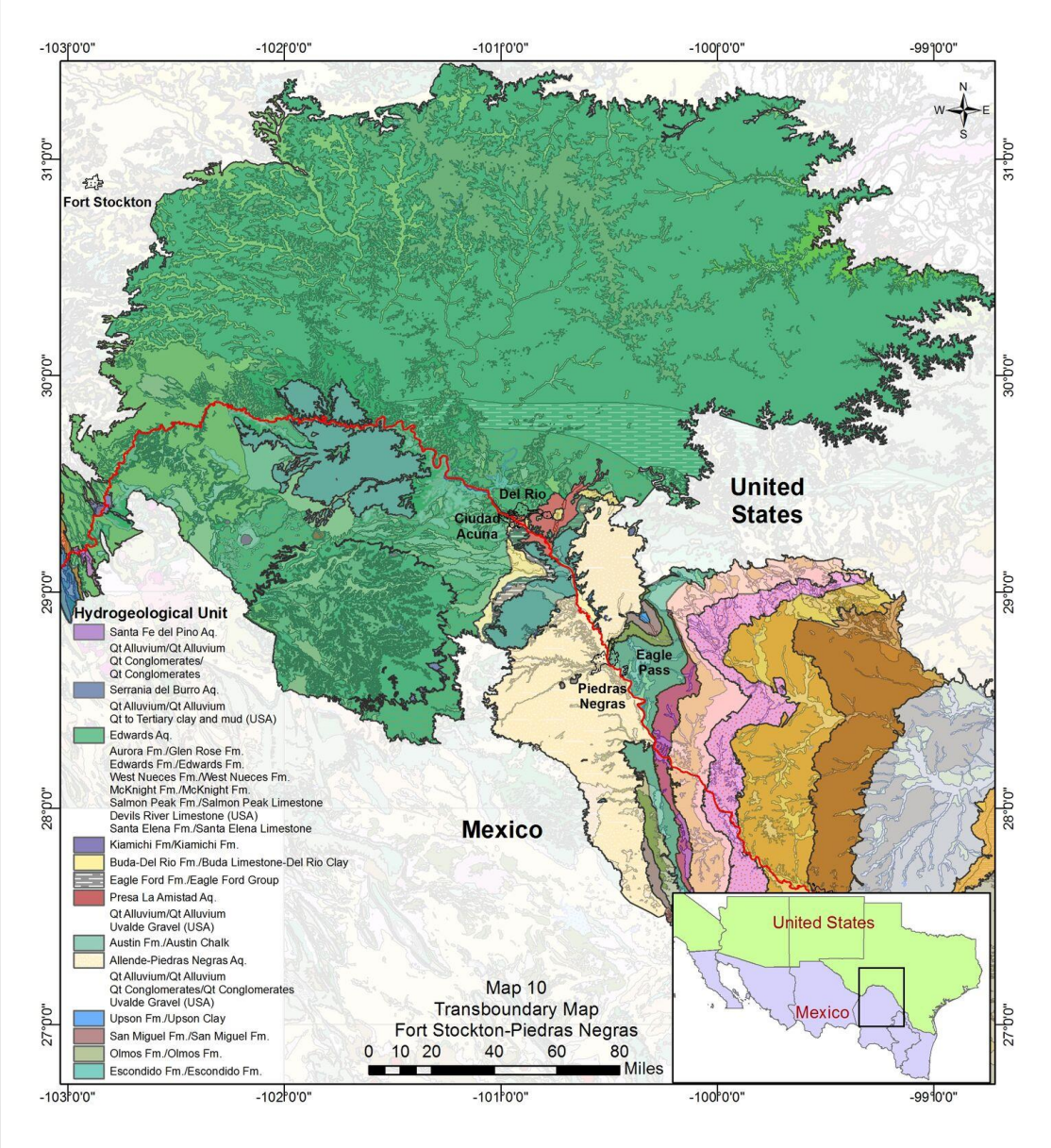
TEXAS A&M UNIVERSITY

IDENTIFICATION OF HYDROGEOLOGICAL UNITS



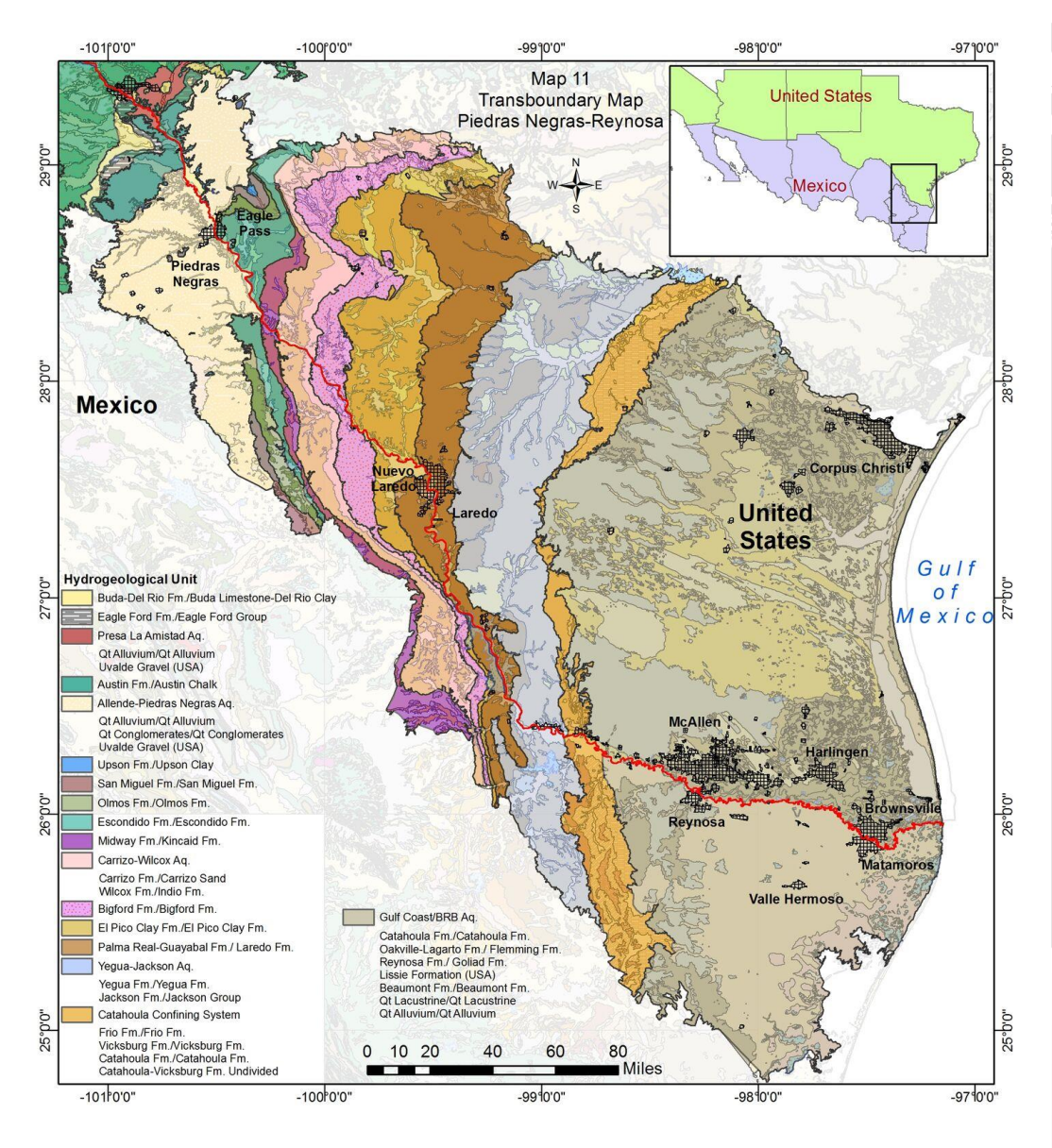
TEXAS A&M UNIVERSITY

IDENTIFICATION OF HYDROGEOLOGICAL UNITS



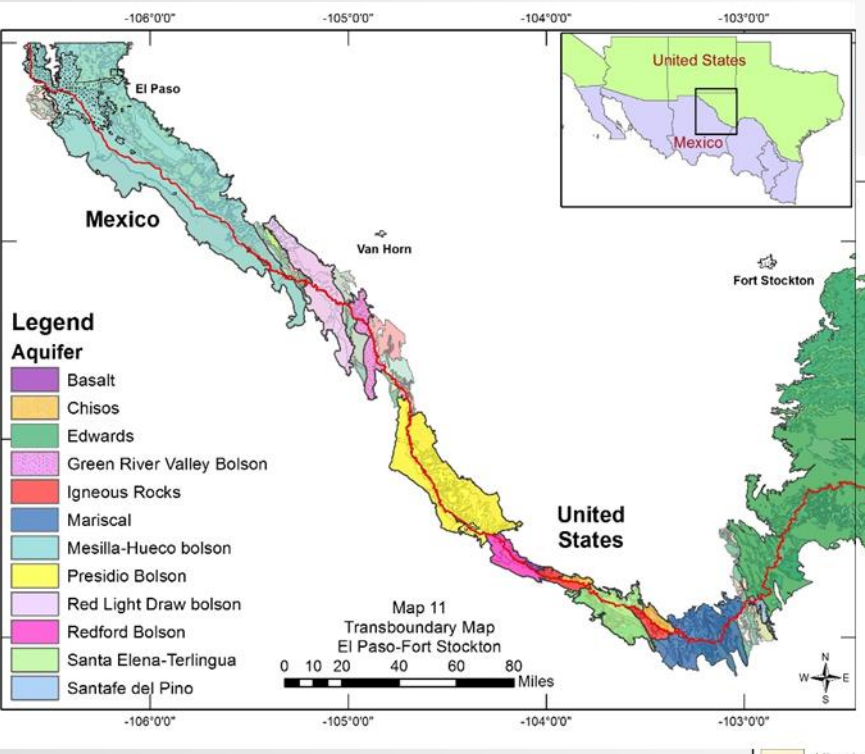
TEXAS A&M UNIVERSITY

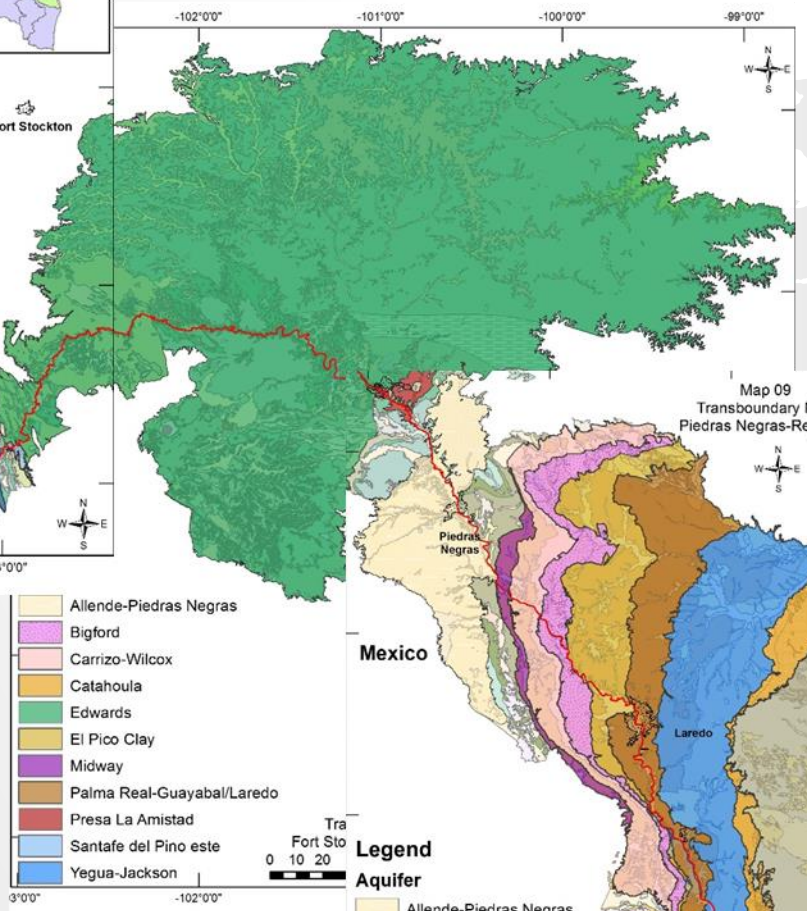
IDENTIFICATION OF HYDROGEOLOGICAL UNITS

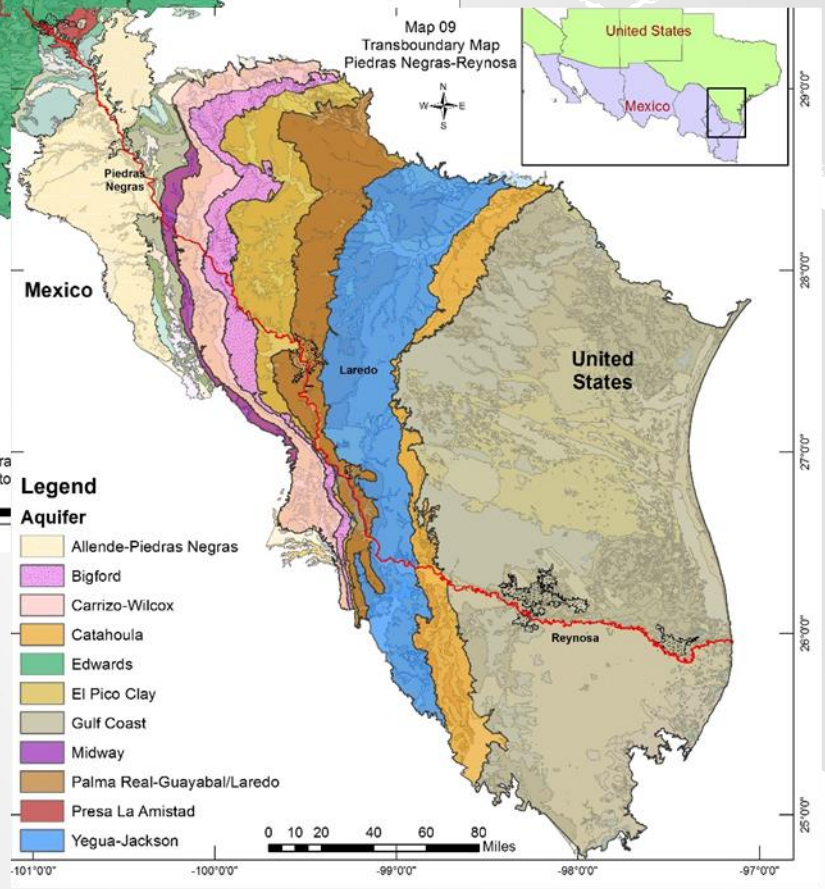


TEXAS A&M UNIVERSITY

IDENTIFICATION OF HYDROGEOLOGICAL UNITS

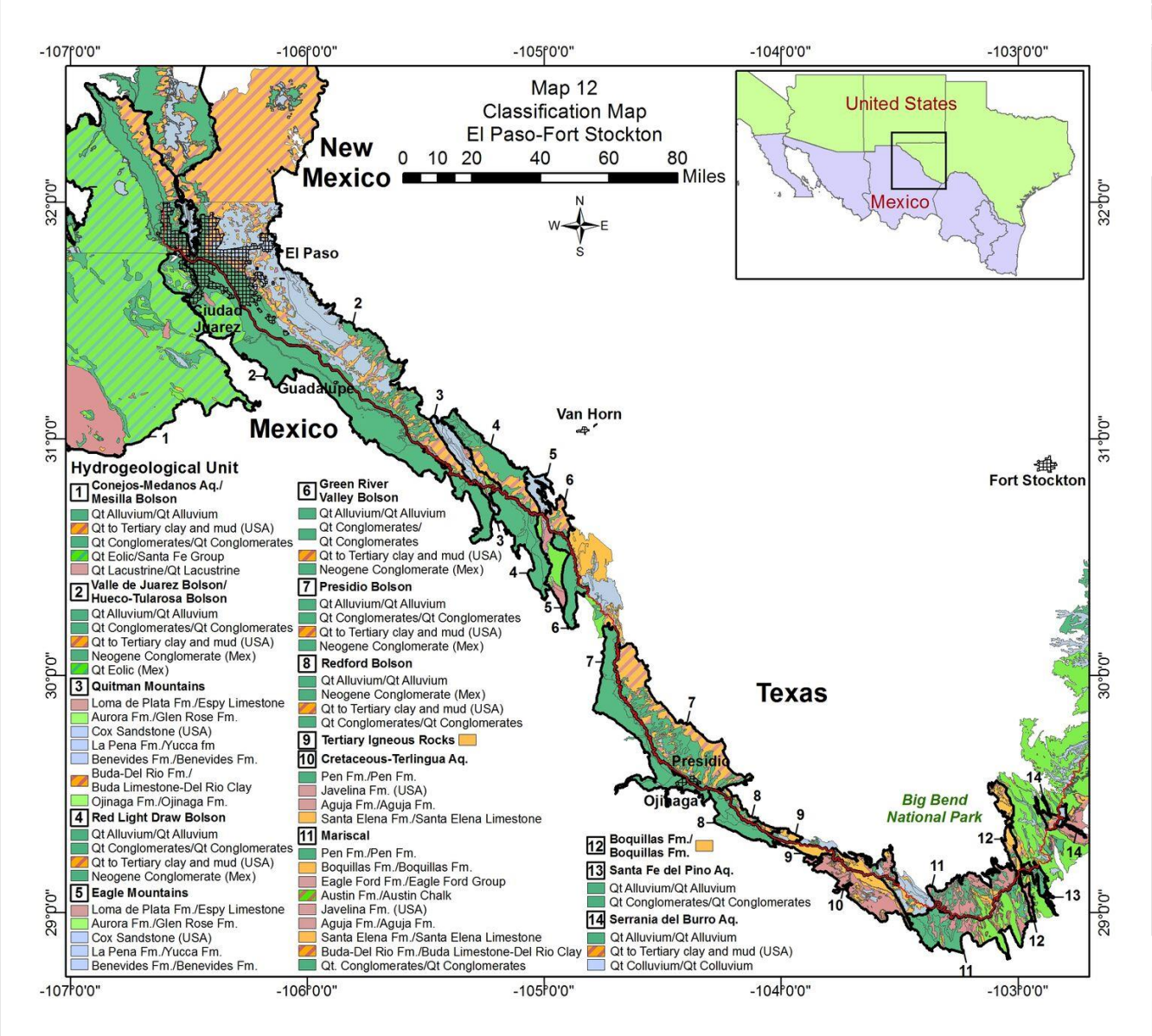






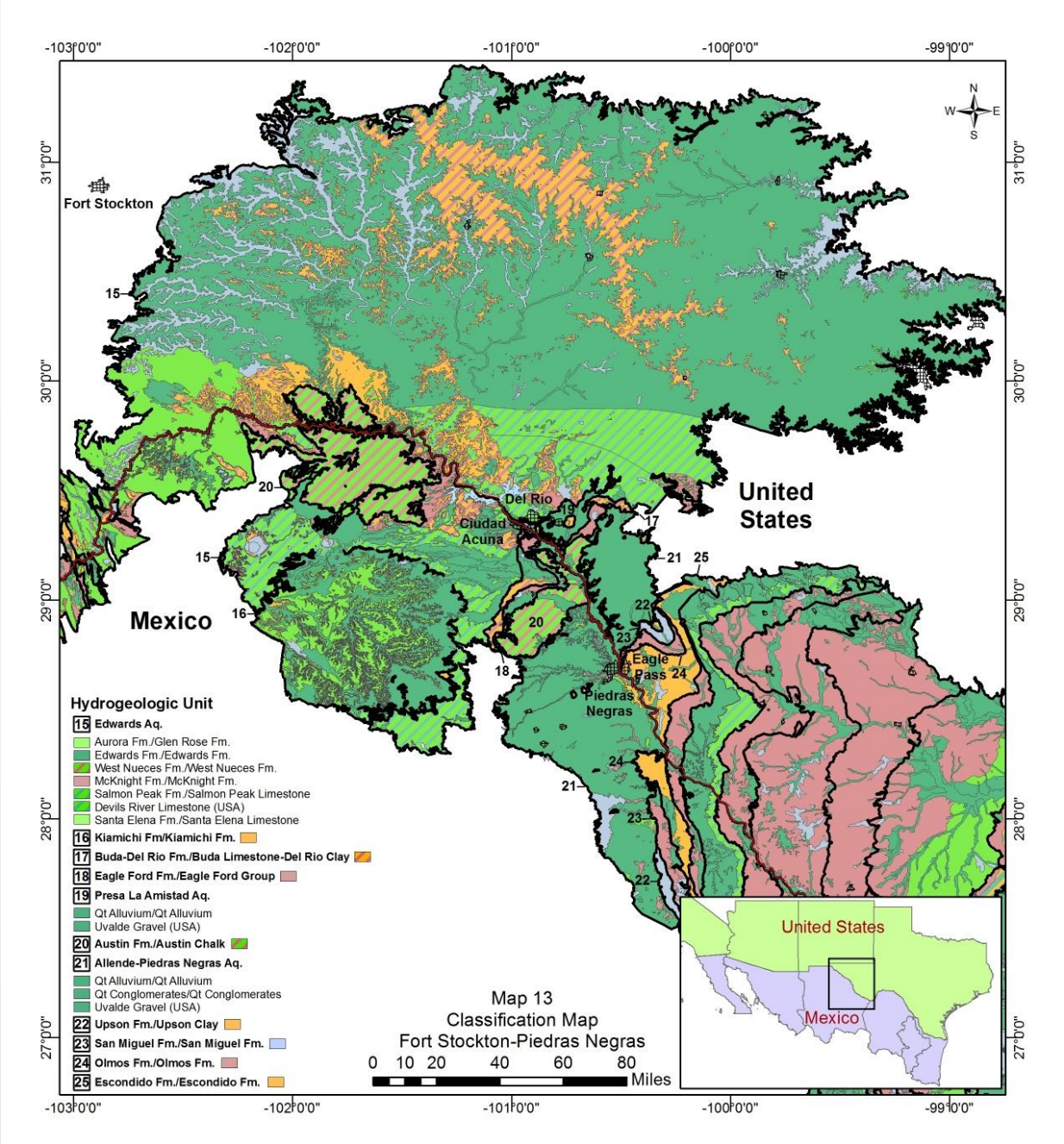
TEXAS A&M UNIVERSITY

CLASSIFICATION OF HYDROGEOLOGICAL UNITS



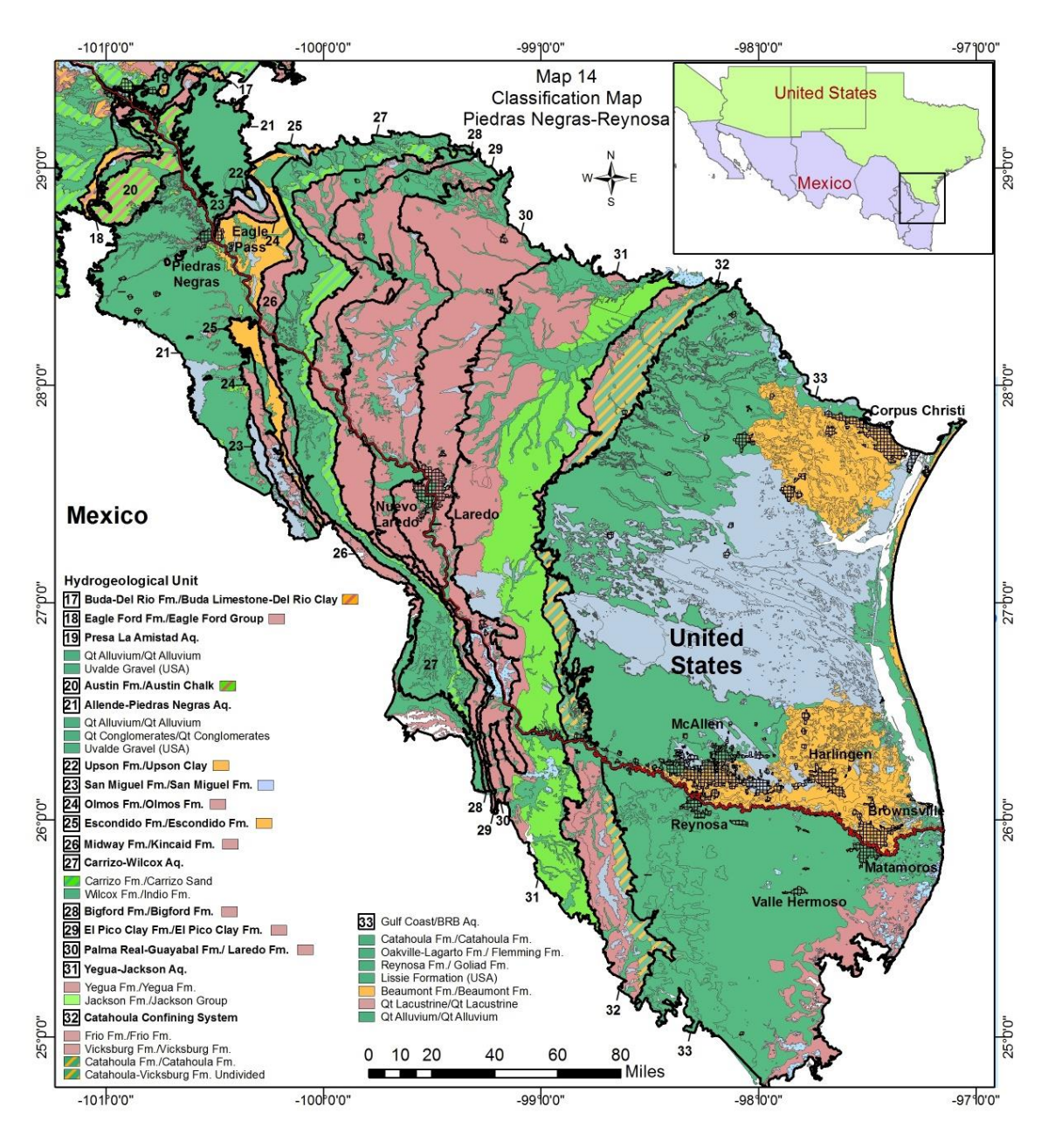
TEXAS A&M UNIVERSITY

CLASSIFICATION OF HYDROGEOLOGICAL UNITS



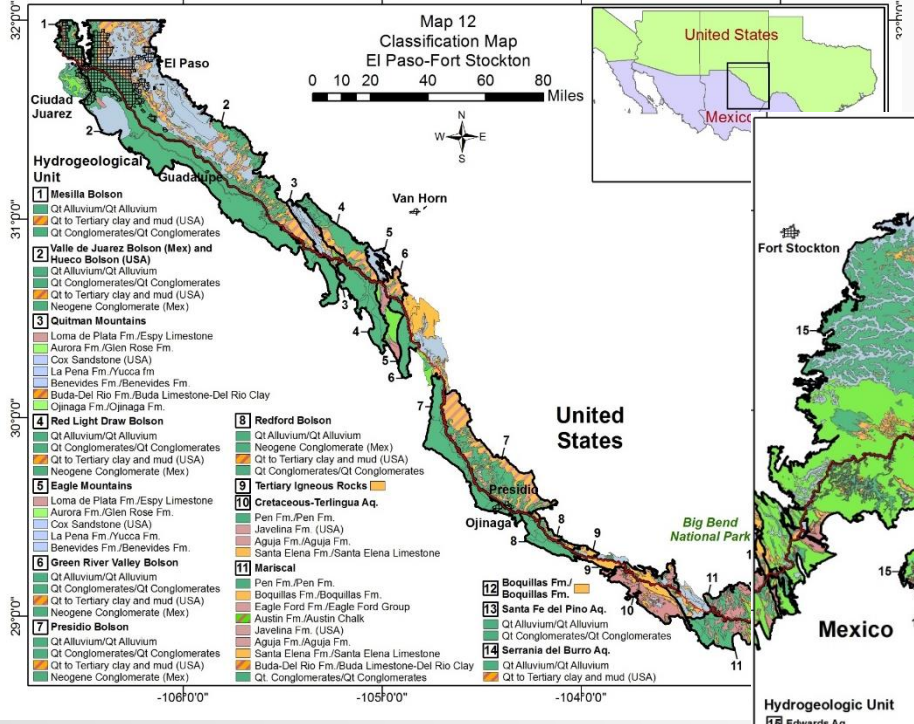
TEXAS A&M UNIVERSITY

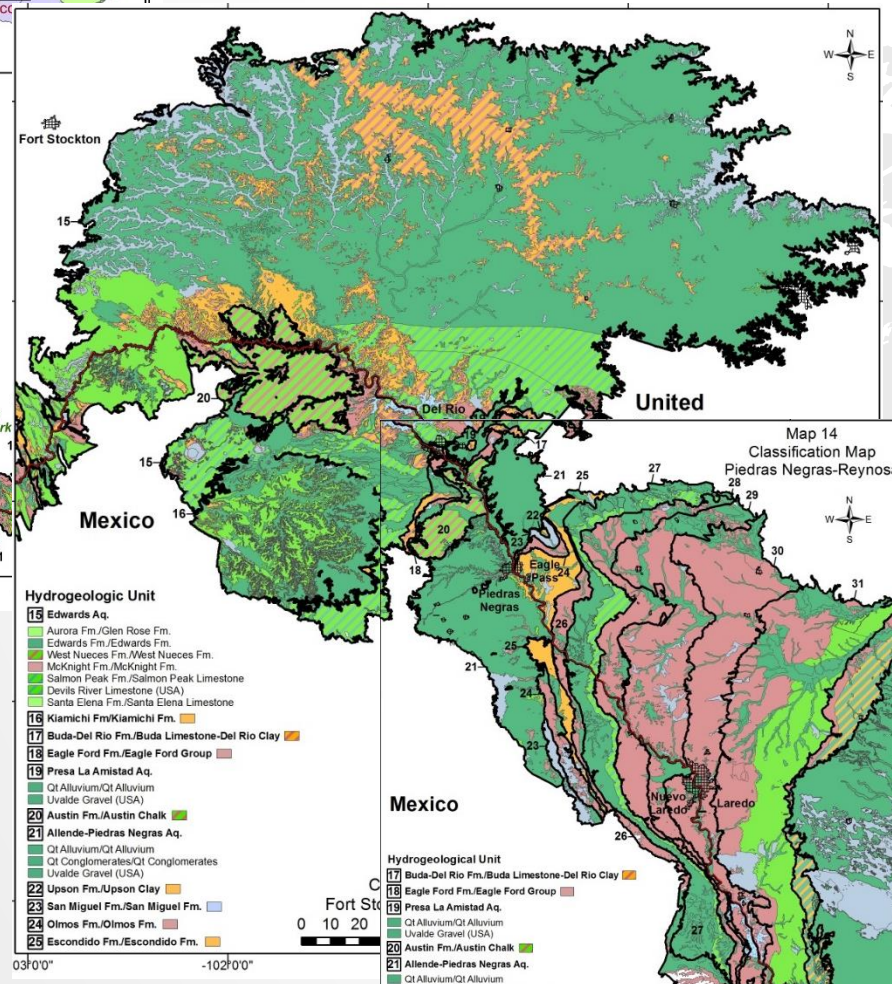
CLASSIFICATION OF HYDROGEOLOGICAL UNITS

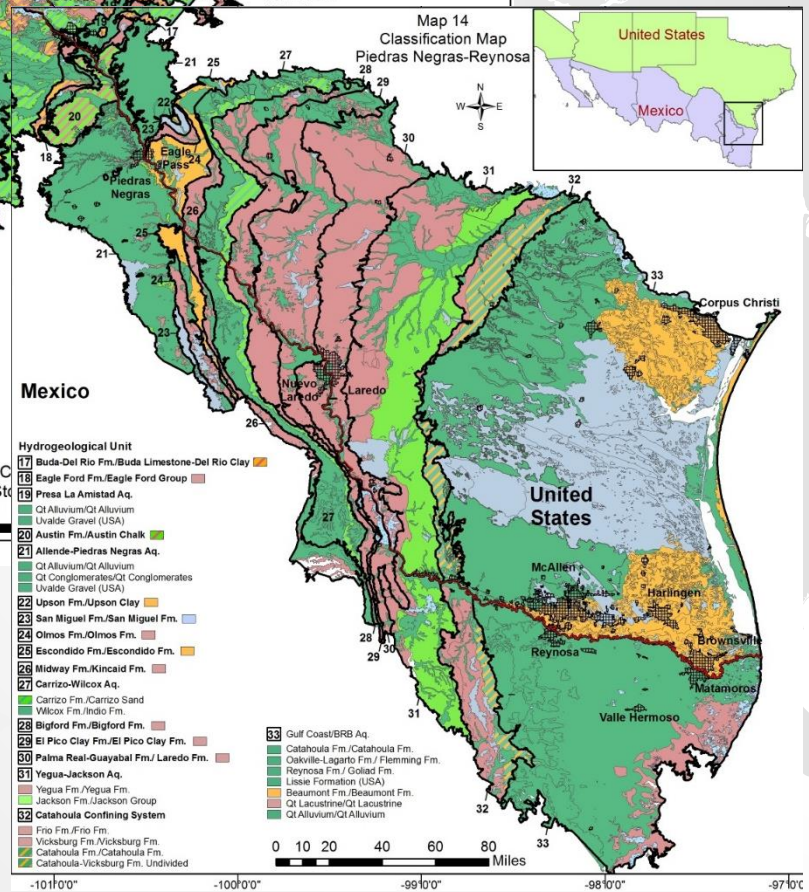


TEXAS A&M UNIVERSITY

CLASSIFICATION OF HYDROGEOLOGICAL UNITS



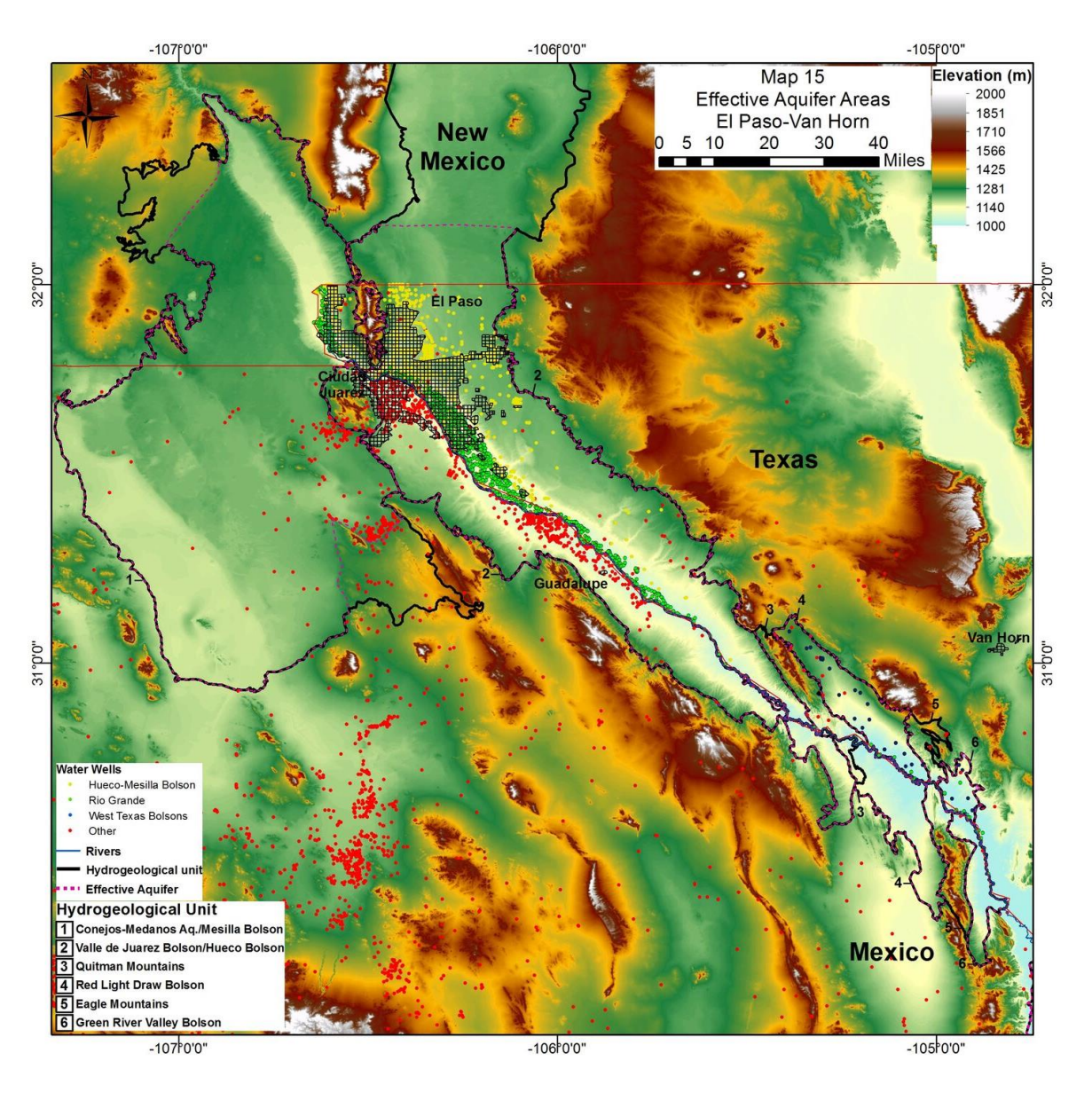




Formation Classification			Water Quality			
			Good	Regular	Poor	No Info
			1	2	3	4
Aquifer Potential	Good	A	A1	A2	A3	A4
	Middle	B	B1	B2	B3	B4
	Poor	C	C1	C2	C3	C4
	Aquitard	D	D1	D2	D3	D4
	No Info	E	E1	E2	E3	E4

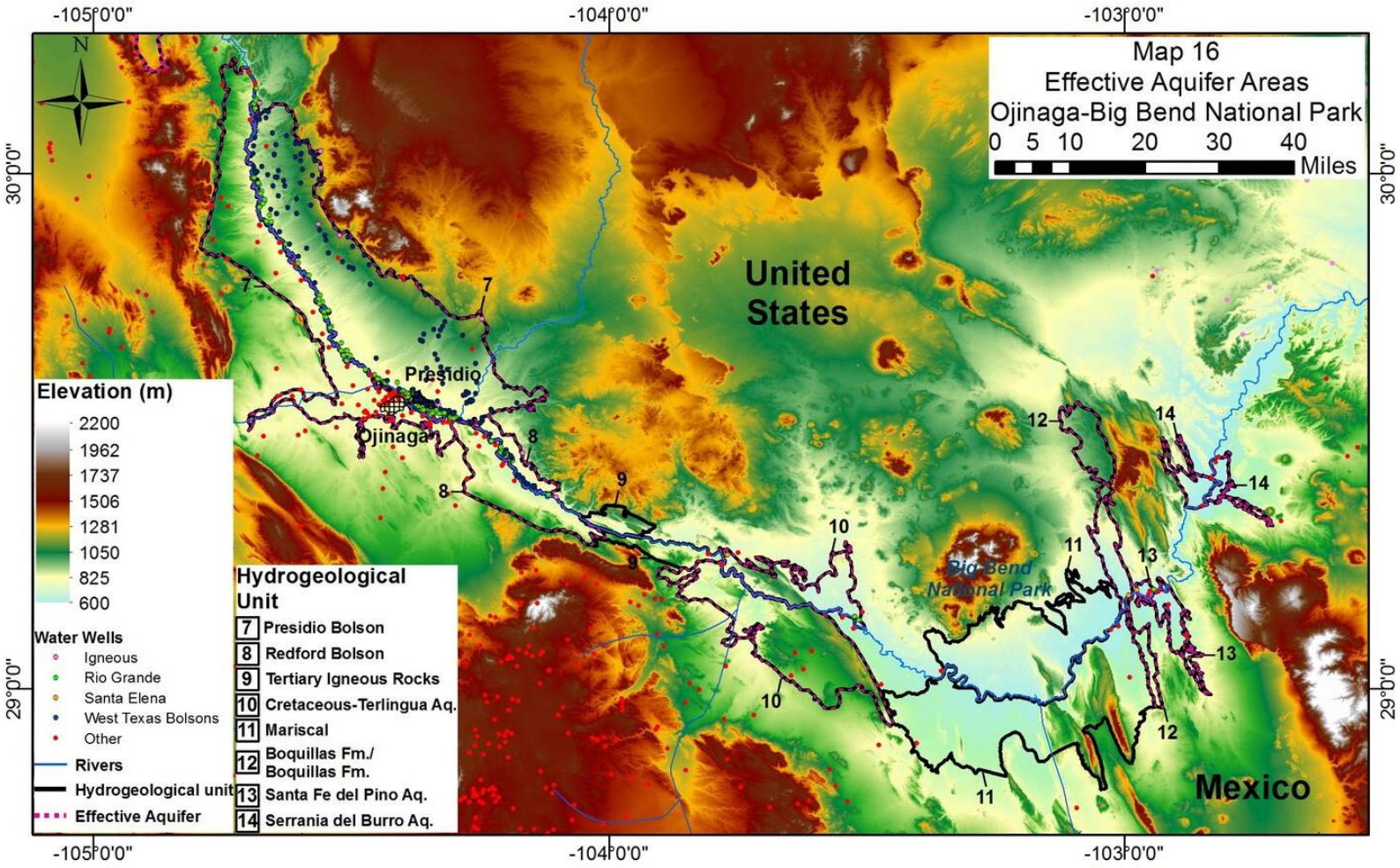
TEXAS A&M UNIVERSITY

EFFECTIVE AQUIFER AREAS

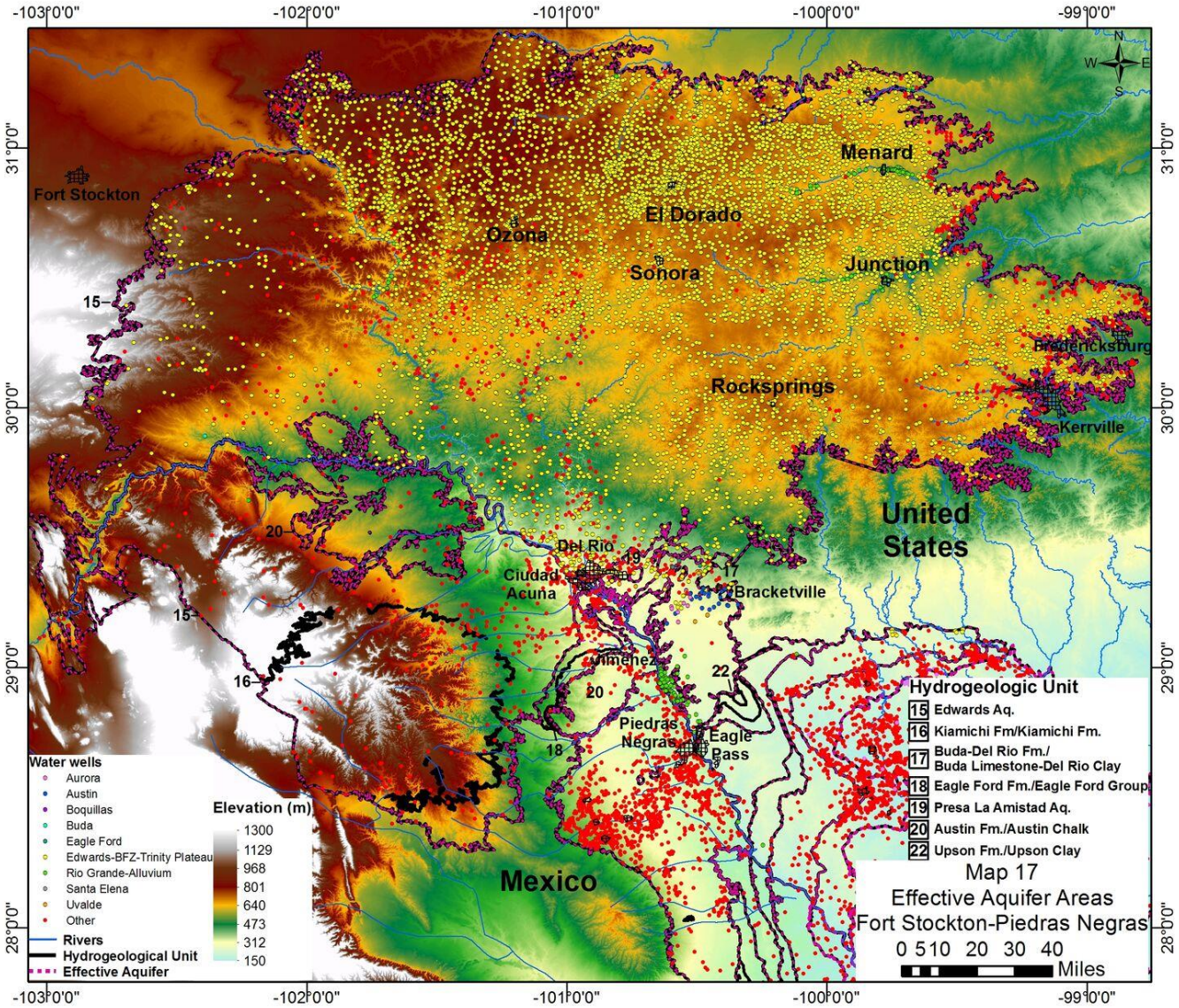


TEXAS A&M UNIVERSITY

EFFECTIVE AQUIFER AREAS

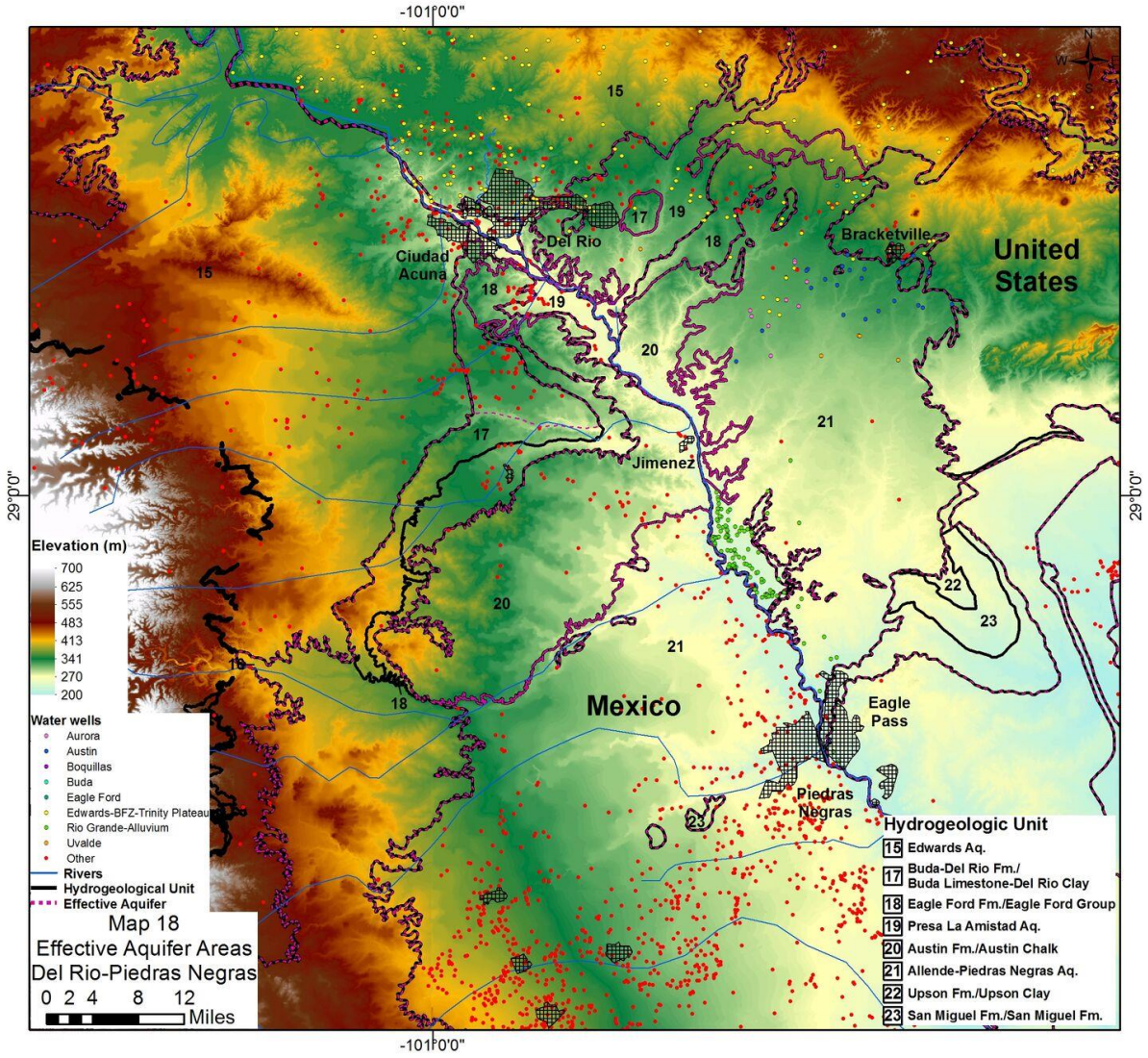


EFFECTIVE AQUIFER AREAS



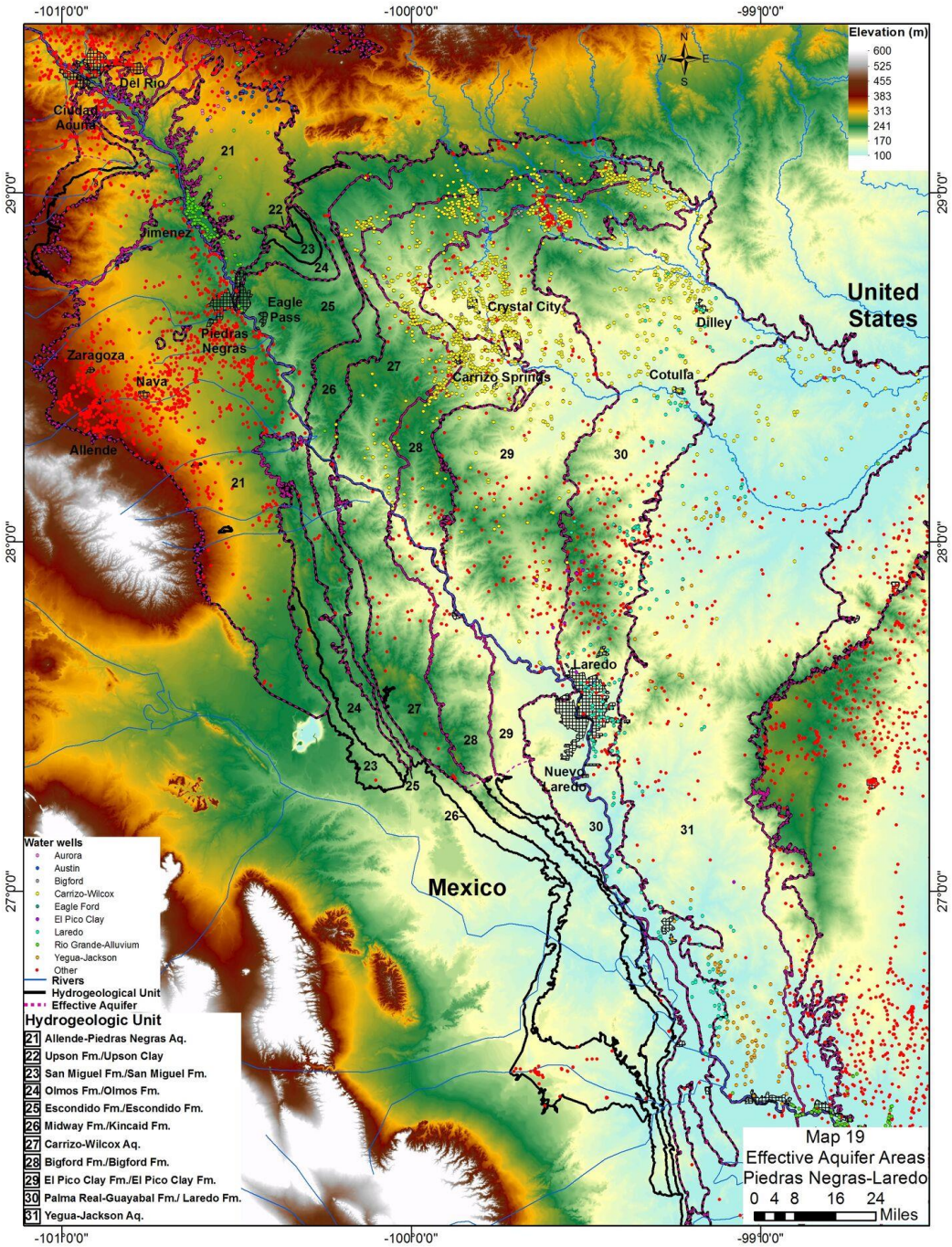
TEXAS A&M UNIVERSITY

EFFECTIVE AQUIFER AREAS



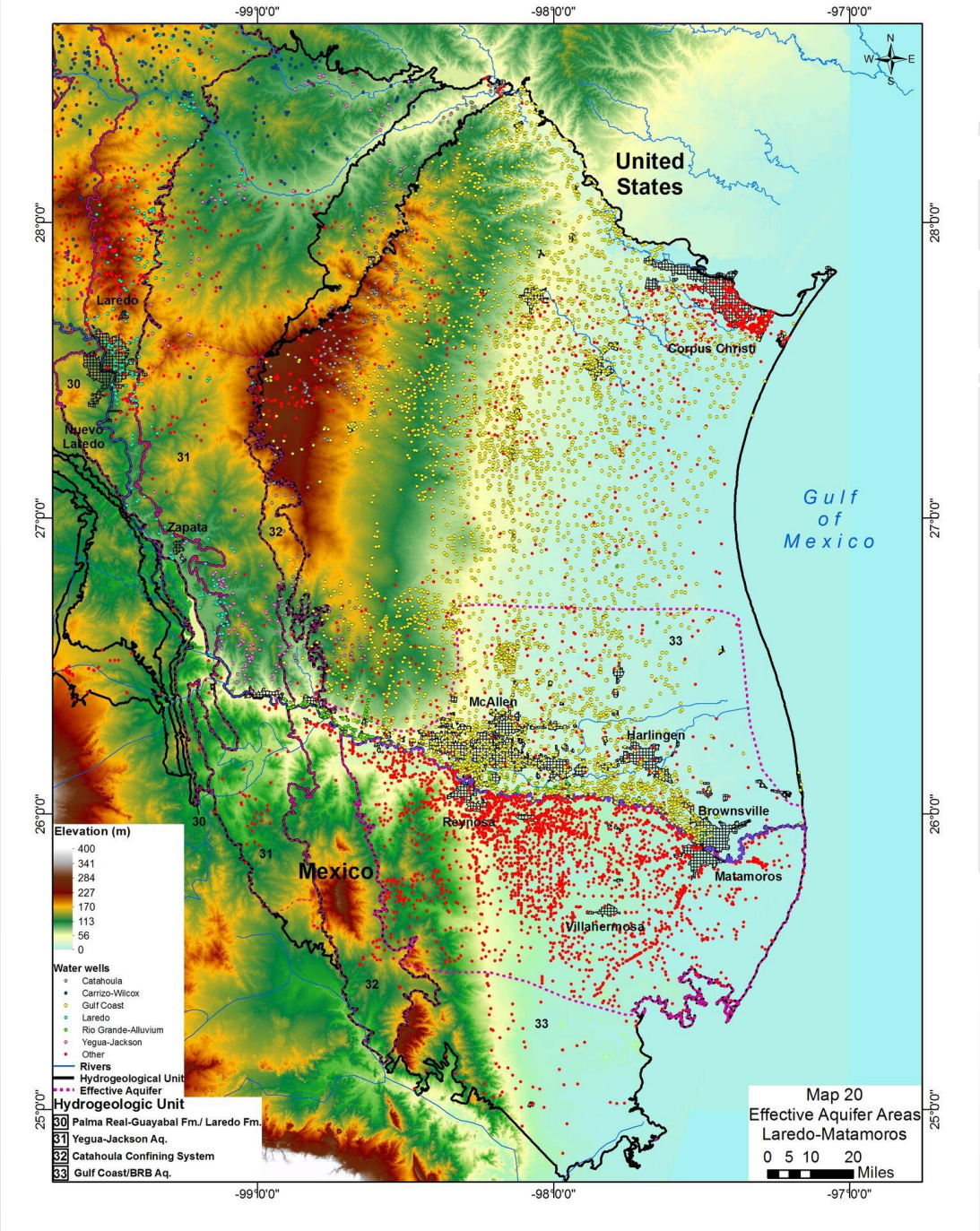
TEXAS A&M UNIVERSITY

EFFECTIVE AQUIFER AREAS



TEXAS A&M UNIVERSITY

EFFECTIVE AQUIFER AREAS



TEXAS A&M UNIVERSITY

THE TRANSBOUNDARY NATURE OF AQUIFERS or *TRANSBOUNDARINESS*

*"**The extent** to which aquifer riparians **prioritize** a particular aquifer over another and recognize **its value in the context** of economic, environmental, social, cultural, and legal institutional criteria".*

*"A **function of the attention** that aquifer riparians give to a particular border aquifer **rather than a simple geographic or hydrologic exercise".***

*"The transboundary **elements related** to the aquifer drive and **extend its limits in different dimensions and at different scales".***

*"A **measure of the implications** of having and identifying and **aquifer that happen to be shared** by two or more countries".* (Sanchez & Eckstein, 2017)

TEXAS A&M UNIVERSITY

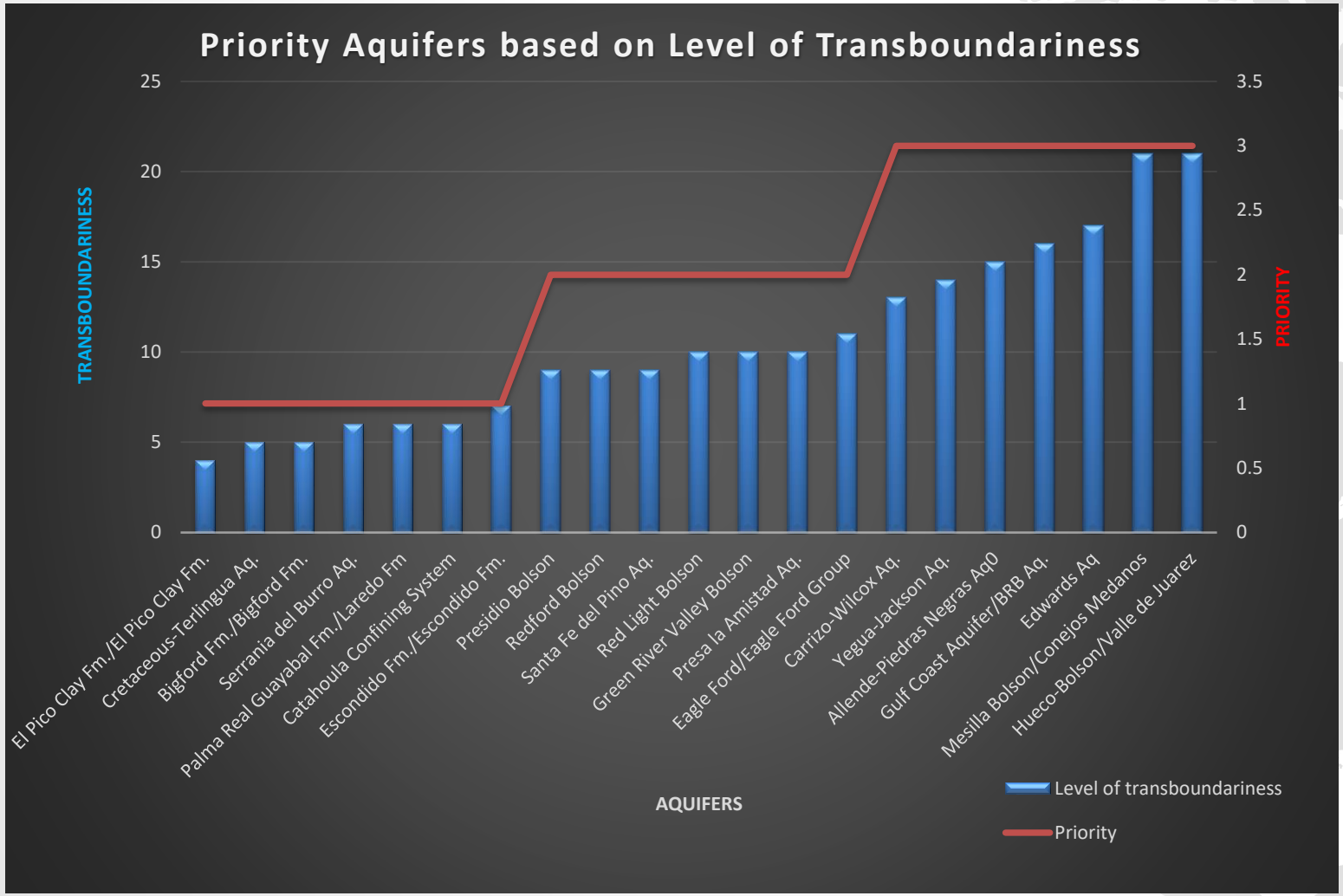
CRITERIA TO MEASURE THE LEVEL OF AQUIFER TRANSBOUNDARINESS

Score: 3 (high), 2 (med), 1 (low)

Aquifer													CRITERIA								
AQUIFER /UNIT	Population			GW Dependency (by any use)			Water Quantity/Quality Challenges			Data/Research Availability			Political Recognition (as transboundary)			Cooperation Efforts			Other Issues Governing the Agenda		
	High >400,000	Med around 200,000	Low < 100,000	High >70%	Med ÷ 40-60%	Low < 30%	High Deficit salinity contamination vulnerability	Med Deficit signs of contamination starting to appear	Low Not reported yet	Reasonable	Some or only on one side	Limited	Both countries	Partial, one country or part of another system	None	High binational and local level	Some local	Limited/ none	Highly visible	Some partial on one country	Limited

TEXAS A&M UNIVERSITY

AQUIFER TRANSBOUNDARINESS



TEXAS A&M UNIVERSITY

WHAT DOES THIS MEAN?

- New approach for aquifer identification, delineation and categorization
- New transboundary management alternatives
- Improve groundwater research on the border
- Improve transboundary water relationships between Texas and Mexico
- Promote cooperation & data exchange

TEXAS A&M UNIVERSITY

TRANSBOUNDARY AQUIFERS BETWEEN MEXICO AND THE US

Research update

Rosario Sanchez & Laura Rodriguez
Texas Water Resources Institute, Texas A&M University

Acknowledgement: USGS TAAP, Texas Agrilife Research, Texas A&M University