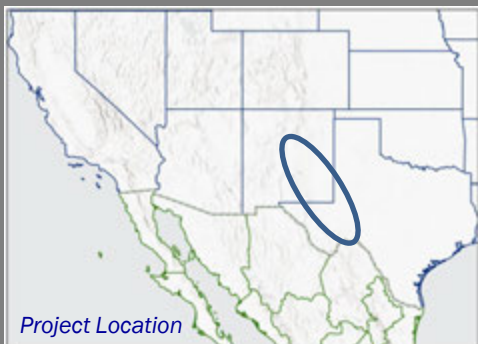


ACTIONABLE SCIENCE

Identifying Areas of High Salinity in the Pecos River Basin



The Pecos River is the largest tributary of the Rio Grande and flows 926 miles south southeast through eastern New Mexico and western Texas. The Pecos River Basin covers approximately 44,000 square miles and can reach elevations more than 12,000 feet above the North American Vertical Datum of 1988 (NAVD 88). Over the years, increased salinity of the Pecos River has become a major concern among water users and water managers. High salinity levels reduce the availability of usable water for agriculture, livestock, and wildlife habitat. In 2015, the U.S. Geological Survey (USGS) and partners assessed the major sources of salinity throughout the basin to identify potential areas of elevated salinity and evaluate how the salinity of the Pecos River has changed over time.



The Confluence of the Pecos River and the Rio Grande, TX

KEY ISSUES ADDRESSED

The Pecos River is an important water source for livestock, irrigation, and wildlife habitat. It provides inflows to the Amistad Reservoir, supplying drinking water to downstream cities and into Mexico. While the flow of the Pecos River has declined from increased water demand and climate variability, salinity levels have increased. High salinity levels can have multiple impacts including degradation of water quality, reduction of usable water, and loss of wildlife habitat. By identifying areas of increased salinity levels, water management alternatives can be implemented, such as developing approaches to better control salinity, or potentially intercepting the source of salinity before it impacts surface-water supplies.

PROJECT GOALS

- Compile data from Santa Rosa Lake, New Mexico to the confluence of Pecos River and Rio Grande, Texas to identify data gaps
- Identify and understand how specific areas are contributing to elevated salinity
- Assess how salinity of the Pecos River has changed over time

ADDITIONAL IDEAS

As part of the literature review, USGS documented scientific recommendations that were made by researchers working in the Pecos River Basin, such as salinity control options, water-quality sampling suggestions, and locations of data gaps.



Collecting Streamflow and Water Quality Data Near Iraan, TX

PROJECT HIGHLIGHTS

Understanding the Geology: The Pecos River Basin is underlain by formations such as the San Andres, Salado and Rustler which contain salt-bearing rocks that dissolve as groundwater migrates through them and subsequently discharges to the Pecos River. To aid in the understanding of how the underlying geology may contribute to the salinity of the Pecos River in the study area, the horizontal extent of and depth to the base of the geologic units that underlie the study area were mapped.

Assessing Salinity: The subreaches between Acme and Artesia, NM, and between Orla and Grandfalls, TX were identified as areas of increasing salinity. Water quality sampling results indicate mixing of different waters occurring from either groundwater or surface-water features. The effect that mixing water has on effectively defining a source may need further investigation.

Learning from Historical Water-Quality Data: Available water-quality data were downloaded from various state and federal agencies, compiled into one location, and reviewed for quality control and assurance by verifying that the data met specific criteria. This was important because it was the first time data from other basin studies were collected, which allowed managers to understand the data gaps.

Collaborators

- U.S. Army Corps of Engineers
- New Mexico Interstate Stream Commission
- Texas Commission on Environmental Quality
- Texas Water Development Board

CCAST Author: Deanna Morrell, Bureau of Reclamation, May 2021.

Photos courtesy of U.S. Geological Survey
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Visit CCAST:



LESSONS LEARNED

Over time multiple agencies collected water-quality data in the Pecos River Basin. These sampling efforts were not coordinated so there was a lack of consistent sampling methods, hindering the ability to effectively analyze long-term changes in water quality that may help with the understanding of how salinity has changed over time and identifying the sources of salinity. Typically, water-quality data is collected at select locations providing a snapshot of the conditions at that location and specific time period as directed by the source agencies' priorities for their collection efforts. What would be beneficial is if all of the agencies that collect water-quality data throughout the Pecos River Basin consistently sampled for the same constituents and coordinated their sampling events which would provide a comprehensive comparison over time.

Community outreach and stakeholder meetings helped build a relationship with the residents and local agencies. Working with local agencies was imperative as they understood the system and the issues more thoroughly than the researchers. Increased communication and collaboration helped researchers plan basin tours, schedule samplings, and assisted with gaining access to remote or privately owned sites and areas. They also provided reservoir release schedules, so researchers were able to sample sites before any water was released.

NEXT STEPS

- This study will be included in the U.S. Army Corps of Engineers Pecos Watershed Assessment to identify possible salinity control projects within the Pecos River Basin

The findings of the study are documented in a USGS Scientific Investigations Report (<https://doi.org/10.3133/sir20195071>).



Pecos River Salinity Stakeholder Group