

Irrigation canals as potential dispersal routes for the Common Snapping Turtle, *Chelydra serpentina*, in the southern High Plains of New Mexico, USA

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The Common Snapping Turtle, *Chelydra serpentina* (Linnaeus, 1758), is a well-known and widely distributed turtle of North America. The native geographic range of the species encompasses southeastern Canada west to southeastern Alberta, the entire Mississippi River drainage westward to the Rocky Mountains, and southwards to the Gulf Coast (Ernst and Lovich, 2009). The state of New Mexico in the United States includes the westernmost portion of this turtle's native distribution. The species occurs throughout the eastern part of the state in the Pecos, Canadian, and Dry Cimarron (Upper Arkansas) river drainage systems (Degenhardt et al., 1996; Painter, 2017). An established population of *C. serpentina* also occurs in the Rio Grande of central New Mexico, where it was likely introduced. The species has recently been documented in the San Juan River (Upper Colorado River Basin), where it is not native (Painter et al., 2017). The elevations associated with *C. serpentina* in the state are below 1400 m but records up to 2050 m exist (Degenhardt et al., 1996).

Chelydra serpentina generally occurs in lentic to slow-moving waterways with abundant aquatic vegetation, submerged snags, and trees (Degenhardt and Christiansen, 1974; Ernst and Lovich, 2009). Although the species prefers shallow waters with a soft sand or mud bottom, *C. serpentina* is highly adaptable and is often found in various freshwater and brackish habitats due to its opportunistic diet and durable physiology (Ernst and Lovich, 2009). For example, in Long Island, New York, USA, populations live in saltmarshes with a salinity of 24.5 ppt (Ernst and Lovich, 2009). In New Mexico, *C. serpentina* has also been collected and observed in lesser quality habitats, such as small, irregular streams. An individual was captured in the Rio Grande in a habitat

without submerged vegetation (Degenhardt et al., 1996; Stuart, 2000). However, two habitats that have not been reported as viable for *C. serpentina* are ephemeral lakes and irrigation canals in the semi-arid plains.

On 7 April 2021, we discovered a *C. serpentina* carapace (Fig. 2; now in the collection of the University of Texas at Arlington, UTA-R-65865) in an augmented ephemeral lake (Regulator Reservoir 2) managed by the Bureau of Land Management (35.0974°N, 103.6556°W; WGS84; Fig. 1). The site is located in a shortgrass prairie in Quay County, New Mexico, 16 km south of the City of Tucumcari (Fig. 2). The nearest perennial water source (i.e., the Canadian River) is approximately 25 straight-line km to the north. Observations of *C. serpentina* in Quay County are scarce, with a single record on the Canadian River (Degenhardt et al., 1996; precise coordinates not available). Two additional records of the species exist on the Canadian River but are assigned to Harding and San Miguel counties (<https://bison.usgs.gov>). In addition to the specimen of *C. serpentina*, we discovered three shells of native *Trachemys scripta elegans* (Schoepff, 1792), also housed at the University of Texas in Arlington (UTA-R-65866–68; Fig. 3), one of the most adaptable and invasive freshwater turtle species in the world (<https://nas.er.usgs.gov>).

The ephemeral lakes, also known as playa lakes, which occur throughout eastern New Mexico, are vital water sources in an arid landscape. When seasonal rains fill these small drainage basins, they may retain water throughout the winter and spring. These temporary hydrological systems are also crucial for recharging groundwater aquifers and provide a habitat for migratory birds, arthropods, and other wildlife (Sublette and Sublette, 1967). The irrigation ditches within Regulator Reservoir 2 connect to the Conchas canal complex and are utilized to catch storm runoff, halt irrigation overflow, and reduce seepage of the irrigation network. The diverted water is heavily used in Quay County to irrigate agricultural lands. These

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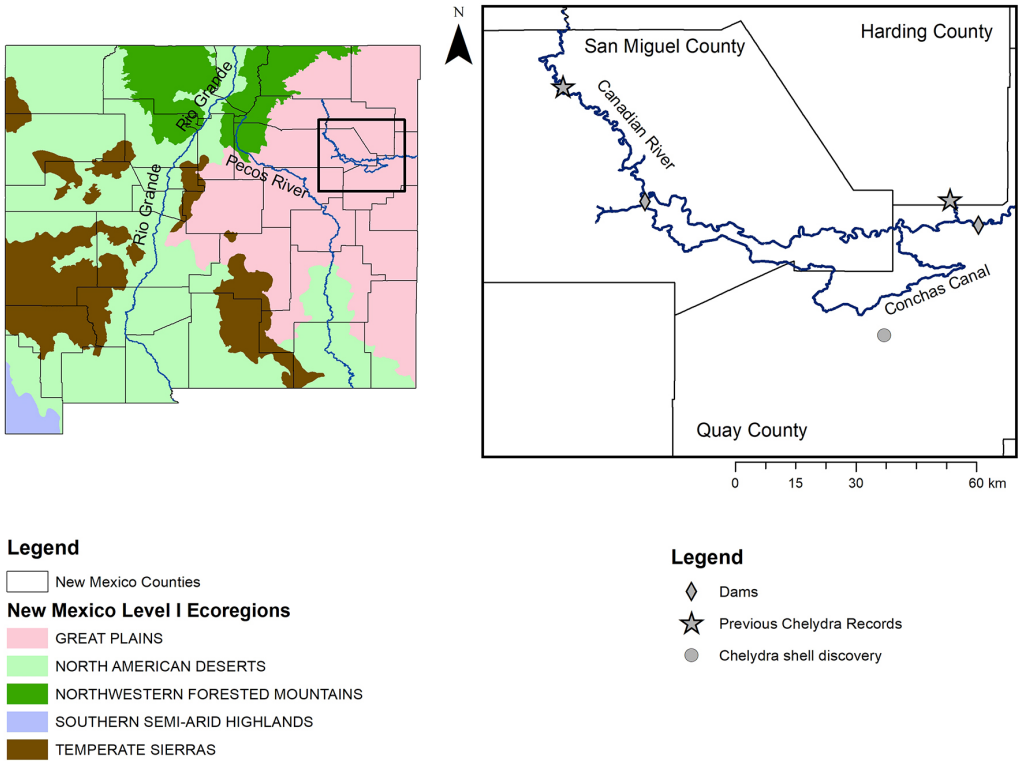


Figure 1. Map of New Mexico, USA, outlining Level I ecoregions (left) and a close-up map of the Canadian River and Conchas Canal (right), including previous reports of *Chelydra serpentina* and that of a newly discovered shell, a ~25 km straight-line distance away from the Canadian River.

canals have a combined length of 177 km and the capacity to divert 370,044,000 m³ of water per annum (Rogers, 2009). Although this canal network can move large amounts of water from the impoundments on the Canadian River, providing a possible dispersal route for turtles, the regional climatic conditions make it unlikely that any aquatic turtle could persist in this area.

New Mexico’s aquatic habitats are extremely susceptible to climate change. Temperature increase can increase evapotranspiration and annual precipitation is becoming increasingly variable, which can lead to diminished water tables and leave freshwater turtles vulnerable (Friggens et al., 2013). While there is no historic data on water availability, it is possible that our study site once supported small turtle populations and the climate change and drought conditions lead to the demise of the turtles. In 2002, historic drought conditions set in and have continued to the present day. The average annual rainfall is 41 cm, but significant deviations from monthly averages can occur during the summer monsoon season. Abnormally dry conditions occurred in the late spring of 2020 and advanced into moderate-to-

severe drought, which persisted into 2021 (<https://www.drought.gov>). According to the U.S. Drought Monitor Index, drought conditions for Quay County and San Miguel County ranged from moderate to severe in April 2021, when we discovered the shell of *C. serpentina*.

Although *C. serpentina* is known to make long overland crossings in temperate, wetter climates, New Mexico’s regional climate is too dry to support long-distance overland movements (Degenhardt et al., 1996; Gibbs et al., 2007). A study on the distribution and habitats of turtles in New Mexico failed to collect any *C. serpentina* more than 8 km away from perennial streams (Degenhardt and Christiansen, 1974). Although people are known to release their unwanted pet turtles into the wild, the remoteness of the area where we found turtle shells makes this a very unlikely scenario. The network of irrigation canals provides a possible explanation as to why the carapace was found so far from suitable habitat. The presence of irrigation canals may aid in the dispersal of turtle species that otherwise would not occupy such arid regions; therefore, alluding to a range expansion of these animals.



Figure 2. The arid landscape in Quay County, New Mexico, USA, where a *Chelydra serpentina* carapace (UTA-R-65865; inset) was discovered in April 2021. Photos by James Alles.

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Figure 3. Two of the three *Trachemys scripta elegans* shells that were discovered in April 2021, Quay County, New Mexico, USA. Photo by Jaecy K. Banther-McConnell.

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