



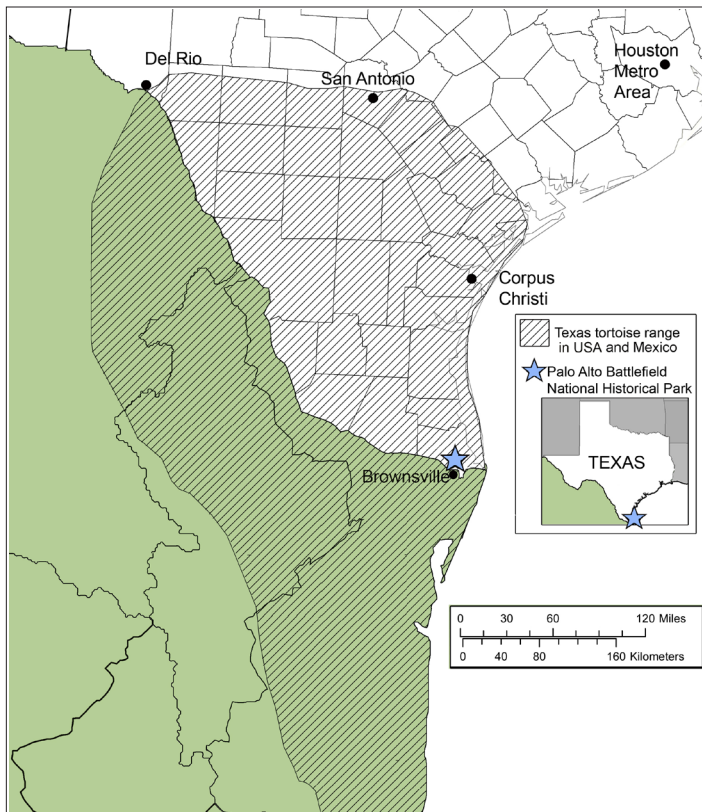
Texas Tortoise Monitoring Program Summary

Network Parks Where Monitoring Occurs

Palo Alto Battlefield National Historical Park (PAAL), in Brownsville, Texas.

Importance

All Inventory and Monitoring (I&M) networks within the National Park Service have identified high priority vital signs that are monitored on parks as indicators of ecosystem health. The Gulf Coast Network (GULN) selected Texas tortoise (*Gopherus berlandieri*) as one such vital sign at Palo Alto Battlefield National Historical Park. This species was selected because (1) it is designated as threatened by the state of Texas due to habitat loss and illegal collections; (2) it is a valued faunal component of the park's shrublands, which mainly occur on low-rising ridges called lomas; (3) the population at the park may be geographically isolated; and (4) some of the park's shrublands are under consideration for replacement with the historical grassland habitat. Long-term monitoring data will inform the park on how to best manage for and protect tortoises and their habitats. This monitoring information will also contribute to the broader assessment of the Texas tortoise across its limited geographic range.



Geographic range of the Texas tortoise in the United States and northern Mexico.

Monitoring Objectives

1. To provide a detailed depiction of the status of Texas tortoises across the park's major lomas, including catch per unit effort, within-park tortoise movements, tortoise body condition, and the distribution of sizes and sexes captured. Catch per unit effort and tortoise body condition are also analyzed for change over time.
2. To assess tortoise population parameters across the park's major lomas and track how these parameters change over time, including estimated abundance and survivorship from mark-recapture data.



The Texas tortoise, *Gopherus berlandieri*, is a threatened species by Texas designation. It is the smallest North American tortoise, from a genus including the desert and gopher tortoises. A juvenile is shown here.

Basic Approach

The Gulf Coast Network's core methodology is a long-term mark-recapture study, which is conducted through time-and-area defined sampling events once per year in the fall. During each survey event, a crew of 4-8 members independently searches for tortoises within one of seven permanent sampling units representing each of the park's major lomas, with each unit surveyed twice per trip at 8 person-hours effort per survey. Each observer walks through the designated search area



Crew member searching for Texas tortoises during survey event at Palo Alto Battlefield National Historical Park.

and carefully scans the ground surface and bases of vegetation for resting or active tortoises. When a tortoise is found, it is measured, photographed, and its GPS location is recorded. If the tortoise is not already permanently marked, the observer marks it by drilling holes in marginal scutes, following a code that uniquely identifies each tortoise for the mark-recapture study. Additional information, including links to all reports, can be found at <https://www.nps.gov/im/guln/texas-tortoise.htm>.

Key Variables Measured on each Tortoise

For each tortoise encountered during a survey event, five activities must be completed. These are in addition to applying permanent marks to unmarked tortoises.

1. The GPS coordinates are recorded directly over the spot where the tortoise was first encountered.
2. The tortoise's total length, carapace length, carapace width and carapace height are measured with calipers.
3. The tortoise's weight is measured with a hanging scale and rope sling.
4. The tortoise's condition (evidence of disease, injuries) and sex are visually assessed.
5. Nine standardized photographs are taken. The photographs are used to verify the tortoise ID and to document the encounter location.



Texas tortoise hiding under prickly pear cactus (*Opuntia engelmannii*).



A male Texas tortoise encountered during a visual ground search at Palo Alto Battlefield National Historical Park.



Rear marginal scutes of a Texas tortoise that have been permanently marked as part of the code that uniquely identifies this recaptured tortoise.

About the Gulf Coast Network

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as “Vital Signs Monitoring,” to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and to determine how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses five goals for all parks with significant natural resources:

1. Determine the status and trends in selected indicators of the condition of park ecosystems,
2. Provide early warning of abnormal conditions,
3. Provide data to better understand the dynamic nature and condition of park ecosystems,
4. Provide data to meet certain legal and congressional mandates, and

5. Provide a means of measuring progress towards performance goals.

Effective long-term management and stewardship of natural resources begins with baseline knowledge of these resources and a scientifically-rigorous understanding of how they change over time. In collaboration with park staff and other stakeholders, the Gulf Coast Network strives to meet this need for the eight parks in its region. The network's geographic region encompasses western Florida, all of Mississippi and Louisiana, the southeastern quarter of Texas and extends up through the northwest corner of Alabama into Nashville, Tennessee.

For more information

GULN Home Page: <https://www.nps.gov/im/guln/index.htm>

About the NPS Inventory & Monitoring Division:

<https://www.nps.gov/im/index.htm>

Data Downloads via the Natural Resource Information Portal:

<http://irma.nps.gov>