

Gulf Coast Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure TORT01

Sampling Crew Training and Safety—Version 3.0

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Summary

This standard operating procedure (SOP) provides description and guidance on training and safety for Texas tortoise (*Gopherus berlandieri*) monitoring at Palo Alto Battlefield National Historical Park (PAAL), as conducted by the Gulf Coast Network (GULN). Throughout this protocol's implementation, the network places a high priority on the occupational health and safety of its employees, cooperators, and volunteers. In this SOP, instructions are provided for defining crew-member roles in training and outlining the resources and requirements for crew training. Regarding safety, details are provided on crew safety roles, risk identification and abatement, and emergency response procedures for the Gulf Coast Network and the National Park Service (NPS). Two Job Hazard Analyses (JHA) are included as appendices to this SOP.

Revision Log

Revision Date	Author	Changes	New Version #
10/2014	Robert Woodman, Jim Garrett	Updated version 1 (from 5/2013) to reflect new standards for formatting and content	2.0
8/2018	Jane Carlson	Revised text for clarity and conciseness. Added a section on Safety Concerns at Palo Alto Battlefield NHP	3.0

Contents

	Page
Summary.....	1
Revision Log.....	1
Introduction.....	4
Training.....	4
Training Roles and Responsibilities	4
Crew Leaders:.....	4
Data Recorder/Time Keepers:	4
GIS Specialist:	5
Project Leader:.....	5
All Crew Members:	5
Training Materials and Training Resources	5
Mentoring and Guidance for Cooperating Park Staff.....	6
Safety	7
Safety Roles & Responsibilities	7
Crew Leaders:.....	7
Project Leader:.....	7
All Crew Members:	7
Required Safety Trainings and Materials	8
General Safety Training	8
In-Office Safety Review	8
On-Site Crew Safety Briefing	8
Job Hazard Analysis	8
Responding to a Life-Threatening Medical Emergency.....	9
Responding to Non-Emergency Incidents.....	9
Safety Considerations for Palo Alto Battlefield NHP	10
Excessive Heat and Sun.....	10
Rainstorms and Lightning	10
Ticks	10

Mosquitos	10
Chiggers.....	10
Precautions to Minimize Risks of Ticks, Mosquitos or Chiggers	11
Potentially Harmful Plants	11
Venomous Snakes	11
Procedures Following a Potentially Venomous Snakebite.....	12
Bees and Wasps.....	12
Literature Cited	14
Appendix S01A: Driving Safety Job Hazard Analysis for GULN Staff	16
Appendix S01B: Job Hazard Analysis for PAAL Texas Tortoise Monitoring.....	20
Appendix S01C: GULN Trip Plan.....	25

Introduction

Tortoise sampling involves diverse activities performed in a challenging physical environment, with likely exposure to high heat, high humidity, venomous snakes and thorny, hazardous vegetation. These conditions pose significant safety and functional challenges to sampling personnel. Crew members must remain vigilant to these risks as they independently search for, encounter, and measure tortoises, while also operating a camera, radio and GPS. Crew members must also avoid inflicting undue stress on the tortoises while handling them. The combination of tortoise sensitivity, work environment, and task diversity mandate that all crew members are well-trained and fully prepared prior to field work, in terms of technical tasks required and safety concerns and procedures. Fully-trained crew members will ensure first, data are collected effectively and consistently over time, and second, data are collected in a manner that is safe for field personnel and the sampled tortoises. The two sections of this SOP—training and safety—provide guidance on crew training and establish safety parameters and guidelines. When non-NPS personnel participate in tortoise sampling, the Gulf Coast Network (GULN) crew leaders are responsible for ensuring these individuals possess the skills necessary for successful and safe participation in tortoise sampling efforts.

Training

Training Roles and Responsibilities

On each trip to the park, the network aims to have two four- to eight-person crews, with the crews surveying different units at the same time. Two crew leaders and two data recorders/time keepers are needed per trip. The crew leaders, data recorders, and GIS specialist have central roles in training field crew members. One of the crew leaders is designated as the primary crew leader, and they have a few additional duties relative to the secondary crew leader. Any network staff member serving on a field crew must participate in training and preparation activities, especially training related to safety issues.

Crew Leaders:

The crew leaders are responsible for ensuring all NPS staff, other agency personnel, non-governmental cooperators and volunteers are adequately trained and prepared for fieldwork. Prior to the trip to the park, the primary crew leader coordinates with park staff about which Palo Alto Battlefield NHP Staff will participate and what training they require. This crew leader then communicates to all participants about how to prepare for the sampling event (see “Training Materials and Training Resources” below) and what clothing and personal supplies to bring, including long sleeve shirts, full-length pants, rain gear, sun hats, hiking boots and water bottle. Once at the park, both crew leaders further assesses the training needs of all new crew members and provide whatever is necessary to support safe and effective participation in sampling. Finally, the crew leaders must conduct safety briefings and field sampling refreshers for their respective teams, or have a single session for all crew members at the start of the first sampling day.

Data Recorder/Time Keepers:

During field work, the data recorders serve as the expert on the completion and handling of data sheets. They are thereby responsible for training others in these skills as necessary. Specific training

for field crew members ensures their familiarity with field data-entry procedures, so that all data are collected as required. If two experienced data recorders are unable to travel to the park, an experienced person or a crew leader must train other crew members to be the data recorder/time keepers. Duties include: (1) filling out the event-level field sheet included as an appendix to the protocol narrative (Appendix A *Event-Level Datasheet*; Carlson et al. 2018a); (2) keeping track of tortoise encounters using tortoise ID numbers, as detailed in SOP TORT03 *Performing Visual Ground Search—Version 3.0* (Carlson et al. 2018b); (3) timing the sampling event and adjusting the sampling time to account for tortoise processing, as detailed in SOP TORT03; and (4) ensuring the field crew understands data entry procedures and fills in the observer-level datasheet correctly (Appendix B *Observer Datasheet*; Carlson et al. 2018a).

GIS Specialist:

The GIS Specialist is responsible for all GPS-related aspects of tortoise sampling. They prepare all GPS units and if participating in sampling, they also train crew members in the use of GPS in the field. If the GIS specialist is not present in the field, the crew leaders train others on GPS use. Instructions on preparing and using the current model of GPS are provided in the In-House Document: Preparation and Use of GPS Units.

Project Leader:

The project leader ensures the training information is up-to-date and consistent with the protocol narrative and SOPs. They inform crew leaders about any recent changes to the protocol so these changes can be communicated to the field crews.

All Crew Members:

All crew members are responsible for attending the training sessions and for reading the available training materials so they fully understand and adhere to the sampling procedures. Since many technical activities in the field are specific to tortoise sampling and handling, mentoring of novice crew member by more experienced members is an important component of the overall training.

Training Materials and Training Resources

National Park Service and Gulf Coast Network procedures for hiring federal employees ensure that all NPS staff members meet the basic skill requirements for participating in the Texas tortoise protocol. Desired additional basic skills such as tortoise detection, tortoise handling, digital photography, and the use of GPS are provided by one or more of the following routes:

- New crew members are encouraged to consult and review literature on the Texas tortoise and appropriate approaches to handling tortoises. Four recommended references are Rose and Judd (2014), Hellgren et al. (2000), Auffenberg and Weaver (1969) and Graeter et al. (2013). The protocol narrative also includes useful descriptions of the tortoise, its habitats, the rationale for monitoring, and the network's overall approach to monitoring at the park (Carlson et al. 2018a). Additional tortoise-related publications are stored on the network server-system; a bibliography and digital copies of individual publications can be provided on request. Many of these materials are also readily found via web searches and in public and university library systems.

- New crew members should review the In-House Document: *Use of Global Positioning System (GPS) Units* as well as operating manuals for the network-supplied GPS and digital camera. The network maintains digital copies of user-guides for all team equipment.
- All crew members must understand field procedures for safety (this SOP), the visual ground search (SOP TORT03; Carlson et al. 2018b) and for tortoise handling, photography, measuring and marking (SOP TORT04 *Tortoise Handling, Photography, Measurement and Marking—Version 3.0*; Carlson et al. 2018c). These SOPs are summarized in the Quick Reference to Texas Tortoise Monitoring, which is provided to all new crew members prior to their first sampling trip.
- New crew members develop field proficiency in technical tasks through mentorship with more experienced crew members. On-the-job mentoring covers appropriate field skills and practices, use of equipment and instruments, tortoise handling, and associated data recording. These can be conducted formally or informally as needed.
- The crew leaders brief the crews on safety and sampling at the start of the first field day. The briefing can include a review of the contents of the field pack and a reminder of how each piece of equipment is used (e.g., calipers, camera, scale). It can also include instruction on the required set of photographs and how to best handle tortoises, both for the animal's well-being and to reduce the potential for disease spread among tortoises in different sampling units.
- Support and assistance can be obtained from non-NPS experts. These technical experts can help train crew members in specific taxonomic and handling skills.
- All NPS and network staff participate in required employee development activities, such as training courses, professional exchange and meetings. Training opportunities include operational leadership and use of field equipment.

Mentoring and Guidance for Cooperating Park Staff

Implementation of the tortoise sampling protocol in Palo Alto Battlefield NHP is meant to involve park staff. Staff members at the park have unique insights into park resources and habitats, and their engagement increases efficiency and effectiveness throughout each sampling trip. Resource managers from other parks can also contribute substantially to sampling efforts at the park. Consequently, the Gulf Coast Network monitoring program places strong emphasis on integrating park resource management staff into tortoise sampling crews. Participation of park staff is fostered through two general approaches: (1) Members of the park natural resources staff are actively encouraged to participate whenever possible, (2) the network invites staff from other network parks to participate during Texas tortoise sampling and provides funding support if necessary. Park staff members are trained and mentored in tortoise sampling techniques using the same approach as with other crew members. This includes participation in crew briefing meetings before sampling, specific instruction in use of equipment and specified routines performed in the field, and “shadowing” of an experienced crew member during sampling activities.

Safety

This section describes how a safe working environment is maintained during tortoise sampling at Palo Alto Battlefield NHP. The topics covered include: sampling crew roles and responsibilities, safety training needs, the Job Hazard Analyses (JHA), and how to respond to a medical emergency. All personnel participating in Texas tortoise sampling in the park must be familiar with these procedures and sign the acknowledgment form (see below).

The tortoise monitoring protocol requires long days of driving for network staff, followed by fieldwork in a harsh environment. Challenges to sampling at Palo Alto Battlefield NHP include prolonged exposure to heat, humidity, and sun, and high probability of encounters with hazardous vegetation, biting arthropods, and venomous snakes. Crew safety is of paramount concern to both the network and the park. The network and the park provide training, procedural guidance, and safety equipment, and crew are expected to make personal safety a priority at all times while engaged in the sampling project.

Safety Roles & Responsibilities

Crew Leaders:

The primary crew leader serves as the crew safety officer before and during sampling trips to the park, with support from the secondary crew leader and any other network staff present. Their duties begin several weeks before the trip and involve relaying safety-related information to and from the park resource manager. Before departure for Palo Alto Battlefield NHP, the primary crew leader conducts an in-office safety review and gathers safety equipment along with the other sampling supplies. Once at the park, both crew leaders have three additional safety-related duties. First, crew leaders conduct a short safety briefing just before sampling begins. Second, crew leaders distribute safety equipment to their crews, including a printed paper listing emergency contact numbers. Third, the primary crew leader is responsible for safety-related check-ins with the network and park points of contact at the start and end of each field day.

Project Leader:

The project leader leads the staff as they prepare for sampling trips and ensures all members are informed of safety concerns, network safety policies and requirements. They coordinate with the park on safety and field-work regulations, policies and advisories. The project leader also ensures all appropriate safety information is communicated to all crew members before the trip and that all safety-related preparations are completed prior to departure from the network office. This person may or may not also serve in one of the crew leader roles.

All Crew Members:

All participants are responsible for being aware of safety information and following guidance relevant to sampling trips. They must remain cognizant of the hazards associated with the sampling activities and associated travel and act in a safe manner during the performance of activities. All crew members must carry radios when sampling and those radios must be used and monitored appropriately so key communications are not missed. They must also be aware of the laminated card in their packs that lists emergency contact numbers for the park and the network. All crew members,

NPS employees, and other personnel are required to follow safety guidelines provided through training and on-site briefing and must subscribe to all regulations and policies regarding fieldwork posted by Palo Alto Battlefield NHP.

Required Safety Trainings and Materials

General Safety Training

Safety is a network and NPS priority. Network policies require all network NPS staff maintain certification in first aid, have completed Defensive Driving and Operational Leadership courses per the network schedule, and maintain a valid state motor-vehicle operator's license. Network staff is provided network-sponsored Red Cross training in CPR, automated external defibrillators (AED) and first aid every two years. Outside of the network, the Gulf Coast Network expects all participants to meet their organization's specific safety training requirements. This includes personnel from other federal (i.e., participating USFWS staff), state (Texas) and academic/non-government agencies and organizations. Park staff or other NPS crew members must meet the basic NPS requirements as well as their park-specific requirements and policies.

In-Office Safety Review

In the weeks prior to the sampling event, the primary crew leader conducts an in-office safety review to ensure all necessary safety preparations will be completed. They inform all participants of park policies, safety requirements and recent changes at the park, based on recent conversations with the resource manager at Palo Alto Battlefield NHP. In this meeting, the crew members will also review the two JHAs (both are appendices to this SOP: Appendix S01A—*Driving Safety Job Hazard Analysis for GULN Staff* and S01B—*Job Hazard Analysis for PAAL Texas Tortoise Monitoring*) and complete the GULN park trip plan (Appendix S01C—*GULN Trip Plan*).

On-Site Crew Safety Briefing

An on-site crew orientation and safety meeting directly precedes all sampling. The two crew leaders can conduct this meeting jointly or separately. During the meeting they review with the crews both anticipated sampling procedures and the apparent hazards and safety-related aspects of the planned tasks and activities. The crew briefing includes a general review of the JHA, after which an acknowledgement form is signed by all participants. This signed form will be attached to the "Trip Report" for each sampling trip, which is kept on file in the network office (see SOP TORT05 *Post-Sampling Activities—Version 3.0*; Carlson et al. 2018d). Typical focal points of the safety briefing include the use of provided safety equipment (including snake chaps, safety glasses, insect repellent and sun-screen), and refreshers on the risks of venomous snakes, heat exhaustion and hazardous, thorny plants. Crew members are reminded at the briefing about carrying water, remaining hydrated at all times, and maintaining radio-contact with others. They are also reminded of the laminated card in their packs that lists the numbers of the park's emergency contact person, the visitor's center main desk, the field crew leaders, the network program manager, and the poison control hotline, in case of a snakebite.

Job Hazard Analysis

An important tool used to promote safe conduct is the job hazard analysis (JHA; formerly called a job safety analysis). This approach is consistent with NPS Directors Order 50 and Reference Manual

50B for Occupational Health and Safety (NPS 2008). The JHA process is to (1) identify hazards associated with field and laboratory settings, as appropriate, and (2) develop approaches to mitigate those hazards.

Two JHAs have been developed for use with the Texas tortoise monitoring protocol (Carlson et al. 2018a), one for driving safety and one for field sampling of tortoises. Both are included as appendices to this SOP. Prior to conducting the first Texas tortoise sampling trip each year, all network personnel involved must review the driving safety JHA. At the start of the first sampling event, all field personnel must participate in a field safety briefing, which provides an overview of the sampling safety JHA. All participants will then sign an acknowledgement form that they will follow all safety guidelines during sampling.

Responding to a Life-Threatening Medical Emergency

1. Call 9-1-1 or the park emergency number. Administer first aid to the best of your knowledge, ability, and training. If appropriate, transport to emergency room. Directions to the nearest hospital and emergency numbers will be updated and printed every January, prior to field sampling, by the project leader or designated field crew leader. Copies of the hospital directions and emergency numbers are included on the supplies and equipment checklists used before each field event.
2. As soon as it is practical to do so, inform the park's emergency contact and the network office of the incident.
3. For injured NPS employees and NPS volunteers, complete workers' compensation paperwork within 48 hours of incident. Non-NPS crew members (i.e., contractors and cooperators) must follow their organization's procedures for documenting accidents.

Responding to Non-Emergency Incidents

1. For a non-emergency incident that may require medical attention, injured monitoring staff must contact the network supervisor immediately after incident. If the supervisor cannot be reached, inform the park's emergency contact.
2. For injured NPS staff and NPS volunteers, complete workers' compensation paperwork within 48 hours of incident. Non-NPS crew members (i.e., contractors and cooperators) must follow their organization's procedures for documenting accidents.
3. Injured crew members should seek medical attention, if needed.

NOTE: Never discard original paperwork related to workers' compensation claims (including information from doctor's visits, CA-1, CA-2, CA-16 or CA-17 forms).

Safety Considerations for Palo Alto Battlefield NHP

Excessive Heat and Sun

Overexposure to heat and sun can cause dehydration, heat exhaustion, or heat stroke. All are serious conditions that can be life threatening. When working in hot weather, be sure to drink plenty of water and eat foods that can replace electrolytes.

Rainstorms and Lightning

Most months of the year are relatively dry at Palo Alto Battlefield NHP, but thunderstorms and rain can happen at any time of year. If a thunderstorm is approaching, the crew should cease sampling until thunder can no longer be heard and the rain stops.

Ticks

Several species of ticks can be encountered while working in Palo Alto Battlefield NHP. Among these are ticks that carry the following diseases: (1) Rocky Mountain spotted fever, with symptoms that include sudden onset of fever, headache, and muscle pain, followed by development of spotted rash at wrists or ankles; and (2) Ehrlichiosis, with similar symptoms except that there is often no rash around the tick bite. Note the presence or absence of a rash is not a diagnostic feature to distinguish any of the tick-borne diseases (CDC 2017).

The blacklegged tick, which transmits Lyme disease, could also be in Palo Alto Battlefield NHP. There are, however, few incidences of Lyme disease reported for this area, relative to the northeast and upper midwestern United States (CDC 2017). Cameron County, where the park is located, had no Lyme disease cases in 2015 and nine cases since 2000. Symptoms of Lyme disease are similar to Ehrlichiosis, except that a ‘bulls eye’ rash forms at the site of the bite in 70–80% of cases (CDC 2017).

Mosquitos

The main mosquito-borne diseases that are possible in Palo Alto Battlefield NHP are dengue fever, West Nile virus and several forms of encephalitis, such as St. Louis encephalitis or eastern equine encephalitis. The latter three diseases are caused by the same family of viruses and can produce similar, flu-like symptoms. Dengue fever has mild to unnoticeable symptoms in most cases, but sometimes can cause excruciating pain or hemorrhaging. Another mosquito-borne disease of concern is Zika virus, which is transmitted by *Aedes aegypti* or *Aedes albopictus*. Most people infected with Zika are asymptomatic, but infection may pose particular risks for pregnant women. Refer to the [CDC webpage](#) for current advisories and distributions of these and other mosquito-borne diseases.

Chiggers

Chiggers are the parasitic larvae of several species of mites in the family Trombiculidae. They are common throughout the Southeast and are typically too small to see with the naked eye. They feed by inserting their mouthparts into the skin and injecting enzymes that dissolve skin cells. Their bites leave itchy spots that sometimes take weeks to heal. Bites are often in dense patches where clothes are constricted. Washing the skin with warm soapy water immediately after fieldwork will remove most chiggers and reduce the number of bites. To prevent multiple attacks following a single field

excursion, any clothes that were worn in the field should be washed before wearing again. Chiggers are not known to be vectors of diseases in the United States.

Precautions to Minimize Risks of Ticks, Mosquitos or Chiggers

The risks of arthropod bites can be reduced with a few basic precautions. Clothes treated with tick and insect repellents have been found to be fairly effective at preventing bites. Crew members are provided with DEET and permethrin, and are encouraged to treat their clothing with permethrin prior to the sampling trip. Crew members should carefully follow the application instructions on the spray bottles to ensure their safety. Permethrin remains active for several weeks and through several washings.

While in the field, crew members should check clothes and skin for ticks regularly throughout the day and then inspect their entire bodies at the end of the day. Ticks typically need to be embedded for at least 24 hours for disease transmission to occur; therefore, the earlier ticks are found and removed, the lower the chances are of acquiring a tick-borne illness. If a tick is found already embedded, it should be removed with fine-tipped tweezers or a spoon-shaped tick remover (not heat or harsh fluids), grasping the tick firmly and close to the skin. The tick's body should be pulled slowly and steadily away from the skin. Twisting or jerking should be avoided, as this may break off the head and leave it embedded. Once the tick is removed, the attachment site should be cleaned with soap and water.

Potentially Harmful Plants

The thorn-scrub habitat at Palo Alto Battlefield NHP is dominated by thorny shrubs, cacti, and yuccas. The spines and thorns on these plants can rip clothing and puncture the skin. Wearing sturdy clothing and exercising caution while in the field can minimize these risks. Additionally, many of the park's plant species have spines at or near eye-level, so crew members should use protective glasses provided by the network.

Venomous Snakes

The following species of venomous snakes may be found at Palo Alto Battlefield NHP: cottonmouths (*Agkistrodon piscivorus leucostoma*), western diamondback rattlesnakes (*Crotalus atrox*), desert massasauga (*Sistrurus catenatus edwardsii*), and coral snakes (*Micrurus fulvius tener*). To avoid snakebites, pay attention to where you put your hands and feet, and remain at a safe distance from any snakes you see (at least one full length of its body). If you hear the rattle of a rattlesnake, freeze, locate the snake visually and back away slowly. Note that many snake bites are purely defensive and contain no venom. Bites from immature snakes are much more likely to contain a dangerous amount of venom than bites from adult snakes. Texas Parks and Wildlife has provided useful resources online about identifying many of the venomous snakes at Palo Alto Battlefield NHP and dealing with their bites (Texas Parks and Wildlife 2018a,b). The free ebook *Poisonous Snakes of Texas and First Aid Treatment of Their Bites* (Werler 1970) is also helpful for species identification and natural history, although its instructions to use constricting bands, incisions and suction are out of date. As described further below, the bite area should basically be left alone, and the primary objective should be getting the victim to a hospital immediately, calling ahead with information on the snake species and bite location.

Cottonmouths are typically associated with wetland habitats. When their bites are for defense purposes, they typically do not contain venom. However, cottonmouth bites are capable of delivering a lethal dose, and even if non-lethal, can result in the loss of fingers or toes.

Western diamondback rattlesnakes are almost certain to be encountered while at Palo Alto Battlefield NHP. Rattlesnakes are capable of delivering a lethal dose of venom and can be aggressive. This snake species is responsible for more fatal snakebites than any other North American snake (Powell et al. 2016).

Pygmy rattlesnakes are in a variety of habitats from arid to wet, but within a given habitat, they are often associated with water. They rarely cause fatalities.

Coral snakes may be encountered in open areas that are dry or sandy. Of the venomous snakes at Palo Alto Battlefield NHP, coral snakes may be the least likely to bite, but bites are still possible if snakes are handled or harassed. Their venom is a dangerous neurotoxin.

Procedures Following a Potentially Venomous Snakebite

- Treat all bites as if envenomation has occurred, which means field crew members must respond rapidly, and the victim must reach the nearest medical facility with antivenom as quickly as possible, travelling either by ambulance, or if quicker, being driven in a vehicle from the park.
- One person on the field team is assigned to use the radio or cell phone to call 9-1-1 for assistance. This person must identify the call as a venomous snakebite incident and identify the victim's location and the closest possible point of access for responders. If driving the victim is a quick and safe option, ensure the target hospital has the appropriate antivenom in stock and call ahead so the antivenom will be ready upon arrival. The 9-1-1 operator or the poison control network (1-800-222-1222) will know which medical centers have the necessary antivenom.
- Prior to departure from the field site, quickly remove the victim's rings, watches, and shoes before swelling begins. If the bite is on the arm, bind it loosely to the body to restrict motion. Reassure the victim they will be OK and maintain calm. Do not use thin circulation restrictive cords, pack with ice, or attempt to cut open or otherwise enlarge the fang punctures.
- Depart the site by leading the victim toward proper medical treatment facilities. Move as slow as necessary to maintain a normal heart rate for the victim. Waiting for assistance will only prolong the process of getting proper medical treatment.

Bees and Wasps

Bees and wasps are present at Palo Alto Battlefield NHP, and in most cases, the risk of getting stung during fieldwork is similar to the risk of getting stung when outdoors for other reasons. All crew members should remain alert to potential hive and nest locations while hiking to sampling units and working on sampling units. If they see insects travelling in and out of one location (e.g., brush,

culverts, abandoned tires), they should avoid the area around it. If someone is stung, Benadryl and a cold compress may bring relief. If the stinger is left behind, it should be scraped off the skin. Do not use tweezers, as this squeezes the venom sack, worsening the injury. If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. If any monitoring staff members know they are allergic to bee or wasp stings, they should inform the field crew leader before fieldwork begins. They should also make sure to carry appropriate medications. If they carry an epinephrine injector (EpiPen), they should make sure all members of their field team know where it is carried and how to administer it.

If a swarm of aggressive bees is encountered, following the instructions below will reduce the potential for serious harm.

- Run away quickly and in as straight a line as possible.
- Protect your head, face and airways as you run; avoid flailing your arms and do not jump in water for protection.
- Seek shelter in a vehicle or building only if bees can be kept out.
- If a person is stung numerous times, seek medical attention even if no signs of allergy are observed.

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Appendix S01A: Driving Safety Job Hazard Analysis for GULN Staff

Job Hazard Analysis Introduction

- **Job Title (and number if applicable):** Driving Safety
- **Date Written:** 08/21/2012
- **Date Revised:** 04/24/2017
- **Title of Person Who Does the Job:** All Gulf Coast Network employees
- **Analysis By:** Robert Woodman, edited by Jane Carlson
- **Supervisor:** Martha Segura
- **Park:** Gulf Coast Network Parks
- **Division:** Inventory and Monitoring
- **Approved By:** Martha Segura
- **Required and/or Recommended Personal Protective Equipment:**
 - Two or more high-visibility safety road vests
 - Functioning seatbelts for all passengers

Table S01A-1. Driving Safety Job Hazard Analysis datasheet.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	RECOMMENDED ACTION OR PROCEDURE
Vehicle Maintenance including pre-driving inspections	Vehicle malfunctions leading to breakdown, injury or accident In the event of a breakdown, lack of crucial equipment that might be needed Accidents or injuries caused from unsecured items	Take the vehicle in for regular scheduled maintenance or when any problem arises with vehicle performance Familiarize yourself with the tire jack, spare tire, tools and other vehicle equipment. Ensure that there is an unused accident reporting form in the vehicle, including several witness statement forms. Check that the vehicle has appropriate equipment such as a first-aid kit, safety vests, flares, cones, and an ice scraper. Do a walk around of vehicle. Inspect for damage and potential hazards. Secure all items that might become projectiles in the event of a crash.
Driving to and from destination on paved roads	Accidents from following a vehicle too closely or driving too fast for conditions Collisions with other vehicles or animals and/or driving off road surface due to inattention Head-on collisions due to driving when visibility is impaired due to elements (rain, fog, smoke, snow).	Obey speed limits and slow down if road conditions become slick or congested with traffic Pay attention at all times. Do not talk on a cell phone or text while driving Choose the safest route such as a road with a divider stripe and passing lanes Be especially careful on curves and stay within your lane If you must drive a road without a lane divider, reduce speed and allow at least 4 seconds between you and the vehicle ahead of you.
Driving to and from destination on unpaved or damaged roads	Accidents (collisions, driving off road)	Reduce speed On very bad roads, scout ahead if in doubt Report hazards such as fallen trees to park dispatch
Driving to and from destination on slippery roads (rain, ice, snow)	Accidents (collisions, driving off road)	Reduce speed Engage proper equipment such as 4-wheel drive. Be prepared to stop in a safe location.
Driving to and from destination in the night	Potential for collisions with pedestrians, animals and other obstacles that are not visible Accidents due to fatigue	Turn headlights on; keep windshield clean Schedule trip to ensure driver is well rested Pull over and rest if sleepy
Towing trailer	Collisions due to extra weight of load, extra length and greater stopping distances Back-up problems	Reduce speed Allow 4 or more seconds between you and the vehicle ahead of you to allow stopping time. Practice backing up with a trailer in a safe environment such as an empty parking lot.
Emergency / breakdown	Exposure due to being stranded Being hit by passing vehicles	If possible, pull off road If there is risk of being hit by passing traffic, turn on four-way flashers. Use cones or flares to provide a buffer around your vehicle. If you need to stand on or near roadway, wear a safety road vest.

SEQUENCE OF BASIC JOB STEPS	POTENTIAL HAZARDS	RECOMMENDED ACTION OR PROCEDURE
Parking	Collision with rocks, pedestrian or other hazard while backing into or out of a parking site Exhaust system igniting a grass fire Parked vehicle moving on its own	Park off of the road or in a designated parking area. Find a safe location to park that will provide safe exiting Put transmission in Park. If parking on a slope, set parking break. Ensure that fuels are clear beneath vehicle so as not to start a fire. Use a backer to guide you into a safe place that will be easy to pull forward out of later. Use mirrors or look over your shoulder. If no backer is available, look behind the vehicle before backing.
Driving – physical and mental fatigue	Accident resulting from falling asleep at the wheel	Get needed rest. Avoid driving when tired and take breaks as needed. Be particularly cautious when driving late at night. If a replacement driver is available, trade off driving when you start to feel tired. If no replacement driver is available, pull off the road and take a break or a nap. Plan the trip so that no person will be driving more than 10 hours. Plan the trip so that no person will be driving after working more than a combined 10 hours of fieldwork and driving.

Acknowledgment

We, the undersigned crew leader and crew members acknowledge reviewing and discussing this JHA and being given the opportunity to propose revisions to improve safety. We understand the provisions of this JHA and will fully adhere to all recommended actions and procedures.

PRINTNAME

SIGNATURE

DATE

Appendix S01B: Job Hazard Analysis for PAAL Texas Tortoise Monitoring

Job Hazard Analysis Introduction

- **Job Title (and number if applicable):** Texas Tortoise Monitoring
- **Date Written:** 7/18/2014
- **Date Revised:** 4/24/2017
- **Title of Person Who Does the Job:** Gulf Coast Network NPS staff, contractors, cooperators
- **Analysis By:** Robert Woodman, edited by Jane Carlson
- **Supervisor:** Martha Segura
- **Park:** PAAL in Brownsville, Texas
- **Division:** GULN Inventory and Monitoring
- **Approved By:** Martha Segura
- **Required and/or Recommended Personal Protective Equipment:**
 - Field clothing appropriate to the weather and sampling activities at Palo Alto Battlefield National Historical Park. This includes long pants, long-sleeve shirts, wide-brimmed hats, appropriate foot-gear (leather or similar), work gloves, sun-block and bug-repellent.
 - First-Aid kit.
 - Snake chaps are recommended when working in known venomous snake habitat.
 - Individuals with known allergies to bees must carry an epinephrine injector.
 - Protective eye-wear / safety goggles are strongly recommended when working in spiny and thorny vegetation.
- **Required Standards and General Notes:**
 - Read the Texas tortoise Monitoring protocol narrative and SOPs TORT01-04.
 - Drive and hike carefully.
 - Bring all necessary equipment into the field.

- **Required Tools and Equipment:**

- Equipment & supplies for planned sampling tasks in the field.
- Communications equipment including cell-phones and hand-radio sets.
- Park maps and Hand-held GPS units.

Table S01B-1. Texas tortoise monitoring Job Hazard Analysis datasheet.

Sequence of Job Steps	Potential Hazards	Safe Action or Procedure
1. Driving to/from site	1a. Car Accident	Wear seatbelt at all times. Drive only on established roads, follow all driving laws and park in a safe location that will not obstruct traffic. Do not use cell phone or other device while driving. Avoid traveling during inclement weather. Drive slowly during icy/snowy conditions, especially around curves. Use 4WD when necessary. Slow down where large animals may be present to allow for reaction time.
	1b. Unimproved roads	Maintain a safe speed for the road condition. Use 4WD when necessary. Move sharp rocks out of road. Ensure that tires are properly inflated and check for tire damage regularly. Always have a fully inflated spare tire and all equipment necessary for changing a tire.
	1c. Fatigue	Do not drive if fatigued. Pull over to rest or have another member of the crew drive.
2. Hiking or use of off-road vehicle to access sampling sites	2a. Rugged and/or thorny terrain.	Wear sturdy, well-fitting boots with good traction. When walking off-trails, take care to assess terrain conditions in order to determine the safest route. Move slowly and deliberately through the thorn scrub habitat. Walking sticks may help to increase stability and push vegetation out of the way.
	2b. Loss of orientation	Ensure all crew members are knowledgeable with map, compass, and GPS. Keep track of current position, vehicle location, and pay attention to landmarks along your way. Use established trails when possible.

Sequence of Job Steps	Potential Hazards	Safe Action or Procedure
	2c. Encounters with venomous snakes	Rattlesnake encounters are common on PAAL. Prior to the sampling event, put on appropriate boots and snake chaps. Know and review snakebite First-Aid procedures before sampling. During the sampling event, look and listen for snakes as you move through vegetation and around objects. Never reach into holes or cavities in or under trees, ground objects, rock ledges or other likely snake hideouts without looking first. Avoid disturbing venomous snakes and do not handle them for any reason. If bitten by a venomous snake, follow appropriate snakebite First-Aid procedures as listed in in SOP—TORT01: Sampling Crew Training and Safety. Get medical help immediately – inform assisting personnel of the type of snake involved. Know locations in advance of nearest emergency room/hospital.
3. Trail and off-trail field work	3a. Hazards due to walking and load-carrying on and off-trails include risks imposed by rough terrain, treacherous footing, obstacles in path, sliding down slopes and on rough surfaces	Wear clothing appropriate to the task(s) being performed. Use caution and look before you step. Exercise special care when stepping over obstructions and on sloped, slippery, muddy and loose terrain. Use teamwork to carry heavy and bulky items and carry heavy objects on your down-slope side when possible. Use additional protective gloves and clothing where appropriate.
	3b. Hazards due to exposure to weather	Be aware and informed of expected weather conditions. Dress appropriately for prevailing weather and temperature conditions. Avoid prolonged exposure to extreme sun and wear sun block >SPF-30. Keep hydrated and be alert for heat exhaustion and heat stroke in hot, humid conditions. Be alert for hypothermia in cold or wet conditions. Take a break in the shade when feeling over-heated.
	3c. Hazards due to site flora and fauna include biting and stinging insects, contact with poisonous / toxic plants, encounter with venomous and other biting animals.	Know the park-specific “hazardous” plants, animals and arthropods (See SOP—TORT01: Sampling Crew Training and Safety). Wear insect repellent and long-sleeve shirts and long pants. Avoid undue contact with spiders, centipedes, and other hazardous arthropods. Frequently check body for ticks during work and after leaving the field site. Treat bites with antiseptic ointment or alcohol, wash bites with soap and water.

JHA Instructions (general instructions from worksheet)

- Identify the location of the work project or activity, the name of Volunteer(s) involved in the process, the date(s) of acknowledgment, and the name of the appropriate supervisor approving the JHA. The supervisor acknowledges that volunteers have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

- Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).
- Identify all known or suspect hazards associated with each respective task/procedure listed. For example:
 - Research past accidents/incidents.
 - Research the Health and Safety Code, or other appropriate literature.
 - Discuss the work project/activity with participants.
 - Observe the work project/activity.
 - A combination of the above.

Emergency Evacuation Instructions

- Work supervisors and volunteers are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a volunteer(s) becomes seriously ill or injured at the worksite.
- Be prepared to provide the following information:
 - Nature of the accident or injury (avoid using victim's name).
 - Type of assistance needed, if any (ground, air, or water evacuation).
 - Location of accident or injury, best access route into the worksite (road name/number), Identifiable ground/air landmarks.
 - Radio frequencies.
 - Contact person.
 - Local hazards to ground vehicles or aviation.
 - Weather conditions (wind speed & direction, visibility, temperature).
 - Topography.
 - Number of individuals to be transported.
 - Estimated weight of individuals for air/water evacuation.
- The items listed above serve only as guidelines for the development of emergency evacuation procedures.

Acknowledgment

We, the undersigned crew leader and crew members, acknowledge reviewing and discussing Gulf Coast Network safety practices for tortoise sampling, as also outlined in the JHA. In signing below, we agree to fully adhere to all recommended actions and procedures for safe sampling at Palo Alto Battlefield NHP.

The topics we have covered include (crew leader check-off)

- General safety information (POC, cellphone and radio communications, allergies, procedures for an emergency)
- Specific hazards at Palo Alto Battlefield NHP (lightning, heat and fatigue, ticks, chiggers, mosquitos, harmful plants, rattlesnakes, bees)
- Issue safety equipment (sunscreen, insect repellent, snake stick, snake chaps, safety glasses)

PRINTNAME

SIGNATURE

CELL # / DATE

Appendix S01C: GULN Trip Plan

GULN TRIP PLAN			
LOCATION: _____		Date: _____	
PERSONS IN FIELD			
Name		Phone numbers (work and cell)	
Crew Leader (primary): _____		_____	
Crew Leader (secondary): _____		_____	
Crew Members: _____		_____	
_____		_____	
_____		_____	
_____		_____	
_____		_____	
CONTACT PERSONNEL			
Network Point of Contact: _____		Work and cell # _____	
Park Point of Contact: _____		Work and cell # _____	
Additional Park POC: _____		Work and cell # _____	
ITINERARY			
Mode(s) of Travel (vehicle make/model/color): _____			
Route: _____			

<i>Date</i>	<i>Departure Location & Time</i>	<i>Arrival Location & Time</i>	<i>Objective</i>

Figure S01C-1. Example of GULN Trip Plan.