

SIMS SINK NATURE PRESERVE MANAGEMENT PLAN

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NSS 17920 FE

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1.0 INTRODUCTION

Sims Sink leads to a relatively small, nearly entirely underwater cave that is the type locality for and contains the only known megapopulation of the Santa Fe Cave Crayfish, *Procambarus erythropus*. Located near the town of Branford, Suwannee County, Florida (Figure 1), it is contained within a 2.0-acre property that was donated in 1987 by Buford Pruitt, Jr., in fee simple to The Nature Conservancy (TNC). TNC did not have adequate in-house resources to manage the cave, leading to benign neglect, and in 2014, Pruitt convinced TNC to give the preserve to the NSS.

The purpose of the preserve is to conserve this critical population of the Santa Fe Cave Crayfish. To this end, this management plan seeks to (1) reestablish the historical nature of the property by restoring its Pre-Columbian flora; (2) remove cultural trash, a dilapidated creosote-wood platform, and invasive plants; (3) continue maintaining security fencing and an access driveway; (4) continue patrolling to limit unauthorized visitation; and (5) encourage scientific research, especially on the population dynamics of *Procambarus erythropus*. The preserve will not be open for recreational or commercial use.

2.0 HISTORY OF THE PROPERTY

1500s: This preserve had two plant communities in the Sixteenth Century when early Spanish explorers passed through Florida. The karst plain was dominated by a fire-adapted, somewhat open woodland dominated by longleaf pine with an understory of shrubby oaks and ground cover of wiregrass and wildflowers. Much of the sinkhole was probably vegetated by a mix of pines and hardwoods.

Pre-1937: Unknown persons converted longleaf pine sandhill habitat to agriculture and constructed a coal-tar creosote-wood platform over the sinkhole that has become known as Sims Sink.

1937: Ebbie Sims' family bought the larger property (70+ acres); the platform already existed, as did an adjacent tenant house, and tenants got their water from the sink with a bucket and pulley. Ms. Sims did not know (pers. comm. Mar. 18, 1985) when the platform was installed; recollected no irrigation pump being on it; the platform was there to keep people from falling in; and fish had been caught on hook-and-line from the sink but she thought they may have been brought in. Corn, peanuts, and watermelon were cultivated on the 70+ acres by the Sims family and tenants.

1975: *Procambarus erythropus* formally described.

1982: Franz estimated Sims Sink crayfish population at 500 individuals based on mark-recapture method.

Summer 1984: The property was occupied by a dense thicket of 5-10 ft tall, possibly 3-4 year old laurel oaks, *Quercus hemisphaerica*. The previous crop was planted slash pine, *Pinus elliotii*.

Dec. 14, 1984: Pruitt bought 18+ acres surrounding Sims Sink.

Apr. 30, 1987: Pruitt donated 2-acre Sims Sink parcel to The Nature Conservancy.

1987: TNC constructs chain-link fence around 1.0-acre portion containing cave entrance.

1996: Pruitt plants 12.5 acres of his 16+ acres in longleaf pine.

1996: Streever estimated *P. erythropus* average lifespan at 17 years.

2014: TNC transfers preserve to the NSS.

2.0 RESOURCES

3.1 HYDROGEOLOGICAL RESOURCES

The cave is a karst window into headwaters of the Floridan Aquifer, also known as the Southeast Principal Aquifer. The Miocene-aged limestone underlying the karst plain's Holocene sediments is quite porous ($\leq 30\%$) and cavernous.

Although larger aquifer voids tend to be interconnected, over geological time these connections are severed and reestablished by sediments filling in and washing out. The absence of fish in the cave indicates it currently does not have a direct connection to downstream waters, although water and dissolved materials certainly flow through pores in the rock. Regional piezometric maps indicate that groundwater from the preserve trends southward to the Santa Fe River.

This karst plain is gently undulating with less than ten feet of relief. Its soils are very sandy, being composed of Appalachian silica sand. Clay in the soils ranges from nearly absent to being clayey-sand in description. The surface of the limestone is believed to have a cockpit topography, so soil depths range from thick to thin, say to 30 feet in depth. Like Sims Sink, most cave entrances in this region are vertical solution pipes that lead to water-filled caves. Most of the non-flowing karst window (phreatic) caves in the region lead to relatively small caverns and caves, but Sims Sink Cave is unusual in that it is a relatively large room.

The cave is roughly triangular in plan view, being about 165 ft long and 105 ft wide, with its entrance at the bottom of a vertical, nearly circular solution pipe approximately 10 ft in diameter and 10 ft in height. The solution pipe is at the bottom center of a shallowly-sloping sinkhole that is approximately 100 feet wide and drops about 10 ft to the top edge of the rocky solution pipe. The existing map of the cave (Figure 2) is a preliminary sketch.

Management Plan Goal: Re-survey the cave, including its relationship to surface features.

The ceiling of the cave below the entrance pipe flares out sub-horizontally in all directions for short distances and then angles downward. Most of the ceiling is believed to be underwater all the time, but to the immediate north of the entrance the ceiling contains a concavity that is exposed to air under normal and low water levels. There is a debris cone located directly under the solution pipe entrance that is composed of natural clastics and cultural artifacts. It extends all the way to the walls in every direction, so the floor throughout the cave is sloped directly away from the entrance except in one or two small areas in the furthest reaches of the cave. The walls and ceiling are covered with a medium- to dark-brown to black biofilm, whereas black and dark brown organic sediments and detritus cover the cave floor.

There is a trench or gully on the east side of the solution pipe leading up the side of the sinkhole. This was probably excavated to make a gentle ramp for people walking down to the platform and back. It is about ___ feet wide and ___ feet long. The forest's root mat has stabilized this ramp.

Management Plan Goals: Continue to use the ramp for access to the cave. Install erosion control as needed.

3.2 PALEONTOLOGICAL RESOURCES

The status of the preserve's paleontological resources is completely unknown. It does not appear that vandals have excavated the debris cone. Subsurface excavations within the underwater portion of the cave would require cave diving technology and be hampered by stirred-up suspended particles resulting in low visibility and work performance losses. Sims Sink and other deadfall traps in this region are well-known for their Plio-Pleistocene fossils, and it is highly probable that they exist in the sink's debris cone. However, siltation from underwater excavations is believed to be harmful to the cave's crustaceans.

Management Goal: The cave's debris cone will not be disturbed except by qualified research staff. The preserve will be made available for limited paleontological assessments when the management committee believes that the proposed amount of stirred-up silt will not significantly harm the cave's crustaceans.

3.3 CULTURAL RESOURCES

3.3.1 Native American Resources

The status of the preserve's paleontological resources is completely unknown. Considering the desirable nature of the preserve's water resource, it is possible that there are Native American cultural resources present on site. Again, there does not appear to be any damage to the debris cone by vandals.

Management Plan Goals: Conduct a Phase I cultural resources assessment prior to significant excavations on the preserve. Incorporate any such findings into the Management Plan.

3.3.2 Historical Resources

The preserve's cultural resources include the adjacent graded limerock road, chain-link fence, share-cropper house, excavated trench, and creosote-wood platform.

3.3.2.1 Limerock Road

The limerock road occupies an easement that covers properties on both sides of the road, so technically the preserve owns about half of the road along its frontage. It is graded periodically and otherwise maintained by the Suwannee County road department. Road-collected stormwaters were deliberately shunted directly into the cave without treatment during and probably well before 1984. Pruitt informed TNC of it and TNC contacted county staff and convinced them to cease the discharge. Currently, road-grading creates a shallow, narrow swale that captures stormwater and shunts it into a second sinkhole, on Pruitt's property. Sims, this second sink, and several more sinkholes are aligned along a lineament that passes from the preserve through the Pruitt parcel and extends into the neighboring five-acre tract to the south. Ultimately, the county or a developer may be required to install a stormwater treatment pond nearby, and the likelihood of that is probably tied to whether the road ever gets paved. Preserve lands owned by non-profits are generally not in jeopardy of being used for that purpose via eminent domain, but any storage pond (or tank) to the immediate north or east of the preserve could adversely impact the cave's ecology. Pruitt intends to retain ownership of his surrounding property for the foreseeable future and has no plans to develop.

Management Plan Goals: Initiate and maintain communication with the county road department in order to keep abreast of planned road maintenance and construction activities.

3.3.2.2 Chain-Link Fence

Erected in 1987, the chain-link fence is six feet high and topped by three strands of barbed-wire angled outward. The fence encompasses approximately one acre of the two-acre preserve. It has a double-door gate on its south side that a vehicle could theoretically pass through and a pedestrian door on the north side at the northeast corner. The double-door and a section of fencing were damaged some years ago by two fallen trees, and shortly thereafter roughly patched up by TNC. The double-door gate is currently blocked by a large fallen tree. This door could not be driven through anyway due to the presence of living trees on both sides of the gate. Both doors are secured with lock and chain.

Management Plan Goals: Maintain the fence and locks suitably to keep unauthorized persons from entering the fenced area. Remove the fallen log preventing use of the double-door gate, but do not enable this gate to open until there is a need for it. Alternatively and preferably, move the double-door gate to the northwest corner along the road frontage.

3.3.2.1 Tenant House

The tenant house has been torn down (date unknown) and most of its remains are long gone. Only a few items of wood framing, metal roofing, and bricks are still present as scatter, although fragments of crockery and glass are occasionally found. There are numerous glass bottles and other pieces of garbage strewn around the preserve, and a large pile of yard debris, mostly leaves, has been dumped on the north side of the sinkhole. Some of the old bottles on the preserve might be culturally interesting. Considering the preserve's water hole, possibly there are other cultural resources present on site besides those listed herein.

Management Plan Goal: Conduct a Phase I cultural resources assessment prior to any significant excavations on the preserve. Incorporate any such findings into the Management Plan. Refer to the Paleontological Resources section for guidance on excavations within the cave versus protection of cave crustaceans.

3.3.2.2 Creosote-wood Platform

Constructed sometime before 1937 (77+ years before NSS ownership), the platform is made of wood preserved with coal-tar creosote, which is highly toxic to plants and animals including cave biota. The platform harms cave crustaceans directly by changing their food supply from a large-item diet to a mostly microbial one. Animals that would have fallen into the water and been consumed by cave crustaceans instead land on the platform, which allows them to walk out of danger. Nearly all of the plant materials like leaves and flowers that would have entered the cave are also caught by the platform. Storm events leach dissolved materials from the platform and the root mat growing atop it, which enter the cave environment in a form that is suitable only for microbes. Thus, the large items that once fed the cave's crayfish and other crustaceans have been almost completely eliminated, leaving thin pickings for the crayfish. It is possible that they can also feed on the biofilms on the cave's underwater surfaces, but that is unknown. The platform greatly limits the diversity and abundance of ferns and other plant and animal life in the solution pipe. Lastly, the platform is dilapidated and in danger of collapsing; it is not safe for people to stand on the platform, enter the cave, or conduct research beneath it.

Management Plan Goals: Completely remove the creosote-wood platform, including any fragments that might have dropped onto the top of the debris cone, and haul them off to an approved landfill.

3.4 BIOLOGICAL RESOURCES

This plan discusses five sets of biological resources – aquatic cave assemblage, fish, bats, sink forest trees, and solution pipe ferns. More exist, of course, but these are of current management concern. The plan can obviously be modified to include other plant and animal resources as the need arises.

3.4.1 Aquatic Cave Assemblage

Firstly, this aquatic habitat unit is the type locality of *P. erythrops*; that is, specimens from this cave were used to describe the species, and those specimens are deposited in well-known research museums where they are accessible to qualified scientists.

The geographical range of *P. erythrops* is very small, only about 88 square miles contained within the uplands between the confluence of the Suwannee and Santa Fe Rivers. The species has been collected from only about a half-dozen locations since its discovery in 1975, and at September 2014 was known only from three locations. Of these, only Sims Sink Cave contained more than a few individuals of *P. erythrops*. A database of known locations for *P. erythrops* is maintained by the Florida Fish and Wildlife Conservation Commission (FWC), and it changes over time as some caves are destroyed and others become known, but the trend in the number of known locations is downward.

The Preserve's most important resource is its megapopulation of *Procambarus erythrops*. The term mega-population is used where a high percentage of the total population of a species occurs. Other examples might include major bat hibernacula and bird migratory concentrations. The 500-strong Sims Sink Cave population of *Procambarus erythrops* easily fits that definition, and there may be more individuals in Sims Sink than all other locations combined. The loss of this particular habitat unit would be catastrophic for *P. erythrops*.

The current number of individuals of *P. erythrops* is unknown. All cave divers that visited the site in the 1980s and 1990s upon questioning noted a great abundance of crayfish in the cave. Dick Franz did a mark-recapture census of the crayfish in Sims Sink Cave in 1982, estimating 500+ individuals. William Streever studied them in 1996 and estimated their average lifespan at 17 years, versus epigeal counterparts living only 2-3 years. No censusing has been done of the crayfish since, no census of any of the other stygobitic crustaceans has ever occurred, and no one knows whether the 500 count is high or low for this cave over the long term. There is an immediate need for a census to determine the current status of the cave habitat. Periodic censusing of its stygobionts could provide real-life, pertinent feedback on how these animals respond to management actions.

Management Plan Goals: Conduct a census in the cave of all three of its known aquatic crustaceans as soon as practical after NSS acquisition. Conduct similar censuses periodically and at other times deemed appropriate by the management committee.

Specimens of *P. erythroptus* were recently collected by Jesse Breinholt, who analyzed its genetics along with many other cave crayfish species from Florida to re-assess their biogeography. This resulted in several changes in estimates of when and how the taxonomic “bush” of Florida’s cave crayfish evolved.

Management Plan Goal: Continue to cooperate with research scientists by allowing them to access the preserve and its cave and collect reasonable amounts of samples or specimens as approved by the management committee.

Procambarus erythroptus is a stygobiont; that is, it requires underwater cave habitat in order to complete its life cycle. Three other stygobionts are known from the cave: *Troglocambarus mclaneii*, *Caecidotea* sp., and *Crangonyx* sp. The latter two are regularly found in Floridan Aquifer waters, but their taxonomy and biogeography are poorly known. *T. mclaneii* is the most cave-adapted crayfish in North America, is distinctly different in appearance from other cave crayfishes by its extra-long and -thin appendages, and is found intermittently throughout the underwater caves of the northern and central portions of the Floridan Peninsula. The presence of this suite of stygobionts indicates that this cave habitat unit has or had a wildlife community every bit as biodiverse and healthy as any in the state.

Florida has more species of cave crayfishes than any comparably sized area in the world. Many of these species are imperiled, and one or more may already be extinct. The Santa Fe Cave Crayfish is listed as a Species of Special Concern and is proposed for Endangered listing by the State of Florida, and the Florida Natural Areas Inventory classifies it as G1/S1 (critically imperiled globally and in the State of Florida). Additional Florida cave crayfish are similarly classified by those organizations, and there are state-wide threats to the Floridan Aquifer in terms of elevated nitrate and depressed oxygen levels. Preserving this property also affords some protection to the state-wide assemblage of stygobionts.

Management Plan Goal: Provide habitat suitable for a healthy population of *P. erythroptus* and its ecological assemblage.

3.4.2 Fish

The absence of fish in a cave that is located within a region known for caves to frequently harbor fish is noteworthy for biological reasons in addition to hydrogeological reasons. Troglomorphic and troglonecic fish frequently migrate through the Floridan Aquifer. Only a few of them regularly take advantage of aquifer interconnections, however, primarily the yellow bullhead (*Amiurus natalis*), brown bullhead (*A. nebulosus*), and spring chub minnow (*Notropis harperi*). These three are commonly seen in the region’s caves, yet no species of fish has been seen in the cave in recent times. Their absence indicates that this habitat unit is isolated as far as fish are concerned, which may be a contributory reason to the high number of crayfish because bullheads prey heavily on crayfish. The natural or artificial colonization of any species of fish in the preserve warrants immediate documentation and mitigation.

Management Plan Goals: The presence of any fish on the preserve should trigger a census of crayfish and assemblage species to document any impact that the fish might have had. The introduction of any species of fish into the preserve is expressly prohibited. Unauthorized introductions of fish into the preserve will result in immediate efforts to remove them.

3.4.3 Bats

There is no written or documented verbal evidence that bats ever occupied Sims Sink Cave. There is a concavity in the cave’s ceiling a few tens of feet from the entrance. This concavity is large enough to provide roosting habitat for at least several hundred bats. Considering that the cave entrance is a dead-fall trap and that the cave floor is completely flooded, it is surprising that bats have not been recorded from this apparently ideal location. This concavity can be

accessed by bats from the outside at low water, but as the water rises the entrance becomes blocked. It logically follows that the numbers of bats and crayfish using the cave would rise during low water periods and decline when conditions reverse. Florida's cave crayfish are typically very long-lived, an average of 17 years in this case, so even multi-decadal cycles could be endured. A flourishing bat colony could easily account for the high number of crayfish in Sims Sink Cave.

Management Plan Goal: Analyze the ceiling concavity and sediments underneath for physical evidence of bats.

3.4.4 Sink Forest Trees

The additional soil moisture found in north Florida sinks like Sims encourages the growth of hardwoods and associated plants. These drop a blanket of deciduous leaves every autumn and their dense leaves impose heavy shade on shrubs and ground vegetation. This plant community produces a substrate comprised of decomposing leaves and twigs plus roots, fungi, and microbiota, which conserve water and tend to keep wildfires at bay. The surrounding longleaf pine sandhill habitat historically burned naturally every few years, which longleaf pines can endure but hardwoods cannot. Thus, the uplands were dominated by fire-tolerant pines and sinkhole probably by a mix of fire-tolerant and -intolerant pines and hardwoods.

Subsequent to agriculturalization, invasive native tree species (laurel oak, live oak, black cherry, and laurel cherry) invaded the preserve and surrounding Pruitt land, an expected consequence in the absence of fire management. Ordinarily, these native early successional species would be thinned out or killed back by wildfires and then longleaf pine xeric upland vegetation would return, or being protected from fire would transition slowly over a hundred years or so into a mature forest dominated by so-called "quality hardwoods" (e.g., live oak, Southern red oak, Shumard oak, Southern magnolia, winged elm, and American ash). The forest canopy existing on the preserve at the time of NSS acquisition was heavily dominated by laurel oak, with smaller numbers of live oak, sugarberry, redbay, black cherry, laurel cherry, Hercules'-club, and Southern red cedar. Pruitt planted a handful of Southern magnolia seedlings but only two or three remained. Several sapling-sized pecan trees grew along the roadside along the western perimeter of the property. All except the pecan are natives to this region, and all have value to wildlife.

Management Plan Goals: The preserve's laurel oaks will be removed in order to make room for a greater variety of species. Other native species will be preserved where practical and quality hardwoods will be planted. All labor and materials for these efforts will be furnished by volunteers and local organizations.

3.4.5 Sink Ferns

North Florida is the northern edge of the ranges of several ferns that flourish only at karst outcrops, some living only at or within cave entrances (e.g., *Asplenium monanthes*, *Blechnum occidentale*). North Florida cave sinkhole entrances are also excellent habitats for many common species of ferns, not to mention bryophytes and flowering plants. This flora grows very well in the solution pipe environment because of a combination of (1) nearly constant high humidity, which increases their ability to withstand summer heat, winter freezes, and droughts, (2) constant availability of water for plant maintenance and growth, (3) protection from fire due to high humidity and below-ground-surface elevation, and (4) a "sweet" substrate/soil based on limestone vs Florida's otherwise mostly acidic sandy soils.

The platform has eliminated nearly all of this fern-based, uncommon plant community (1) below the platform by shading and (2) above the platform by exposure to winter freezes. There are currently no rare ferns present at Sims Sink, nor is it known if there ever were. However, it is certain that removing the platform would enhance the solution pipe plant community in terms of the number of species, species diversity, and absolute abundances. Also, more plants around the sink equates to more crayfish food items at the cave entrance and thus more food entering the cave.

Management Plan Goals: Remove the creosote-wood platform. Transplant a variety of native north Florida ferns into the lower elevations of the sinkhole and at the top of the solution pipe.

4.0 ACCESS POLICY

The continued presence of the rare Santa Fe Cave Crayfish is of the highest importance in managing this preserve. No other resource on the preserve is believed to be as valuable. No potential management action will occur on the preserve unless the preserve committee believes it will have no significant adverse impacts on *Procambarus erythropus*. It is understood that Sims Sink Cave is not a recreational or commercial resource; only monitoring and research staff will be allowed to enter.

Visiting Sims Sink Cave necessarily involves cavern diving, cave diving, and possibly also silt-induced dangers such as complete loss of visibility and equipment failure. Therefore, all divers entering the cave with scuba equipment must be certified by the NSS-CDS or equivalent training organization to the "full cave" level. All divers entering with snorkeling equipment should be certified at least at the "cavern" level, but this suggestion can be relaxed upon preserve committee approval.

Management of the property will be done in ways designed to limit liability for property damages and injuries to or deaths of preserve visitors. Florida's Recreational Resources Law prevents harmed plaintiffs from suing private owners provided that (a) there is no fee charged for the recreational visit and (b) there are no improvements to the property for that recreational use. Liability releases offer good protection from tort. Florida has some of the strongest anti-trespassing laws in the country, defining a trespasser as anyone entering a property without written authorization from the landowner to do so (but producing written authorization after the fact is evidence of legal access).

There is no evidence of on-going, unauthorized cave diving or other uses of the property by unauthorized persons. There are rare past reports of unauthorized visits, but these are believed to be limited to a few instances.

Management Plan Goals: Preserve access management will conform to the requirements of the Florida Recreational Resources Law or subsequently modified legislation, which currently means that no fee will be charged for visiting the preserve or its cave and no improvements for ingress to or egress from the sinkhole or solution pipe will be constructed. Visitors will be required to provide their own aids to accessing the cave; *e.g.*, ladders, ropes, and scaffolding. There will be no recreational or commercial use of the preserve whatsoever. Only monitoring and research field trips will be allowed into the cave. All cave diving researchers must have full-cave certification by an approved agency. All visitors to the cave will be made aware of the dangers therein and must sign a liability release immediately before each visit. All trespassers, as legally defined by the State of Florida, are expressly directed to not enter the preserve. All trespassers found on the preserve are subject to prosecution.

5.0 CAVE & PRESERVE MANAGEMENT

The Sims Sink Nature Preserve will be managed by a committee appointed by its chairman and approved by the NSS Administrative Vice President (AVP). The committee's chairman will be appointed by the NSS AVP. The management committee will be comprised of several volunteers drawn from local NSS grottos and the regional cave diving community. The preserve committee chairman will submit written reports thrice yearly to the NSS Nature Preserves Committee Chairman about the preserve's status, including plans, activities, problems, and actions taken.

The neighbors across the road from the preserve, George and Kay Reynolds, have kept an eye on the property for many years in response to a TNC request. They are probably willing to continue to watch the place. Pruitt visits his 16-acre parcel often during November to April, usually spending most of a day during each visit conducting land management activities on his own property. He also patrols the preserve when on site. It is desirable to make the preserve known to local law enforcement, roadway, and other agencies to minimize future misunderstandings and damages.

FWC wants to work closely with landowners on the management of imperiled species habitat units. Cooperation with FWC will be required upon designation of the species as Endangered, which FWC is pushing.

Management Plan Goals: Establish the Sims Sink Nature Preserve Management Committee. Participate in NSS Preserves Committee reporting to the BOG. Maintain cooperative relationships with neighbors for mutual patrolling benefits. Introduce the preserve to appropriate local agencies. Maintain close coordination with FWC.

The preserve is exempted from *ad valorem* taxation by filing with Suwannee County Property Appraiser for the exemption every year between January 1 and March 1.

Management Plan Goal: File with Suwannee County Property Appraiser every year between January 1 and March 1 for *ad valorem* taxation exemption.

6.0 PUBLICITY

The preserve's cave habitat is susceptible to vandalism such as by unauthorized crayfish collection, swimming hole activities, and disposal of garbage and toxic or hazardous wastes. Fortunately, such events have happened very rarely at Sims Sink, at least since the 1980s and possibly even further into the past. Maintaining this level of obscurity is highly desired, as the preserve's crayfish megapopulation could theoretically be destroyed by a single instance of pollution. Publicity is considered generally harmful to the preserve, such as on-site ceremonies (*e.g.*, weddings), educational field trips (*e.g.*, students, scouts), and newspaper articles.

Management Plan Goal: Maintain a low profile in the local community by limiting publicity within the Society and strenuously avoiding publicity otherwise.

7.0 SURFACE MANAGEMENT

The management of preserve vegetation, its fence, and historical and archaeological resources are covered in the sections on Biological Resources and Cultural Resources.

The driveway accessing the pedestrian gate is a primitive trail road on nearly level ground on the adjacent Pruitt property. It is very little used and has no erosion issues. Pruitt uses the driveway to access his own property and is committed to maintaining it.

There are no provisions for hosting visitors; *e.g.*, buildings, restrooms, portable toilets, water outlets, and electricity.

Littering is an on-going but minor issue. Fast-food litter and beer containers are the primary constituents. Several times annually, Pruitt sweeps trash from the roadside on his property and the preserve's for recycling and proper disposal.

Management Plan Goal: Maintain good relationships with neighbors and continue picking up the trash.

8.0 FUTURE PLANS

The opportunity exists for the NSS to preserve a cave-adapted species, determine why this particular cave harbors so many of them, and successfully maintain or re-create conditions required to sustain a large number of them in perpetuity. The Santa Fe Cave Crayfish already has attention from state and federal wildlife agencies. The Nature Conservancy cooperated with these agencies and a similar working relationship should be pursued by NSS preserve management. This will become even more important if the species' imperilment status should change from Species of Special Concern to Endangered as recommended by state wildlife officials. This preserve management plan is in accordance with the recommendations for this species by FWS, and will be modified as needed to remain consistent with state and federal imperiled species regulations.