RECLAMATION

Managing Water in the West

Final Environmental Assessment

Ciénega Wetland Rehabilitation at Phantom Lake Spring, Toyavale, Texas

U.S. Department of the Interior
Bureau of Reclamation
Albuquerque Area Office

March 1, 2011

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Front Cover Photo: Vintage Photo of Phantom Lake Spring (courtesy Balmorhea State Park, photographer unknown).

U.S. Department of the Interior

BUREAU OF RECLAMATION
Albuquerque Area Office
Albuquerque, New Mexico

FINDING OF NO SIGNIFICANT IMPACT

Environmental Assessment
Ciénega Wetland Rehabilitation at Phantom Lake Spring, Toyavale, Texas

Manager, Environment Division — 3/3/11 Date

Approved by:

Area Manager, Albuquerque, New Mexico — 3/3/11 Date

FONSI Number: AAO-11-003

BACKGROUND

Phantom Lake Spring is located approximately 6 km (3.7 mi) west of Toyavale, Texas near the border of Jeff Davis and Reeves Counties in the Trans-Pecos region of West Texas. Prior to development, flow from Phantom Lake Spring flowed from the cave mouth and formed a shallow lake and ciénega. The Bureau of Reclamation (Reclamation) purchased Phantom Lake and the surrounding land (7.1 ha, 17.6 acres) from the Kingston family in 1945. That same year in response to local requests Reclamation constructed a concrete-lined irrigation ditch to capture a majority of the spring flow and convey it to the Reeves County Water Improvement District's main canal at San Solomon Springs. The spring supports a variety of species including the endangered Comanche Springs pupfish (*Cyprinodon elegans*), endangered Pecos gambusia (*Gambusia nobilis*), as well as several candidate species: Phantom Lake Spring tryonia (*Tryonia cheatumi*), Phantom Cave snail (*Pyrgulopsis texana*), and diminutive amphipod (*Gammarus hyalelloides*).

Spring flow at Phantom Lake Spring has been continually declining since measurements began being recorded in the 1940s. Corresponding aquifer levels in Phantom Cave have dropped about 2.5 feet in elevation in the last 10 years. The natural spring water ceased consistent flowing around 2001, prompting the creation of a pumping system to maintain the aquatic habitat for species of concern. The current pump system circulates water to the ciénega from about 75 feet back in Phantom Cave. The system is not regularly monitored and the small check dam constructed to maintain water in the ciénega is currently leaking so severely that the pump system needs constant adjustment to maintain a target water level in the pool. Over recent months, the system experienced several short-term pump failures resulting in extreme low-water conditions in the ciénega. The current situation is not sustainable over the long term and the present risk of accidental extirpation of the listed/candidate populations is very high. Reclamation, Texas Parks and Wildlife Department (TPWD), and U.S. Fish and Wildlife Service (Service) propose to 1) secure the current pool, and 2) rebuild a larger, more natural ciénega. This project is partially supported by a grant from the Desert Fish Habitat Partnership, as well as funding from Reclamation, and the Service.

SUMMARY OF THE PROPOSED ACTION

This Environmental Assessment (EA) addresses the environmental effects of the proposed project to (1) secure the current pool and (2) restore a small portion of the historic ciénega.

1. Modify the existing pool to ensure the immediate survival of the aquatic species that inhabit the pool. The small pool will be partially bordered with sand bags to slow leaking through the cave wall. A new pumping system will be constructed, complete with a backup power supply, remote monitoring system (via satellite link communication), and alarm system to reduce response time to system failures (see attached proposals). The gate that secures the cave from trespassers will also be replaced.

2. A new, more natural ciénega would be created to the south of the current pool, away from the porous cave wall (see Figure 4). The modification will include both a refuge pool and an overflow pool, to take advantage of the natural spikes in flow that occasionally result in flooding of the immediate area around the mouth of the cave. The refuge pool would be lined and covered over with natural substrate (e.g. gravel, boulders) to create feeding and cover habitat for the Comanche Springs pupfish and Pecos gambusia (USFWS 1981, 1983). Subsequent colonization and/or active planting of the substrate by macrophytes and algae will create habitat

for the candidate invertebrates. The pump system will supply water from the pool to the refuge pool where the water will flow back towards the mouth of the cave. The overflow pool will be located at the southeast end of the refuge pool and will only be available for use during the natural but irregular flow spikes that come out of the mouth of the cave. This area will be graded so that as the water recedes, the organisms will be able to move back into the refuge pool. Prior to construction of the overflow pool, invasive salt cedar (*Tamarisk* spp.) will be removed to prevent impacts to the area's hydrology and promote native vegetation.

The Service, TPWD, and Reclamation will cooperate to document the success of the project through regular monitoring of Phantom Lake Springs. Monitoring will include a population estimate for each of the five species, and a survey of native vegetation. Non-native species, both faunal and floral, will be removed when possible.

Alternatives Considered

The No Action alternative is to maintain current management at the spring which consists of pumping water into the current pool at the cave mouth to maintain the aquatic species.

ENVIRONMENTAL IMPACTS RELATED TO THE RESOURCES OF CONCERN

The following resources and factors were evaluated in detail in the EA for anticipated impacts of the proposed action: water, biological resources, socioeconomic considerations, cultural resources, environmental justice, Indian Trusts Assets, and cumulative effects. A summary of impacts for each of these resource areas follows.

Water

If the Proposed Action is implemented, the water that is currently pumped from the cave will be pumped into the restored ciénega. Net water loss should not be significantly different from current operations. The amount of water pumped may be less than the current levels due to improved design. Water will return to the cave after flowing through the restored ciénega system. Natural surface water outflow from the cave into the outflow canal should not differ significantly from the current design. Since 2001, surface water has only flowed occasionally depending on local rainfall patterns and is no longer a reliable source of water for downstream users. Groundwater levels in the area have been dropping since 1945. If groundwater levels continue to drop, it is conceivable that sometime in the future water may be unavailable to sustain the proposed project.

Biological Resources

The Proposed Action is designed to enhance conditions for biological resources, mainly the five species of concern that currently inhabit the pool. The Service has performed an intra-service Section 7 consultation for the proposed project. Other wildlife species will likely benefit from improved access to surface water. Additionally, invasive species control is part of the long term goal associated with the Proposed Action.

Socioeconomic Considerations

While the value of water in the region is high, the implementation of the Proposed Action would not likely result in a significant change in crop production, employment, income, indirect business taxes, or value added in the regional economy. Due to the small proportion of the total regional water supply affected by the Proposed Action, there would be no adverse economic effects.

Cultural Resources
The area has had a record search and survey by Reclamation archeologists, Section 106 is complete. Additionally the project is within the area of the historic spring so discovery of artifacts is not highly probable.

Environmental Justice
No low-income or minority populations would be disproportionately impacted by the Proposed Action.

Indian Trusts Assets
There are no Indian Trust Assets that would be impacted by the Proposed Action.

Cumulative Effects
Cumulative effects are defined as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertake such other actions. There have been several activities in the area including the early development of the water and creation of several structures to aid in the preservation of the aquatic community at Phantom Lake Spring. This project will attempt to bring a more natural appearance to the area and remove some of the previous infrastructure.

ENVIRONMENTAL COMMITMENTS

The following environmental commitments will apply if the Proposed Action is selected and implemented:

1. Reclamation will continue to maintain the pumps and supply electricity to support the aquatic life at Phantom Lake Spring, until the Partners deem the project is unsustainable.

2. The Partners will coordinate to monitor the restored ciénega and the aquatic life within it.

3. The Partners will cooperate to control tamarisk and other invasive species around the site.

COORDINATION

This is a collaborative project between Reclamation, the Service, and TPWD. This Proposed Action will be funded by Reclamation, Service and Desert Fish Habitat Partnership Grant.

CONCLUSION

Based on the analysis presented in the EA, Reclamation finds that there would be no significant impacts associated with implementation of the Proposed Action. Reclamation makes this Finding of No Significant Impact (FONSI) pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.) and the Council on Environmental Quality implementing regulations (40 CFR 1500). Reclamation has determined that the Proposed Action does not constitute a major federal action that would significantly affect the human environment. Therefore, no environmental impact statement will be prepared for this proposal.

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List of Acronyms and Abbreviations

BA	Biological Assessment
BO	Biological opinion
CFR	Code of Federal Regulations
cfs	Cubic feet per second
EA	Environmental Assessment
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
ITA	Indian trust Assets
ha	Hectare
km	Kilometers
mi	Miles
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
Reclamation	US Bureau of Reclamation
ROD	Record of Decision
Service	US Fish and Wildlife Service
TPWD	Texas Parks and Wildlife Department
USGS	US Geological Survey

Chapter 1. Purpose and Need

Federal Action

The federal action proposed in this Environmental Assessment is to rehabilitate a small portion of a ciénega wetland that lies within Reclamation property near Toyavale, Texas. Work would be performed by the Service, TPWD, and Reclamation staff, as well as contractors paid by the Service and Reclamation.

Purpose of and Need for Action

Phantom Lake Spring is a unique, spring-fed wetland system (ciénega) that supports five aquatic species of concern: two endangered fishes and three candidate invertebrates. Spring flow at Phantom Lake Spring has been continually declining in measurements recorded since the 1940s. Corresponding aquifer levels in Phantom Cave have dropped about 2.5 feet in elevation in the last 10 years. The natural spring water ceased consistent flowing around 2001, prompting the creation of a pumping system to maintain the aquatic habitat for species of concern. The current pump system circulates water to the ciénega from about 75 feet back in Phantom Cave. The system is not regularly monitored and the small check dam constructed to maintain water in the ciénega is currently leaking so severely that the pump system needs constant adjustment to maintain a target water level in the pool. Over recent months, the system experienced several short-term pump failures resulting in extreme low-water conditions in the ciénega. The current situation is not sustainable over a long term and the present risk of accidental extirpation of the listed/candidate populations is very high. In cooperation with the U.S. Bureau of Reclamation and the Texas Parks and Wildlife Department, the U.S. Fish and Wildlife Service propose to (1) secure the current pool and (2) restore a small portion of the historic ciénega.

Background

Phantom Lake Spring is located approximately 6 km (3.7 mi) west of Toyavale, Texas near the border of Jeff Davis and Reeves counties in the Trans-Pecos region of West Texas (Figure 1). Prior to development, flow from Phantom Lake Spring flowed from the cave mouth and formed a shallow lake and ciénega (Figure 2). The Bureau of Reclamation (Reclamation) purchased Phantom Lake Spring and the surrounding land (7.1 ha, 17.6 acres) from the Kingston family in 1945. That same year in response to local requests Reclamation constructed a concrete-lined irrigation ditch to capture a majority of the spring flow and convey it to the Reeves County Water Improvement District's main canal at San Solomon Springs. The spring supports a variety of species including the endangered Comanche Springs pupfish (*Cyprinodon elegans*), endangered Pecos gambusia (*Gambusia nobilis*), as well as several candidate species: Phantom Lake Spring tryonia (*Tryonia cheatumi*), Phantom Cave snail (*Pyrgulopsis texana*), and diminutive amphipod (*Gammarus hyalelloides*). Studies have indicated that historic flow in the spring was based on two components; base flow from old groundwater and spike flows that are influenced by rainfall in the nearby Davis Mountains (Chowdhury et al. 2004). Base flow of the spring consistently declined since measurements were initiated in the 1940s (Figure 3). In 1993 a refuge canal was constructed by the Rio Grande Fishes Recovery team and Reclamation in response to recommendations outlined in the Recovery Plans for the federally endangered fishes. The base flow ceased flowing out of the cave around 2001 and the aquatic life has been fully supported by pumping since that time. Occasionally, heavy rains in the Davis Mountains cause the spring to flow from the cave.

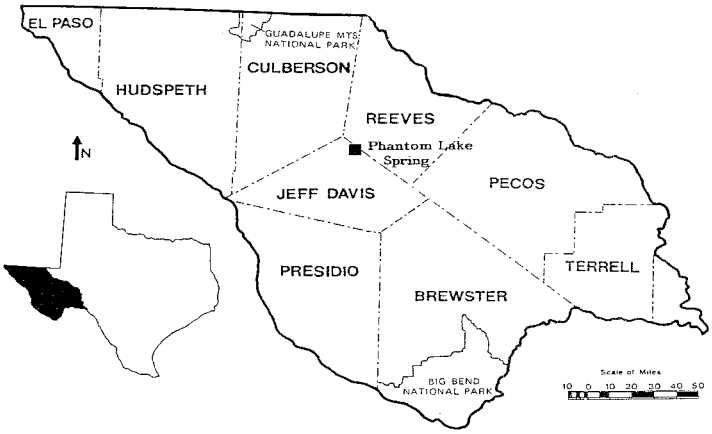

Figure 1. Location of Phantom Lake Spring

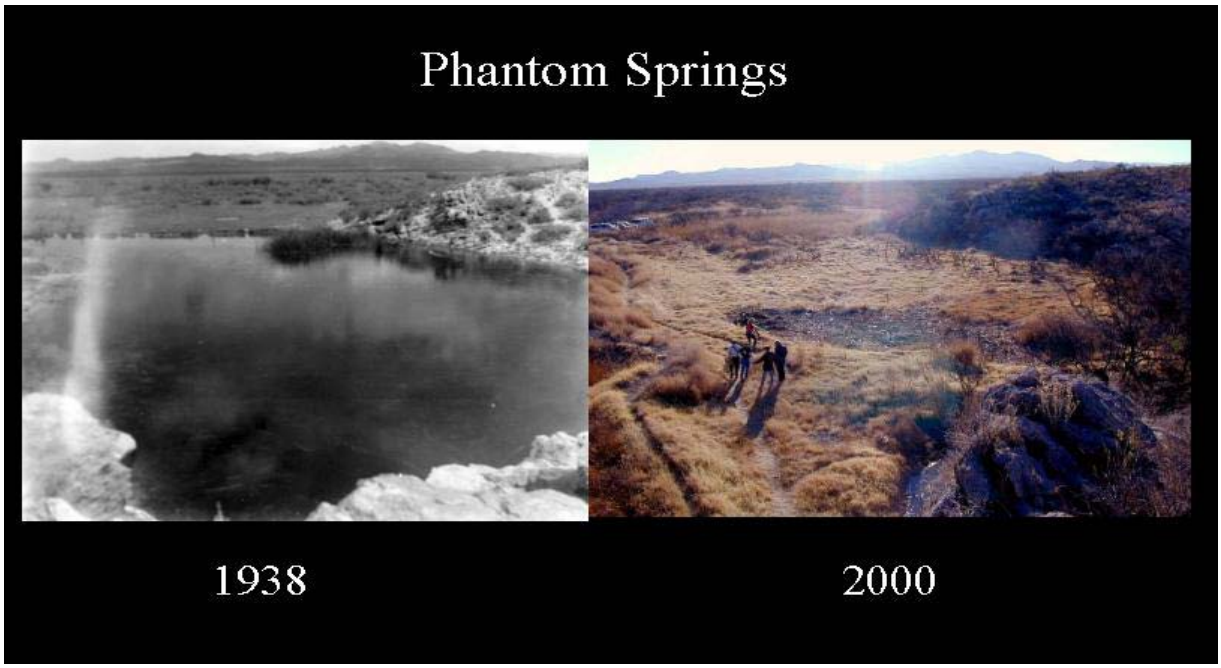

Figure 2. Photos of the historic lake that was fed by Phantom Lake Spring prior to development and the current state of the area.

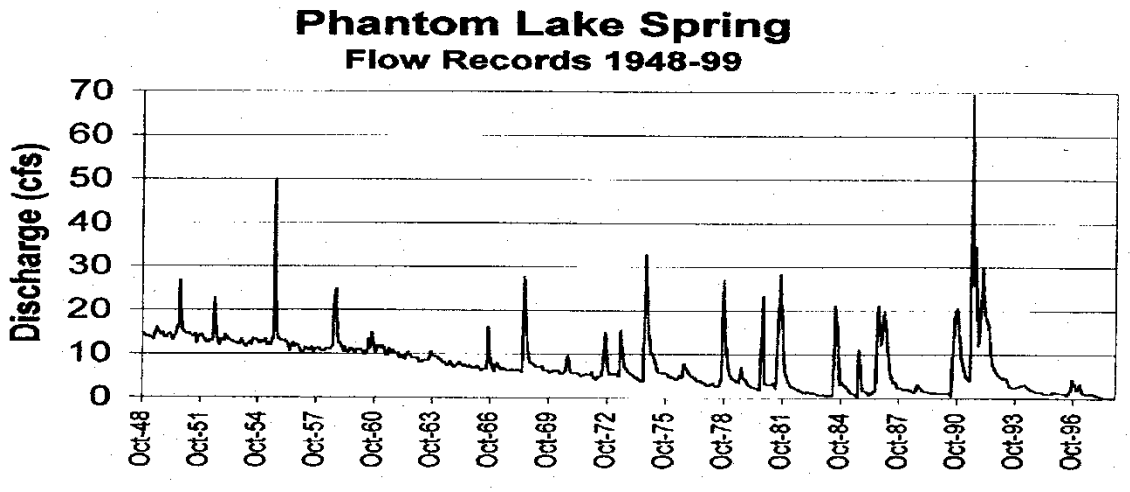

Figure 3. Surface water measurements for Phantom Lake Spring.

Current and Expected Beneficial Uses

The current and proposed management supports a small community of endemic aquatic species that would otherwise become extinct. The proposed action would provide a higher level of security for these species by expanding their occupied area and providing a more secure pond area that is less likely to be influenced by leakage and fluctuating groundwater levels. It is expected that the amount of water needed to maintain this new pond may be less than is currently pumped through the system since the outlet will be designed to stop leakage and the new pond will be lined. The proposed action will also bring a more natural appearance to the area and allow better access to the water to local terrestrial wildlife.

Relevant Statutes, Regulations, and other Plans

Endangered Species Act

Consultation under Section 7 of ESA is required to determine if the project will adversely affect threatened or endangered species or designated critical habitat. The Service as a collaborating agency is consulting through an intra-service Section 7.

This project is consistent with goals of the recovery plans for Comanche Springs pupfish and Pecos gambusia.

National Historic Preservation Act

The area has had a record search and survey by Reclamation archeologists, Section 106 is complete. Additionally the project is within the area of the historic wetland so discovery of artifacts is not highly probable. Should new evidence of possible scientific, prehistorical, historical, or archeological data be discovered during the course of this action, work shall cease at the location and the Area archaeologist shall be notified by phone immediately with the location and nature of the findings. Care shall be exercised so as not to disturb or damage artifacts or fossils uncovered during operations and the proponents shall provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the government.

Discovery if Human Remains
Any person who knows or has reason to know that he or she has inadvertently discovered human remains on Federal or tribal lands, must provide immediate telephone notification of the inadvertent discovery, with confirmation, to the responsible Federal agency official with respect to Federal lands, and, with respect to tribal lands to the responsible Indian tribe official. The requirement is prescribed under the Native American Graves Protection and Repatriation Act (P.L. 101-601; 104 Stat. 3042) or November 1990 and National Historic Preservation Act, Section 110 (a)(2)(E)(iii)(P.L. 102-575, 106 Stat. 4753) or October 1992.

Clean Water Act
Work will be done in the dry so no 404/401 consultation is required.

Chapter 2: Description of the Alternatives

Proposed Action
Reclamation, the Service and TPWD are proposing to rehabilitate a small portion of the ciénega wetland area near the mouth of Phantom Lake Spring cave.

No Action Alternative
Under the No Action Alternative, Reclamation would continue current pumping operations and maintenance of the existing refuge channel and cave mouth pool (pool).

Discussion of Proposed Action
The partners have selected the proposed action as its preferred alternative because it would provide a more secure habitat for the aquatic species that are dependent on Phantom Lake Spring. Without the action a sustained power outage or pump failure would likely result in the extirpation of the endangered fish and candidate invertebrates that are endemic to the area. There are two phases to the project. Part one is considered maintenance and was also evaluated under a Categorical Exclusion (ALB-CE-11-002). This project is partially supported from a grant from the Desert Fish Habitat Partnership (Proposal – Attachment 4) as well as funding from Reclamation and the Service.

1. Modify the existing pool to ensure the immediate existence of the aquatic species that inhabit the pool. The small pool will be partially bordered with sand bags to slow leaking through the cave wall. A new pumping system will be constructed, complete with a backup power supply, remote monitoring system (via satellite link communication), and alarm system to reduce response time to system failures.

2. A small, more natural ciénega would be created to the south of the current pool, away from the porous cave wall (see Figure 1) in the outline of the historic pool. Small backhoes will be used to excavate the area as needed. Surface area of the restored pool will be approximately 0.08 hectare (0.03 acres). The modification will include both a refuge pool and an overflow pool, to take advantage of the natural spikes in flow that occasionally result in flooding of the immediate area around the mouth of the cave. The refuge pool would be lined and covered over with natural substrate (e.g. gravel, boulders) to create feeding and cover habitat for the

Comanche Springs pupfish and Pecos gambusia (USFWS 1981, 1983). Subsequent colonization and or active planting of the substrate by macrophytes and algae will create habitat for the candidate invertebrates.

The pump system will supply water from the cave to the refuge pool where the water will flow back towards the mouth of the cave. After completion, the current pump system may be removed from within the cave and replaced with a surface pump with an intake pipe in the cave. The overflow pool will be located at the southeast end of the refuge pool and will only be available for use during the natural but irregular flow spikes that come out of the mouth of the cave. This area will be graded so that as the water recedes, the water and organisms will flow back into the refuge pool. Prior to construction of the overflow pool, invasive salt cedar (*Tamarisk* spp.) will be removed to prevent impact to the area's hydrology and promote native vegetation. Physical means (chainsaws, pruning etc.) will be the main method of removal. As needed, resprouts will be treated individually with herbicide by a certified applicator. Native vegetation will be reseeded as needed.

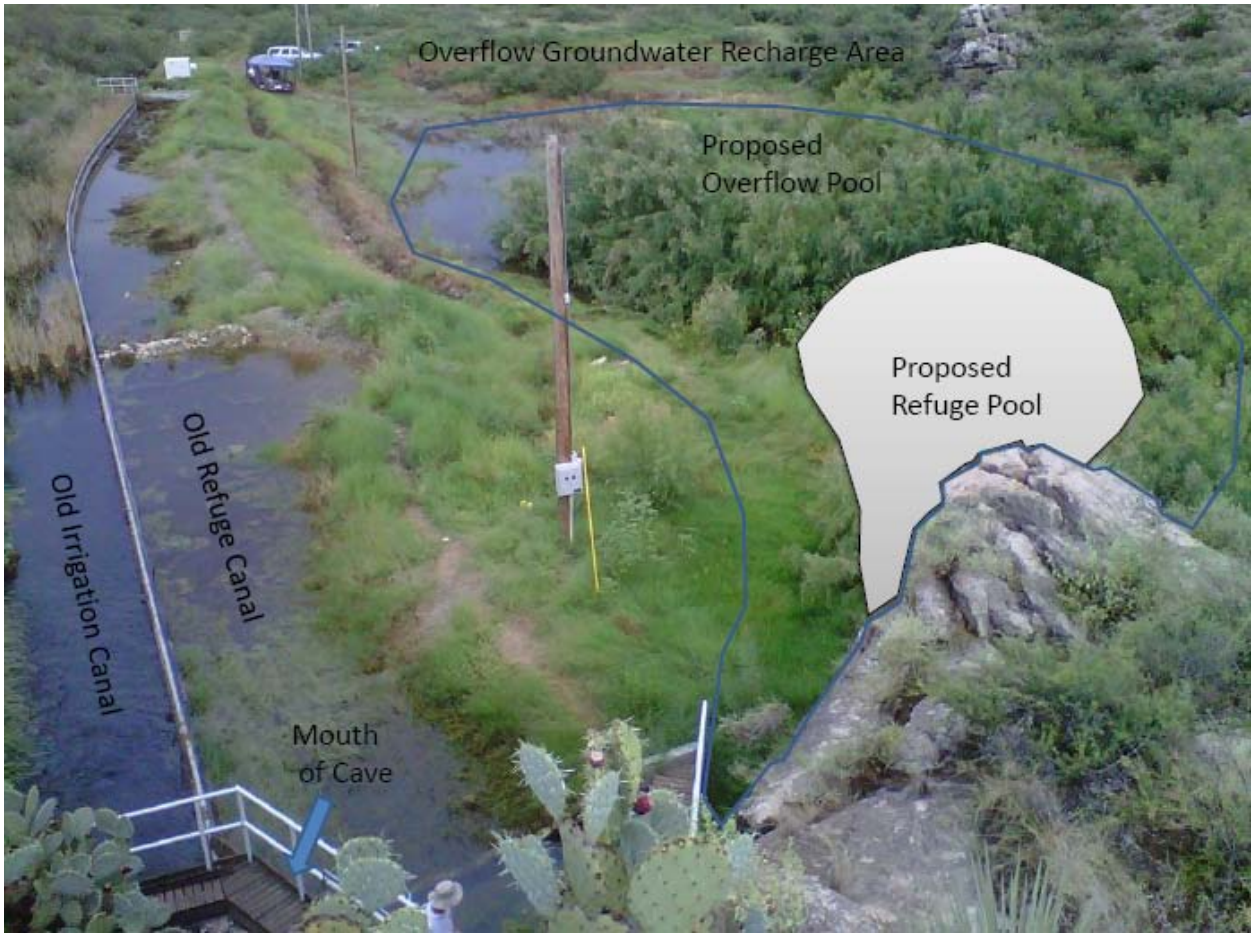

Figure 4. Location of proposed ciénega (above bird's eye view, left view from canal side).

Chapter 3: Affected Environment

This chapter describes the existing environment that would be affected by the proposed alternative. The resource information presented here is of sufficient detail to support and clarify the impact analyses provided in Chapter 4.

Scope of Analysis

Due to the small scale of the proposed alternative the scope of analysis is limited to the immediate area surrounding Phantom Lake Spring. This section provides a baseline description of the landscape characteristics of the Project Area.

Study Area

Phantom Lake Spring is located approximately 6 km (3.7 mi) west of Toyavale, Texas near the border of Jeff Davis and Reeves counties in the Trans-Pecos region of West Texas (Figure 1). Prior to development, flow from Phantom Lake spring flowed from the cave mouth and formed a shallow lake and ciénega (Figure 2). The Bureau of Reclamation (Reclamation) purchased Phantom Lake and the surrounding land (7.1 ha, 17.6 acres) from the Kingston family in 1945. The water was later funneled into a concrete lined canal system for irrigation in Reeves County. Spring flow at Phantom Lake Spring has been continually declining in measurements since the 1940s. Corresponding aquifer levels in Phantom Cave have dropped about 2.5 feet in elevation in the last 10 years. The natural spring water ceased consistent flowing around 2001, prompting the creation of a pumping system to maintain the aquatic habitat for species of concern. The current pump system circulates water to the ciénega from about 75 feet back in Phantom Cave.

Water Resources

The exact cause or causes for the decline in spring discharge are unknown. Some of the obvious reasons are groundwater pumping of the supporting aquifer and decreased recharge of the aquifer from drought (Sharp et al.1999). Unfortunately, the supporting aquifer for the springs is not well defined. Several studies (LaFave and Sharp 1987, Schuster 1997, Sharp et al. 1999) indicate that the spring is locally recharged by runoff from the Davis Mountains (resulting in the flow spikes) but the "base flow" comes from a regional groundwater system. The source to the springs is likely from the aquifer of the Capitan Reef associated with the Apache Mountains, with recharge areas in the Wildhorse Flat Basin to the northwest of the Toyah Basin.

Recent (2004 & 2005) groundwater and spring water studies in the area were conducted by Texas Water Development Board. The 2004 publication is available online. http://rio.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/R360AEPC/Ch17.pdf. Though there have been several studies, none have provided concrete information about where the water for Phantom Lake Spring originates or flows to, if specific actions may be causing the decline of flow, or recommendations to restore spring flow in the area.

In addition, divers have been mapping the underground network of water tunnels that feed Phantom Lake Spring. Beyond the entrance, the cave is a substantial conduit that transports a large volume of water generally from the northwest to the southeast, consistent with regional flow pattern hypothesis. Over 8,000 feet (2,438 meters) of the cave conduit have been mapped so far. In addition, flows have been measured and are in the 25 cubic feet per second (0.71 cubic

meter per second) range. The relatively small flow at Phantom Lake Spring is essentially an overflow of a larger underground flow system.

Climatic and Geomorphic Setting
Prior to development, flow from Phantom Lake Spring flowed from the cave mouth and formed a shallow lake and ciénega (Figure 2). In approximately 1945, Reclamation constructed a concrete-lined irrigation ditch to capture a majority of the spring flow and convey it to the Reeves County Water Improvement District's main canal at San Solomon Springs. Since 2001, surface water has only flowed occasionally depending on local rainfall patterns and is no longer a reliable source of water for downstream users (Figure 3). Groundwater levels in the area have been dropping since 1945. Based on these flow records (1948-1999), it is conceivable that sometime in the future water will be unavailable to sustain the project.

Biological Resources

Wildlife and Habitat
The focus species of the area are the aquatic species which inhabit the cave and pool. Several of these are special status species covered in detail in the following section. Other aquatic species include Mexican tetra and a variety of invertebrates, including, flatworms and aquatic snails. The cave system supports several cave specific species that are still being classified. One of the known species is the endemic Phantom cave isopod *(Lirceolus cocytus).*

There is an abundance of terrestrial wildlife in the area that potentially utilizes water from the spring. Currently wildlife must negotiate the concrete walls around the pool to access the water; occasionally animals get trapped in the pool. Commonly seen wildlife in the area include javelina, mountain lion, blue heron, various types of reptiles and amphibians, and white tail deer. There are at least thirteen species of bats that are found in the general area of Phantom Lake Spring. There are other small caves in the area of Phantom Lake Spring that are inhabited by bats (unknown species). The current gate that restricts access to Phantom Cave has vertical bars which are difficult for bats to negotiate. Commonly seen birds of the area have been compiled by TPWD for the Balmorhea area.
http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_bk_p4501_0002b.pdf

The area has many plants that are common in the south-west Texas portions of the Chihuahuan Desert. Upland species include mesquite, prickly pear cactus, creosote bush, and catclaw acacia. Current riparian species include baccharis, salt grass, and cattail. A full plant list was compiled by Hughes in 1992 (Charles et. al. 1994). The only common plant between this plant list and the list of Rare, Threatened and Endangered species for Reeves and Jeff Davis counties http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species/ is the Night blooming cactus (*Peniocereus greggii).*

Threatened, Endangered and Special Status Species
There are several special status species that may be found in the general area of Phantom Lake Spring. Most are birds which are migratory through the area including federally endangered Northern Aplomado Falcon (*Falco femoralis septentrionalis*) and Interior Least Tern (*Sterna antillarum athalassos*) as well as Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), a

candidate species. State listed species that have been documented in the Balmorhea area include Zone-tailed Hawk (*Buteo albonotatus*), Reddish Egret (*Egretta rufescens*), and Peregrine Falcon (*Falco peregrines*). The federally endangered Mexican long-nosed bat (*Leptonycteris nivalis*) has been documented in Jeff Davis County. Pecos sunflower (*Heliantus pardoxus*) is not currently documented on the property but would have suitable habitat if the proposed action is carried out. There are four state listed reptiles in Jeff Davis and Reeves counties though these have not been specifically documented on the Phantom Lake Spring property: Texas horned lizard (*Phrynosoma cornutum*), Mountain short-horned lizard (*Phrynosoma hernandesi*), Trans-Pecos black-headed snake (*Tantilla cucullata*), and Chihuahuan Desert lyre snake (*Trimorphodon vilkinsonii*).

There are five special status aquatic species which occur within the Phantom Lake Spring project area. These species are more fully described below.

Comanche Springs pupfish (Cyprinodon elegans) - Endangered
Comanche Springs pupfish was listed as federally endangered in 1967 without critical habitat (32 FR 4001). In 1981, a recovery plan for the species was completed (USFWS 1981). Since then several updates of the recovery plan have been drafted but not yet completed. Comanche Springs pupfish is one of the most distinctive members of the genus *Cyprinodon* (Echelle et al. 2003). Males possess a unique speckled color pattern and all individuals have a relatively streamlined body shape. They lack the vertical bars on the sides of their bodies that are found in most other *Cyprinodon*. Comanche Springs pupfish are small only attaining a maximum size of approximately 2 inches (50 millimeters) standard length (Service 1981).

Status and distribution
Comanche Springs pupfish originally inhabited two isolated spring systems approximately 56 miles (90 kilometers) apart in the Pecos River drainage of western Texas (Baird and Girard 1853). The type locality, Comanche Springs, inside the city limits of Fort Stockton, Pecos County, Texas, is now dry and the population at this locality is extinct. The other population is restricted to a small series of springs, their outflows, and a system of irrigation canals historically interconnecting Phantom Lake Spring (located in easternmost Jeff Davis County, Texas), San Solomon Springs, Giffin Springs and Toyah Creek near Balmorhea, Reeves County, Texas (Echelle et al. 2003).

Primary threats to the Comanche Springs pupfish include the loss of aquatic habitat due to declining spring flows and hybridization with the introduced fish, sheepshead minnow. The complete loss of spring habitat from Comanche Springs in Fort Stockton extirpated the fish from its type locality. Flows from Phantom Lake Spring have been declining since measurements have been taken in the 1930s (Brune 1981, Sharp et al 1999).

Comanche Springs pupfish readily hybridize with sheepshead minnow and are eventually replaced by the nonnative congener. A large population of sheepshead minnow occurs in Lake Balmorhea (Stevenson and Buchanan 1973, Echelle and Echelle 1994); expansion of the nonnative species into upstream areas of the spring outflows is a constant threat to the existence of the species in the wild.

Phantom Lake Spring ceased flowing during the summer of 1999 and has not recovered. There is now only a small pool remaining at the cave mouth and the water is provided by a pump system cycling water from inside the cave to the springhead and allowing flow back into the cave. The fish populations at this site are severely impacted from loss of habitat, resulting in extremely small population sizes. Less than 100 individuals of gambusia and 50 individuals of pupfish are likely present (N. Allan, Service, personal observation, 2003). Maintenance of the habitat for these genetically-unique populations is exclusively dependent on the pumping system. Heavy local rainfalls periodically cause water to flow from Phantom Lake Spring. The duration and effects of the flows are highly variable. Generally the spring's hydrology returns to pre-rainfall conditions within a few months.

Pecos gambusia (Gambusia nobilis) - Endangered

Baird and Girard (1853) described Pecos gambusia based on material from Leon and Comanche springs, Pecos County, Texas. Leon Springs was later designated the type locality (Hubbs and Springer 1957). This fish has been listed as federally endangered since 1970. Pecos gambusia produces live young. Hybrids between Pecos gambusia and western mosquitofish (*Gambusia affinis*) or largespring gambusia (*G. geiseri*) are occasionally found, especially in habitats where one of the species is rare (Hubbs and Springer 1957, Service 1983).

Status and distribution

Pecos gambusia inhabit stenothermal springs, runs, spring-influenced marshes (ciénegas), and irrigation canals carrying spring waters (Service 1983, Hubbs 2003). Some populations are also known from areas with little spring influence; these habitats generally have abundant overhead cover, and include sedge-covered marshes and gypsum sinkholes (Echelle and Echelle 1980).

The Pecos gambusia is endemic to the Pecos River basin in southeastern New Mexico and western Texas and originally ranged from near Fort Sumner, New Mexico to the area around Fort Stockton, Texas. At present, the species is restricted to four main areas, two in New Mexico and two in Texas. Populations live in various springs and sinkholes in Bitter Lake National Wildlife Refuge, near Roswell, New Mexico; Blue Spring, east of Carlsbad Caverns National Park, New Mexico; the Diamond Y springs and draw (=Leon Creek), near Fort Stockton, Texas; and the Toyah Basin (San Solomon springs complex) near Balmorhea, Texas. Extirpated populations include the Pecos River near Fort Sumner and North Spring River in New Mexico, and Leon and Comanche springs, which are now dry, in Texas.

The Pecos gambusia faces severe threats from spring flow declines and habitat modification throughout their range. Loss of outflow in Phantom Lake Spring (described earlier) has also affected the local population of Pecos gambusia. Currently, the total number of individuals persisting at Phantom Lake Spring is estimated to be less than 100 (N. Allan, Service, personal observation, 2003). Throughout their historic range, ciénegas, presumed to have supported large numbers of Pecos gambusia, have been systematically drained and spring flows diverted for irrigation. Additional stresses on the population may occur through competition with the introduced largespring gambusia.

Phantom Cave snail (Pyrgulopsis (formerly Cochliopa) texana) – Candidate (2001)
The Phantom Cave snail was first described by Pilsbry (1935). Hershler and Thompson (1992) described the systematics of the Subfamily Cochliopinae, Family Hydrobiidae, based on morphological characteristics. Hershler et al. (2010) reassigned the snail from the genus *Cochliopa* to *Pyrgulopsis*. It is a very small snail, measuring only 0.039 to 0.55 inches (1 to 1.4 millimeters) in length (Dundee and Dundee 1969).

In the desert southwest, aquatic snails are distributed in isolated geographically-separate wetland populations (Hershler et al. 1999). They likely evolved into distinct species during recent dry periods (since the Late Pleistocene, within the last 100,000 years) from parent species that once enjoyed a wide distribution during wetter, cooler climates of the Pleistocene.

Status and distribution
The Phantom Cave snail is an aquatic snail occurring in only three spring systems and their associated outflows (Phantom Lake, San Solomon, and East Sandia springs) in the Toyah Basin of Jeff Davis County and Reeves County, Texas (Taylor 1987). The Phantom Cave snail only occurs in desert spring outflow channels. They are most abundant in the first few hundred meters downstream of spring outlets. Habitat of the species is found on both soft and firm substrates on the margins of spring outflows (Taylor 1987). They are also commonly found attached to plants, particularly in dense stands of submerged *Chara* beds. There is no available information that indicates the species historic distribution was larger than the present distribution. However, other area springs may have contained the same species, but because these springs have been dry for many decades, there is no opportunity to determine the potential historic occurrence of the snail fauna.

The most significant threat to the continued existence of this snail is the degradation and eventual loss of spring habitat (flowing water) due to the decline of groundwater levels of the supporting aquifer. The San Solomon Spring System (System) provide important habitat for rare aquatic fauna, area springs but are also an important source of irrigation water for the farming communities in the Toyah Basin. Phantom Lake Spring is in Jeff Davis County, while the other major springs in this system are in Reeves County. The natural ciénega habitats of the Balmorhea area have been mostly altered over time to accommodate agricultural irrigation. Two of the three known occurrences of the species are in degraded habitats (exception is East Sandia Spring) because the natural conditions of the springs have been substantially modified for human use. Any additional modifications to channelize the spring flow habitats will further threaten the species.

An exotic snail, *Melanoides* sp., has become established in Phantom Lake Spring (McDermott 2000). The species has been at San Solomon Spring for some time longer, but is not found in East Sandia Spring. In many locations at San Solomon Spring, this exotic snail essentially is the substrate in the small stream channel. The effects of this introduction are not known. However, this exotic snail is likely competing with the native snails for space and resources. Other changes to the ecosystem from the dominance of this species are likely to occur and could have detrimental effects to the native invertebrate community.

Another threat to snail habitat is the potential degradation of water quality from point and nonpoint pollutant sources. This can occur either directly into surface water or indirectly through contamination of groundwater that discharges into spring run habitats used by the snail. The primary threat for contamination comes from herbicide and pesticide use in nearby agricultural areas. The snail may be more sensitive to changes in water quality or other habitat changes than the fish and are likely more directly threatened by the presence of the exotic *Melanoides* snail than the endangered fish.

Phantom Spring tryonia (Tryonia cheatumi) – Candidate (2001)
The Phantom Spring snail was first described by Pilsbry (1935). It is a very small snail, measuring only 0.11 to 0.14 inches (2.9 to 3.6 millimeters) long (Taylor 1987). The shell is narrowly conical, with an obtuse apex and a broadly rounded anterior end.

In the desert southwest, aquatic snails are distributed in isolated geographically-separate wetland populations (Hershler et al. 1999). They likely evolved into distinct species during recent dry periods (since the Late Pleistocene, within the last 100,000 years) from parent species that once enjoyed a wide distribution during wetter, cooler climates of the Pleistocene. Recent systematic studies (Hershler et al. 1999, Hershler 2001) of snails in the Family Hydrobiidae have been conducted using mitochondrial DNA sequences and morphological characters. These analyses support the unique taxonomic status of the Phantom spring snail. Phantom spring snail was assigned to a clade of "true *Tryonia*" made up of 16 species in southwestern North America (Hershler et al. 1999).

Status and distribution
The Phantom Spring snail only occurs in desert spring outflow channels. They are most abundant in the first few hundred meters downstream of spring outlets. Habitat of the species is found on both soft and firm substrates on the margins of spring outflows (Taylor 1987). They are also commonly found attached to plants, particularly in dense stands of submerged *Chara* beds.

The Phantom Spring snail has essentially the same current distribution as the Phantom Cave snail. Dundee and Dundee (1969) described the conditions of Phantom spring snail at Phantom Lake Spring in 1968. Despite the fact that Phantom Lake Spring has been drastically altered from its original state, the native snails (Phantom Spring snail and Phantom Cave snail) occurred in the irrigation canal in such tremendous numbers that the sides of the canal appeared black from the cover of snails. Today the snails are limited to low densities in the small pool at the mouth of Phantom Lake Spring Cave.

The most significant threat to the continued existence of this snail is the degradation and eventual loss of spring habitat (flowing water) due to the decline of groundwater levels of the supporting aquifer. The San Solomon Spring System (System) is located in the Toyah Basin at the foothills of the Davis Mountains near Balmorhea, Texas. In addition to being an important habitat for rare aquatic fauna, area springs are also an important source of irrigation water for the farming communities in the Toyah Basin. Phantom Lake Spring is in Jeff Davis County, while the other major springs in this system are in Reeves County.

Within the last 10 years, an exotic snail, *Melanoides* sp., has become established in Phantom Lake Spring (McDermott 2000). The effects of this introduction are not known. However, this exotic snail is likely competing with the native snails for space and resources. Other changes to the ecosystem from the dominance of this species are likely to occur and could have detrimental effects to the native invertebrate community.

Another threat to snail habitat is the potential degradation of water quality from point and nonpoint pollutant sources. This can occur either directly into surface water or indirectly through contamination of groundwater that discharges into spring run habitats used by the snail. The primary threat for contamination comes from herbicide and pesticide use in nearby agricultural areas. The snail may be more sensitive to changes in water quality or other habitat changes than the fish and are likely more directly threatened by the presence of the exotic *Melanoides* snail than the endangered fish.

Diminutive amphipod (Gammarus hyalelloides) - Candidate (2004)
The diminutive amphipod was first collected by W.L. Minckley from Phantom Lake Spring in 1967 and was formally described by Cole (1976). The name comes from the species being considered the smallest of the known North American fresh-water Gammarus amphipod. Adults range in size from 0.197 to 0.315 inches (5 to 8 millimeters). In Cole's (1985) description of these amphipods based on morphological measurements, he considered *G. hyalleloides* to be endemic to Phantom Lake Spring. Genetic analysis suggests that diminutive amphipod and the other amphipod populations form an unresolved taxonomic group from the Toyah Basin (Gervasio et al. 2004).

Status and distribution
The diminutive amphipod only occurs in desert spring outflow channels. The small amphipods occur on substrates, often within interstitial spaces on and underneath rocks and within gravels (Lang et al. 2003), and are most commonly found in microhabitats with flowing water. They are also commonly found in dense stands of submerged vegetation, primarily *Chara* beds (Cole 1976). Because of their affinity for the constant water temperatures, they are most common in the immediate spring outflow channels, usually only a few hundred meters downstream of spring outlets.

The diminutive amphipod occurs in only four springs in Jeff Davis and Reeves counties, Texas: Phantom Lake, San Solomon, Giffin and East Sandia springs (collectively referred to here as the San Solomon Springs System) (Gervasio et al. 2004). These springs are all within about 8 miles (13 kilometers) of each other. There is no available information that the species historic distribution was larger than the present distribution. However, other area springs may have contained the same or similar species, but because these springs have been dry for many decades (Brune 1981), there is no opportunity to determine the potential historic occurrence of amphipods.

Within the last 10 years, an exotic snail, *Melanoides* sp., has become established in Phantom Lake Spring (McDermott 2000). The effects of this introduction are not known. However, this exotic snail is likely competing with the native macroinvertebrates for space and resources.

Other changes to the ecosystem from the dominance of this species are likely to occur and could have detrimental effects to the native invertebrate community.

Cultural Resources
A full archeological survey was completed in 1994 (Charles et al.). The area has had a full record survey. These archeological surveys revealed this was an important area with evidence of human occupation dating back 9,000 years. All identified sites were on the higher elevation areas, outside of the proposed project area.

Indian Trust Assets
Indian Trust Assets (ITAs) are legal interests in assets held in trust by the United States through the Department of the Interior for Indian tribes or individual Indians. This trust responsibility requires that all federal agencies, including Reclamation, ensure their actions protect Indian Trust Assets.

Environmental Justice
An evaluation of environmental justice impacts is mandated by Executive Order 12898 on Environmental Justice (February 11, 1994). Environmental justice addresses the fair treatment of people of all races and incomes with respect to Federal actions that affect the environment. Fair treatment implies that no group of people should bear a disproportionate share of high and adverse human health and environmental impacts from a Federal action.

The impacts of an action can be considered disproportionately distributed if the impacts imposed on a specific group are greater than the percentage of the total population represented by that group. A group is typically defined by race, ethnicity, income class, or community identity. Evaluating potential environmental justice concerns requires an understanding of where the project impacts are likely to occur and where potentially affected groups are located. The analysis relies on demographic data from sources such as the U.S. Census Bureau, individual counties and municipalities, and local school districts to determine the location of different groups of people. Census demographic data and state economic development figures are typically the most complete and comparable information available for individuals and households.

Chapter 4: Environmental Consequences

This chapter describes the predicted consequences, or potential effects, on the environment by implementing the proposed alternative described in Chapter 2. The current conditions of the potentially affected environmental resources in the project Area, described in Chapter 3, establish the baseline for impact analyses. Using the information in Chapter 3 and a description of the activities that may occur in the reasonably foreseeable future within the Project Area (see Chapter 2), the types of impacts that could result from implementing the alternatives are identified.

Water Resources
Changes in water quantities pumped from Phantom Cave were selected as an indicator to evaluate potential impacts on water resources.

No Action Alternative
Water has been pumped from within the cave to supply water to the pool since 2001. The current pumping system resides within the cave and consists of two pumps which feed water to a small refuge pool at the cave mouth. The water in the current pool would likely fully drain into the cave within a short time if pumping was suspended. The no action alternative would result in no change in water use from ongoing actions.

Proposed Action
The amount of water pumped from the cave and circulated through the ciénega for the proposed action should be similar or less than the amount that is currently pumped. The current pumping system may be removed from the cave and replaced with an external pump with an intake pipe in the cave. Surface area of the restored pool will be approximately 0.08 hectare (0.03 acres) similar to the size of the current pool at the cave mouth. The pool will be designed to hold water even in the event that water flow is suspended for a period of time. A small amount of flow through water will be required to keep water quality good for the fishes and invertebrates within the pool. Flow through water will return to the cave.

Biological Resources
Increased security for species of concern of Phantom Lake Spring was selected as an indicator to evaluate potential impacts on biological resources.

No Action Alternative
The current situation is an artificially supported ecosystem, equipment malfunction and power outage is possible and could result in total habitat loss in the spring outflow. The No Action Alternative would continue on-going management which provides limited security for aquatic species due to the threat of complete dewatering if pump operations fail. Terrestrial species have to negotiate concrete walls to access the water. Bats have a difficult time using the cave with the current gate structure.

Proposed Action
If the proposed action is implemented, the aquatic species that inhabit Phantom Lake Spring will be less likely to be extirpated due to pump failure with the redesign of the pool to hold water independent of pumping operations. Though the pool would not support aquatic species indefinitely without supplemental water, it would give managers a longer time to respond to malfunctions. In addition, a monitoring and alarm system will be installed to alert the Partners to pump failures. The occupied area will be more naturalized. Terrestrial species will have greater access to water. The gate on the cave will be replaced and modified to allow bats greater access to the cave. There will be short term disturbance to species during construction phases. The potential short term negative impacts are relatively minor from the construction activities and the likelihood of a contaminant spill is small. However, because both listed, candidate, and nonlisted species are in a precarious situation due to the loss of spring flow, special care and all attempts will be made to minimize risks. Service biologists will be on site during all phases of construction.

Cultural Resources
Disturbance of cultural resources was used as an indicator to evaluate changes to cultural resources.

No Action Alternative
The No Action Alternative will continue to avoid cultural resources. No disturbance would occur.

Proposed Action
The proposed action is unlikely to affect cultural resources. Limited disturbance will occur within the historic lake area. Reclamation and/or TPWD archeologists will be onsite when ground disturbance occurs.

Indian Trust Assets
Indian Trust Assets (ITAs) are legal interests in assets held in trust by the United States through the Department of the Interior, Bureau of Indian Affairs, for Indian tribes or individual Indians. This trust responsibility requires that all federal agencies, including Reclamation, ensure their actions protect ITAs.

No Action Alternative and Proposed Action
No ITAs have been identified in Phantom Lake Spring area. There are no reservations or ceded lands present. No impacts are anticipated to result from the No Action Alternative or the proposed action.

Environmental Justice
The potential for the action to cause a disproportionate share of high and adverse human health and/or environmental impacts on low income and/or minority communities are used as indicators.

No Action Alternative
Under the No Action Alternative, there would be no change from current conditions and trends. The No Action Alternative would have no effect on ongoing socioeconomic and environmental trends affecting minority and low income populations.

Proposed Action
The action of restoring the ciénega would have little or no effect on Environmental Justice. There would be no disproportionate human health, economic and environmental impacts on any group of people.

Irretrievable Commitment of Resources
No Action Alternative and Proposed Action
Reclamation will continue to maintain the pumps and supply electricity to support the aquatic life at Phantom Lake Spring, until the cooperating agencies deem the project is unsustainable.

Cumulative Impacts
According to the Council on Environmental Quality's regulations for implementing NEPA (50 CFR §1508.7), a "cumulative impact" is an impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. It focuses on whether the proposed action, considered together with any known or reasonable foreseeable actions by Reclamation, other Federal or state agencies, or some other entity combined to cause an effect.

Proposed Action
There is no perceived cumulative impact for rehabilitating a small portion of the ciénega at Phantom Lake Spring.

Chapter 5. Consultation & Coordination

The following lists individuals and organizations that were consulted in preparing this EA and to develop the proposed action:

- U.S. Fish and Wildlife Service
- Texas Parks and Wildlife Division
- Texas Historical Commission
- Reeves County Water Improvement District
- Jeff Davis Underground Water Conservation District

Draft EA Comment Process
The Draft EA went out for 30-day public review and comment January 28-February 28, 2011. The Draft EA was available for public review at Balmorhea State Park, and on the Albuquerque Area Office Reclamation website. No comments were received.

Other Consultation
The Service has performed an intra-service Section 7 consultation regarding effects to endangered species. The Texas Historical Commission will be consulted, as necessary, regarding effects to cultural resources.

Chapter 6. Environmental Commitments

The following environmental commitments will apply if the Proposed Action is selected and implemented:

1. Reclamation will continue to maintain the pumps and supply electricity to support the aquatic life at Phantom Lake Spring, until the cooperating agencies deem the project is unsustainable.

2. The Partners will coordinate to monitor the restored ciénega and the aquatic life within it.

3. All Partners will cooperate to control tamarisk and other invasive species around the site.

Chapter 7. List of Preparers

Name	Agency/Organization	Degree	Project Role
Yvette Paroz	Bureau of Reclamation	M.A., Wildlife and Fisheries	Fishery Biologist
Marsha Carra	Bureau of Reclamation	B.S., Anthropology/ Geography	Environmental Protection Specialist

Chapter 8. References

Baird, S. F. and C. Girard. 1853. Descriptions of new species of fishes collected by Mr. John H. Clark, on the U. S. and Mexican Boundary Survey, under Lt. Col. Jas. D. Graham. Proc. Acad. Nat. Sci. Philadelphia 6:387-390.

Brune, G. 1981. Springs of Texas. Vol. 1. Branch-Smith, Inc., Fort Worth, Texas.

Charles, M. C., C. Edwards, J.R. Greene Jr., J. M. Mabry, M. P. Marshall, T. Meade, S. C. Mulholland, K. J. Reinhard, L. Schniebes, S. K. Stratton 1994. Archeological Evaluation and Testing Site 41JD63, Phntom Spring Jeff Davis County, Texas. Complete Archaeological Service Associates, Cortez, Colorado. Final Report Prepared for Bureau of Reclamation: Contract No. 8-CS-40-06920.

Chowdhury, A. H., Ridgeway, C., and Mace, R. E., 2004, Origin of the waters in the San Solomon Spring system, Trans-Pecos Texas: *in* Mace, R. E., Angle, E. S., and Mullican, W. F., III, eds., Aquifers of the Edwards Plateau: Texas Water Development Board Report 360, p. 315-344.

Cole, G. A. 1976. A new amphipod crustacean, *Gammarus hyalelloides* n. sp., from Texas. Transactions of the American Microscopical Society 89:80-85

Cole, G.A. 1985. Analysis of the Gammarus-pecos complex (Crustacea:Amphipoda) in Texas and New Mexico, U.S.A. Journal of the Arizona-Nevada Academy of Science 20(2):93-103.

Dundee, D. and H. Dundee. 1969. Notes concerning two Texas molluscs, *Cochliopa texana* Pilsbry and *Lyrodes cheatumi* Pilsbry (Mollusca: Hydrobiidae). Transactions of the American Microscipical Society 88 (2):205-210.

Echelle, A.A. and A.F. Echelle. 1980. Status of the Pecos gambusia (Gambusia nobilis). Endangered Species Report No. 10. USFWS. 73pp.

Echelle, A.F. and A.A. Echelle. 1994. Assessment of genetic introgression between two pupfish species, *Cyprinodon elegans* and *C. variegatus* (Cyprinodontidae), after more than 20 years of secondary contact. Copeia 1994:590-597.

Echelle, A.A., A.F. Echelle, S. Contreras Balderas, and Ma. De L. Lozano Vilano. 2003. Pupfishes of the northern Chihuahuan Desert: status and conservation. *In*, G.P. Garrett and N.L. Allan, eds. Aquatic fauna of the northern Chihuahuan Desert. Museum of Texas Tech University, Special Publications 46:11-126.

Gervasio, V., D. J. Berg, B. K. Lang, N. L. Allan, and S.I. Guttman. 2004. Genetic diversity in the *Gammarus pecos* species complex: implications for conservation and regional biogeography in the Chihuahuan Desert. Limnology and Oceanography 49:520-531.

Hershler, R., and F.G. Thompson. 1992. A review of the aquatic gastropod family Cochliopinae (Prosobranchia: Hydrobiidae). Malacological Review Supplement 5:1-140.

Hershler, R., Hsiu-Ping Liu, and M. Mulvey. 1999. Phylogenetic relationships within the aquatic snail genus *Tryonia*: implications for biogeography of the North American Southwest. Molecular Phylogenetics and Evolution 13:377-391.

Hershler, R. L., H-P. Liu, and B. K. Lang 2010. Transfer of *Cochliopa texana* to *Pyrgulopsis (Hydrobiidae*) and description of a third congener from the lower Pecos River basin. Journal of Molluscan Studies 76:245-256.

Hubbs, C. and V. G. Springer. 1957. A revision of the *Gambusia nobilis* species group, with descriptions of three new species, and notes on their variation, ecology, and evolution. Texas Journal of Science 9:279-327.

Hubbs, C. 2003. Spring-endemic *Gambusia* of the Chihuahuan Desert. 2003. *In*, G.P. Garrett and

N.L. Allan, eds. Aquatic fauna of the northern Chihuahuan Desert. Museum of Texas Tech University, Special Publications 46:127-134.

LaFave, J.I. and J.M. Sharp. 1987. Origins of groundwater discharging at the Springs of Balmorhea. West Texas Geological Society Bulletin 26:5-14.

Lang, B. K., V. Gervasio, D. J. Berg, S. I. Guttman, N. L. Allan, M. E. Gordon, and G. Warrick. 2003. Gammarid amphipods of northern Chihuahuan Desert spring systems: an imperiled fauna. Pages 47-57, *in* Aquatic Fauna of the Northern Chihuahuan Desert, G. P. Garrett and N. L. Allan, eds. Museum of Texas Tech University. Special Publications 46.

McDermott, K. 2000. Distribution and infection relationships of an undescribed digenetic Trematode, its exotic intermediate host, and endangered fishes in springs of west Texas. Unpublished Master's Thesis, Southwest Texas State University, San Marcos, Texas. 26+ pp.

Pilsbry, H.A. 1935. Western and southwestern Amnicolidae and a new *Humboldtiana*. Nautilus 48:91-94.

Schuster, S.K. 1997. Hydrogeology and local recharge analysis in the Toyah Basin Aquifer. Masters Thesis, Geological Sciences, University of Texas at Austin. 130 pp.

Sharp, J.M., Uliana, M.M., and R. Boghici. 1999. Fracture controls on regional groundwater flow in a semiarid environment and implications for long-term maintenance of spring flows. Water 99 Joint Congress, Inst. of Engineers. Australia, Brisbane. v. 2, p.1212-1217.

Stevenson, M. M. and T. M. Buchanan. 1973. An analysis of hybridization between the cyprinodont fishes *Cyprinodon variegatus* and *C. elegans*. Copeia 1973:682-692.

Taylor, D.W. 1987. Fresh-water molluscs from New Mexico and vicinity. Bulletin 116, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico. 50 pp.

USFWS. 1981. Comanche Springs Pupfish (Cyprinodon elegans) recovery Plan. U.S. Fish and Wildlife Service,, Albuquerque, New Mexico. 25pp.

USFWS 1983. Pecos gambusia (Gambusia nobilis) recovery plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 41pp.

Attachment 1

Letters to Interested Parties/Native Americans

FEB 04 2011

ALB-186
ENV-1.10

Ms. Janet Adams
General Manager
Jeff Davis Underground Water Conservation District
P. O. Box 1203
Fort Davis, TX 79734

Subject: Scoping Notice under NEPA for Ciénega Wetland Restoration at Phantom Lake Spring, Toyavale, Texas

Dear Ms. Adams:

In accordance with the National Environmental Policy Act of 1969 (NEPA), the Bureau of Reclamation is preparing an Environmental Assessment (EA), to evaluate the rehabilitation of a spring-fed wetland system (ciénega) near the mouth of Phantom Lake Spring cave, in partnership with the US Fish and Wildlife Service and the Texas Parks and Wildlife Department.

The federal action proposed in the EA is to rehabilitate a small portion of the ciénega wetland that lies within Reclamation property near Toyavale, Texas. This is a unique ciénega that supports five aquatic species of concern: two endangered fishes and three candidate invertebrates.

Scoping, as defined in the Council on Environmental Quality regulations, is "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." This scoping period is meant to provide interested members of the public, Native American tribes, local governments, and organizations an opportunity to comment on the proposed project and to obtain information that will focus the EA on important issues.

The scoping process helps us to identify the following:

- The important issues, resource concerns, and possible impacts to be addressed in the EA;

- Those issues that are not important, or which have been addressed by prior environmental review and eliminated from further study;

- Existing information sources;
- Other environmental review, permits, and consultation requirements; and
- Alternatives to be evaluated in the EA.

The EA will present an analysis of the physical, biological, social, cultural, and economic effects of the proposed action and no action alternative. The draft EA will be posted under the Current Focus section on web page: http://www.usbr.gov/uc/albuq/index.html by February 2011. If you have any questions about the project, please contact Ms. Marsha Carra at Reclamation, 505-462-3602, for additional information.

Sincerely,

MIKE A. HAMMAN

Mike A. Hamman
Area Manager

cc: Mr. Bruce Treadaway
President
Reeves County Water Improvement District
P.O. Box 185
Balmorhea, TX 79718

Mr. Tom Johnson
Manager
Balmorhea State Park
P O Box 15
Toyavale TX 79786

Gary P. Garrett- Program Director
Watershed Policy & Management
Texas Parks & Wildlife Dept.
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Mountain Home, TX 78058

Mr. Adam Zerrenner
Field Supervisor
U.S. Fish and Wildlife Service
Region 2 Listing Branch
10711 Burnet Road, Suite 200
Austin, Texas 78758

Mr. Michael Montagne
Texas Fish and Wildlife Conservation Office
500 East McCarty Lane
San Marcos, TX 78666

Mr. and Mrs. Roy Bird
P.O. Box 6
Toyavale, TX 79786

Mr. Bill Martin
SHPO
Texas Historical Commission
P.O. Box 12276
Austin, TX 78711-2276

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FEB 02 2011

ALB-186
ENV-1.10

Honorable Billy Evans Horse
Chairman, Kiowa Tribe of Oklahoma
P.O. Box 369
Carnegie, OK 72015

Subject: Consultation Invitation Regarding the Ciénega Wetland Restoration at Phantom Lake Spring, Toyavale, TX Environmental Assessment (EA)

Dear Chairman Horse:

In accordance with the National Environmental Policy Act of 1969 (NEPA), the Bureau of Reclamation is preparing an EA, to evaluate the rehabilitation of a spring-fed wetland system (ciénega) near the mouth of Phantom Lake Spring cave, in partnership with the U.S. Fish and Wildlife Service and the Texas Parks and Wildlife Department.

The federal action proposed in the EA is to rehabilitate a small portion of the ciénega wetland that lies within Reclamation property near Toyavale, Texas. This is a unique ciénega that supports five aquatic species of concern: two endangered fishes and three candidate invertebrates.

The purpose of this letter is to invite your tribe's involvement on a government-to-government basis to identify any concerns your tribe may have regarding the potential effects of our future activities on trust assets, cultural and biological resources, or tribal health and safety. Reclamation wants to ensure that you have an opportunity to help us identify and address any issues important to your tribe.

The EA will present an analysis of the physical, biological, social, cultural, and economic effects of the proposed action and no action alternative. The draft EA will be posted under the Current Focus section on web page: http://www.usbr.gov/uc/albuq/index.html in February 2011. If you have any questions about the project, please contact Ms. Marsha Carra at Reclamation 505-462-3602 for additional information.

Sincerely,

MIKE A. HAMMAN

Mike A. Hamman
Area Manager

cc: Honorable Johnny Wauqua
Chairman, Comanche Tribal Business Committee
P.O. Box 908
Lawton, OK 73502

Honorable Wallace Coffey
Chairman, Comanche Indian Tribe
P.O. Box 908
Lawton, OK 73502

Honorable Earl Yeahquo
Chairman, Kiowa Business Committee
P.O. Box 369
Carnegie, OK 2015

Mr. George Daingkau
Kiowa NAGPRA Coordinator
Route 2, Box 74
Ft Cobb, OK 73038

Honorable Mark Chino
President, Mescalero Apache Tribe
P.O. Box 227
Mescalero, NM 88340

Ms. Donna Stern-McFadden
Tribal Historic Preservation Office
P.O. Box 227
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Attachment 2

Meeting Summary

Meeting Summary, Phantom Lake Spring, June 22, 2010

This document summarizes a meeting held June 22, 2010, at the U.S. Fish and Wildlife Service (Service), Austin Ecological Services Field Office in Austin, Texas. Representatives of the Service, Bureau of Reclamation (BOR), and Texas Parks and Wildlife Department (TPWD) worked through issues related to the management of Phantom Lake Spring in west Texas.

Purpose Statement: The purpose of the meeting was to develop a clear recommendation as to the best alternative(s), including a schedule for future actions, to guide the management of Phantom Lake Spring and its biota.

Key Findings: **There is an urgent need to take action to prevent extinction of rare species in the next few months.** The most immediate management needs are to establish captive populations of the species and to improve the current situation for habitat maintenance at Phantom Lake Spring, while a long-term alternative is implemented to evaluate the feasibility, and, if appropriate, conduct translocation of the species to other sites.

In Attendance:

USFWS: **Wendy Brown**, Region 2, Recovery Coordinator (meeting facilitator)
Adam Zerrenner, Field Supervisor, Austin ESFO
Tom Brandt, Director, San Marcos National Fish Hatchery & Technology Center
Mike Montagne, Project Leader, San Marcos Fish & Wildlife Conservation Office
Nathan Allan, Biologist, Austin ESFO

USBOR: **Lisa Croft**, Deputy Area Manager, Albuquerque Area Office
Gary Dean, Supervisior, Environmental Compliance, Alb.
Yvette Paroz, Fish Biologist, Alb.

TPWD: **Gary Garrett**, Program Director, Watershed Policy & Management
Wendy Gordon, Program Leader, Nongame & Rare Species

Meeting Agenda:

- Introductions
- Meeting Objectives and Structure
- Background Presentation (Nathan Allan)
- Problem Statement Discussion
- Identify Project Objectives
- Brainstorm Available Alternatives
- Evaluation of Best Alternatives

  Consider multiple time scales:
  - Immediate (this year or ASAP)
  - Short-term (~ 2-3 years)
  - Long-term (~ 10 years)

- Decision Process?
- Recommendations, responsibilities, & timeline

Meeting Structure: Wendy Brown facilitated the meeting and used simplified concepts of structured-decision making as a framework to guide the discussion and form the basis of the meeting agenda. The goal is to make decisions that are more defensible and transparent. Though not referenced in the meeting, a very short summary fact sheet of how the Service is using structured-decision making can be found on-line: http://www.fws.gov/science/doc/structured_decision_making_factsheet.pdf

Background: Nathan Allan presented the basic background information (slides attached).

Problem Statement: This statement was drafted before the meeting and agreed to at the meeting.

> Phantom Lake Spring is in the Chihuahuan Desert of western Texas and supports an assemblage of five aquatic species of concern: two endangered fishes, Comanche Springs pupfish (*Cyprinodon elegans*) and Pecos gambusia (*Gambusia nobilis*); and three candidate invertebrates, Phantom springsnail (*Tryonia cheatumi*), Phantom Cave snail (*Cochliopa texana*), and diminutive amphipod (*Gammarus hyalleloides*). Although none of the species have been *confirmed* as strict endemics, at least some genetic uniqueness of the Phantom populations has been documented for both fishes and the amphipod. Currently, only the pupfish has a captive refuge population (in two Service facilities).
>
> The U.S. Bureau of Reclamation (Reclamation) owns about 17 acres of land surrounding the spring and, along with the U.S. Fish and Wildlife Service (Service) and Texas Parks and Wildlife Department (TPWD), has responsibilities for conservation of the rare spring fauna.
>
> Spring flow from Phantom Lake Spring has been continually declining since measurements began being recorded in the 1940s. Corresponding aquifer levels in Phantom Cave have dropped about 2.5 feet in elevation in the last 10 years. The natural spring water ceased consistent flowing around 2001, with some relief provided by temporary flow spikes following large rainfall events. However, water levels have declined to pre-spike conditions each time. The precise cause of the decline is unknown, but the water from base flows has been aged to be over 10,000 years old, with little modern recharge from the surface.
>
> The aquatic habitat in the small spring pool at Phantom has been maintained by a pumping system since 2001. The current pump system circulates water to the spring pool from about 75 feet back in Phantom Cave. The system is not regularly monitored and the small check dam constructed to maintain water in the spring pool is currently leaking severely so that the pump system needs constant adjustment to maintain a target water level in the pool. Over recent months, the system experienced several short-term pump failures resulting in extreme conditions in the pool; with a small amount of stagnant water remaining until pumping could be resumed.
>
> The agencies have been working together on an ad-hoc, emergency basis to maintain the habitat at Phantom Lake Spring over the past decade. Efforts have been successful so far, but the current situation is not sustainable over a long term and the present risk of accidental extirpation of the populations is very high. We need to develop a management plan for the habitat and the species through a coordinated effort by the Service, Reclamation, and TPWD. A range of alternatives for management include, but are not limited to, groundwater conservation, on-site habitat maintenance, alternate habitat sites, and captive propagation. To develop the management plan, we will identify the best alternative(s), or suite of actions, that best addresses this problem, and are driven by the shared objectives of the management agencies.

One clarification from the last paragraph of the problem statement: the reference to “develop a management plan” was not intended to imply a formal and lengthy planning process with extensive documentation, but a conceptual plan of action that would come out of this meeting.

Project Objectives: The group brainstormed and discussed a wide range of objectives related to the management of Phantom Lake Spring. The objectives were divided into Fundamental Objectives and Means Objectives. These objectives will be used to evaluate the potential alternatives. The wording and meaning of these objectives were refined throughout the rest of the meeting and the list below represents the final version of the objectives from the meeting.

FUNDAMENTAL OBJECTIVES

- Minimize extinction risk for the unique taxa [all 5 rare species are included]
- Avoid negative impacts to other species and systems [related to harm outside of Phantom]
- Avoid harm to current pool ecosystem from human activities [don't make it worse]
- Minimize costs [partially a means objective; be aware of hidden costs]
- Minimize safety risks for employees and contractors [related to actions at Phantom]
- Be aware of precedent setting for future decisions [may not be a driving objective for the alternatives, but an important issue to be aware of]

MEANS OBJECTIVES

- Provide clear direction for management of Phantom, and endpoint
- Maintain or restore a naturally functioning system and habitat
- Maximize sustainability and reliability of maintenance system
- Comply with policy and regulations [in a way, this is a fundamental obj.]
- Acknowledge limitations of our ability to control situation (pragmatic approach) [may not be an objective, but an important issue to be aware of]

Available Alternatives: The group brainstormed and discussed a range of alternatives. The possible alternatives were organized into five broad alternatives. The group discussed some details of what each alternative might entail, but did not attempt to define those details. It was assumed that the alternatives were not mutually exclusive. The group worked through these alternatives throughout the rest of the meeting and the list below represents the results from the meeting.

1. **Lock the gate and let it go.** No more management intervention. This assumes pump failure very soon and the loss of the habitat and species at Phantom.
2. **Status quo.** Maintain the current management practices with no significant increase in conservation efforts. This assumes a high risk of pump failure and the loss of the habitat and species at Phantom relatively soon.
3. **Improve current situation through necessary interventions.** Enhance the current system to maintain the species and habitat on-site at Phantom. There is a wide range of options that could be pursued under this alternative. Some of the options discussed include:

   - Moving the submersible pumps farther back in Phantom Cave
   - Drilling a groundwater well on BOR property and installing a surface pump
   - Installing a surface pump and extending an intake hose farther back in the cave
   - Constructing a new artificial ciénega adjacent to the existing pool at Phantom
   - Installing backup pumps and alarms – backup electric systems (propane, solar, generators, etc)

- Instituting a formal monitoring program (including remotely through internet video or phone/radio system and scheduled in person visits from TPWD and others)
- Improving security of the site with gates, etc. (to prevent vandalism and protect human safety)
- Altering geology of the cave (feasibility questioned and uncertain down-gradient impacts)
- Initiating new groundwater studies with the intent of determining if there are any groundwater management options that could benefit the flow at Phantom (this action may be necessary under several alternatives)

4. Bring species into captivity. Establish captive populations at appropriate facilities for all five rare species. The group discussed options for the short term (next 3 years) and long term (10 to 15 years) captive propagation.

- Short-term captive propagation would provide insurance against extinction to facilitate and provide time to investigate and implement longer-term solutions. This assumes establishing a captive population in addition to the wild population. Options for locations include: zoos and conservation facilities; on site tanks; and fish hatcheries (Dexter, San Marcus, Uvalde, Inks, and State facilities).
- Long-term captive propagation would be an end point to prevent extinction, assuming no habitat would exist in the wild. This assumes there are only captive populations and no wild populations. Options for locations include: zoos and conservation facilities; on site tanks; and fish hatcheries (Dexter, San Marcus, Uvalde, Inks, and State facilities).
- Cryopreservation was also mentioned but not explored.
- Contingency planning for emergency rescue, if needed.

5. Translocation. Establish populations of the rare species in new habitats. Options discussed included:

- Existing spring sites (e.g., Giffin Spring; East Sandia Springs; “unnamed springs” near Phantom, near Boy Scout Ranch, on McCoy’s ranch)
- Restoring historic springs (e.g., Comanche Springs in Fort Stockton)
- Construct new artificial habitat (e.g., downstream of the dam at Lake Balmorhea; City of Balmorhea water treatment plant)

Evaluation of Best Alternatives: The group constructed a basic consequence table to evaluate the alternatives against the objectives (Figure 1). The group divided each alternative into short-term (less than 3 years) and long-term (10 years or more) options.

	BROAD ALTERNATIVES									
	1. Let it Go		2. Status Quo		3. Improve Current Situation		4. Captivity		5. Translocation	
FUNDAMENTAL OBJECTIVES	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term
Minimize extinction risk										
Avoid impacts to other systems										
Avoid harm to pool ecosystem										
Minimize costs										
Minimize safety risks										
Precedent setting										
MEANS OBJECTIVES										
Clear direction for management										
Maintain or restore ecosystem										
Max. reliability of maint. system										
Comply with policy and regs										
Acknowledge limitations										

Figure 1. Initial consequence table for Phantom Lake Spring management alternatives.

Due to time limitations the group only evaluated the five broad alternatives and only considered the fundamental objectives. The means objectives could be best used to evaluate more detailed alternatives in the future.

The group began scoring each alternative based on how well it met the stated fundamental objectives. A simple scale of 0 to 3, with 3 being the best fit, was used to evaluate the alternatives (Figure 2). As the group worked through the scoring process the objectives and alternatives were clarified and reworded. The scores for the minimizing safety risks objective were dropped because this objective was determined to be a requirement for all the alternatives and may be more appropriate to score based on more detailed alternatives. The group also did not score the precedent setting objective because there was not a good basis for what kind of precedent was most desirable.

The short-term translocation alternative was eliminated because the group reached consensus that this alternative was not likely to be feasible in the short term. It would likely take at least three years or more to implement a translocation alternative, but the group recognized the alternative needs to be initiated now to be implemented later.

The scores of the first four fundamental objectives were summed and the group evaluated the results. The first two alternatives generally had the highest overall scores, however, each option scored either 0 or 1 on the minimize extinction risk objective. The group consensus was that the fundamental objective to minimize extinction risk was the most important objective of those considered. It was decided that since both the Let it Go and Status Quo alternatives did not sufficiently meet the objective to minimize extinction, they would not be further considered. The group consensus was that both alternatives should be eliminated from further evaluation.

	BROAD ALTERNATIVES

FUNDAMENTAL OBJECTIVES	*ELIMINATED* 1. Let it go.		*ELIMINATED* 2. Status Quo		3. Improve Current Situation		4. Captivity		5. Translocation
	Short term	Long term	Short term	Long term	Short term	Long term	Short term	Long term	Long term
Minimize extinction risk	0	0	1	0	2	1	2	1	2
Avoid impacts to other systems	3	3	3	3	2	2	2	2	1
Avoid harm to pool ecosystem	2	3	1	1	1	1	2	0	2
Minimize costs	3	3	2	2	1	1	1	1	1
Minimize safety risks									
Precedent setting									
TOTAL SCORES	8	9	7	6	6	5	7	4	6

Scale: 0 = does not meet objective; 1= minimally meets objective; 2=mostly meets objective; 3=fully meets objective

Short term = < 3 years; Long term= 10+ years

Figure 2. Modified consequence table with scores for Phantom Lake Spring management alternatives.

Decision Process: The remaining scores from the consequence table were informative in considering how to move forward with management of Phantom Lake Spring. There are three alternatives that all had a score of 2 for the objective to minimize extinction risk and had the overall three highest scores: Captivity (short-term); Improve Current Situation (short-term); and Translocation (long-term). The other two alternatives had the lowest scores: Improve Current Situation (long-term) and Captivity (long-term).

The results of this exercise, and the associated discussion and critical thinking, provided a process for evaluating the broad alternatives to maximize our stated objectives. It was recommended that these three alternatives must be implemented concurrently. The most immediate management needs are to establish captive populations of the species and to improve the current situation to provide habitat at Phantom Lake Spring. The best long-term alternative is to find other locations and implement a translocation of the species.

The two long-term alternatives of artificially maintaining the habitat Phantom Lake Spring (Improve Current Situation – long-term) or depending solely on captive populations (Captivity – long-term) are not viable alternatives because they have a high cost with a low likelihood of preventing extinction. These alternatives were eliminated from further consideration.

Recommendations, Responsibilities, & Timelines:

The group recognizes there is an urgent need to take action to prevent extinction in the next few months.

Recommendations for Short-term Actions:

1. Establish Captive Populations – With attention to available resources, there needs to be a plan in place to get all species in captivity. Bring in all four species not currently in captivity (all except the pupfish) on an experimental basis to some facility. Need to have monitoring plan in place to assess the efficacy of the captive management. San Marcos and/or Dexter NFHTC are the most likely facilities with the capability to implement this action. Note that the costs can be very high for captive management.
2. Improve Current Situation at Phantom – Simultaneously with establishing the captive populations, develop a new and improved system at Phantom Lake Spring to maintain habitat and provide security for the populations for approximately the next 10 years while a more "permanent" solution is identified. This will

require maintaining pumps, tapping deeper water source, building a new external pool on site, and installing an alarm system and monitoring system.

Recommendations for Long-term Actions:

1. Investigate Translocation Alternatives – determine if other locations are feasible and develop plans for potential translocation.

Other long-term actions included conducting updated genetic studies for the five species to determine current conservation status and initiating new groundwater studies.

Accountability of Available Resources:

Known Resources:

- BOR base funding of $30,000/year (pump system and/or captive propagation)
- Service Fisheries $25,000 for candidate conservation (pump system or captive propagation)
- Chad Hargrave's current biological project funded by BOR (ensure it will include extensive investigations of translocation options)
- Dave Rogowski's Section 6 invertebrate project (investigate captive propagation techniques?)
- BOR and Fisheries has access to heavy equip (for new ciénega construction at Phantom)

Potential Resources:

Desert Fish Habitat Partnership (FY11 proposals accepted now, Mike M. will work on this)

- SSP funding with USGS (proposal due date has already past for this FY)
- Section 6 grants (FY11 proposals usually due in November 2010)
- Preventing extinction grant (FY11 proposals would be in the spring of 2011)

Desert Landscape Conservation Cooperative (unknown)

Next Immediate Steps:

- Develop a summary of this meeting (Nathan and Wendy B.) – by July 6
- Brief mgmt on results (Adam , Gary G. & Wendy G.) – by July 26 (Adam to RO)
- Talk to Chad (Yvette, Gary G., Nathan) – by July 6
- Formalize a monitoring plan at Phantom (Yvette) – by July 30
- Initiation of captive propagation - determine where they will go (Mike M.) – by August 27
- Develop a site plan at Phantom (Yvette, Nathan and Gary G.) – by Sept. 30
- Develop a contingency plan (Nathan, Yvette, Gary G., Mike.) – by December 30

Attachment 3

Intra-Service Section 7

INTRA-SERVICE SECTION 7 BIOLOGICAL EVALUATION FORM

Originating Person: Michael Montagne

Telephone Number: 512-353-0011

Date: January 10, 2011

Consultation #: 21450-2011-I-0067

I. Region: Region 2 (Southwest)

II. Service Activity (Program): Fisheries, Texas Fish and Wildlife Conservation Office (FWCO)

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

Comanche Springs pupfish (*Cyprinodon elegans*) and Pecos gambusia (*Gambusia nobilis*), listed species that occur within the action area.

B. Proposed Species and/or proposed critical habitat within the action area:

No Proposed Species occurs within the action area.

C. Candidate species within the action area:

Phantom springsnail (*Tryonia cheatumi*), Phantom Cave snail (*Cochliopa texana*), and diminutive amphipod (*Gammarus hyalleloides*) occur within the action area.

IV. Geographic area or station name and action:

Texas FWCO, San Marcos, Texas

Project location: Phantom Lake Spring, Chihuahuan Desert, Jeff Davis County, spring enhancement project.

V. Location (attach map):

A. Ecoregion Number and Name: 9, Chihuahuan Desert

B. County and State: Jeff Davis County, Texas

C. Latitude and Longitude: North Latitude 30°56'05.87", Longitude - 103°50'58.29"

D. Distance (miles) and direction to nearest town: 8.4 miles to Balmorhea, TX

E. *Species/habitat occurrence:* Comanche Springs pupfish (*Cyprinodon elegans*) and Pecos gambusia (*Gambusia nobilis*); Phantom springsnail (*Tryonia cheatumi*), Phantom Cave snail (*Cochliopa texana*), and diminutive amphipod (*Gammarus hyalleloides*) all occur on/near project site.

VI. Description of Proposed Action:

Background

Phantom Lake Spring is a unique, spring-fed wetland system (ciénega) that supports five aquatic species including two endangered fishes and three candidate invertebrates. Spring flow at Phantom Lake Spring has been continually declining since measurements began being recorded in the 1940s. Corresponding aquifer levels in Phantom Cave have dropped about 2.5 feet in elevation in the last ten years. The natural spring water ceased consistent flow around 2001, prompting the creation of a pumping system to maintain the aquatic habitat for species dependent on the spring. The current pump system circulates water to the ciénega from about 75 feet back in Phantom Cave. The system is not regularly monitored and the small check dam constructed to maintain water in the ciénega is currently leaking so severely that the pump system needs constant adjustment to maintain a target water level in the pool. Over recent months, the system experienced several short-term pump failures resulting in extreme low-water conditions in the ciénega. The current situation is not sustainable over a long term and the present risk of accidental extirpation of the listed/candidate populations is very high. In cooperation with the U.S. Bureau of Reclamation and the Texas Parks and Wildlife Department, the U.S. Fish and Wildlife Service (Service) proposes to: 1) secure the current cave pool, and, 2) rebuild a larger, more natural ciénega.

Methods (See attached Desert Fish Habitat Partnership Project)

The Service proposes to:

1. Modify the existing pool to secure the immediate existence of the aquatic species that inhabit the pool. The small pool will be partially bordered with sand bags to slow leaking through the cave wall. A new pumping system will be constructed, complete with a backup power supply, remote monitoring system (via satellite link communication), and alarm system to reduce response time to system failures (see attached proposals); and,

2. Create a new, more natural ciénega south of the current pool, away from the porous cave wall (see Figure 1). The modification will include both a refuge pool and an overflow pool, to take advantage of the natural spikes in flow that occasionally result in flooding of the immediate area around the mouth of the cave. The refuge pool would be lined and covered over with natural substrate (e.g. gravel, boulders) to create feeding and cover habitat for the Comanche Springs pupfish and Pecos gambusia (USFWS 1981, 1983). Subsequent colonization and or active planting of the substrate by macrophytes and algae will create habitat for the candidate invertebrates.

The overflow pool will be located at the southeast end of the refuge pool and will only be available for use during the natural but irregular flow spikes that come out of the mouth of the cave. This area will be graded so that as the water recedes, the organisms will be able to move back into the refuge pool. Prior to construction of the overflow pool, invasive salt cedar (*Tamarisk* spp.) will be removed to prevent alteration of the area's hydrology and promote native vegetation.

The Service will document the success of the project through regular monitoring of Phantom Lake Springs. Monitoring will include a population estimate for each of the five species, and a survey of native vegetation. Non-native species, both faunal and floral, will be removed when possible. All construction, completion, and monitoring activity at the springs will be reported in the accomplishments module of FIS, of the Service.

See attachments for maps, pictures, and DFHP project description.

VII. Determination of Effects:

A. Description of Effects

Every species listed in item III relies on the aquatic habitat at Phantom Lake Spring to grow and reproduce. Completion of the proposed project would therefore benefit the current fauna at the Phantom Lake Spring in two main ways: 1) by reducing the response time to pump system failures, we will prevent the ciénega from reaching catastrophic low-water levels, and 2) the larger ciénega that includes a refuge and overflow pool would substantially increase the amount of habitat available, thus increasing the carrying capacity and population sizes of the five aquatic species of concern. Both the Comanche Springs pupfish and Pecos gambusia have prospered in a similar man-made ciénega at Balmorhea State Park. The improved security of the Phantom Lake Spring ciénega will allow for more time to strategically plan a long-term solution for these populations, such as finding alternative sites with more secure water resources for relocation. This planning process will benefit other similar populations in ciénega habitats that are at risk due to declining ground water levels.

Implementation of the project is not anticipated to result in any significant adverse effects to listed species. Sandbags along the cave wall of the current spring pool have been added and the pumping system has been moved in the past with no adverse effects to the populations. The modifications to the pump system will take seven days total and water level integrity will be maintained during this time. The construction of the refuge and overflow pools are in an area south of the cave mouth where these species do not currently occur, therefore sediment from construction activities will be prevented from entering the existing pool where the species of concern reside.

The proposed action is intended and designed to benefit the listed species addressed by improving habitat conditions. Due to anticipated benefits to listed species, the proposed project may affect, but will not likely adversely affected listed species.

VIII. Effect determination and response requested:

A. Listed species/critical habitat:

Determination		Response Requested	
No effect on species/critical habitat			
(species: _____)		_____	Concurrence
May affect, is not likely to adversely affect species/critical habitat (anticipated beneficial)			
(species: Comanche Springs pupfish; Pecos gambusia)		X	Concurrence
May affect, is likely to adversely affect species/critical habitat			
(species: _____)		_____	Formal Consultation

B. Proposed species/proposed critical habitat:

Determination		Response Requested	
No effect on proposed species/critical habitat			
(species: _____)		_____	Concurrence
Is not likely to jeopardize proposed species/adversely modify proposed critical habitat			
(species: _____)		_____	Concurrence
Is likely to jeopardize proposed species/adversely modify proposed critical habitat			
(species: _____)		_____	Concurrence

C. Candidate species:

Determination		Response Requested	
No effect on candidate species			
(species: Phantom springsnail; Phantom Cave snail; diminutive amphipod)		X	Concurrence
Is not likely to jeopardize candidate species			
(species: _____)		_____	Concurrence
Is likely to jeopardize candidate species			
(species: _____)		_____	Conference

IX. Reviewing ESFO Evaluations:

A. *Concurrence:* X *Nonconcurrence:* _____

B. *Formal consultation required:* _____

C. *Conference required:* _____

D. *Informal conference required:* _____

E. *Remarks (attach additional pages as needed):*

Due to the avoidance and minimization measures stipulated in Section VII of this document, the project, as proposed in this consultation or in the accompanying Project pre-proposal, may affect, but will not likely adversely affect listed species. The Service anticipates that recovery benefits to listed species from the proposed project will likely occur. As provided in 50 CFR § 402.16, consultation must be re-initiated should: (1) new information reveal effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this consultation; (2) the agency action be subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this consultation; or (3) a new species be listed or critical habitat designated that may be affected by the action.

Michael Montagne — 10 Jan 11
Michael Montagne — Date
Texas FWCO Biologist

Allison Arnold — 10 Jan 11
Allison Arnold — Date
Section 7 Biologist

1/10/1
Adam Zerrenner — Date
Field Supervisor,
Austin ESFO

Attachment 4
Grant Proposal