Keystone McAlester Conservation Area American Burying Beetle Permittee Responsible Conservation Plan

November 16, 2012

COMMON GROUND CAPITAL

&

WLLL, LLC

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I. Keystone Gulf Coast Pipeline Project Background

TransCanada Keystone Pipeline, LP (Keystone) is constructing and will operate a crude oil pipeline and related facilities from the crude oil supply hub at Cushing, Oklahoma to existing crude oil storage terminal facilities near Nederland, Texas. The project is known as the Gulf Coast Project (Project). The Project will consist of approximately 485 miles of new pipeline. The Gulf Coast Project will have the initial capacity to transport 700,000 barrels of oil per day and can be expanded to transport 830,000 barrels of oil per day to Gulf Coast refineries. The Project is planned to be placed into service in 2013. In addition to the pipeline, Keystone will construct permanent and temporary construction access roads, temporary facilities (contractor yards, pipe yards, and rail sidings) and aboveground facilities including pump stations, delivery facilities, and mainline valves.

The construction of the Project and associated facilities in Oklahoma will cause the minor loss and disturbance of habitat used by the American burying beetle (ABB). This species is listed as endangered and protected under the Endangered Species Act of 1973, as amended (ESA, 16 USC 1531 –1544). Consequently, Keystone decided it would be prudent to apply to the United States Fish and Wildlife Service (Service) for a Section 10(a)(1)(B) permit (ITP) to authorize the incidental take of federally listed species resulting from construction, operation, maintenance, and repair (both routine and emergency) for the Project. A Habitat Conservation Plan (HCP) was prepared in support of the Permit application. Among other things, the HCP specified conservation measures that will be implemented to minimize and mitigate, to the maximum extent practicable, a specified level of incidental take of listed species. The Covered Species addressed in this HCP is the ABB. This species is known to occur in a portion of the Project area in Oklahoma. In the final HCP, potential incidental take of the ABB is expressed as the number of acres of known and potential habitat that will be directly and indirectly impacted by Covered Activities within the Plan Area. This mitigation project will conserve (in perpetuity) substantially more ABB habitat than will be disturbed by construction of the Pipeline Project. The majority of any ABB habitat impacted by the Project will entail temporary disturbance. The ITP permit was issued on November 2, 2012.

Keystone analyzed its mitigation options for impacts to ABBs. Conservation Banking and a Permittee Responsible conservation site were the only two options available. Because of the time-consuming nature of a conservation bank approval process in relation to the November 2, 2012 target ITP date, it was not expected that an ABB conservation bank would be operational prior to issuance of the ITP in this time frame. To address this situation, Keystone worked with a third party conservation entity to create a Permittee Responsible Conservation Project Site.

Keystone contracted with the Common Ground Capital, LLC (CGC) and WLLL, LLC (WLLL) partnership to secure a 1600 tract of property in Pittsburg County, Oklahoma to develop and manage the 876 acre permittee responsible mitigation site, named the “Keystone McAlester Conservation Area” (KMCA). In parallel, CGC/WLLL is developing a conservation bank on the

remaining 724 acre parcel lying adjacent to the KMCA. This conservation bank will be designed to provide for future potential ABB species credit needs of various entities that may impact ABB habitat in the future. It is possible that Keystone may acquire some of these credits during the operational phase of the Project if unanticipated future impacts to ABB habitat should occur.

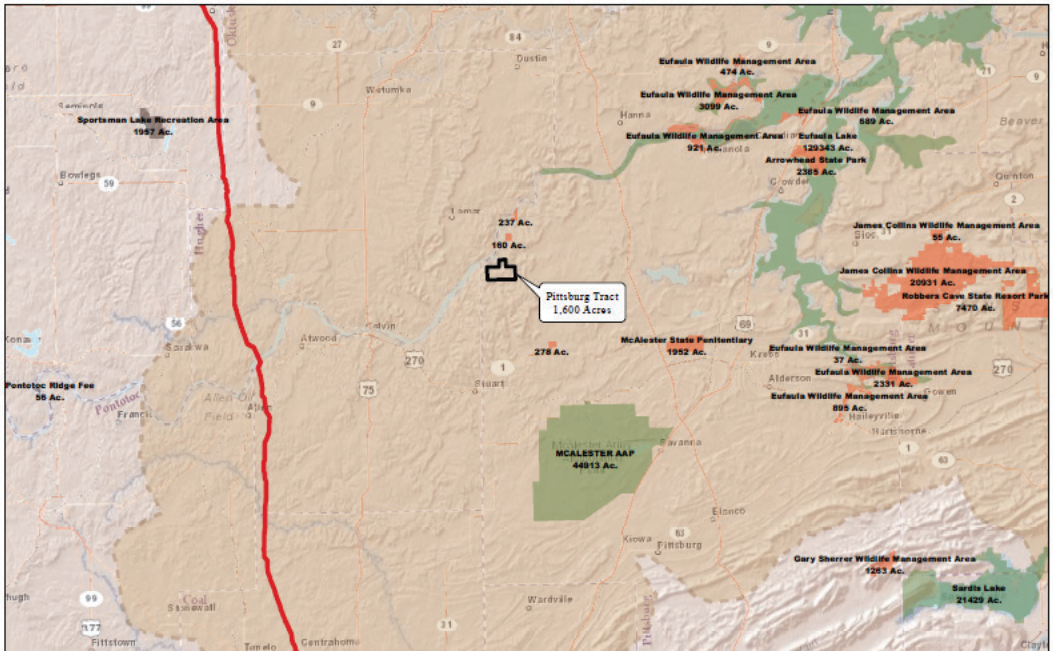
Upon approval of this Conservation Plan by the United States Fish & Wildlife Service (Service) CGC/WLLL will complete steps to acquire the 1,600-acre Pittsburgh County site with funds provided by Keystone. Contemporaneously, the 876-acre sub-parcel described herein (the KMCA) will be carved out and set aside for long-term conservation as a permittee-responsible mitigation site.

CGC/WLLL will assume the responsibility of acquiring and managing the entire 1600-acre tract for ABB habitat in perpetuity. Although CGC/WLLL will not use any of the 1,600 acres for purposes that would conflict with this Conservation Plan, active conservation measures on the 724-acre bank site would be implemented over time as credit sales take place. Conservation measures on the 876-acre KMCA site would commence as soon as the tract is acquired by CGC-WLLL. The entire 1,600-acre tract of land will be purchased out-right and deed restricted by CGC/WLLL and secured in perpetuity by a conservation easement to prevent unauthorized future development. Management and restoration activities to be employed at the KMCA site will be approved by the Service by virtue of its approval of this Conservation Plan. Keystone will provide appropriate funding assurances to ensure that these land acquisition, management, and restoration activities will occur as planned.

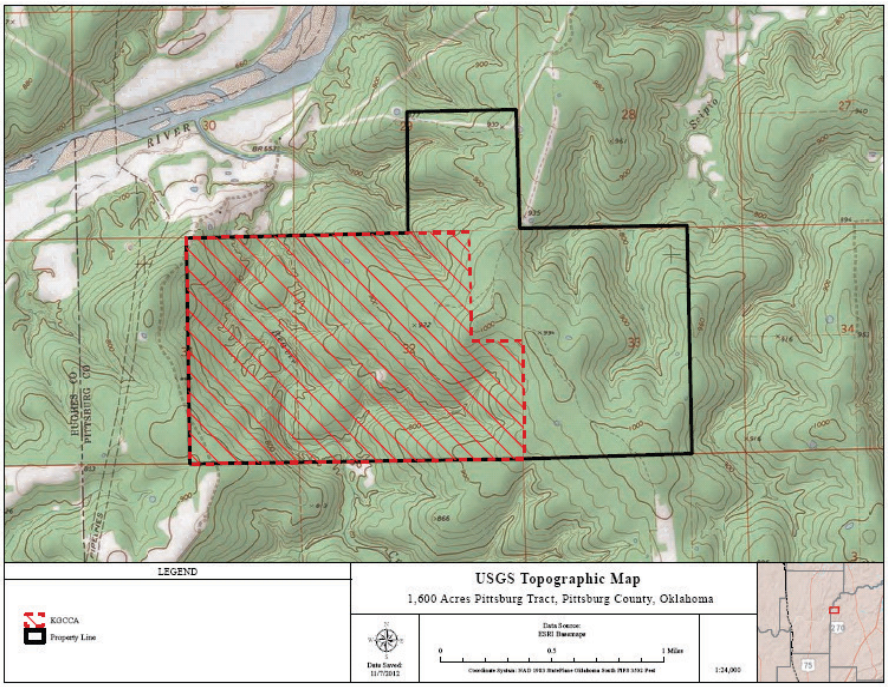
II. Keystone McAlester Conservation Area Project Description

Project proponents, Common Ground Capital, LLC (CGC) and WLLL, LLC (WLLL) are developing a combined 1,600 acre American Burying Beetle (ABB) Permitee Responsible Conservation Plan and conservation bank northwest of McAlester, Pittsburg County, Oklahoma. The project names for the two parcels are the "Keystone McAlester Conservation Area" (KMCA) and "American Burying Beetle Conservation Bank" (ABBCB).

Both properties will be owned and managed by a dedicated project company, American Burying Beetle Conservation Bank, LLC (ABBCB). ABBCB will be jointly owned by CGC and WLLL and WLLL will be responsible for the management of the property going forward. 876 acres will constitute the KMCA and be dedicated to mitigate ABB habitat impacts for the Oklahoma portion of Keystone's Gulf Coast Pipe Line Project. ABBCB will host what is expected to be the first ABB Conservation Bank in the United States and the first conservation bank of any species in Oklahoma with a size of 724 acres. This conservation bank will be approved through a separate USFWS approval process from the Keystone McAlester Conservation Area. Keystone will retain a right of first refusal on 200 credits of the conservation bank's ABB credits once approval is granted by the United States Fish & Wildlife Service (USFWS). The balance of the credits will be sold by ABBCB to interested parties developing projects within the ABB Consultation Range in the State of Oklahoma. The financial assurances provided by Keystone will be adequate to insure KMCA's long term success, even if ABBCB were to fail as a conservation bank in the future.



Map 1: General location of 1,600 acre tract in relation to Gulf Coast Pipe Line



Map 2: 1,600 Acre tract property boundaries with Keystone 876 Acre Parcel hatched in red

Project Attributes

The KMCA offers several attractive features that will be beneficial to ABB conservation efforts including:

*Significant landscape scale species habitat contributor: As part of a 1,600 acre project, the KMCA mitigation tract is more than 60% larger than the USFWS' minimum 500 acre parcel size. The tract is located approximately ten miles from the McAlester Army Ammunition Plant (MAAP), a 44,913 acre facility known to have significant and viable populations of American Burying Beetles. The majority of the landscape in between KMCA and the MAAP is undeveloped and likely to remain rural in nature for years to come. Less than a mile to the North of KMCA is the Canadian River which provides a long term water source in the area. Within 50 miles of KMCA is an additional 193,949 acres of land managed by the state, federal government, and as land trusts.

*Ancillary benefits to other ecosystem functions: The 876 acre tract will also provide a valuable corridor to many other wildlife species in the area that provide conventional and unconventional value to the State of Oklahoma. Recreational hunting is a valuable economic driver in the area and assistance with sustaining a protected landscape will ensure that many future generations of hunters will continue to frequent the area and enjoy the benefit this tract of land will provide wildlife populations. Unconventional

benefits will also be realized: Watershed protection in general will benefit and potential new ecosystem service markets from surrounding properties could be realized in the future.

*Creates a high standard for future ABB Conservation Actions: Whether for future ABB permittee responsible projects or conservation banks, the USFWS will be able to encourage other parties to pursue activities that have the best potential for delivering net conservation benefits to the ABB.

*Conservation Project/Bank is close to the impact location: The boundary of the 876 acre tract is less than 20 miles from the Keystone Gulf Coast Pipe Line project. The total distance that the Keystone Pipeline traverses the ABB Conservation Priority Area is 84 miles.

*Positive presence/absence studies: The successful location of multiple ABB's on the 8761,600 acre tract provided an important data point confirming that ABB's are still present in this part of Oklahoma. This data point combined with the fact that many surveys with densities near or above the minimum for establishment of a beetle bank nearby (e.g., within 4 km) shows potential for colonization from nearby sources. Therefore, this site is very likely to be part of the larger regional population of ABB.

*Met all seven of the minimum requirements of the American Burying Beetle Conservation Banking Criteria (August 13, 2012 Version)

*Low traditional development threats: Beyond some oil & gas exploration and pipeline activity in the area, due to its extremely remote location, conventional real estate development threats are very low. Future development of the mineral estate will require USFWS Section 7 or Section 10 consultation process, which will reduce impacts of this development and require increased mitigation associated with impacts occurring within an established mitigation area.

*Highly qualified project proponents: In addition to having strong reputations as responsible energy developers in their previous careers, the principals of CGC and WLLL have been able to transfer their multiple decades long commercial experience in both the traditional and the renewable energy exploration field to wetlands banking and now the conservation banking industry. This unique skill set will help insure conservation solutions will achieve both the species biological and the industry's commercial needs will be successfully addressed in the requisite definitive agreements to consummate the transaction.

Picture 1: American Burying Beetles Discovered on Project Site, September 10, 2012

III. Project Goals

Working with Keystone, the project proponents believe they have achieved several important goals for the KMCA project:

1. Met all of the USFWS American Burying Beetle (ABB) Conservation Banking Criteria (August 13 draft).

2. Working closely with USFWS, select a 1,600 acre tract that met the needs of Keystone's permittee responsible conservation project to mitigate the possible impacts to ABB habitat from the Gulf Coast Pipe Line Project and successfully secure an incidental take permit. In parallel, work with USFWS to select a site that is scalable beyond Keystone's needs and can achieve best in class conservation bank stature in Oklahoma that will serve future demand for ABB species credits.

3. Select a site that encompass both the quantifiable biological objectives as well as other qualitative benefits that will enable Keystone, USFWS, CGC/WLLL and future partners (research interests, Oklahoma Department of Wildlife Conservation, etc.) to achieve a best in class conservation outcome for the American Burying Beetle and its habitat which will provide a net conservation benefit to the species and realize a workable commercial structure for development interests.

4. Successfully identify and secured a site where the landowner is either willing to sell their property or enter into a long term conservation easement.

5. Create and adequately fund a long term management plan that will both implement known actions that will benefit the ABB and its habitat, such as prescribed fire, and carefully investigate via research partnerships for other contemplated management

activities prior to full scale implementation in order to achieve the best long term conservation success for KMCA.

IV. Insurance

Comprehensive general liability insurance will be put in place for the property with aggregate coverage up to $1,000,000. In addition to this policy all contractors on the property will be required to demonstrate proof of insurance prior to commencing activities.

V. Conservation Easement Strategy

The project proponents, in collaboration with Keystone, have selected a non-governmental land trust entity active in the State of Oklahoma to hold the conservation easement for both KMCA and ABBCB in perpetuity. A portion of the non-wasting endowment used to execute the management plan of the property will be set aside to create a smaller endowment which will be adequate to reimburse the land trusts annual expenses to insure compliance with the terms and conditions of the conservation easement.

VI. BIOLOGICAL RESOURCES ASSESSMENT

CONTAINING ENDANGERED SPECIES HABITAT ASSESSMENT

BIOLOGICAL RESOURCES ASSESSMENT

FOR THE KEYSTONE MCALESTER CONSERVATION AREA

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1.0 INTRODUCTION

The Keystone McAlester Conservation Area (KMCA) is an 876 acre parcel dedicated to mitigating impacts to the endangered American burying beetle (*Nicrophorus americanus*) for the Oklahoma portion of Keystone's Gulf Coast Pipe Line Project. The balance of the total 1,600 acre property is an additional 724 acre parcel which is expected to be the first American burying beetle conservation bank in the United States and the first conservation bank of any species in Oklahoma.

The KMCA and the adjacent 724 acre American Burying Beetle Conservation Bank (ABBCB) meets the requirements for an American burying beetle conservation bank as outlined by the USFWS (USFWS 2012a). The area is within the USFWS designated American burying beetle Conservation Priority Area. It meets the minimum requirement of 500 acres of contiguous suitable habitat achieving the 95% threshold suitable habitat threshold. American burying beetles are historically known to occur on the 1,600 acre property and within the general vicinity. A current (September 2012) survey confirmed the presence of ABBs on the 876 acre KMCA and exceeded USFWS's ABB density requirements.

The KMCA is within 10 miles of the McAlester Army Ammunitions Plant which contains 44,913 acres of native vegetation. Within 50 miles of KMCA is an additional 193,949 acres land managed by the state, federal government, and as land trusts. With the exception of KMCA, none of these areas are purposely managed for ABBs.

This Biological Resources Assessment describes the natural history of the American burying beetle (*Nicrophorus americanus*), its suitable habitats, and the results of habitat assessments for the KMCA area. The focus of this document is the KMCA, however much of the information presented here applies to the larger whole of 1,600 acre property as identified in subsequent figures.

2.0 NATURAL HISTORY

The American burying beetle, *Nicrophorus americanus* Olivier (Coleoptera, Silphidae) is the largest carrion beetle in North America. It was placed on the Endangered Species List in 1989 after it had declined to a mere 10% of its historical range (Federal Register 1989). Historically distributed throughout 35 states and several Canadian provinces, it is now only found in eight states: South Dakota, Nebraska, Kansas, Oklahoma, Arkansas, Texas, Rhode Island, and Massachusetts. A nonessential population was reintroduced in Missouri in 2012.

Figure 1. Female (left) and male (right) ABBs show sexual dimorphism. Photo by Lou Perrotti/Roger Williams Park Zoo.

The American burying beetle (ABB) measures from 25-35 mm in length and has distinct orange markings on their shiny black elytra, pronotum and frons. The orange mark on the pronotum is the distinguishing characteristic for *N. americanus* versus the other *Nicrophorus* species. The males and females can be distinguished by the triangular orange mark below the frons in females and the rectangular to trapezoidal orange mark in males (Figure 1). This species is nocturnal and requires night time temperatures above 60°F (15°C) for peak activity. This genus of carrion beetle is unique in its parental care of young in a non-social insect.

The endangered ABB is unusual among non-social insects in providing parental care of young. Male beetles search for a suitable carrion item using sensitive chemoreceptors on the antenna. When a male beetle locates a suitable carcass, he attracts females with pheromones. Competition with other ABBs and congeners occurs until one pair of beetles occupies the carcass, although evidence exists for intraspecific (Wilson and Fudge 1984, Scott and Williams 1993) and interspecific communal brooding (Smith and Clifford 2008a and 2008b).

Reproduction occurs between late April and mid-August depending on latitude (USFWS 1991). The carcass is typically buried during the first night, cleaned of fur or feathers, and coated with anal and oral secretions to retard decomposition (USFWS 1991). Eggs are laid in an escape tunnel near the carrion item. After hatching from the egg, the larvae will move into the chamber. Parents will provide food for larvae and defend them from predators and competitors (Eggert and Müller 1997; Eggert et al. 1998; Scott 1998).

Phonetic mites, *Poecilochirus carabi*, associated with Nicrophorine species in a commensalistic or mildly mutualistic relationship (Brown and Wilson 1992), appear to assist the brood rearing by eating bacteria and fly eggs which reduces competition for the carcass and decreases decomposition. The beetle transports the mites over large distances between carrion sources.

Nicrophorus larvae are able to self-feed upon hatching but are provided with predigested carrion by the parents (Featherston et al. 1990; Rauter and Moore 1999; Smiseth and Moore 2002; Smiseth et al. 2003). The larva of at least one *Nicrophorus* species (*N. vespilloides*), begs for food from the parents (Rauter and Moore 1999; Smiseth and Moore 2007). The begging behavior ceases after 72 hours of age (Smiseth et al. 2003).

Hatching is asynchronous resulting in large size variation within broods as larvae increase body mass rapidly within 24 hours after hatching (Smiseth et al. 2003). If the carcass is being consumed at a rate that will result in brood loss or if hatching is more successful than planned, the adults will cannibalize the larvae to reduce competition (Bartlett 1987, Trumbo 1990b). The male often leaves after the eggs hatch and the female leaves before the carcass is depleted (14-15 days) (Scott and Traniello 1990).

Larvae will move into the soil and pupate. New adults emerge approximately one month after carcass burial depending upon soil temperature. Adults will leave the soil to feed at night. The young of the year adults will overwinter and emerge the following spring to continue the cycle. ABBs are generally considered univoltine and live for one year (Bedick et al. 1999).

3.0 REASONS FOR ENDANGERED STATUS

Research on the ABB has been carried out since it was listed as endangered in 1989 but there still remains much speculation as to the proximate cause(s) of the 90% decline in this species range (Lomolino and Creighton 1996). Among the numerous hypotheses proposed to explain the decline of the ABB are: habitat alteration, competition with vertebrates, competition with congeners, lack of appropriately sized carcasses for feeding and reproduction, use of pesticides and rodenticides, light pollution, and pathogens (Sikes and Raithel 2002 and citations within). As noted by Jurzenski (2012)

"There are limitations to these generalizations because they seek to explain the decline of ABBs as a large-scale event rather than localized events accumulating".

4.0 SUITABLE HABITAT

No critical habitat has been established for the ABB by the USFWS. Identifying the specific habitat requirements of ABBs has been difficult because of its unusual life history and ecology. Researchers have been able to lure ABBs into a variety of native vegetative habitats during survey efforts. ABBs can utilize either forests or grasslands and gradients between. ABBs are mobile and individual beetles have been documented to move between habitats and travel an average of 1.23 km per night (Creighton and Schnell 1998). Given the known distributions of ABBs in the varied ecoregions of Nebraska, Oklahoma, and Rhode Island, it is apparent that ABBs do not have specific habitat requirements that are consistent across its entire known range and that ABBs have a wider niche than many other similar species (Jurzenski 2012). At best, we know what habitats ABBs avoid. These are wetlands, impervious surfaces, row crops, or areas mowed two or more times per year (USFWS 2012a).

While no specific habitat requirements has been established for the ABB throughout their range, environmental variables have been identified that support populations. These include carrion for feeding and suitable carcasses for reproduction, adequate soils for carcass burial, and the presence of fire to maintain diverse habitats.

4.1 CARRION RESOURCES

The ABB uses carrion for feeding and suitable sized carcasses for successful reproduction. Carrion is a temporally and spatially unpredictable resource. The large size of ABB enables them to use larger carcasses for reproduction (80-374 g) (Kozol et al 1988, Trumbo 1992, Lomolino and Creighton 1996) than other burying beetle species which reduces competition with congeners. However ABBs are hypothesized to travel greater distances to find a suitable carcass, therefore expending more energy. Smith and Merrick (2001) estimated the populations of *Nicrophorous investigator* and mammal biomass and found that the mammal biomass used by the beetle in one year correlated significantly with the beetle population the following year. Holloway and Schnell (1997) observed that ABBs occurred in areas that had carrion for breeding and suitable soils irrespective of the predominant habitat. Not only are carcasses key for fecundity, but overwintering survival of ABBs increases if provisioned with a food source regardless of habitat (Schnell et al. 2008). Many birds and mammals of suitable size have declined (Sikes and Raithel 2001) making this resource even more temporally and spatially unpredictable.

4.2 SUITABLE SOILS

The ABBs exhibit soil preferences for reproduction. In a study in Nebraska by Bishop et al. (2002) *Nicrophorus* spp. were more abundant in undeveloped riparian areas with alluvial soils. Reproductive studies at Camp Gruber indicate that ABBs show site preferences for reproduction. Burial of carcasses was higher at sites with lower soil compaction and clay content in studies at Camp Gruber (Smith and Clifford 2008a) and Cherokee Wildlife Management Area(2008b). Trapping success of ABBs at Fort Chaffee (Arkansas) varied with soil characteristics. ABBs tended to avoid soils with less than 40% sand,

greater than 50% silt, and more than 20% clay (Lomolino et al. 1995). Sandy loam or silt loam soils therefore should be considered a key factor of suitable habitat (USFWS 1991).

4.3 PRESCRIBED FIRE

Fire has successfully been used to manage for diversity of habitats and subsequently small game that would provide carcasses for ABBs. The area with the highest concentration of ABBs in Oklahoma is Camp Gruber in Muskogee County which has had surveyed ABB populations since 1993. Camp Gruber contains 32,000 acres of cross-timber habitat with a mosaic of oak-hickory forests and tallgrass prairie. The area is maintained through prescribed fire which results in a lower basal area than other forested habitats in Oklahoma where fire is suppressed (USFWS 2008). Prescribed fire has been used as a management tool to increase game such as quail, turkey and prairie chickens (MDC 2003, Dailey and Hutton 2007, OCES). The number of acres burned in a year should be limited to no more than 40% of the total area so it does not result in a reduction of ABBs (USFWS 2012a).

5.0 REDUCTION OF THREATS

In addition to providing suitable habitat, threats to ABBs should be reduced at every opportunity to protect the population. Threats include multiple factors that will probably not be eliminated but may be controlled so the local effects do not accumulate. Identified threats include competition and predation by vertebrate scavengers; red imported fire ants (*Solenopsis invicta*); soil disturbance; fragmentation of habitats that can lead to increased vertebrate scavengers; clear cutting; and invasive species such as *Serecia lespedeza*.

5.1 COMPETITION AND PREDATION BY VERTEBRATE SCAVENGERS

Competition with vertebrate scavengers for carcasses results in the reduction of food availability and carcasses for reproduction. In at least one case, vertebrates (opossums and frogs) have taken the opportunity to feed on ABBs themselves (Jurzenski and Hoback 2011). The impact of vertebrate scavengers is substantial. In a study in South Carolina, vertebrate scavengers removed 35% of carcasses over a year. Scavenged carcasses were removed 2.58 days after placement on average. In forested patches surrounded by agriculture, vertebrates removed 88% of carcasses within two weeks of placement (DeVault et al. 2004). When vertebrate competition is reduced, ABBs have been successful (Raithel 2002, Smith 2009) as is the case of the ABB population on Block Island, RI where there are very few vertebrates that compete with ABBs for carrion. It is recommended that top predators be encouraged in the area to control vertebrate scavengers. If vertebrate scavengers become overpopulated, then harvesting will be used as part of a research opportunity.

5.2 RED IMPORTED FIRE ANTS

Red imported fire ants (RIFA) are an aggressive communal species that have extended their range into Oklahoma. Scott et al. (1987) noted that ants function as competitors of burying beetles for carcasses. Ants have recruitment systems that allow them to quickly arrive at a carcass and defend it. RIFA have the ability to not only swarm a carcass, but cause burying beetle mortality (Warriner 2004). RIFA may

also reduce ground nesting populations of vertebrates in an area (Vinson and Sorenson 1986 in USFWS 2008).

Infestations of RIFA are not homogeneous but occur more frequently in open, disturbed habitats. Mature oak-hickory and pine forests are thought to have relatively low densities of fire ants. The presence of RIFA has been associated with the collapse of ABBs at Weyerhaeuser HCP Area in McCurtain County, Oklahoma and Little River County, Arkansas. Schnell et al. (2006) proposed that RIFA may compete with ABBs for carrion resources. Expansion of RIFA is likely. Areas should be surveyed and treated accordingly as noted in the Management Plan. All possible efforts should be made to revegetate disturbed areas to discourage RIFA establishment. Disturbance of additional areas should be avoided to further discourage establishment of RIFAs.

5.3 SOIL DISTURBANCE

Soil disturbance may result in direct and indirect mortality of ABBs. Direct mortality to eggs, larvae, pupae and adults may occur when soil is disturbed. Indirect mortality may occur by changing soil moisture. Burying beetles are sensitive to soil moisture and die quickly when soil moisture is low (Bedick et al. 2006). Soil disturbance may also increase the suitability of the area for RIFA as noted above. All possible effort should be made to re-vegetate disturbed areas with native species to discourage RIFA establishment. Disturbance of additional areas should be avoided.

5.4 FRAGMENTATION

Bedick et al. (1999) examined the Gothenburg, Nebraska population of ABBs and found few ABBs in disturbed and fragmented habitats. Creighton et al. (2009) found that ABBs declined significantly at sites after forest removal, but did not change in adjacent forested plots. Since ABBs are found in open areas, they concluded that the disturbance of sites, not necessarily forest loss was the likely factor in ABB decline.

Possible reasons for the decline of ABBs in fragmented areas may be carcass availability, increased number of scavengers, and a change in microclimate. Gibbs and Stanton (2001) noted that fragmentation was related to reductions in the bird and mammal populations and reduced recruitment of carcasses. Scavengers competing with burying beetles for available carcasses increase with increases in edge habitat (Ratcliffe 1996, Trumbo and Bloch 2000).

Fragmentation changes the microhabitat in forest fragments (Didham et al.. 1997), which results in warmer, drier conditions that increase fly development and abundance. Increased fly development increases the potential competitive impact of flies on ABBs. The phoretic mites carried by ABBs reduce competition between ABBs and flies by feeding on fly eggs and the mites are of limited use if the fly eggs have already hatched (Trumbo 1990). Gibbs and Stanton (2001) found flies were 1.5 times more abundant in fragmented areas than contiguous forests. Flies in warmer areas may be problematic because they find carcasses faster (within the hour) (Nabaglo 1971 and Putnam 1983 in Trumbo 1990).

Warmer, drier conditions may also increase mortality of ABBs. *N. marginatus* lost 1-5% of body mass per hour in low humidity conditions (25%-30%) depending upon temperature. This resulted in 50%

mortality within 7-16 hours at temperatures between 16-28 °C. Beetles readily drink so those with water or high humidity conditions have near zero mortality (Bedick et al. 2006).

Habitat fragmentation likely negatively affects ABBs. Fragmentation may decrease carcass availability and increase competition with vertebrate scavengers and invertebrates. Changes in the microhabitat along edges likely intensify this by increasing flies and reducing humidity. All of these factors could result in reduced reproductive success and therefore reduce populations of ABBs.

5.5 CLEAR CUTTING

ABBs have exhibited significant avoidance of clear cuts (Lomolino and Creighton 1996) in the Tiak District of the Ouachita National Forest. Creighton et al. (2009) also found a significant decline in ABBs trapped in areas of forest removal, but ABB trapping densities did not change in nearby controls. While forest harvest should be considered a management tool, clear cutting will be avoided .

6.0 SITE DESCRIPTION

The Keystone McAlester Conservation Area (KMCA) is an 876 acre parcel located northwest of McAlester, Oklahoma in the southeast ¼ of Section 29, the east ½ of Section 31, the entirely of Section 32, and the west ¾ of Section 33, Township 7 North, Range 12 East. It is found within the United States Geological Survey (USGS) 7.5 minute series Wetumka southeast, Oklahoma topographic quadrangle map.

The KMCA is dominated by savanna. Savanna was defined as areas of open tree cover between 10-50% identified by reviewing aerial imagery, satellite imagery, land use/land cover data, and field observations. The KMCA is located within the Arkansas Valley's Lower Canadian Hills ecoregion (Figure 2). The Lower Canadian Hills are a mosaic of hills and valleys with ridges scattered throughout.

Typically there are 215 to 235 frost-free days each year. Annual rainfall is typically 41-46 inches. This supports a wide variety of natural vegetation including cross-timbers, tallgrass prairie, and a mosaic of the two (Woods et al. 2005). The dominant vegetation on the KMCA is post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*), and big bluestem (*Andropogon gerardii*). Shortleaf pine (*Pinus echinata*) stands occur mainly on the eastern half of the site. Eastern red cedars (*Juniperus virginiana*) also occur on the site.

The geologic formation of the area occurred during the Quaternary Period. Most of the area is underlain by Pennsylvanian-age shale and sandstone (Woods et al 2005). Soils on the site are mainly (≥90%) Bengal-Clebit-Clearview Complex of stony fine sandy loam (NRCS Web Soil Survey, Appendix A).

7.0 ENDANGERED SPECIES HABITAT ASSESSMENT

7.1 GENERAL INFORMATION

PROJECT NAME:	Keystone McAlester Conservation Area
COUNTY:	Pittsburg County, Oklahoma
PARCEL SIZE:	876 acres
SUBJECT SPECIES:	American burying beetle (*Nicrophorus americanus* Olivier)
SUITABLE HABITAT AREA:	865 acres is suitable habitat as defined in Biological Resources Assessment (4.0).
SURVEY PERSONNEL:	Amy Smith, PhD
SURVEY DATES:	August 24 and September 9-11, 21 of 2012
TOTAL SURVEY TIME:	>14 person hours in the field
NUMBER OF VISITS:	5

7.2 HABITAT ASSESSMENT

The KMCA is located northwest of McAlester, Oklahoma in Pittsburg County. It is within 10 miles of the McAlester Army Ammunitions Plant which contains 44,913 acres of native vegetation. The Canadian River is northwest of KMCA.

7.2.1 METHODS

The extent of suitable habitat for the ABB within the subject property was identified by reviewing aerial imagery, satellite imagery, land use/land cover data and field observations. The Natural Resources Conservation Service Web Soil Survey was used to determine the presence of suitable soils (Appendix A). Surveys were completed to determine trapping densities of ABBs using the 5-gallon above ground trapping method outlined in the "Draft American burying beetle *Nicrophorus americanus* range wide survey guidance updated 4/20/2012" (USFWS 2012b).

Over 14 person field hours were spent visually observing habitat conditions along roadways and at ABB survey sites. Notes on vegetative species composition, small game diversity, and signs of vertebrate scavengers, feral hogs, and red imported fire ants were made. Systematic surveys of the area have not been completed, with the exception of ABB surveys.

7.2.2 DATA REVIEW

Terrain within KMCA is generally hilly with a large ridge along the eastern boundary (Figure 3). Elevations vary from approximately 795-905 ft. above sea level. Geology on the area is composed predominantly of the Bengal-Clebit-Clearview Complex with 5-30% slopes. The ecological site is sandy savanna with stony fine sandy loam.

Geology near Beaver Creek is Rexor and Verdigris soils that are subject to frequent flooding. Larton and Larton-Glenpool complex are found in the riparian zone. These are loamy sand soils. Soil types and distribution are described further in Appendix A produced using the Natural Resource Conservation Service Web Soil Survey.

Delineation of the area using aerial imagery, satellite imagery, landcover data, and GIS determined that the KMCA contains 93% savanna and pine forest. Open areas comprise 3%. Rights of way (ROW) comprise an additional 3%. Roads, water resources, and well pads comprise 1% (Figure 4). The area is currently used for hunting.

7.2.3 FIELD OBSERVATIONS

Field visits confirmed that KMCA is dominated by savanna areas containing native vegetation (Figures 5a, b, and c). Savanna areas are dominated by post oak, blackjack oak, and bluestem. There are some stands of shortleaf pine which are mainly found in the eastern half of the 1,600 acre area. Red cedars occur but are infrequent.

Open areas occur in patches, presumably for the establishment of food plots. Roads and right of ways occur on KMCA. Roads have been recently graded. One right of way was established within the past growing season. Vegetation within open areas and right of ways is a mix of Bermuda grass (*Cynodon dactylon*), rye (*Secale cereale*), arrow leaf clover (*Trifolium vesiculosum*), and crimson clover (*Trifolium incarnatum*). Invasive species were not observed.

Numerous cut and/or burned stumps were observed of various ages, indicating the area has been burned frequently in the recent past. Landcover maps confirmed that as much as 84% of KMCA has been burned. Much of the oak and pine were mature, mid-aged growth.

Multiple brush piles lie along clearings. These would provide cover for rodents and other vertebrates, many of which would be food sources for ABBs.

Water resources on the area are limited to Beaver Creek in the southwest portion of KMCA and multiple isolated ponds (Figure 4). Ponds viewed from the road were clearly developed for wildlife and or historical cattle use. Ponds had gentle slopes. Many were overgrown with cattails (*Typha spp.)* and other aquatic vegetation.

A variety of small game was observed during site visits including gray and fox squirrels (*Sciurus carolinensis* and *S. niger* respectively), cottontail rabbit (*Sylvilagus floridanus*), mourning doves (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*). Songbirds were notably prevalent on the site. Those positively identified included the cardinal (*Cardinalis cardinalis*), bluejay (*Cyanocitta cristata*), eastern

bluebird (*Sialia sialis*), and northern mockingbird (*Mimus polyglottos*). Other songbird species were observed visually or by song, but were not positively identified.

Red imported fire ants (RIFA) were not observed on KMCA area during ABB surveys. No RIFA mounds were noted along roads or elsewhere on the property during site visits.

Three abandoned natural gas wells exist on the property. The minerals on the KMCA property are leased so there is a threat of additional oil and gas activity. Future development of minerals may require USFWS Section 7 or Section 10 consultation, which will likely reduce impacts of this development and require increased mitigation.

7.2.4 HABITAT DELINEATION

Based on reviews of aerial imagery, satellite imagery, land use/land cover data and field observations the 876 acre KMCA meets the 95% (865 acres) suitable habitat requirement as defined in section 4.0. Delineation of the area using aerial imagery, satellite imagery, landcover data, and GIS determined that the KMCA contains 93% savanna and pine forest. Open areas (grasslands and other native vegetation) comprise 3%. Rights of way (ROW) comprise an additional 3%. Currently ROW are not native vegetation and will be reseeded as part of management in the first year (2013) to make the area suitable for ABBs. Roads, water resources, and well pads comprise 1% (Figure 4). The area is currently used for hunting. Approximately 90% of the 1,600 acre property was burned during a wildfire between March 11 and April 12, 2011 (Figure 6). Photographic examples of these can be found in figures 5a, b, and c.

Delineation of landcover based on GIS analysis concluded that <1% of the area is in water. Visual observations concluded that water resources do occur on the area. Beaver Creek runs along the western half of the area. Wildlife ponds occur as well. Scipio Creek lies to the east and the Canadian River lies to the northwest of KMCA.

The soil survey produced using the Natural Resource Conservation Service Web Soil Survey (Appendix A) indicated that over 90% of soils are a variety of sandy loam. This meets the USFWS requirement that the area contain sandy loam soils. Soils may be field tested to confirm this if required.

7.2.5 SURVEY RESULTS

Presence/absence surveys for ABBs were completed in September following USFWS protocols (USFWS 2012b). Traps were deployed on September 9 and checked daily through September 11, 2012. During the two trapping nights, four ABBs (1 male and 3 female) were trapped at one of three sites. This exceeded the USFWS density requirement of 0.637 beetles per trap night or 2 beetles per 3 trap nights for the 0.5 mile trapping radius area.

An impressive diversity of other burying beetles (*Nicrophorus spp*.) was noted during surveys. The diversity exceeded that typically noted at Camp Gruber which has the largest concentration of ABBs in Oklahoma.

Drought conditions likely reduced ABB captures across the state. It is expected that ABBs would be found in other areas of the property with additional trapping and suitable weather conditions. Historical surveys for ABBs associated with oil and gas activity have confirmed that ABBs have been known to exist in the area (personal communication with USWS).

8.0 CONCLUSIONS

The 1,600 acre property which includes the 876 acre KMCA parcel and the adjacent 724 acre American Burying Beetle Conservation Bank (ABBCB) parcel meets the requirements for an American burying beetle conservation bank as outlined by the USFWS (USFWS 2012a). The area is within the USFWS designated American burying beetle Conservation Priority Area. It meets the minimum requirement of 500 acres of contiguous suitable habitat. It contains 95% of suitable ABB habitat. ABBs are historically known to occur on KMCA and within the general vicinity. A current (September 2012) survey confirmed the presence of ABBs on the1,600 acre property and exceeded USFWS's ABB density requirements.

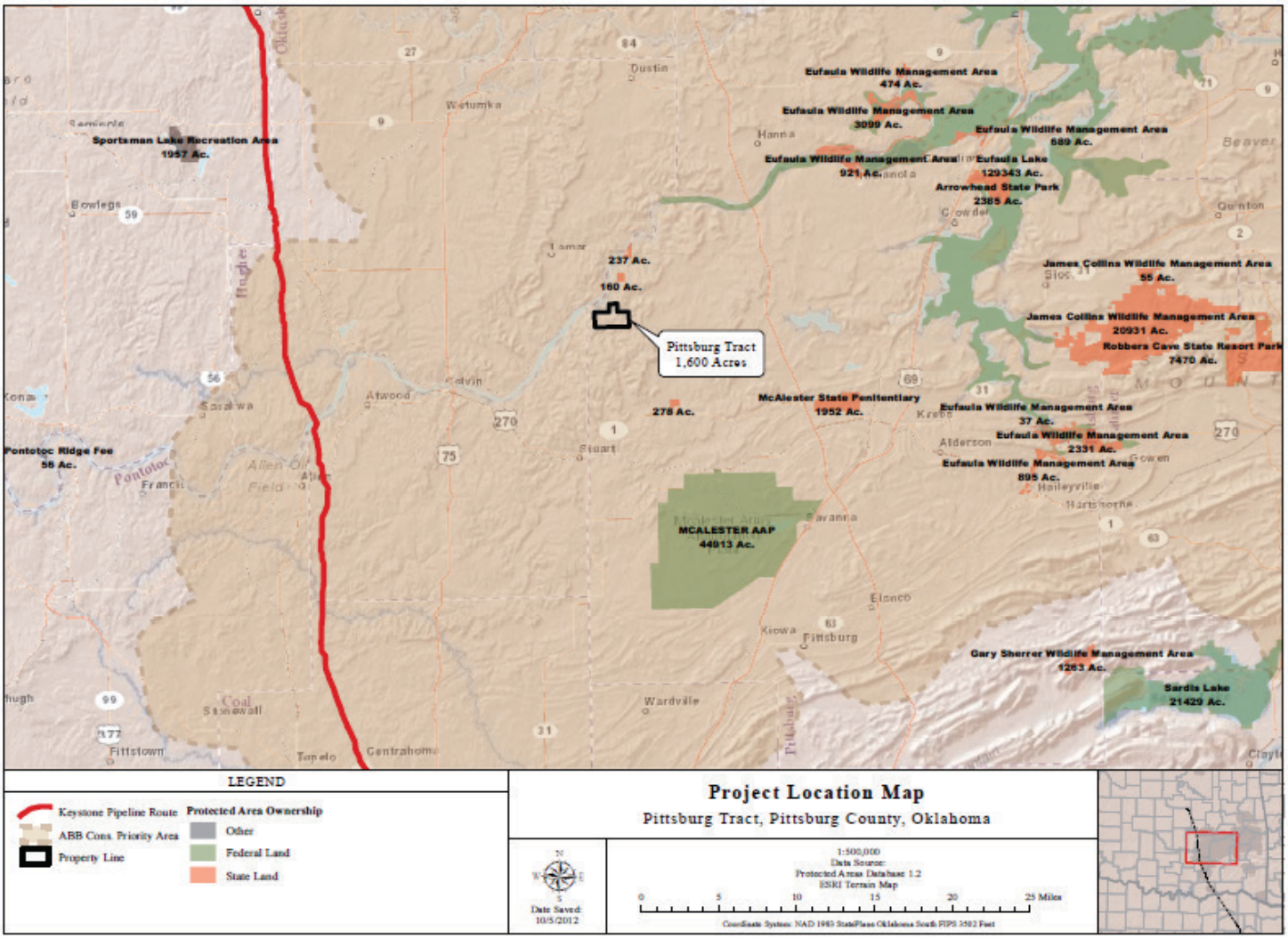

Figure 2. The 876 acre KMCA and adjacent 724 acre ABBCB parcel (Pittsburg Tract on map) is located in Pittsburg County, Oklahoma. Numerous protected areas exist in the vicinity including the McAlester Area Ammunition Plant, state and federally managed lands. Only the KMCA and the ABBCB (1,600 total acres) specifically protects and is managed for ABBs.

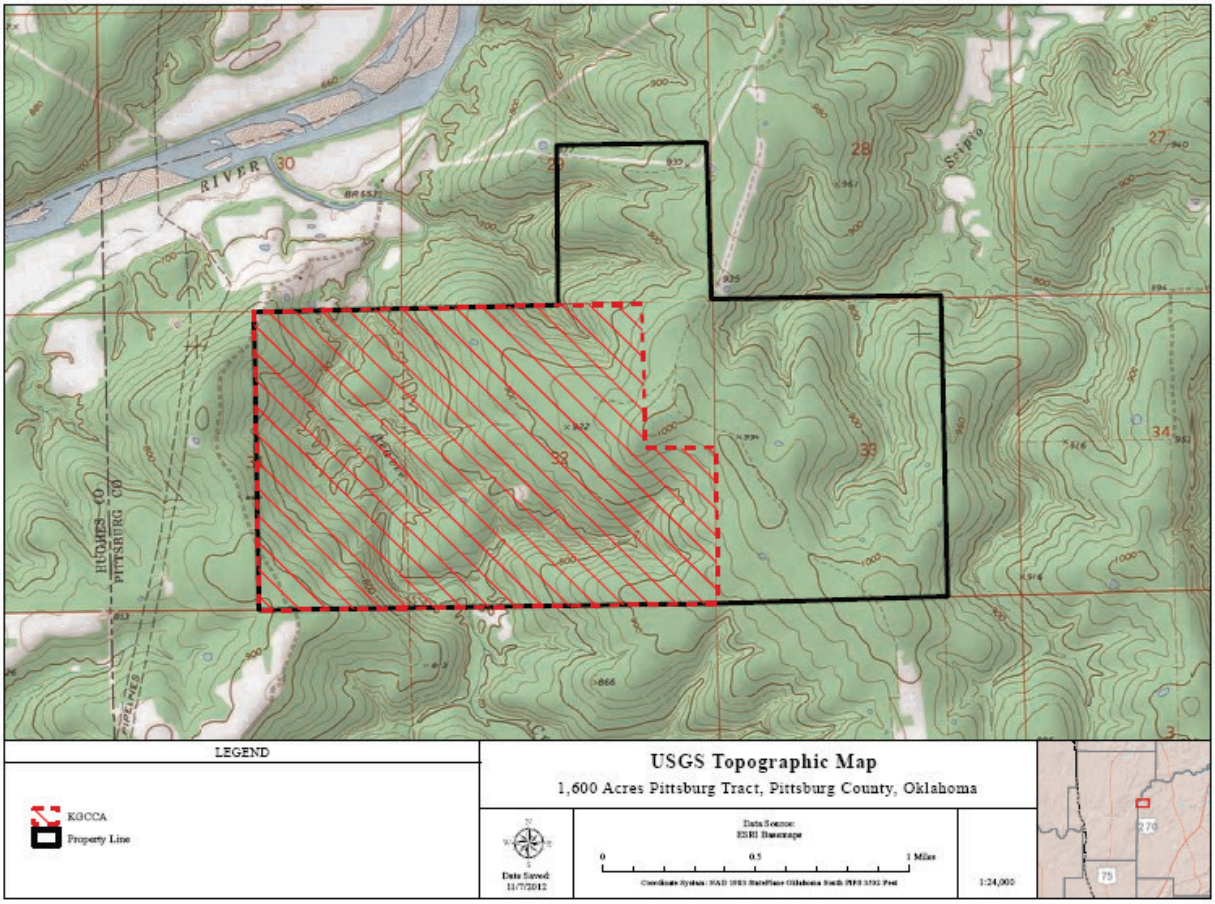

Figure 3. The KMCA (in red) and 724 acre ABBCB tract (1,600 total acres) is hilly with a ridge that bisects the 1,600 acres. Numerous water sources are near by. The Canadian River is northwest. Beaver Creek runs through the property and Scipio Creek is located to the east.

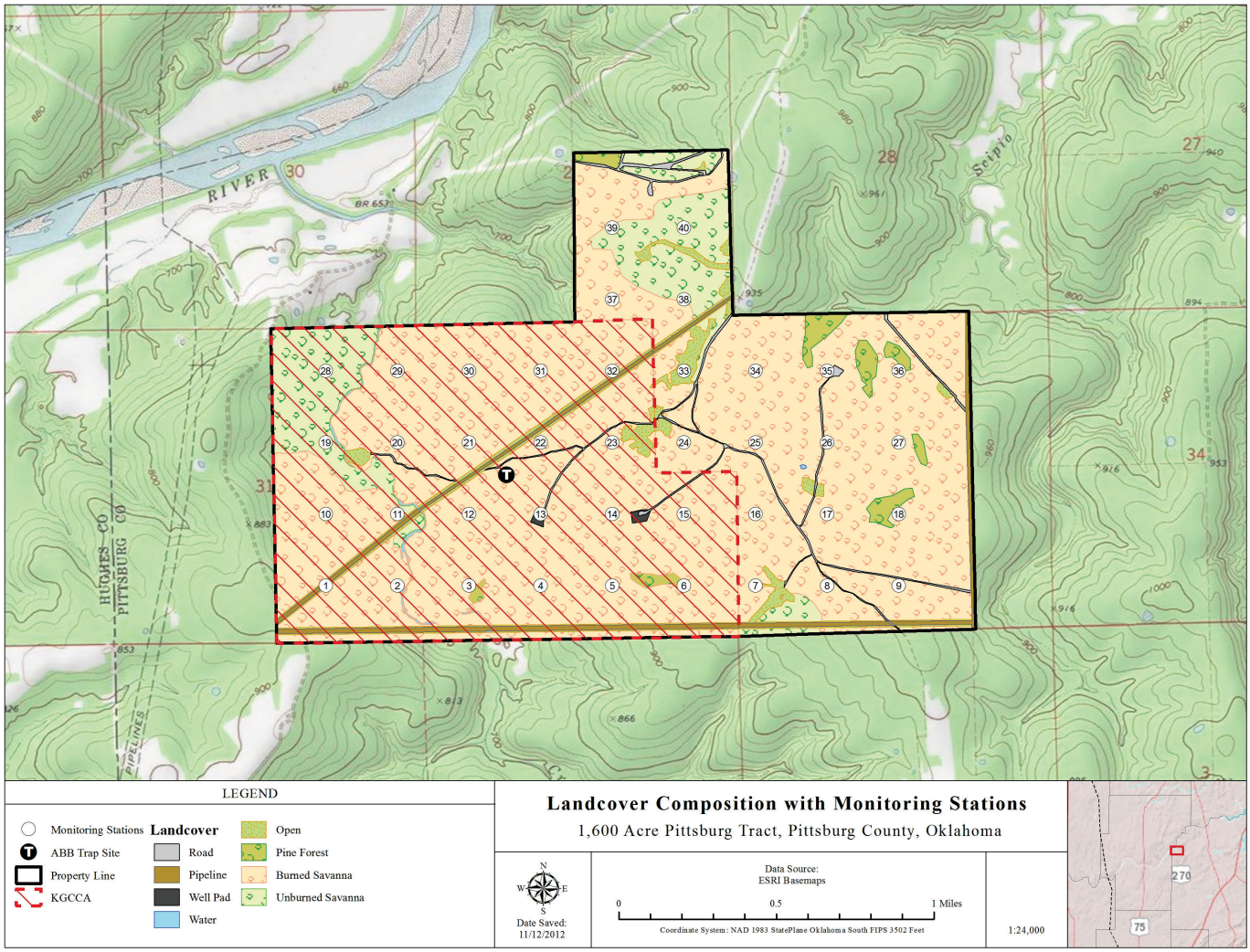

Figure 4. The area was delineated using the most recent satellite imagery, landcover maps, and GIS. The legend applies to the entire 1,600 acre area which is dominated by savanna. KMCA contains 93% savanna and pine forest. Open areas comprise 3%. Rights of way (ROW) comprise an additional 3%. Roads, water resources, and well pads comprise 1%.

Figure 5a. Savanna areas are dominated by oak trees with native grasses.

Figure 5b. Open areas form a mosaic with savanna and shortleaf pine stands.

Figure 5c. Right of ways exist on the property and provide additional habitats.

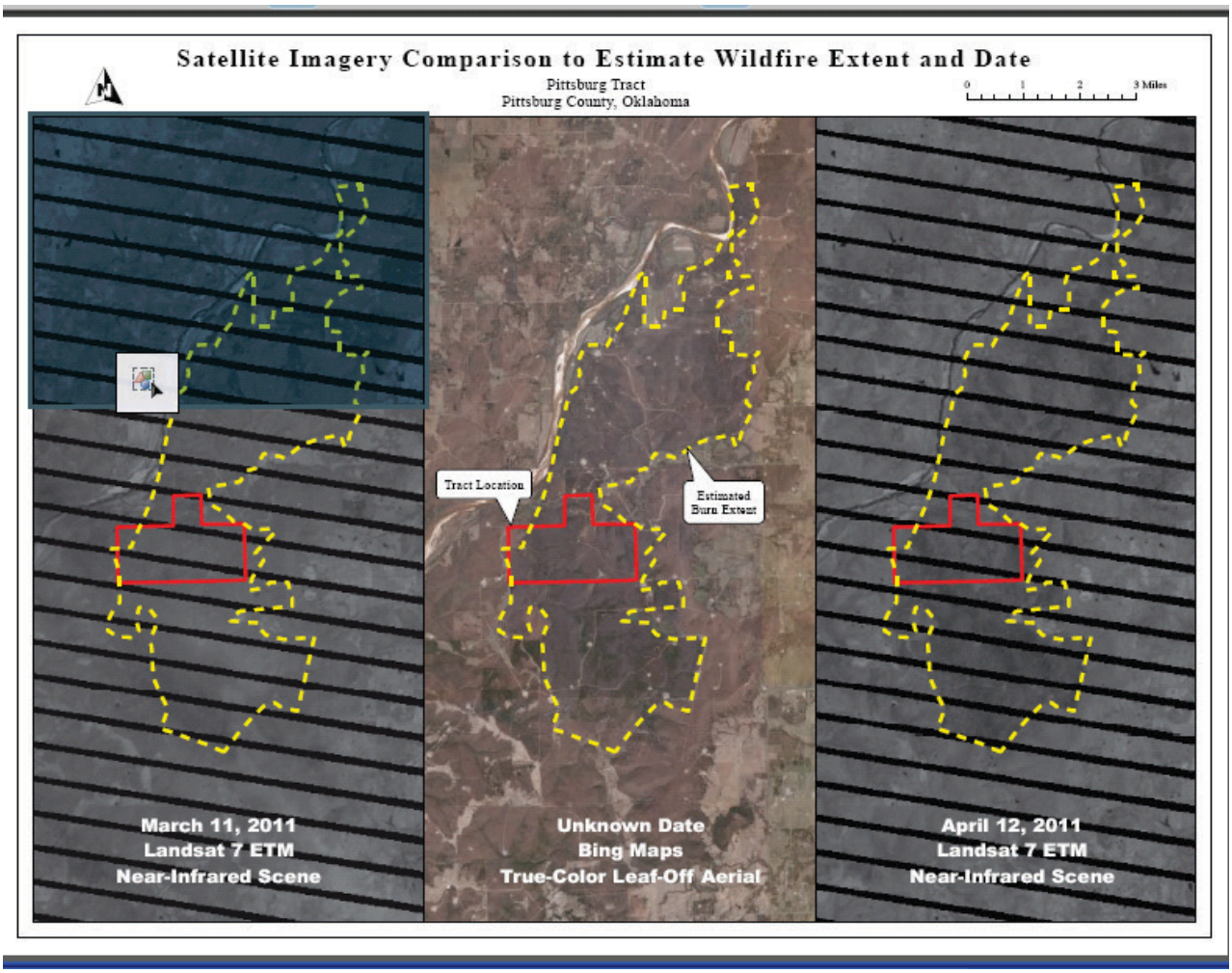

Figure 6. Satellite imagery documenting wildfire that occurred around March 2011 which burned almost the entire property.

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APPENDIX A

CUSTOM SOIL RESOURCE REPORT FOR PITTSBURG COUNTY, OKLAHOMA

PITTSBURG TRACT

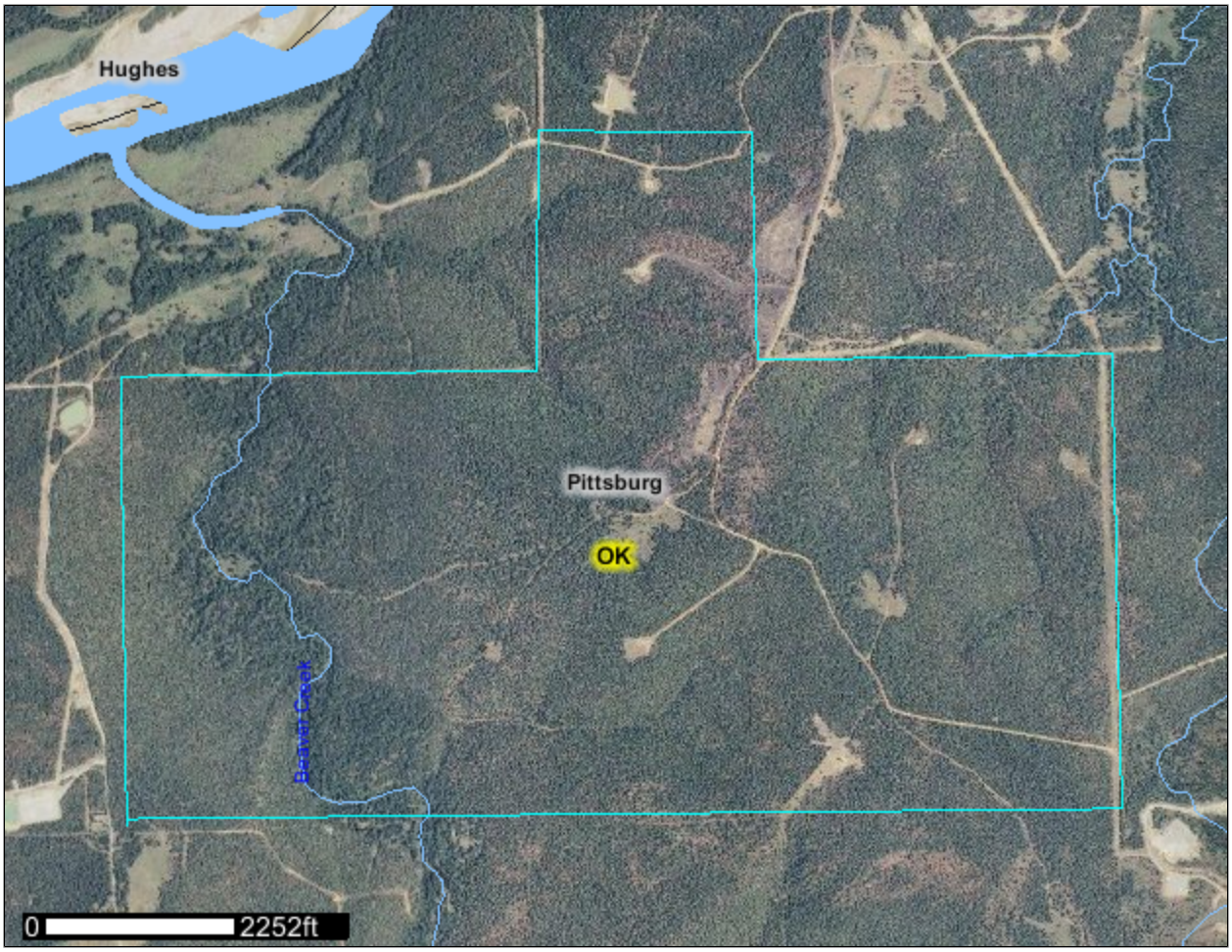
United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pittsburg County, Oklahoma

Pittsburg Tract



October 4, 2012

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

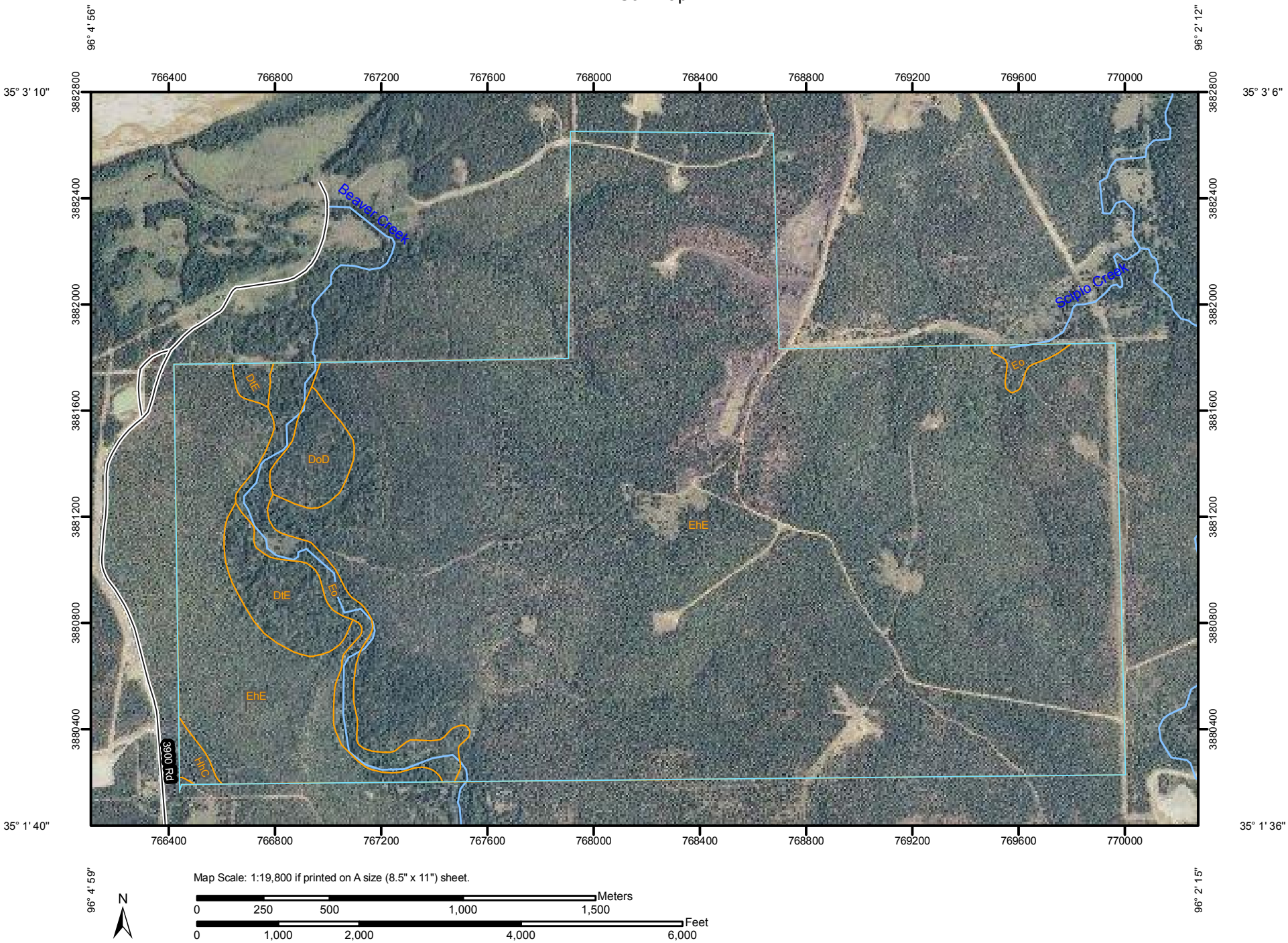
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Gully

Short Steep Slope

Other

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:19,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 6, Sep 16, 2008

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Pittsburg County, Oklahoma (OK121)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
DoD	Larton loamy fine sand, 3 to 8 percent slopes	21.8	1.4%
DtE	Larton-Glenpool complex, 8 to 20 percent slopes	36.7	2.3%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	1,450.6	92.7%
Eo	Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded	51.5	3.3%
HhC	Clebit-Clearview complex, 3 to 5 percent slopes	5.0	0.3%
Totals for Area of Interest		**1,565.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pittsburg County, Oklahoma

DoD—Larton loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

Elevation: 200 to 1,000 feet
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 57 to 66 degrees F
Frost-free period: 190 to 230 days

Map Unit Composition

Larton and similar soils: 97 percent
Minor components: 3 percent

Description of Larton

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and sandy alluvium and/or eolian deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Ecological site: Deep Sand Savannah PE 66-72 (R118BY020OK)

Typical profile

0 to 24 inches: Loamy fine sand
24 to 66 inches: Sandy clay loam

Minor Components

Karma

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Sandy Savannah PE 66-72 (R118BY075OK)

DtE—Larton-Glenpool complex, 8 to 20 percent slopes

Map Unit Setting

Elevation: 200 to 1,000 feet
Mean annual precipitation: 38 to 52 inches
Mean annual air temperature: 57 to 66 degrees F
Frost-free period: 190 to 230 days

Map Unit Composition

Larton and similar soils: 70 percent
Glenpool and similar soils: 25 percent
Minor components: 5 percent

Description of Larton

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy and sandy alluvium and/or eolian deposits

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: Deep Sand Savannah PE 66-72 (R118BY020OK)

Typical profile

0 to 24 inches: Loamy fine sand
24 to 66 inches: Sandy clay loam

Description of Glenpool

Setting

Landform: Dunes on dune fields on paleoterraces
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands

Properties and qualities

Slope: 12 to 15 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.3 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: Deep Sand Savannah PE 66-72 (R118BY020OK)

Typical profile

0 to 4 inches: Fine sand
4 to 42 inches: Fine sand
42 to 80 inches: Loamy fine sand

Minor Components

Karma

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Sandy Savannah PE 66-72 (R118BY075OK)

EhE—Bengal-Clebit-Clearview complex, 5 to 30 percent slopes

Map Unit Setting

Elevation: 500 to 1,800 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 190 to 220 days

Map Unit Composition

Bengal and similar soils: 50 percent
Clebit and similar soils: 30 percent
Clearview and similar soils: 20 percent

Description of Bengal

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium over clayey residuum weathered from shale

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.4 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Ecological site: Sandy savannah PE 70-80 (R119XY075OK)

Typical profile

0 to 4 inches: Stony fine sandy loam
4 to 9 inches: Stony sandy clay loam
9 to 24 inches: Clay
24 to 40 inches: Bedrock

Description of Clebit

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly residuum weathered from sandstone

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 0.9 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Ecological site: Shallow Savannah PE 70-80 (R119XY088OK)

Typical profile

0 to 15 inches: Stony fine sandy loam
15 to 30 inches: Bedrock

Description of Clearview

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Ecological site: Sandy savannah PE 70-80 (R119XY075OK)

Typical profile

0 to 5 inches: Fine sandy loam
5 to 12 inches: Fine sandy loam
12 to 16 inches: Loam
16 to 24 inches: Sandy clay loam
24 to 34 inches: Sandy clay loam
34 to 39 inches: Sandy clay loam
39 to 41 inches: Bedrock

Eo—Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

Elevation: 300 to 1,500 feet
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 190 to 240 days

Map Unit Composition

Rexor and similar soils: 45 percent
Verdigris and similar soils: 35 percent
Minor components: 20 percent

Description of Rexor

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups
Land capability (nonirrigated): 5w
Ecological site: Loamy bottomland PE 70-80 (R119XY050OK)

Typical profile
0 to 9 inches: Silt loam
9 to 43 inches: Silt loam
43 to 70 inches: Silt loam

Description of Verdigris

Setting
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Properties and qualities
Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 12.0 inches)

Interpretive groups
Land capability (nonirrigated): 5w
Ecological site: Loamy bottomland PE 62-80 (R112XY050OK)

Typical profile
0 to 15 inches: Silt loam
15 to 90 inches: Silt loam

Minor Components

Cupco
Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy Bottomland PE 66-72 (R118BY050OK)

Lightning
Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Ecological site: Heavy bottomland PE 62-80 (R112XY045OK)

Dela

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Loamy savannah PE 70-80 (R119XY062OK)

HhC—Clebit-Clearview complex, 3 to 5 percent slopes

Map Unit Setting

Elevation: 500 to 1,800 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 190 to 220 days

Map Unit Composition

Clebit and similar soils: 60 percent
Clearview and similar soils: 35 percent
Minor components: 5 percent

Description of Clebit

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly residuum weathered from sandstone

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.0 inches)

Interpretive groups

Land capability (nonirrigated): 4s
Ecological site: Shallow Savannah PE 70-80 (R119XY088OK)

Typical profile

0 to 8 inches: Very gravelly fine sandy loam
8 to 15 inches: Very gravelly fine sandy loam
15 to 20 inches: Bedrock

Description of Clearview

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 6.5 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Ecological site: Sandy savannah PE 70-80 (R119XY075OK)

Typical profile

0 to 5 inches: Fine sandy loam
5 to 12 inches: Fine sandy loam
12 to 16 inches: Loam
16 to 24 inches: Sandy clay loam
24 to 34 inches: Sandy clay loam
34 to 39 inches: Sandy clay loam
39 to 50 inches: Bedrock

Minor Components

Bengal

Percent of map unit: 5 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: Sandy savannah PE 70-80 (R119XY075OK)

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APPENDIX B

AMERICAN BURYING BEETLE SURVEY RESULTS FROM SEPTEMBER 2012 PITTSBURG COUNTY, OKLAHOMA

PITTSBURG COUNTY TRACT

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Project Type: area (linear / area) Project Description: survey

Time Checked[1] 0650 Date Checked[1] 9/9/12 (M/D/Y) Transect #: ~~017~~ 1 Survey Night (1) 2 3 4 5 6 7 8 9 10

Survey Company: _____ Permittee: Amy Smith (Spell out) Action Agency/Proponent: Bank Survey

State: OK County: Pittsburg Legal Description[2]: 7N 12E 32 (Sec Township Range) General Location: 19 m NW McAlester Apelar, (nearest town, city, landmark)

Decimal Degrees[2]: ~~N35 02.184~~ N 35.03604 / ~~W96 04.004~~ W96.06673 (NAD 83)

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal-Clebit clearview complex (Refer to County Soil Survey) stoney fine sandy loam

Temp[3]: Min ~~79~~ 52 Max 79 °F Wind >10 mph?[4] **yes** *or* **no**

Additional survey night(s) required because of wind or temperature? **yes** *or* **no** cold

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. (U) D[5]	—	—	—	—	—	—	—	—
2. U D								
3. U D								
4. U D								
5. U D								

Additional survey night(s) required because of disturbance[6]?: **yes** *or* **no**

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[7]	New[7]	Age Unknown[7]	Recapture[8]	Newly Marked[9]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.wunderground.com
4. Wind exceeds 10 mph > than 20% of time between 7 pm to 7 am, must use data from www.wunderground.com.
5. Circle U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
6. If any 5-gallon bucket traps are disturbed an additional night of survey is required for that transect. For transects using 5 1-gallon bucket traps, the disturbance of 2 or more buckets over the 3 day period requires an additional night of trapping.
7. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
8. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
9. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Project Type: area (linear / area) Project Description: Survey

Time Checked[1] 0920 Date Checked[1]: 9/10/12 (M/D/Y) Transect #: 12 Survey Night: 1 2 3 4 5 6 7 8 9 10

Survey Company: _____ Permittee: Amy Smith (Spell out) Action Agency/Proponent: Bank Survey

State: OK County: Pittsburg Legal Description[2]: 7 N 12E 32 (Sec Township Range) General Location: Arpelar, OK (nearest town, city, landmark)

Decimal Degrees[2]: N 35.03264 / -96.06673 (NAD 83)

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal - Clebit Clearview Complex (Refer to County Soil Survey) Stoney fine sandy loam

Temp[3]: Min 55 Max 87 °F Wind >10 mph?[4] yes *or* no

Additional survey night(s) required because of wind or temperature? **yes** *or* **no**

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. U D[5]	2	3	1	—	1	1	—	17
2. U D								
3. U D								
4. U D								
5. U D								

Additional survey night(s) required because of disturbance[6]?: **yes** *or* **no**

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[7]	New[7]	Age Unknown[7]	Recapture[8]	Newly Marked[9]	Tag #	Death	Pronotum Width
1	1			1			1	G2		
2		1		1			1	G3		
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.weatherunderground.com
4. Wind exceeds 10 mph > than 20% of time between 7 pm to 7 am, must use data from www.weatherunderground.com.
5. Circle U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
6. If any 5-gallon bucket traps are disturbed an additional night of survey is required for that transect. For transects using 5 1-gallon bucket traps, the disturbance of 2 or more buckets over the 3 day period requires an additional night of trapping.
7. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
8. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
9. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Time[1]: 7:00 Date[1]: 9/11/12 (M/D/Y) Transect #: ~~012~~ 1 Survey Night: 1 ~~2~~ ~~3~~ 4 5 6

Survey Company: _____ Surveyor: Amy Smith, Mitch Lockhart (Spell out) Project Proponent: Bank

State: OK County: Pittsburg Legal Description[2]: 7N 12E 32 (Sec Township Range) General Location: Appler, OK (nearest town, city, landmark)

Decimal Degrees[2]: N35.0364 / W-96.06673 Coordinate System[2]: NAD83

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal - Clebit Clearview Complex (Refer to County Soil Survey) stoney fine sandy loam

Temp[3]: Min 68 Max 88 °F Rain > 0.5 in.?[4] **yes** *or* **no**

Additional survey night(s) required because of rain?[5] **yes** *or* **no**

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. U D[6]	2	1	–	–	4	–	–	85
2. U D								
3. U D								
4. U D								
5. U D								
6. U D								
7. U D								
8. U D								
Totals								

Number of disturbed traps and/or bait (D): _____

Additional survey night(s) required because of disturbance?[7] : **yes** *or* **no**

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[8]	New[8]	Age Unknown[8]	Recapture9	Newly Marked[10]	Tag #	Death	Pronotum Width
1		1		1			1	G4		
2		1		1			1	G5		Huge!
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
4. Rain from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
5. Additional trapping required if > 0.5 in. of rainfall occurs between 7pm and 7 am on the night of survey, must use data from www.mesonet.org
6. U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
7. Determine total number of disturbed traps over all 3 survey nights. If between 4 and 8 traps are disturbed over the 3 survey nights, 1 additional night of surveys are required. If between 9 and 16 traps are disturbed, 2 additional nights required. If between 17 and 24 traps are disturbed, 3 additional nights required.
8. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
9. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
10. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Updated 4-4-11

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Project Type: area (linear / area) Project Description: survey

Time Checked[1]: 0710 Date Checked[1] 9/9/12 (M/D/Y) Transect #: ~~613~~ 2 Survey Night: (1) 2 3 4 5 6 7 8 9 10

Survey Company: _____ Permittee: Amy Smith (Spell out) Action Agency/Proponent: Bank Survey

State: OK County: Pittsburg Legal Description[2]: 7N 12E 33 (Sec Township Range) General Location: 19 m NW McAlester, Arpelar OK (nearest town, city, landmark)

Decimal Degrees[2]: ~~N35 01.829~~ 35.03048 / ~~W96 02.844~~ 96.048233 (NAD 83)

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal - Clebit Clearview Complex (Refer to County Soil Survey) Stoney fine sandy loam

Temp[3]: Min ~~79~~ 52 Max ~~52~~ 79 °F Wind >10 mph?[4] yes *or* (no)

Additional survey night(s) required because of wind or temperature? (yes) *or* no cold

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. (U) D[5]	—	—	—	—	—	—	—	1
2. U D								
3. U D								
4. U D								
5. U D								

Additional survey night(s) required because of disturbance[6]?: **yes** *or* (**no**)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[7]	New[7]	Age Unknown[7]	Recapture[8]	Newly Marked[9]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from [illegible]
4. Wind exceeds 10 mph > than 20% of time between 7 pm to 7 am, must use data from [illegible].
5. Circle U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
6. If any 5-gallon bucket traps are disturbed an additional night of survey is required for that transect. For transects using 5 1-gallon bucket traps, the disturbance of 2 or more buckets over the 3 day period requires an additional night of trapping.
7. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
8. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
9. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Project Type: area (linear / area) Project Description: Survey

Time Checked[1]: 0940 Date Checked[1]: 9/10/12 (M/D/Y) Transect #: 1/5 2 Survey Night: 1 (2) 3 4 5 6 7 8 9 10

Survey Company: _____ Permittee: Amy Smith (Spell out) Action Agency/Proponent: Bank

State: OK County: Pittsburg Legal Description[2]: _____ (Sec Township Range) General Location: Angelar, OK (nearest town, city, landmark)

Decimal Degrees[2]: N 35.03048 / -96.048233 (NAD 83)

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal-Clebit Clearview Complex (Refer to County Soil Survey)

Stoney fine sandy loam

Temp[3]: Min 55 Max 87 °F Wind >10 mph?[4] **yes** *or* (**no**)

Additional survey night(s) required because of wind or temperature? **yes** *or* (**no**)

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. (U) D[5]	–	–	–	–	1	–	–	25
2. U D								
3. U D								
4. U D								
5. U D								

Additional survey night(s) required because of disturbance[6]?: **yes** *or* (**no**)

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[7]	New[7]	Age Unknown[7]	Recapture[8]	Newly Marked[9]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.wunderground.com
4. Wind exceeds 10 mph > than 20% of time between 7 pm to 7 am, must use data from www.wunderground.com.
5. Circle U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
6. If any 5-gallon bucket traps are disturbed an additional night of survey is required for that transect. For transects using 5 1-gallon bucket traps, the disturbance of 2 or more buckets over the 3 day period requires an additional night of trapping.
7. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
8. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
9. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Time[1]: 0715 Date[1]: 9/11/12 (M/D/Y) Transect #: 4 Survey Night: 1 2 3 4 5 6

Survey Company: _____ Surveyor: Amy Smith Mitch Lockhart (Spell out) Project Proponent: Scipio 3200

State: OK County: Pittsburg Legal Description[2]: 7N 12E 33 (Sec Township Range) General Location: Apelar, OK (nearest town, city, landmark)

Decimal Degrees[2]: 35.03048 / -96.048233 Coordinate System[2]: NAD83

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal-Clesit Clearview Complex (Refer to County Soil Survey) Stoney Fine sandy loam

Temp[3]: Min 68 Max 88 °F Rain > 0.5 in.?[4] yes *or* no

Additional survey night(s) required because of rain?[5] yes *or* no

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. U D[6]					11=2			163
2. U D								
3. U D								
4. U D								
5. U D								
6. U D								
7. U D								
8. U D								
Totals								

Number of disturbed traps and/or bait (D):_____

Additional survey night(s) required because of disturbance?[7] : yes *or* no

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[8]	New[8]	Age Unknown[8]	Recapture[9]	Newly Marked[10]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments:_____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
4. Rain from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
5. Additional trapping required if > 0.5 in. of rainfall occurs between 7pm and 7 am on the night of survey, must use data from www.mesonet.org
6. U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
7. Determine total number of disturbed traps over all 3 survey nights. If between 4 and 8 traps are disturbed over the 3 survey nights, 1 additional night of surveys are required. If between 9 and 16 traps are disturbed, 2 additional nights required. If between 17 and 24 traps are disturbed, 3 additional nights required.
8. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
9. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
10. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Updated 4-4-11

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Project Type: area (linear / area) Project Description: survey

Time Checked[1] 0730 Date Checked[1] 9/9/12 (M/D/Y) Transect # ~~3 of 4~~ 3 Survey Night: 1 2 3 4 5 6 7 8 9 10

Survey Company: _____ Permittee: Amy Smith (Spell out) Action Agency/Proponent: Bank Survey

State: OK County: Pittsburg Legal Description[2]: 7N 12E 28 (Sec Township Range) General Location: 14 m NE McAlester (nearest town, city, landmark)

Decimal Degrees[2]: N ~~35 07.736~~ 35.04506 / W ~~96 03.095~~ 96.051583 (NAD 83)

Vegetation Type: woodland near clearing (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal - Clebit Clearview Complex stoney fine sandy loam (Refer to County Soil Survey)

Temp[3]: Min 52 Max 79 °F Wind >10 mph?[4] yes *or* no

Additional survey night(s) required because of wind or temperature? yes *or* no cold

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. U D[5]	—	—	—	—	—	—	—	—
2. U D								
3. U D								
4. U D								
5. U D								

Additional survey night(s) required because of disturbance[6]?: yes *or* no

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[7]	New[7]	Age Unknown[7]	Recapture[8]	Newly Marked[9]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments: _____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.wunderground.com
4. Wind exceeds 10 mph > than 20% of time between 7 pm to 7 am, must use data from www.weatherunderground.com.
5. Circle U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
6. If any 5-gallon bucket traps are disturbed an additional night of survey is required for that transect. For transects using 5 1-gallon bucket traps, the disturbance of 2 or more buckets over the 3 day period requires an additional night of trapping.
7. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
8. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
9. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Supio 3200 Time[1]: ____ Date[1]: 9/10/12 (M/D/Y) Transect #: 043 Survey Night: 1 (2) 3 4 5 6

Survey Company: _____ Surveyor: Amy Smith (Spell out) Project Proponent: Bank

State: OK County: Pittsburg Legal Description[2]: 7 N 12 E 28 (Sec Township Range) General Location: Arpelar, OK (nearest town, city, landmark)

Decimal Degrees[2]: N 35.04506 / -96.051583 Coordinate System[2]: NAD83

Vegetation Type: woodland (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal-Clebit Clearview Complex (Refer to County Soil Survey)

Temp[3]: Min____ Max____ °F Rain > 0.5 in.?[4] **yes** *or* **no**

Stoney fine sandy loam

Additional survey night(s) required because of rain?[5] **yes** *or* **no**

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1. U D[6]	–	–	–	–	–	–	–	27
2. U D								
3. U D								
4. U D								
5. U D								
6. U D								
7. U D								
8. U D								
Totals								

Number of disturbed traps and/or bait (D):____

Additional survey night(s) required because of disturbance?[7] : **yes** *or* **no**

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[8]	New[8]	Age Unknown[8]	Recapture9	Newly Marked[10]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments:_____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
4. Rain from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
5. Additional trapping required if > 0.5 in. of rainfall occurs between 7pm and 7 am on the night of survey, must use data from www.mesonet.org
6. U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
7. Determine total number of disturbed traps over all 3 survey nights. If between 4 and 8 traps are disturbed over the 3 survey nights, 1 additional night of surveys are required. If between 9 and 16 traps are disturbed, 2 additional nights required. If between 17 and 24 traps are disturbed, 3 additional nights required.
8. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
9. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
10. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Updated 4-4-11

Appendix 1. **AMERICAN BURYING BEETLE SURVEY DATA COLLECTION FORM**

Project Name: Scipio 3200 Time[1]: 7:50 Date[1]: 9/11/14 (M/D/Y) Transect #: 3 Survey Night: 1 (2) 3 4 5 6

Survey Company: _____ Surveyor: Amy Smith (Spell out) Project Proponent: Bank Survey Mitch Lockhart

State: OK County: Pittsburg Legal Description[2]: 7N 12E 28 (Sec Township Range) General Location: Apelar OK (nearest town, city, landmark)

Decimal Degrees[2]: N 35.04506 / -96.051583 Coordinate System[2]: NAD83

Vegetation Type: woodland near clearing (Prairie, woodland, forest, pasture) Primary Soil Type: Bengal - Clebit Clearview Complex (Refer to County Soil Survey)

Temp[3]: Min_____ Max_____ °F Rain > 0.5 in.?[4] **yes** *or* **no**

Stoney fine sandy loam

Additional survey night(s) required because of rain?[5] **yes** *or* **no**

Trap No.	*americanus*	*orbicollis*	*tomentosus*	*pustulatus*	*marginatus*	*carolinus*	*sayi*	*Other carrion beetles*
1 U D[6]	—	1	—	—	2	1	1	49
2. U D								
3. U D								
4. U D								
5. U D								
6. U D								
7. U D								
8. U D								
Totals								

Number of disturbed traps and/or bait (D):_____

Additional survey night(s) required because of disturbance?[7] : **yes** *or* **no**

List each individual American burying beetle captured below and complete the appropriate columns.

ABB	Male	Female	Old[8]	New[8]	Age Unknown[8]	Recapture9	Newly Marked[10]	Tag #	Death	Pronotum Width
1										
2										
3										
4										
5										
6										
7										
8										
9										

Comments:_____

1. Date and time refer to when trap checked;
2. Check that legal description fits decimal degrees location. Lat/long MUST be in decimal degrees, NAD 83
3. Max/Min temp from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
4. Rain from 7pm to 7am prior to checking traps, must use data from www.mesonet.org
5. Additional trapping required if > 0.5 in. of rainfall occurs between 7pm and 7 am on the night of survey, must use data from www.mesonet.org
6. U= trap undisturbed, bait present; D= trap disturbed AND/OR bait gone;
7. Determine total number of disturbed traps over all 3 survey nights. If between 4 and 8 traps are disturbed over the 3 survey nights, 1 additional night of surveys are required. If between 9 and 16 traps are disturbed, 2 additional nights required. If between 17 and 24 traps are disturbed, 3 additional nights required.
8. OLD=breeding adult; NEW=newly enclosed adult; UNK=age cannot be determined.
9. Recaptures refer to color and number of bee tag on beetles that have been previously marked.
10. Newly marked males and females refers to color, number of bee tag, and age of beetle (e.g. R54[old]).

Updated 4-4-11

VII. KEYSTONE MCALESTER CONSERVATION AREA MANAGEMENT PLAN

PREPARED BY
AMY SMITH, PhD
218 SOUTH WRIGHT STREET
SILOAM SPRINGS, AR 72761

Establishment of the conservation area for the endangered American burying beetle (Nicrophorus americanus) is a unique opportunity to apply the best management science to conserve the species.

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1.0 INTRODUCTION AND BACKGROUND

The Common Ground Capital, LLC (CGC) and WLLL, LLC (WLLL) partnership have contracted with TransCanada Keystone Pipeline, LP (Keystone) to develop and manage the permittee responsible mitigation site, named the "Keystone McAlester Conservation Area". The Keystone McAlester Conservation Area (KMCA) is an 876 acre parcel of a 1,600 acre property dedicated to mitigate impacts to the endangered American burying beetle (*Nicrophorus americanus*) for the Oklahoma portion of Keystone's Gulf Coast Pipe Line Project.

Adjacent to KMCA is an additional 724 acre parcel which is expected to be the first American burying beetle conservation bank in the United States and the first conservation bank within the state of Oklahoma for any species. Upon approval of the United States Fish and Wildlife Service (USFWS), which will be approved separately from the Keystone McAlester Conservation Area, the conservation bank, "American Burying Beetle Conservation Bank, LLC" (ABBCB) will provide for future potential ABB credit needs. The 1,600 acre property meets or exceeds the requirements for an American burying beetle conservation bank as outlined by the USFWS (USFWS 2012a).

The KMCA is within 10 miles of the McAlester Army Ammunitions Plant which contains 44,913 acres of native vegetation. Within 50 miles of the KMCA is an additional 193,949 acres land managed by the state, federal government, and as land trusts. With the exception of KMCA and ABBCB, none of these areas are purposely managed for ABBs.

The KMCA and ABBCB permanently protect existing habitat for the American burying beetle (ABB) and implements management activities to maintain or enhance the habitat through time. While the focus of this Management Plan is the 876 acre KMCA parcel, in most cases the management practices are applicable to the whole 1,600 acre property as identified in figure 1.

This adaptive Management Plan sets the habitat management and monitoring standards for KMCA. The owner shall implement management and monitoring consistent with this Management Plan and within the limits of the annual budget for such activities. It is anticipated that WLLL will implement this Management Plan. The Land Manager will coordinate with the USFWS and/or KMCA beetle management team as necessary to carry out the requirements of this plan. Management practices developed in coordination with the USFWS following baseline reporting will be implemented. In subsequent years coordination with USFWS will occur following the receipt of the annual report and/or when the USFWS received new information relevant to ABB management.

The KMCA beetle management team may consist of the Land Manager, ABB researcher(s), and designated representatives of Keystone; US Fish and Wildlife Service; and Oklahoma Department of Wildlife Conservation. The purpose of the KMCA beetle management team is to provide information and input that may be beneficial to the management plan and assist in framing research opportunities on the 1600 acre property. The natural resources and conservation value of this area are described in the Biological Resources Assessment for the KMCA.

The establishment of the KMCA and this subsequent management plan for the ABB addresses the following steps for recovery outlined in the USFWS's ABB recovery plan (USFWS 1991):

- 1.11 Monitor the Oklahoma population
- 1.23 Explore all measures necessary to provide long-term protection
- 1.31 Using information from Task 4, develop management strategies for the Oklahoma population
- 4.21 Qualify and quantify vertebrate composition
- 4.24 Evaluate other potential limiting factors
- 4.3 Investigate land use/vertebrate composition trends at more recent historical *N. americanus* localities
- 6.0 Characterize habitat at all known localities
- 8.0 Continue to conduct research into the species' decline

2.0 PURPOSE AND OBJECTIVES

PURPOSE

The purpose of this Management Plan is to direct the management of habitats within the KMCA in order to maintain or enhance the conservation value of the property for ABBs .

MANAGEMENT GOAL

The goal of this Management Plan is to maintain or enhance the resources within the KMCA for the benefit of the endangered American burying beetle (*Nicrophorus americanus*).

OBJECTIVES

1. Determine the baseline condition of managed resources and establish long term study sites.
2. Clearly define the desired condition of the managed resources to establish planning, implementation, monitoring, and evaluation targets.
3. Monitor the condition of the managed resource and the magnitude of threats in order to evaluate effective management practices.
4. Diminish direct and indirect impacts that reduce the conservation value of the KMCA resource, as practicable.
5. Use adaptive management practices to maintain or enhance the conservation value of KMCA as prudent.

6. Rights of way (ROW) will be reseeded with native vegetation.

MEASUREABLE OUTCOMES WITH THE OBJECTIVES ADDRESSED IN ()

1. Complete surveys to determine the baseline condition of managed resources in 2013. (Objective 1)

2. Establish long term monitoring sites with geo-referenced photographs for each site in 2013. (Objective 1)

3. Establish KMCA beetle management team within first year. (Objective 2)

4. Using baseline conditions, define the desired condition of the managed resources to establish planning, implementation, monitoring, and evaluation targets. These will be initially communicated in the annual report of 2013. These will likely change with adaptive management of the area. (Objective 2)

5. Monitor the condition of the managed resource and the magnitude of threats in order to evaluate effective management practices. Conditions will be compared with the baseline. These will be communicated in the annual report. (Objective 3)

6. Diminish direct and indirect impacts that reduce the conservation value of the KMCA resource, as practicable using baseline conditions for comparison. These will be communicated in the annual report. (Objective 4)

7. Adaptive management practices will be used to maintain or enhance the conservation value of KMCA as prudent. These will be communicated in the annual report and will guide future management plans. (Objectives 2 and 5)

8. Native vegetation will be reseeded on 23 acres on the KMCA with 17 acres on the ABBCB. (Objective 6)

9. Provide $25,000 annually in research funding in the first two years. Priority will be given to research projects that evaluate management practices. (Objective 2)

10. Complete required monitoring. The results of monitoring projects will be communicated in the annual report.

3.0 IMPLEMENTATION

This Management Plan will be implemented on the KMCA by WLLL or its designated Land Manager. The designated Land Manager will manage the KMCA under this Management Plan. Impacts to the ABB associated with management and monitoring will be covered under a USFWS Section 10(A)(1)(a) permit under the Endangered Species Act. The specific roles and responsibilities of these parties pertaining to management and monitoring activities are set forth in and controlled by the Conservation Plan as applicable and not this Management Plan.

The type and intensity of management needed to maintain or enhance the conservation value of the KMCA will depend on the type, extent, location, and condition of habitats and the land uses adjacent to the KMCA. Only basic management practices may be needed to maintain the conservation value where there is little impact from human or natural forces. Management activities may increase as threats or impacts to the resources increase to help prevent decline of the KMCA's conservation value within the constraints of the endowment.

4.0 REFERENCE BASELINE DOCUMENTS

While accounts of some conditions are available, no systematic surveys have been completed with the exception of surveys for the ABB to confirm required trapping densities were met. Systematic surveys will be completed in 2013 to determine baseline conditions and meet management objectives.

4.1 ENDANGERED SPECIES HABITAT ASSESSMENTS

The KMCA was initially assessed for its location within the USFWS's American Burying Beetle Priority Area. The presence of ABBs on the KMCA was confirmed through surveys in September 2012, following the USFWS "Draft American Burying Beetle (*Nicrophorus americanus*) Range Wide Survey Guidance (4/20/2012)" (USFWS 2012a). The extent of suitable habitats was delineated using aerial maps and GIS and ground truthed during site visits. An "Endangered Species Habitat Assessment" referenced in the "Biological Resources Assessment" further identifies conservation values of KMCA.

4.2 HABITAT DOCUMENTATION

An account of existing vegetative habitats for the KMCA is documented in the report "Endangered Species Habitat Assessment" (ESHA) as part of the "Biological Resources Assessment". The ESHA contains information on the KMCA size and location; locations of water bodies; and the location and extent of modified vegetation. The ESHA includes include sample photographs of property conditions. Geo-referenced photos will be taken at long term monitoring sites in 2013 to document baseline conditions. These will be used to compare the condition of the resource through time.

5.0 BEST MANAGEMENT PRACTICES

The Land Manager will develop reasonable written Best Management Practices (BMPs) for known, allowed activities that may reasonably cause an adverse effect on the conservation value of the KMCA such as the development of fire breaks or road maintenance. The Land Manager may rely on established BMPs published by resource agencies.

<u>Perpetually Prohibited Uses and Activities.</u>
Any activity on or use of the Property inconsistent with the Conservation Plan or the purposes of this Easement is prohibited. Without limiting the generality of the foregoing, the following activities are expressly prohibited:

(a) The construction or fabrication of any residential, commercial, recreational, or industrial facility on the Property or any other structure not specifically reserved herein or approved in

advance by Keystone and the FWS;

(b) Surface mining or quarrying of soil, sand or other minerals;

(c) Agricultural uses of any kind, except limited levels of cattle grazing which may be approved by Grantee, subject to consistency with a grazing plan as specifically provided in the Conservation Plan;

(d) Subdivision of the Property, whether by physical or legal process, other than separation of the 876-acre KMCA from the 724-acre Prospective ABB Banking Site;

(e) Erection of commercial, institutional or other similar types of signage;

(f) Altering the surface or general topography of the Property, or installation of covering surfaces with impervious material; other than as needed to implement the Conservation Plan;

(g) Any dumping or accumulation of any kind of trash, ashes, refuse, waste, bio-solids or hazardous waste on the Property or any placement of bulk soil on the Property that could contaminate surface waters or that would be inconsistent with the Conservation Plan;

(h) Installation of new electrical power lines unless such installation is carried out on a small scale by existing mineral interest or easement holders in support of their surface rights. If any lawfully constructed utility line is installed on or through the Property by such a mineral interest or easement holder, Grantor shall use its best efforts to persuade the that party to restore the physical features of the Property to their general pre-disturbance condition within one year from the initial date of disturbance;

(i) Erection of electrical generating windmills or solar arrays;

(j) Construction or continued maintenance of confined animal feeding lots or operations;

(k) Recreational facilities, resort structures, golf courses, sports fields, or other public or commercial facilities. However, passive recreational uses may be carried out on the Property by the landowner or its invitees, so long as those uses do not conflict with the Conservation Plan and do not entail the creation of new horseback or bike trails on the Property;

(l) Selling or transferring any easement, right of way or other encumbrance on the Property to a third party, other than as approved in advance by Keystone, Grantee and the FWS;

(m) Use of off-road vehicles and use of any other motorized vehicles except on existing vehicle trails, except for the purpose of implementing the Conservation Plan or conducting research in accordance with the Conservation Plan and any FWS authorizations for such research;

(n) Removing, destroying, or cutting of trees, shrubs or other vegetation, except as required for (i) maintenance of forest health, (ii) fire breaks, (iii) maintenance of existing foot trails or roads, or (iv) ABB habitat management as provided for in the Conservation Plan;

(o) Engaging in any use or activity that may violate, or may fail to comply with, relevant federal, state, or local laws or regulations;

(p) Manipulating, impounding, polluting or altering any natural water course, on the Property, except for alterations for the purpose of implementing the Conservation Plan;

(q) Planting, introduction or active dispersal on non-native or exotic plant or animal species; or

(r) Unseasonable watering activities, or such use of fertilizers, pesticides, biocides, herbicides or other agricultural chemicals that is not authorized by the Conservation Plan and could interfere with the purposes of this Easement, recognizing that the use of such chemicals may be either required by the Conservation Plan or may be otherwise justifiable from an ecological perspective, such as the use of FWS-approved chemical application techniques for control of Red Imported Fire Ants or invasive species of plants.

Grantor further understands that the above-list is not exclusive. Grantor further recognizes that nothing in this Deed relieves Grantor of any obligation or restriction on the use of the Property imposed by law.

Reserved Rights.
Grantor reserves to himself, and to his personal representative, heirs, successors, and assigns, all rights accruing from their ownership of the Property, including the right to engage in or permit or invite others to engage in all uses of the Property that are not prohibited herein, are consistent with the Conservation Plan, and are not inconsistent with the purposes of this Easement. Without limiting the generality of the foregoing passive recreation such as low-impact hiking, jogging, non-motorized trail bike and horseback riding, hunting, bird-watching and camping on the Property is expressly reserved to the Grantor and his assigns. Grantor may conduct activities on the 724-acre sub-parcel shown in Exhibit B as may be approved by the FWS for ABB conservation.

6.0 BASIC HABITAT MANAGEMENT

6.1 SUITABLE HABITAT

No critical habitat has been established for the ABB by the USFWS. Identifying the specific habitat requirements of ABBs has been difficult because of its unusual life history and ecology. Researchers have been able to lure ABBs into a variety of native vegetative habitats during survey efforts. ABBs can utilize either forests or grasslands and gradients between. ABBS are mobile and individual beetles have been documented to move between habitats and travel an average of 1.28 km per night (Smith unpublished data). Given the known distributions of ABBs in the varied ecoregions of Nebraska, Oklahoma, and Rhode Island, it is apparent that ABBs do not have specific habitat requirements that are consistent across its entire known range and that ABBs have a wider niche than many other similar species (Jurzenski 2012). At best, we know what habitats ABBs avoid. This includes wetlands, impervious surfaces, row crops, or areas mowed two or more times per year (USFWS 2012a).

The USFWS 5-year ABB review, and citations within (USFWS 2008), notes that the limiting factors for the ABB are not necessarily the shortage of suitable habitat but the lack of suitable sized carrion, the abundance of competitors for carrion (vertebrate and invertebrate), and presence of suitable soil for carcass burial. ABBs utilize a variety of native vegetative habitats. The designation of "suitable habitat" in this Management Plan will focus on native vegetative habitats that maintain or increase small game abundance and diversity which would provide suitable sized carrion for ABBs. Examples of suitable sized carrion include small game such as northern bobwhite quail, mourning doves, eastern cottontails, gray squirrels, and native rats. The area should be managed as a mosaic of native vegetation with savanna/forested areas and grasslands to maximize the diversity and abundance of small game. Non-native food plots will be converted to native vegetation or would not be eligible for full credit but may be considered for buffer credit.

Only USFWS approved chemicals should be used in the conversion of food plots to native vegetation when other options are not viable. The use of insecticides will be avoided unless required for red imported fire ants control and will be coordinated with the USFWS.

6.2 HABITAT MANAGEMENT STANDARDS

Management activities should be designed to maintain or enhance suitable habitat to increase small game abundance and diversity which will provide suitable sized carrion for ABBs. Since the long-term maintenance of suitable habitat requires periodic disturbance on a rotational basis, it is expected that the short-term condition of vegetation at any one site may not always be representative of suitable habitat. Management of suitable habitat should be designed to promote a mosaic of native vegetation with savanna/forested areas and grasslands to maximize the diversity and abundance of small game and avoid treatments causing unsuitable habitat conditions when possible.

6.3 HABITAT MANAGEMENT ACTIVITIES

Management activities should include measures that maintain or enhance suitable habitat. Basic habitat management will include periodic use of selective mechanical treatments, chemical treatments, or prescribed burning to encourage vegetative diversity and therefore increase the abundance of small game. The Land Manager will determine whether and what type of active, adaptive management may be needed to maintain suitable habitat. The Land Manager will make such determinations, in coordination with the KMCA beetle management team (including USFWS), on the basis of information collected from management practices and advancing research.

At a minimum, management of suitable habitat within the KMCA will consider the following measures:

- Conduct vegetation management practices outside of the ABB's active season (May 20-September 20) when practicable.
- Limit vegetation management activities to those appropriate for maintaining or enhancing suitable habitat.
- Avoid impacting more than 40% of such habitat in a single year.
- To the extent practicable, select management tools that minimize the disturbance, removal, or compaction of topsoil in the area. These practices may include, but are not limited to those that

utilize hand tools instead of heavy equipment. If it is necessary to use heavy equipment, choose equipment to minimize impacts.

- Conduct any prescribed burns outside of the ABB active season (May 20-September 20) and in accordance with a detailed burn plan prepared by an experienced Prescribed Fire Burn Boss. To the extent practicable, assistance from local representatives of the USFWS, U.S. Natural Resources Conservation Service, Oklahoma Agriculture Extension Service, Oklahoma Department of Wildlife Conservation, and/or The Nature Conservancy and/or independent prescribed fire contractors will be obtained to conduct prescribed burning.
- Insure hunting activities preclude the use of feed stocks that would attract feral hogs to the property.
- Revegetate areas as soon as possible to reduce the suitability of disturbed areas for red imported fire ants.

6.3.1 SELECTIVE FOREST HARVEST

Selective forest harvest methods may be used within the guidance of the above noted measures (6.3) to promote a mosaic of native vegetation with savanna/forested areas and grasslands to maximize the diversity and abundance of small game which would provide suitable sized carrion for ABBs. Selective forest harvest may be used in conjunction with prescribed burning to maintain basal area in forested stands to 70ft^2 per acre or less (USFWS 2012a). Forest slash will be removed, mulched on site, or used to build limited brush piles. The use of clear cutting will be avoided as ABBs have exhibited significant avoidance of clear cuts (Lomolino and Creighton 1996, Creighton et al. 2009). The following measures should be considered as part of the selective forest harvest plan:

- Determine baseline conditions of savanna/forested areas including dominant tree species, shrub species, canopy cover, and basal area within the first year the KMCA is established.
- Develop a selective forest harvest management plan under the guidance of a professional forester that encourages a mixed-age stand and reduces basal area to 70ft^2 per acre or less.
- Vegetative species that provide hard or soft mast for small game animals should be maintained when practicable.
- Timber harvested as part of habitat management may be sold to offset the costs of implementation.
- Brush piles will be established to provide structure for small game.

6.3.2 CHEMICAL TREATMENTS

Chemical treatments may be used to control non-native or exotic vegetative threats, as noted in section 7.2. Initial emphasis will be to treat potential invasive species growing along existing roadways. This will be accomplished through spraying chemicals approved by USFWS using a backpack sprayer or ATV.

Use of USFWS approved chemicals may be considered in the conversion of food plots to native vegetation when other options are not viable.

6.3.3 PRESCRIBED BURNING

Prescribed burning is a recognized habitat management tool to promote a mosaic of native vegetation with forested/woodland areas and grasslands to maximize the diversity and abundance of small game which would provide suitable sized carrion for ABBs. Initial plans are to burn approximately 160 acres per year during the baseline and research (section 8.0) investigation period on the 876 acre KMCA. Thereafter approximately 500 acres per year will be burned on the entire available area (1,600 acres). The USFWS recommends that prescribed burning be conducted at minimum over the entire available area once every 3-5 years with no more than 40% burned each year. The fire return interval will be 5 years initially but the vegetation response will be evaluated and the fire return interval will be adjusted accordingly.

Prescribed burning may be used in conjunction with selective forest harvest to reduce basal area in forested stands to 70ft^2 per acre or less (USFWS 2012a). The following measures should be considered as part of the prescribed burning plan:

- Determine baseline conditions of savanna/forested areas including dominant tree species, shrub species, canopy cover, and basal area within the first year the KMCA is established.
- Develop a prescribed burning plan under the guidance of a professional forester that encourages a mixed-age stand and reduces basal area to 70ft^2 per acre or less.
- Threats from prescribed burning will be addressed as noted in section 7.3.

6.3.4 REVEGETATION

Native plants will be used as a conservation measure in the restoration of disturbed areas to reduce the suitability of the area for red imported fire ants; to stabilize any areas of erosion; and during habitat restoration projects. The seed mix in disturbed areas would be based on recommendations from the Natural Resource Conservation Service and/or Oklahoma Department of Wildlife conservation and the availability of seed at the time. The seeding method used will be determined based on weather conditions, topography and soil type. Seed will be planted at depths consistent with local or regional agricultural practices. Habitat restoration is expected to occur in open areas. The conversion of open areas (such as food plots) to native vegetation would use disking and application of approved chemicals. Vegetation management practices would occur outside of the ABB's active season (May 20-September 20) when practicable. If vegetation management practices are required during the active season, the USFWS will be contacted prior to implementation, unless already written into USFWS approved plans.

7.0 THREATS MANAGEMENT

Management should address threats to the conservation resources including each of the applicable threat categories listed below. Other threat categories may need to be addressed if other conditions are found to be adversely impacting conservation values. The Land Manager will use the adaptive

management process to determine whether and what types of management practices are necessary to reasonably minimize the potential impacts of identified threats to the conservation resources in consultation with the USFWS and/or the KMCA beetle management team.

7.1 PROBLEM ANIMALS

A variety of exotic, invasive, feral, and/or nuisance animal species have the potential to negatively impact the conservation values of KMCA. These problem animal species may pose a threat to the conservation resources via competition for carrion resources, predation on ABBs, or by causing damage to habitats. Problem animals may include (but are not limited to) the species listed in Table 1. If other species become a threat to the banked resources, they should also be addressed as part of the adaptive management process.

7.2 PROBLEM VEGETATION

Non-native or invasive plants have the potential to reduce the conservation value of the KMCA. Any known or reasonably likely threats to the conservation resources from non-native or invasive vegetation should be considered. Reasonable management practices will be developed as part of the adaptive management process to minimize the impact of those threats. Management tools may include selective mechanical treatments, chemical treatments, or prescribed burning.

Where non-native or invasive plants have become well-established in an area, control or eradication of these species may become difficult or impossible. Therefore, measures to prevent their establishment include:

- Surveying for non-native or invasive vegetation within the first year after the KMCA is established.
- After establishing a baseline, the Land Manager will develop non-native or invasive vegetation Management Plan within the first year and submit the plan for USFWS approval.
- The use of non-native or invasive vegetation will not be used in plantings. Individual non-native or invasive vegetation will be removed upon detection with selective mechanical means.

Table 1. Management considerations related to potential problem animals.

Category	Considerations and Guidelines
Vertebrate Scavengers	Vertebrate scavengers such as opossums (*Didelphis virginiana*), skunks (*Mephitis mephitis*), coyotes, (*Canis latrans*), turkey vultures (*Cathartes aura*) and crows (*Corvus brachyrhynchos*) compete with ABBs for carrion. Direct predation of vertebrates on ABBs has been documented. Many of these species use roads and other corridors to road hunt carrion efficiently. The removal of one vertebrate scavenger may cause others to increase in its place, though may be considered with USFWS approval. Management should control populations of scavengers by encouraging their predators and maintaining or reducing fragmentation.
Deer and Other Browsers	Native white-tailed deer (*Odocoileus virginianus*) and a variety of other ungulates browse on leaves, buds and twigs of woody plants that would provide food and shelter for small game species. Grazing may also increase soil compaction and may open areas to establishment of red imported fire ants. The total population of browsing animals (including livestock) should be kept low enough to allow for the regeneration of oak trees (hard mast). If cattle or bison grazing is to be used as a management tool, it will be identified in the management plan. No more than 25% of the total annual forage maybe harvested by domestic livestock. Supplemental feeding of overabundant deer on the KMCA is generally prohibited, except for temporary baiting at hunting stations one month prior to the start of hunting season and through hunting season. Feeders must be fenced off to exclude feral hogs from eating supplemental feed. Deer hunting regulations established by the Oklahoma Department of Wildlife Conservation (ODWC) will be followed unless deer are overabundant. In such a case, the ODWC would be consulted to determine harvest levels.
Feral Hogs	Feral hogs (*Sus scrofa*) are domestic pigs that have reverted to a wild condition. These animals are prolific and eat a wide variety of plant and animal material. Feral hogs are a threat to native landscapes primarily due to their rooting habits that destabilize soil and uproot young plants. Feral hogs are considered unprotected, exotic, non-game animals and may be hunted or removed using non-attracting removal techniques at any time without limit. Feral hogs will be hunted with the intent to suppress them below the point that the habitat is adversely impacted. Use of corn as a deer feeding supplement will be avoided on the property.
Red Imported Fire Ants	The red imported fire ant (*Solenopsis invicta,* RIFA) is an exotic species and is thought to be a pest, competitor and predator on native wildlife species including the ABB. They can threaten ABBs by competing for carrion, killing ABBs and potentially their larva. Large scale eradication is unlikely. Control measures should be sensitive to the preservation of native wildlife and the environment, as many native colonies can serve as a natural biological defense against RIFA. The Land Manager will work with the USFWS and/or KMCA beetle management team and entities such as the USDA Imported Fire Ant Laboratory to develop a plan for RIFA sampling and treatment.

7.3 FIRE MANAGEMENT

Prescribed burning is a recognized Habitat Management Activity (6.3) and will be conducted over the entire property approximately once every 3-5 years with no more than 40% burned each year. The fire return interval will be 5 years initially but the vegetation response will be evaluated and the fire return interval will be adjusted accordingly. Fires will be conducted outside of the ABB's active season (May 20-September 20).

Prescribed fire is a recognized land management tool, but uncontrolled wildfires can threaten human safety and the conservation values of the KMCA. The use and control of fire on the KMCA must first and foremost protect human health and safety. Guarding habitats from catastrophic wildfire is also a major consideration. Management activities on the KMCA should consider strategies for prevention and control of wildfires and the use of prescribed fire as a management tool.

7.3.1 WILDFIRE CONTROL

Ensuring human safety and limiting property damage are the foremost priorities when controlling wildfires. Where possible, wildfire control should seek to minimize damages and limit the catastrophic loss of habitats. The following actions should be taken to minimize impacts:

- Provide the local fire department with a map of the KMCA that clearly delineates gate/gap locations and accessible roads. Include on the map directions to the KMCA, owner contact information, and Land Manager information.
- Fire line width should be kept to the minimum necessary to stop the spread of a fire, using natural barriers or existing linear clearings (e.g. roads) where possible to avoid the unnecessary fragmentation of habitats.
- The use of low-impact fire control tools is preferred when the use of such tools is safe and feasible.
- During fire line construction and mop-up, tree felling should be minimized when feasible unless in an area designated for selective harvest. Minimization of soil disturbance during mop-up is recommended.
- Cut trees, limbs, and brush should be left in piles for small game structure.
- Avoid using temporary fire lines as travel corridors whenever possible to minimize soil compaction and facilitate restoration of the habitat.

If the conservation values of the KMCA are damaged by catastrophic wildfire, adaptive management measures may be implemented as practical within the limits of funding using the best available information to restore the conservation values of the damaged landscapes.

7.3.2 PRESCRIBED BURNING

Prescribed burning will be used as a land management practice on the KMCA as noted in 6.3.3 but requires detailed planning and coordination. The following provisions will be implemented:

- Prescribed burning must be conducted accordance with a detailed burn plan prepared by an experienced Prescribed Fire Burn Boss.
- Prescribed burns will be conducted outside of the ABB active season (May 20-September 20).
- To the extent practical, assistance from local representatives of the USFWS, U.S. Natural Resources Conservation Service, Oklahoma Agriculture Extension Service, Oklahoma Department of Wildlife Conservation, and/or The Nature Conservancy should be obtained to conduct prescribed burning.
- Comply with local fire or burning ordinances.
- Notify appropriate local governmental jurisdiction prior to burning.

7.4 TRESPASS

Trespass is likely to be infrequent with adequate safeguards The Land Manager should assess any degradation or potential degradation of the conservation values associated with trespass. Such degradation may include, but is not limited to, decreased hardwood recruitment from browsing, removal or destruction of vegetation, soil compaction, or actions constituting “harm” to an endangered or threatened species under provisions of the Endangered Species Act.

Marking boundaries, notification and monitoring are the best safeguards of access and deterrence to trespass. The following considerations should help the Land Manager protect against and respond to trespass:

- Procedures for documenting, reporting, and evaluating responses to incidences of trespass should be established as part of the adaptive management process.
- Responses to trespass may require involvement of the County Sheriff or local police. The Land Manager and owner shall retain the discretion of when to notify local authorities of trespass.
- Where “harm” may occur to ABBs, the Land Manager should notify and consult with USFWS promptly.
- Remedies to, and restoration of, routine or harmful trespass should be coordinated with the owner and USFWS as appropriate.
- If signage is to be used, the Land Manager will coordinate with the owner and USFWS as to what information should be included on the signage. The Land Manager shall maintain such signage as needed.
- The need for perimeter enhancement, fencing or barriers should be evaluated on a case-by-case basis. Costs for implementing and maintaining such should be borne by or recovered from the violator causing the need, if possible.

7.5 OIL AND GAS ACTIVITY

The minerals on the KMCA property are leased so there is a threat of additional oil and gas activity. Future development of minerals will require USFWS Section 7 or Section 10 consultation permit, which may reduce impacts of this development and will require increased mitigation. The same is true for the surrounding areas. CGC/WLLL will collaborate with oil and gas lessees to ensure best management practices and footprint minimization. CGC/WLLL will report any unanticipated oil and gas activity to the USFWS.

8.0 MONITORING AND RESEARCH

Monitoring is necessary to verify the long-term integrity of the habitat, to document changes from baseline conditions at the time of KMCA establishment, and to verify the status of existing wild populations ABBs (per the ABB recovery plan task 1.11 (USFWS 1991)). Monitoring plans will be developed along the same 15 year cycle as the Management Plan and be reevaluated and updated at least every 5 years based upon experience and best available practices. Long term monitoring sites will be established that will be equally distributed across the KMCA and the adjacent 724 acre parcel in a grid formation (Figure 1). These monitoring sites or a subset will be used in common for biological monitoring and habitat monitoring. Habitat conditions at these long term monitoring sites will be photo documented as a record of changing conditions.

Research opportunities will be encouraged to assess management practices with the intent of improving management through sound scientific principles. Funds will be set aside by CGC/WLL to support research projects in the first two years of the KMCA's operation to investigate benefits and impacts of different proposed management activities on the ABB population. If trapping and relocating ABBs is approved as a conservation measure for ABBs, then the KMCA could serve as a relocation site. Documentation of ABBs relocated to the KMCA in conjunction with annual ABB monitoring would help answer questions about the effects of trapping and relocating on beetle populations.

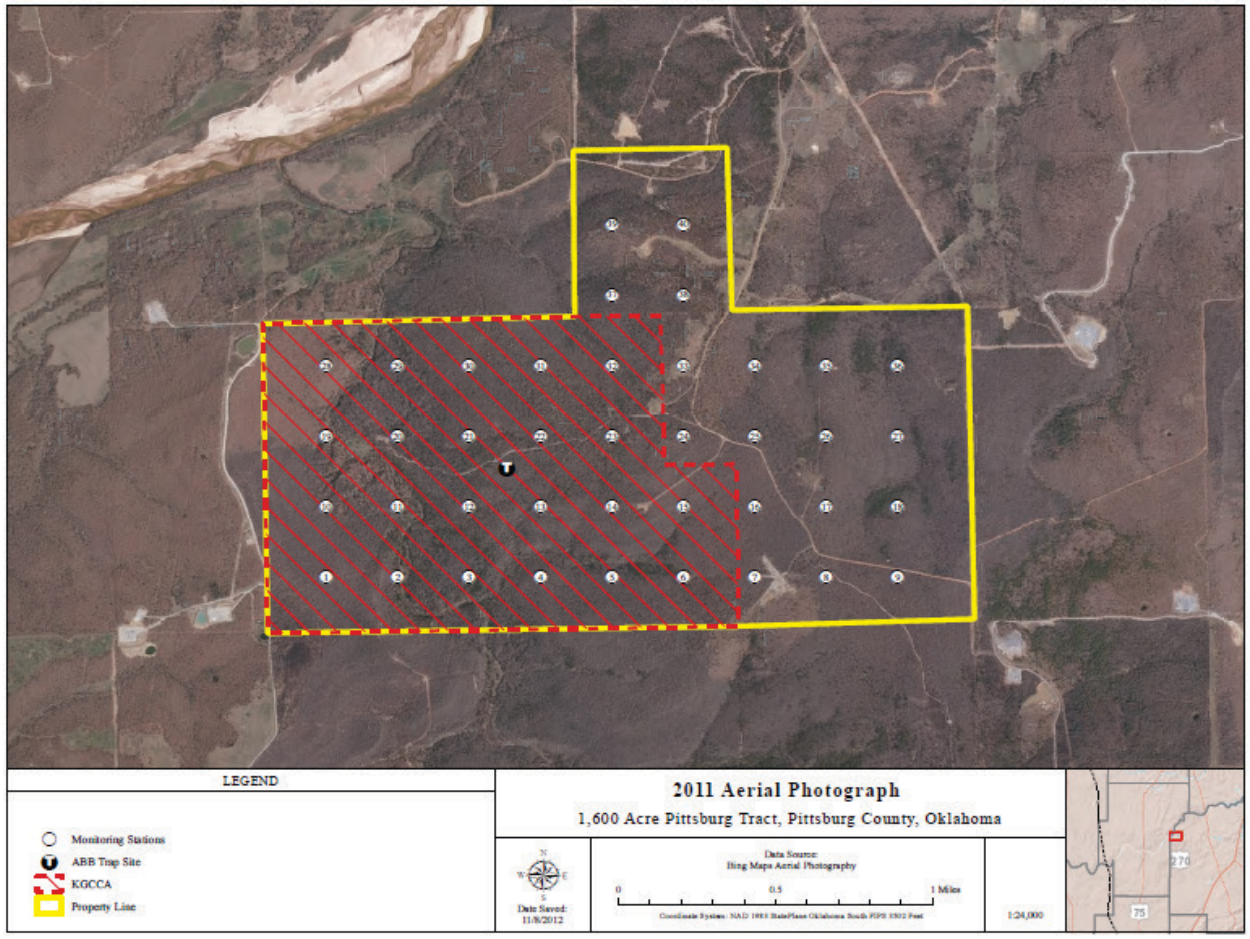

Figure 1. The aerial map shows the 876 acre KMCA area (in red) and the adjacent 724 acre ABBCB with approximate locations of proposed long term monitoring sites.

8.1 BIOLOGICAL MONITORING

Biological monitoring will be used to determine baseline conditions. Biological monitoring would continue along a timeline as proposed in Table 2. The timeline may be adjusted to evaluate management activities and or support research that benefits the ABB. Monitoring protocols will be selected and implemented with the knowledge that these will be long term studies. Monitoring will occur at long term study sites established on a grid system or a subset of those study sites as appropriate for the subject of study (Figure 1). Alternative habitat monitoring methods may be used in the future provided that such methods are approved by the KMCA beetle management team in advance, are sufficient to achieve the management goals, result in data comparable with previous protocols, and be justified. Monitoring will be completed by individuals with the appropriate state and federal permits.

American burying beetles will be monitored annually at 2 of the longterm study sites on the KMCA and 1-2 sites on the ABBCB according to USFWS protocols (such as USFWS 2012b or its updated equivalent) to determine if the 1,600 acre property meets a beetle density average of 0.637 beetles per trap night over 5 years of surveys. If the beetle density falls below the baseline, then as a voluntary measure, reproduction may be supplemented by trapping ABBs and placing a male and female on a carcass protected from scavengers or other competitors. This has been shown to increase carcass burial rate and the number of larval broods six fold (Smith 2009). This action would be in coordination with USFWS. Monitoring will occur at the same time, early in the ABB active season in order to provide time for any supplemental actions. Carcass seeding is not recommended as it may attract scavengers or other competitors and may result in the direct mortality of ABBs (Jurenski and Hoback 2011).

While it is expected that trapping densities of ABBs will be maintained or enhanced through management activities, the success of the KMCA should not be evaluated wholly on the presence of ABBs. ABB trapping densities may decline because of variables outside of the Land Manager's control. Such variables may include climate change, drought, and other unanticipated events.

Monitoring for red imported fire ants (RIFA) will be vigilant during all on-the-ground activities including ABB surveys, prescribed burning, vegetation surveys, and small mammal surveys. The status of RIFA will be reported to the USFWS as part of the annual report.

Small mammals will be monitored using large (7.6 x 9.5 x 30.5 cm and 10.2x 11.4 x 38 cm) and extra-large (at least 17.8 x 17.8 x 43.2 cm) folding, aluminum Sherman live traps with galvanized treadles and doors. These live traps will be set in a grid arrangement in areas with homogenous habitat with 10m spacing between traps. A minimum of 100 trap nights over a period of at least 3 nights will occur at each location. The size of the grid will depend upon the size and shape of the habitats. Traps will be placed under shade and flagged (Cheryl Schmidt PhD, CWB personal communication).

Small mammal traps will be baited with a mix of seeds, carrots, and mealworms. Bait will be placed in a small piece of folded paper to improve baiting efficiency and avoid fouling the trap mechanism. Traps will be set before 1900 hours. Traps will be checked the following morning. Under hot, cold, or wet weather conditions, the traps will be checked at least once in the late afternoon. Cotton will be placed in traps for insulation if nighttime temperatures are below 60°F. Individuals will be identified to species,

marked with black permanent ink on the ventral surface for future recognition, and weighed to determine size ranges present (Resources Inventory Committee 1998). Data will be recorded on standardized survey forms.

Mammal trapping will be coordinated with ABB surveys early in the ABB active season to reflect the potential carcass base for ABB reproduction. Trapping grids will be deployed in at least 2 different locations on the KMCA. If possible, at least one trapping grid will be deployed within each prescribed burn units at a long term monitoring site (Figure 1) to assess the effect of prescribed burning on small mammals. Ideally these would be at the same long term monitoring sites as those used in ABB surveys to examine relationships between small mammals and ABB trapping densities.

Table 2. Biological monitoring timeline reflecting the "Draft USFWS American burying beetle Conservation Banking Guidelines" (USFWS 2012a).

TASK	2013	2014	2015	2016	2017	EVERY 3 YEARS	EVERY 10 YEARS	ANNUAL
ABB monitoring								
Mammal monitoring						Frequency may vary if part of research projects.		
Red imported fire ant monitoring (RIFA)	The area will be vigilantly monitored during all on-the-ground activities.							
Vegetation monitoring Shrub/Herbaceous							Frequency may vary if part of research projects.	
Forest with basal area								

8.2 HABITAT MONITORING

Habitat within the KMCA will be monitored along the timeline noted in Table 2. Basal area will be measured as the average of plot basal area per acre for the subset of monitoring sites within the KMCA. If a regularly scheduled survey determines that the basal area is above 70 ft^2/acre, then surveys will be completed in two year intervals until basal area falls below 70 ft^2/acre, at which point monitoring will resume the schedule in Table 2. The shrub and herbaceous cover monitoring interval is expected to increase as the habitat is restored. Vegetation cover will be reported in GIS format (latitude/longitude in decimal degrees, and shape files). Annual changes in the ecological structure of the KMCA will be documented by establishing permanent photographic monitoring locations at each long term monitoring site.

Monitoring will occur at long term monitoring sites established on a grid system or a subset of those study sites. Each site on the entire grid system will be surveyed on the schedule found in Table 2. Alternative habitat monitoring methods may be used in the future provided that such methods are sufficient to achieve the management goals, result in data comparable with previous protocols, and be justified.

Baseline habitat information will be collected in the first year at each of the 22 long term monitoring sites for the KMCA with a total of 40 sites over the entire 1,600 acre property (Figure 1). Plot size will be determined during preliminary surveys prior to the initiation of monitoring. A single plot size will be used for all plots. The plot size for the tree survey will be based on the size of area that includes a mean of 6-8 trees greater than 3 inches diameter at breast height (DBH) over all sample sites. Plots will be permanently marked. Photographs will be taken in each cardinal direction and geo-referenced. Protocols will be documented and data will be recorded in a database so that changes can be tracked through time. Circular plots will be used in the collection of tree data. Square plots will be used for herbaceous vegetation monitoring. Transects will be used to assess fuel load.

Within Circular Plots

- The number of trees per acre will be determined by counting all trees with diameter at breast height (DBH) >3 inches within the plot.
- The snag density will be determined by counting all snags with DBH >3 inches within the plot.
- Tree basal area will be measured using standard DBH tapes for all trees with DBH >3 inches within the plot.
- Tree species will be determined for trees that have DBH >3 inches within the plot.
- Canopy coverage will be determined using a spherical densitometer.
- Midstory coverage will be determined by counting all trees within the plot with a DBH <3 inches but are taller than 4.5 feet.
- Midstory species will be determined for those trees within the plot with a DBH <3 inches but are taller than 4.5 feet.

Within Square Plots

- Ground coverage (herbaceous, woody, and rock) will be visually estimated as the percentage of cover within the plot.
- Ground cover estimates will include only woody and herbaceous plants less than 4.5 feet in height.
- A photograph will be taken at each square plot and geo-referenced.
- The three most abundant herbaceous and woody ground coverage species will be identified within the plot.

Transects

- Fuel load will be measured at each site using the method outlined in the "Handbook for inventorying downed woody material". (Brown, 1974)

8.3 THREATS MONITORING

Potential threats to ABBs and their habitats will be regularly monitored as applicable on the KMCA and as practicable within the limits of the available funds from the management endowment. Types of threat monitoring considered will include measuring invasive plants or infestations/diseases and may include monitoring predator/competitor species.

8.4 RESEARCH

Research opportunities will be encouraged to assess management practices with the intent of improving management through sound scientific principles. Research proposals will be selected by the Land Manager and/or KMCA beetle management team for funding. Research projects that additionally address the USFWS's ABB recovery plan (USFWS 1991), such as those noted in 1.0 of this management plan, will receive priority. Examples of research topics and the ABB recovery plan steps (in parenthesis) include:

- Examine the relationship between small game management practices and ABB trapping densities (USFWS (1991) steps 4.21 and 4.3).
- Determine the effect of rotational prescribed burning on ABB trapping densities (USFWS (1991) steps 1.23, 1.31, 4.24, and 6.0).
- Evaluate the success of vegetation restoration methods as recommended in USFWS (2011) and USFWS (1991) (steps 1.23, 1.31, 6.0, and 8.0).
- Identify where ABBs overwinter (USFWS (1991) step 8.0).
- Identify where ABBs are located during the day (USFWS (1991) step 8.0).

8.5 COMBINATION OF EFFORTS

Combining biological and habitat condition monitoring points is strongly encouraged so both efforts can be accomplished simultaneously where appropriate. During monitoring years, the Land Manager is will conduct threats monitoring over habitats as part of the combined effort. For example, all monitoring efforts should simultaneously look for RIFA and report any occurrences immediately.

9.0 REPORTING

The KMCA will submit an annual management report to the local office of the USFWS by January 31st of that year. The report will contain:

- A description of progress within the established Management Plan, including but not limited to: restoration and management activities and approximate acreage subject to such activities, including prescribed burning (date of burn), selective forest harvest, and chemical treatments; and listing of important habitat parameters, including canopy cover, basal area, shrub cover, herbaceous cover and invasive species information.
- Population trends, if known.
- Other listed species encountered.
- Date stamped photo documentation of habitat management activities.
- Recommended modifications to the Management Plan via the adaptive management process.

In addition, the USFWS, along with members of the KMCA beetle management team consisting of the Land Manager, ABB researcher(s), and designated representatives of the KMCA; and Oklahoma Department of Wildlife Conservation will visit the KMCA at least one time over 2 years to inspect the progress of the conservation activities at the KMCA, preferably after the annual report is received.

10.0 ADAPTIVE MANAGEMENT PROCESS

The adaptive management process identifies that protection and management practices are often implemented, by necessity, with imperfect knowledge. Identification of this uncertainty allows for the development of approaches that increasingly improve knowledge and therefore management of the conservation resources. The management process for the KMCA is an adaptive process involving the following general steps:

- Document baseline species and habitat conditions to provide the basic information needed for informed management and monitoring decisions.
- Evaluate threats to the resources and plan appropriate management strategies and practices to eliminate or minimize such threats to the extent practicable.
- Implement appropriate management activities.
- Monitor to track the results of management practices or strategies and identify trends in populations and habitat conditions.
- Evaluate if the management program successfully maintained the conservation values of the resources.
- Monitoring data feed back into updated baseline evaluations and the cycle repeats.

The Management Plan will be adaptive and change. Monitoring data and any available and relevant research or other similar information will be used to update baseline evaluations and the Management Plan. The Management Plan will be developed for a 15-year period and re-evaluated every five years by the KMCA Beetle Management Team consisting of the Land Manager, ABB researcher(s), and designated representatives of the KMCA; US Fish and Wildlife Service; and Oklahoma Department of Wildlife Conservation. More frequent updates may be completed as appropriate.

11.0 ACTIVITIES CONSISTENT WITH MANAGEMENT ENDOWMENT

The scale and/or practicability of all activities recommended or required by this Management Plan (including, without limitation, those described in Sections 6, 7, and 8 herein) will be limited to those which are feasible by the available funds under the management endowment. Under no circumstances shall activities, not provided in this Management Plan, be required if the cost of those activities would exceed the available funding from the annual endowment budget.

12.0 NO LIMITATION ON ACTIVITIES GREATER THAN MINIMUM REQUIREMENTS

Nothing in this Management Plan is intended to prohibit additional conservation practices by the owner that are otherwise consistent with accepted best practices for management and improvement of ABB suitable habitat.

Furthermore, nothing in this Management Plan is intended to prohibit the owner from seeking grants and third-party funding to augment the available annual management funds to pursue research, land management goals and enhancement practices beyond those specified here.

13.0 REFERENCES

Bandera Corridor Conservation KMCA Agreement between Bandera Conservation Corridor LLC and the United States Fish and Wildlife Service. 2011. 289 pp.

Jurzenski, J. 2012. Factors affecting the distribution and survival of endangered American burying beetles, *Nicrophorus americanus* Olivier. Dissertation. 266 pp. http://digital commons.unl.edu/entomologydiss/20.

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(USFWS) U.S. Fish and Wildlife Service. 1991. American burying beetle (*Nicrophorus americanus*) recovery plan. West Kingston, RI, USA. 81 pp.

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(USFWS) U.S. Fish and Wildlife Service. 2011. Transmittal of the U.S. fish and Wildlife Service's Biological Opinion on the Effects to Threatened and Endangered Species from the issuance of a Presidential Permit to TransCanada Keystone Pipeline, LP (Keystone) by the U.S. Department of State for the proposed construction, connection, operation, and maintenance of the Keystone XL pipeline and associated facilities at the border of the United States for importation of crude oil from Canada. Grand Island, NE, USA. 86 pp.

(USFWS) U.S. Fish and Wildlife Service. 2012a. Draft guidelines for the establishment, management, and operation of American burying beetle conservation KMCAs. Tulsa, OK, USA. 10 pp.

(USFWS) U.S. Fish and Wildlife Service. 2012b. Draft American burying beetle *Nicrophorus americanus* range wide survey guidance updated 4/20/2012. Tulsa, OK, USA. 9 pp. http://www.fws.gov/southwest/es/oklahoma/Documents/ABB/Surveying%20final/DRAFT%20ABB%20Range%20wide%20Survey%20Guidance%204_20_2012.pdf.

IN WITNESS WHEREOF, the Parties have each executed or caused to be executed and approve this Conservation Plan on November 19, 2012.

TRANSCANADA KEYSTONE PIPELINE, LP

By: _____

Name: **Andrea Jalbert**

Title: Authorized Signatory

IN WITNESS WHEREOF, the Parties have each executed or caused to be executed and approve this Conservation Plan on November 19, 2012.

COMMON GROUND CAPITAL/WLLL, LLC

By: _____ (CGC)
Name: K. Wayne Walker, Sr.
Title: Principal

By: _____ (WLLL)
Name: PRESTON L. SMITH
Title: PRESIDENT 11/19/12

IN WITNESS WHEREOF, the Parties have each executed or caused to be executed and approve this Conservation Plan on ~~November __, 2012~~.
December 5, 2012

U.S. Fish and Wildlife Service

By: Michelle Shaughnessy
Name: Michelle Shaughnessy
Title: Assistant Regional Director
Ecological Services