

Faunal & Floral Inventory

FINAL REPORT TASK 1 ENVIRONMENTAL DATA FOR THE ARKANSAS RIVER CORRIDOR PROJECT, TULSA, OKLAHOMA W912BV-06-P-0303



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PURPOSE OF THE STUDY

The Greater Tulsa Area communities recognized that the Arkansas River Corridor (ARC) is an important natural resource that could be developed and greatly improve the quality of life for current and future generations. In August 2004, The Indian Nations Council of Government (INCOG) directed and oversaw the development of an Arkansas River Corridor Master Plan/Phase I Vision Plan. The purpose of this plan was to enhance the aesthetic quality and development opportunities along a 42 mile stretch of the Arkansas River through Tulsa County through the establishment of numerous low-water dams. In October 2005, the U.S. Army Corps of Engineers (USACE), Tulsa District and INCOG developed a Phase II Master Plan and Pre-Reconnaissance Study. Some of the objectives of the Phase II Plan involved addressing potential environmental initiatives. This led to a letter agreement between Tulsa County, the Oklahoma Water Resources Board and the USACE Tulsa District to inventory, assess and evaluate environmental data for the Arkansas River from the Keystone Dam to the Tulsa/Wagoner County line, a 42-mile long corridor.

In September 2006, the Tulsa District of the USACE began Phase III of the Arkansas River Corridor Study. The purpose of Phase III of the study is to collect baseline environmental data along the Arkansas River Corridor. The Arkansas River Corridor was divided into five sampling segments between Lake Keystone and the community of Broken Arrow and shown on *Appendix A*.

The environmental studies conducted included a: 1) faunal and floral inventory; 2) fish community structure and composition assessment; 3) aquatic macro-invertebrate structure and composition; 4) water quality data assessment, and; 5) cultural resource evaluation. This report presents the results of the faunal and floral inventory.

INTRODUCTION

The Arkansas River's headwaters begin near Leadville, Colorado and flows 1,450 miles across Colorado, Kansas, northeastern Oklahoma and Arkansas to the confluence of the Mississippi River about 600 miles north of New Orleans. The Arkansas River is the fourth longest river in the United States with a drainage basin of nearly 195,000 miles and is the largest tributary of the Mississippi-Missouri River System. The Arkansas River enters Oklahoma near Arkansas City on the Kansas border north of Kaw Lake in Kay County, then flows generally southeast through Tulsa and Muskogee and then veers to the east and flows across the Arkansas State Line to Fort Smith. Numerous dams have created very large lakes on the Arkansas River including Keystone Dam Lake near Tulsa. The Arkansas River is fed by the Salt Fork, Black Bear, Cimarron, Illinois, Verdigris and South Canadian Rivers along with several other smaller rivers, creeks and streams (McCord, 2002).

The climate, geology, and soils of a region are interrelated to the flora that grows and fauna that inhabits the Arkansas River Corridor study area. Climate regulates the temperature and the amount of precipitation that affects the abundance and location of plant and animal populations. The freeze and thaw of water in the winter and strong winds and precipitation in the summer help to breakdown the exposed bedrock which leads to the development of soils. The different soil types created by the mixture of clay, silt, and sand, and whether the soil is acidic or alkaline, is directly related to available parent material, topography, and material transported by wind or water from nearby sources.

The plants and animals that occur in a region are the direct result of the interrelations of climate and geology toward the formation of soil. The following paragraphs provide a summary of the climatic, geologic, and soil characteristics of the Arkansas River Corridor study area.

Climate

The climate of Tulsa County is a temperate. The normal annual temperature is about 60 degrees Fahrenheit (F). The average annual maximum and minimum temperatures are 71° and 49° F, respectively. The highest recorded temperature was 115° F and the lowest recorded temperature was -15° F. On average, the relative humidity ranges between 47% and 92%. The normal annual precipitation is about 42 inches with approximately 83 days per year of precipitation. The majority of the annual rainfall (64%) occurs between April and September. Thunderstorms occur predominantly in the spring and summer for about 50 days out of the year. The prevailing winds across Tulsa County are predominantly from the south to southeast and the wind speeds average nearly seven miles per hour on an annual basis (Bennison, 1972; Oklahoma Climatological Survey).

Geomorphology and Geology

Geomorphic features identified in Tulsa County include the Eastern Sandstone Cuesta Plain and the Claremore Cuesta Plain. The Eastern Sandstone Cuesta Plain forms rugged hills with one steep face. The Claremore Cuesta Plain produces less pronounced and frequent hills and is composed of sandstone and limestone on top of the broad shale plains. The Claremore Cuesta Plain occurs throughout the rest of the county (Johnson, 1979). These hills form the topographic highs while the Arkansas River forms the topographic lows. These topographic highs and lows define the watersheds and drainage basin boundaries for the Arkansas River within the study area. The relief ranges from 180 to 300 feet when the cuestas are close to the river and 20 to 60 feet when the floodplains dominate the landscape.

The geology of the ARC study area is underlain by rocks of Pennsylvanian age. The hills along the upper reaches of the river are composed of the Dewey Limestone and Nellie Bly Formation. The rock formations become progressively younger downstream and include the Coffeyville, Checkerboard Limestone, Seminole, Holdenville, and Nowata Shale. These rocks were formed in ancient river and sea deposits that include delta; prodelta; subtidal clastics and marine shell banks; shallow marine banks; platform shallow marine, and; marine basinal shales (Bennison, 1972; Marcher, 1988). Quaternary river deposits overlie the younger Pennsylvanian formations on the broad floodplains along the river. The younger Holocene deposits represent modern floodplain alluvium that overly older Pleistocene terrace deposits. The deposits consist of unconsolidated gravels, sands, silts and clays.

Soils

The Choska-Severn Association is the predominate soil along the Arkansas River. These soils are deep, nearly level, well drained, loamy to gravelly soils overlying loamy and sandy materials on the floodplains. There are four basic horizons with alternating colors of dark reddish brown and yellowish red. The depth to groundwater is typically six feet. The depth to bedrock is greater than 60 inches (Cole, 1977).

General Habitat Types

The ARC survey corridor traverses many different habitat types or ecotones. Overall, habitat diversity may be considered moderate with the following identified: upland forests (including northern cross timbers) near Keystone Dam and at Turkey Mountain, riparian corridors along the river channel and tributaries, tame pastures, agriculture fields, sod farms, native grass meadows, fallow fields in the rural areas, and variable habitats associated with human-use metropolitan areas. The goal of this baseline inventory was to sample the representative habitat types and identify the plant and animal species associated therewith. Future surveys may be replicated at the respective sample stations in an effort to detect changes in habitat and species richness that may result from construction projects, human population growth, and/or metropolitan expansion (urban sprawl). A variety of habitats were sampled ranging from residential developments to areas adjacent to commercial enterprises to relatively pristine or undeveloped rural areas.

METHODS

The principle objective of this fauna and flora report is to conduct an inventory of the terrestrial plant and vertebrate species up to a maximum distance of one-half mile from the centerline of the Arkansas River. First, an inventory and review of existing federal and state databases, studies, and surveys for species distribution and historical accounts was completed. The research focused on mammals, birds, sensitive environments, and threatened and endangered species. Historical accounts of the respective flora and fauna are provided at *Appendix B*. Finally, pedestrian surveys were conducted within the five segments of the project area on a quarterly basis. The comprehensive inventory was conducted to visually observe and document all mammals, amphibians, reptiles, birds, and plants species within and adjacent to the individual sample sites.

Terrestrial surveys were performed using randomly located sample plots within the five survey corridor segments to determine the general floral and faunal composition. Fifteen 30-meter plots were established along the river study corridor to survey the homogeneous habitat types either side of the Arkansas River up to a maximum distance of one-half mile measured from the centerline of the river.

The floral survey consisted of observations of the dominant vegetation in each plot identified to species (to the extent possible) during which each sample plot was photo-documented. Botanical preservation would be coordinated with the respective agencies regarding the requested species protocol. Floral inventories were conducted at each sample site within a 30-meter radius of sample plot center, specified by GPS coordinates. The dominant plant species were identified at a minimum. However, each observed species was identified to the extent practical and recorded resulting in a more detailed inventory of plants represented within the predominant habitat types. The sample station location maps are provided at *Appendix C* and selected photographs of each station are presented at *Appendix D*. A brief and general habitat description of each sample site is provided below:

Survey Corridor Segment 1

1TR11.1 is characterized as a riparian corridor area situated at a relatively low elevation located on the left descending bank of the river. The area is a moderately mature forested area with an open understory. Soils were described as sandy to sandy loam. The area is part of a trail system associated with the nature area and overlook downstream of Keystone Dam.

1TR11.2 is described as a narrow riparian zone adjacent to forested upland hillsides on the right descending bank of the river.

The area is relatively young-aged with a variety of species represented at 4 strata. Overstory composition was somewhat limited and open which promoted a relatively dense understory. Herbaceous species presence was limited and sparse.

1TR11.3 is located on a middle ridge bench on an upland forest hillside. The area was dominated by oak and hickory species along the rocky outcrop. Canopy closure was estimated at greater than 70% and the understory was comprised primarily of those species present in overstory. Herbaceous and vine species were present but somewhat sparse in terms of stem density.

Survey Corridor Segment 2

1TR12.1 is located on the left descending bank of the river near Sand Springs and on the river side of the levee. The area was very sandy and the observed vegetation was mostly at the herbaceous stratum. A few trees were present and associated with the levee, depressional areas, and along the riverbank.

1TR12.2 was very similar to the previous sample site however; a depression wetland was identified within the sample point. Dominated by herbaceous vegetation, the wetland area contained the majority of the identified trees and understory. The overall area appears to have been disturbed and depression area may be a former borrow or sand pit.

1TR12.3 is located on a very steep upland hillside situated well above the riverbank south of State Highway 51. The sample site lies on the north slope of the rocky hillsides that may be the ancient river bank bluff. The area is very rocky and rugged with relatively young-aged trees and a moderately open understory.

Survey Corridor Segment 3

1TR13.1 lies within a mature upland forest on the top of Turkey Mountain overlooking the Arkansas River to the east. Canopy closure was estimated at 50% with a moderately dense understory. The surrounding area has been preserved from development and is currently used for outdoor activities including hiking and off-road bicycling.

1TR13.2 is described as a moderately open second terrace riparian zone located on the left descending bank. The area is relatively narrow and exhibited a moderately mature overstory. The understory and herbaceous strata were well developed and diverse. Soils within this sample site were described as sandy to sandy loam and well drained.

1TR13.3 is located in well maintained a residential area and was described as a partially fenced yard dominated by Bermudagrass. Plant diversity appeared to be very low.

Survey Corridor Segment 4

1TR14.1 is very similar to 1TR13.2 and is also described as a moderately open second terrace riparian zone located on the left descending bank. The overstory component was more developed and canopy closure was ocularly estimated at 75%. The understory was not as diverse and the herb stratum was not well represented. Soils within this sample site were described as sandy to sandy loam and well drained.

1TR14.2 is situated in a developing riparian forest near the confluence of Polecat Creek with the Arkansas River. The sample site is relatively young but exhibited a diverse plant community at all four strata. The area lies within the floodplain of the river and the stem density within and adjacent to this site was considered moderate. Sandy well drained soils were prevalent throughout the area.

1TR14.3 is situated between a fallow, previously disturbed open field dominated by forb species and a well developed riparian corridor adjacent to the river. A small early successional stage upland forested area lies between the two more prominent habitat features. Species diversity was considered moderate.

Survey Corridor Segment 5

1TR15.1 is located adjacent to and partially within a remnant oxbow on the left descending bank of the river downstream of an active sand removal operation. The eastern edge of this sample site is situated along the former riverbank while the western portion may be part of the sand removal operation or former sand pit. The majority of the area was classified as a palustrine deciduous forest seasonally flooded wetland (Cowardin Nomenclature PFO1C).

1TR15.2 is characterized as a developing forested floodplain area located between agriculture fields and the ancient riverbank. While not classified as wetland, the area may be a remnant of a once expansive floodplain riparian corridor associated with the river and a nearby creek channel. Situated over one-quarter mile east of the left descending bank of the river, the area has not experienced appreciable disturbance and contained a diverse array of plant species across four strata.

1TR15.3 is considered a relatively pristine sample site nestled along the ancient river bank that does not appear to evidence any appreciable disturbance in recent history. The area contained several mature hardwood species and a very diverse understory. Many species of vine were present however due to the canopy coverage and additional understory shading the herbaceous component was somewhat limited.

The faunal survey consisted of the visual observation of species within each plot or evidence of the presence of the species, including but not limited to; observations of tracks, scat, carcasses, sign posts, scent, skin, hair, feathers, and song in each plot. Earthen sign stations and/or scent posts were not used. Detailed statistical analysis of populations were not considered a goal of this study rather a general overall species presence or baseline inventory was to focus.

The flora and fauna surveys along the ARC (Arkansas River Corridor) were conducted by the Eagle Environmental field sampling team based on the division of the 42-mile survey corridor along the Arkansas River into 5 segments with 3 sample points in each segment for a total of 15 individual sample points. Global Position System (GPS) coordinates for each flora and fauna sample point within the survey segments were collected using sub-meter accuracy hand held Trimble and Sokkia GPS units.

Surveys were performed to document those species present or utilizing the multiple different habitat types associated with the Arkansas River corridor within Tulsa County. Specific intervals of time, typically 15 minute intervals, were utilized to standardize the amount of time (effort) expended at each sample station. Standard time periods ranged between 1 and 2 hours and were primarily utilized for avian observation/detection surveys.

Avian surveys were conducted using a fixed plot sample method however; approval was provided by the USACE to include any species observed, detected, and/or evidenced within one-half mile of any one sample site.

Mammal, amphibian, and reptile surveys were not considered time sensitive and were based on the evidence of all species within the sample plot or vicinity. The preparation and archival of specimens, as appropriate, would be coordinated with an accredited zoological museum for faunal collections. However, no species of significance or special status has been observed or identified. Threatened and endangered species as well as species of special concern in the State of Oklahoma were afforded special attention to determine their use and locations.

Federal and State Database Inventory

Threatened and Endangered Species

The Endangered Species Act of 1973 declares the intention of Congress to protect all federally listed threatened and endangered species and designated habitat of such species occurring in the United States. The United States Fish and Wildlife Service (USFWS) is the primary regulatory agency responsible for ESA compliance. Coordination with the USFWS have determined that there are four federally listed species that occur in Tulsa County that included: the endangered American burying beetle (*Nicrophorus americanus*), the threatened (proposed for delisting) bald eagle (*Haliaeetus leucocephalus*), the endangered interior least tern (*Sterna antillarum*), and the threatened piping plover (*Charadrius melodus*) (**Table 1**). Descriptions of the species are provided below.

Table 1		
Threatened and Endangered Species		
Common Name	Scientific Name	Status
American Burying Beetle	<i>Nicrophorus americanus</i>	Endangered
Interior Least Tern	<i>Sterna antillarum</i>	Endangered
Piping Plover	<i>Charadrius melodus</i>	Threatened

Source: U.S. Fish and Wildlife Service, 2007

American Burying Beetle



The American Burying Beetle is large and has a shiny black appearance with four orange-red spots on the wing covers (elytra). A large red spot on the pronotum of the beetle is indicative of the species. The habitat requirements for this beetle are not fully known, however, the ABB is considered a habitat generalist and is known to occupy a diverse range of habitats. Habitats associated with the ABB include open grasslands, forests, as well as transitional areas.

The beetle is a carrion feeder and utilizes small vertebrate carcasses for food and reproductive purposes. Adult ABB's locate suitable food sources and mates through olfactory senses. Adults prepare and preserve the carrion by covering the carcass with mucilaginous secretions and burying in a shallow grave. Eggs are laid in a small chamber adjacent to the buried carrion by the adults (Schnell, et. al.1993). Both the male and female adults remain with the young until pupation is complete. The ABB appears to utilize a mixture of woodlands and open grasslands for protective cover, foraging, and brooding purposes however their potential presence in these areas may be more predicated on prey/forage availability rather than specific habitat selection. Surveys for the ABB were completed in the 4th sampling quarter between July 30 and August 1, 2007.

Interior Least Tern



The interior least tern is the smallest member of the tern family with a wingspan of 20 inches (50 cm). They have a grayish back and wings, and snowy white undersides. Least terns can be distinguished from all other terns by their combination of a black crown, white forehead, and a variable black-tipped yellow bill. Interior least terns arrive at breeding sites from late April to early June where they typically spend four to five months. Least terns nest in small colonies on exposed salt flats, river sandbars, or reservoir beaches. Nests are small scrapes in the sand, and usually two or three eggs are laid. Interior least terns favor islands or sandbars along large rivers for nesting. The sand must be mostly clear of vegetation to be used by terns. Least terns prefer shallow water for fishing. The traditional period of presence for the Interior least tern had not occurred through the latest sampling period. Surveys for this species were performed during the 4th quarter sampling period.

Piping Plover



The Piping Plover is described as a small compact shorebird with pale gray upperparts. The breast and stomach areas are white with a white neck collar. Piping plovers have orange legs and a short stout bill. Piping plovers forage on aquatic invertebrates and various terrestrial insects. Nests are described as shallow excavations in sand and are often lined with pebbles, shells, and/or small woody drift (Knopf 1996). Habitat degradation from reservoir construction, river channel alteration, and development are contributing factors for its decline. The piping plover is identified as a breeding resident of Oklahoma and arrives in April. The piping plover is normally associated with larger river waterway system with large isolated sand bars. No piping plovers were observed during the completed sampling periods.

Bald Eagle



The bald eagle was removed from the threatened species list in July 2007 (72 FR 37345-373732), but continues to be provided protection under the Bald and Golden Eagle Protection Act. Bald eagles are rather large raptorial birds measuring 3 feet in height with a 7-foot wingspan. The bald eagle prefers large trees or high cliffs along large waterways for perching and nesting purposes. Fish is the preferred diet of eagles, but they also eat small mammals, waterfowl, turtles and dead animals. Preferred foraging areas include quiet coastal areas, rivers or lakeshores with large tall trees (Buehler 2000). Generally, bald eagles migrate through Oklahoma in early spring and return by September or October. Bald eagles were observed from sampling point 1TR1.1 near Keystone Dam during the 2nd quarter sampling period.

State Species of Special Concern

Nine species of special concern listed by the State of Oklahoma occur in Tulsa County and are shown in **Table 2**. The species of special concern designation is primarily a planning tool for the Oklahoma Department of Wildlife Conservation and other conservation agencies interested in focused conservation efforts for declining species. State species of special concern do not receive the same legal protection as threatened and endangered species.

Scientific Name	Common Name
<i>Vireo bellii</i>	Bell's Vireo
<i>Macrolemys temminckii</i>	Alligator Snapping Turtle
<i>Cemophoro coccinea copei</i>	Northern Scarlet Snake
<i>Lutra canadensis</i>	River Otter
<i>Phrynosoma cornutum</i>	Texas Horned Lizard
<i>Gryllotalpa major</i>	Prairie Mole Cricket
<i>Buteo swainsoni</i>	Swainson's Hawk
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Zapus hudsonius</i>	Meadow Jumping Mouse

Bell's Vireo



Bell's Vireo is found in open shrub land habitats that are dominated by willow, sand plum, roughleaf dogwood and hawthorn. They are found in shrubby rangeland and old-fields where sand plum and other deciduous thickets are common; and they are found in willow thickets along streams and the Arkansas River. While habitat for this species is believed to be present within some of the sample site locations, no sightings or song was confirmed.

Alligator Snapping Turtle



The Alligator snapping turtle is found in the vicinity of log/debris piles in the Arkansas River and its tributary streams. This aquatic turtle is usually found in forested, slow-moving waters such as backwater areas on the Arkansas River and some of its larger tributaries. Individual Alligator Snapping Turtles rarely leave the water (except females when they leave to lay their eggs) so they almost never colonize ponds or bodies of water not directly connected to perennial streams. This species has not been observed to date.

Northern Scarlet Snake



The northern scarlet snake is a rare snake that is usually associated with oak woodlands and forests on sandy soils. It has only been documented a few times in Tulsa County. The northern scarlet snake is generally found under boards, rocks, and logs, in forests and open adjacent fields with well drained soil. This species is nocturnal and is considered a burrower, spending most of its time underground. No observation or evidence of the Scarlet snake has been documented.

The River Otter



The River otter has been increasing in numbers and expanding its range over the past 25 years. Within the past 7 to 8 years the otter began to recolonize Tulsa County and a few are seen regularly along the Arkansas River and in its tributaries. When prime, river otter fur appears black-brown, with the belly slightly lighter in color than its back. The chin and throat are grayish. Otter fur consists of a very dense undercoat overlaid with longer guard hairs. Its tail is powerful and a little more than a third as long as its head and body. Only the hind feet are webbed. River otter presence has not been confirmed within or near the selected sampling locations.

The Texas Horned Lizard, Prairie Mole Cricket, Swainson's Hawk, Loggerhead Shrike, and the Meadow Jumping Mouse are typically associated with native prairie and grassland habitats and are most frequently observed in the grasslands in the northern part of Tulsa County:

The Texas Horned Lizard



The Texas Horned Lizard is found in tallgrass prairie and shrubby prairie habitats. It is not restricted to sites with sandy soils, but it does appear to be the most common in sandy soils. Most of the recent records have been in the northern part of Tulsa County and along the Arkansas River. Presence of this species has not been confirmed.

Prairie Mole Cricket



The Prairie Mole Cricket is found in native prairie and appears to survive well in hay meadows and grazed pasture land and does not appear to use Bermuda grass or fescue pastures. Prairie mole crickets may be present within or near some of the sampling sites however their presence was not detected.

Swainson's Hawk



Swainson's Hawk occurs at low densities in open grassland habitat in the northern part of the county. This hawk prefers open grasslands and desert-like habitats. It is common to see this hawk perched on a fence post in a prairie or open range. This hawk's most unique feature is its variation in color. The light color morph includes white patches on the forehead, the throat and the belly. These hawks vary in length from 19 to 22 inches, and have a wingspan of 47 to 57 inches. No Swainson's hawks have been observed during the previous sampling periods.

Loggerhead Shrike



The Loggerhead shrike is uncommon and with a spotted distribution and usually found in open grassland/prairie habitat. The loggerhead shrike is a masked, hook-billed songbird known for its habit of impaling prey on thorns or barbed wire and easily confused with mockingbirds. Specific habitat required for this species has not been observed at or near any of the selected sample stations. Species observation or evidence of presence has not been documented.

Meadow Jumping Mouse



The meadow jumping mouse is very rare and only recorded twice in Tulsa County (both records are in excess of 30 years old) in shrubby, tallgrass prairie habitat. This species probably no longer occurs in Tulsa County and has not been confirmed as present within the survey corridor.

RESULTS

Surveys for flora and fauna were conducted quarterly from October 2006 to July 2007. Primarily opportunistic direct observation of the identified species was the primary methods of survey. Survey efforts were conducted each quarter at different times during diurnal periods ranging from crepuscular to midday. However, weather conditions were selected to avoid sampling during high wind and/or precipitation conditions. Ambient temperatures were not a factor in determining sample periods or timing. Fifteen sample plots were used to collect evidence of resident and/or migratory species within the five survey corridor segment and are shown on maps in *Appendix C*.

Fall 2006 Sampling

The fall quarterly sampling was conducted from October 1 to December 31, 2006. A total of 107 different species of animals were identified at the 15 sample stations including 21 species of mammals, 16 amphibian and reptile species, and 70 different species of birds. Species diversity ranged from 8 animals identified as using sample station 1TR13.3 to 46 species confirmed at station 1TR14.1. One hundred thirty-five plant species were identified during this survey corridor across the 15 sample stations. Station 1TR13.3 exhibited the least species diversity with 11 while station 1TR15.2 and 1TR13.2 maintained 48 different plants species. A detailed list of species observed and a representation of the species identified at each sampling site is provided in *Appendix E*.

Winter 2007 Sampling

The winter 2007 sampling was conducted from January 15 to April 15, 2007. A total of 56 species comprised of 10 mammals, no amphibians or reptiles, and 46 birds. Species diversity ranged from 2 animals identified as using sample station 1TR13.3 to 20 species confirmed at station 1TR11.1. The overall diversity of plants observed during the winter survey totaled 103 different species. Sample site 1TR13.3 exhibited 11 species and 1TR15.3 contained 37. A detailed list of species observed and a representation of the species identified at each sampling site is provided in *Appendix F*.

Spring 2007 Sampling

The spring 2007 sampling event was conducted from April 15, to June 15, 2007. A total 71 animal species were confirmed during this survey period consisting of 9 mammals, 19 amphibians and reptiles, and 43 birds. The range of species present was 6 at 1TR13.3 and 25 at 1TR11.1. The number of plant species identified throughout the 15 sample stations was 108. Stations 1TR12.3 and 1TR13.3 exhibited the least number of plant species with 12 and 1TR13.2 maintained the greatest diversity with 39 species observed. A detailed list of species observed and a representation of the species identified at each sampling site is provided in *Appendix G*.

Summer 2007 Sampling

The summer 2007 sampling even was conducted from June 15, 2007 and to August 15, 2007. A total 64 animal species were confirmed during this survey period consisting of 11 mammals, 3 amphibians and reptiles, and 69 birds. The range of species present was 7 at 1TR13.3 and 23 at 1TR11.1, 1TR12.2 and 1TR14.2. The number of plant species identified throughout the 15 sample stations was 95. Station 1TR13.3 exhibited the least number of plant species with 11 while 1TR15.3 experienced the greatest diversity with 40 species observed. A detailed list of species observed and a representation of the species identified at each sampling site is provided in *Appendix H*.

A survey was conducted to identify the presence or absence of the American Burying Beetle between July 30 and August 1, 2007 and completed after three nights of trapping. Members of the *Nicrophorus* genus were found including *Nicrophorus orbicollis* and *Nicrophorus americanus*. Four American Burying Beetles were collected. The report of survey is provided in *Appendix I*.

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