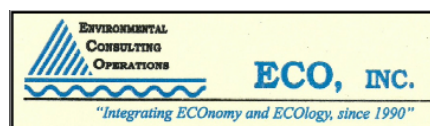


GUIDANCE FOR CONDUCTING SCIENTIFIC RESEARCH AT WOOLSEY WET PRAIRIE SANCTUARY



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JACOBS



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Guidance for Conducting Scientific Research
At Woolsey Wet Prairie Sanctuary

1.0 - Purpose

In recent years, there has been an increased interest in conducting scientific research at Woolsey Wet Prairie. The City of Fayetteville and Environmental Consulting Operations, Inc. (ECO, Inc.) fully support scientific research activities at the site; however, certain guidelines are required. Woolsey Wet Prairie is like no other city-owned property, due to its ecological significance and the federal requirements and restrictions under Section 404 of the Clean Water Act (CWA) that apply to the property. The purpose of this guidance is to inform parties interested in conducting scientific research at the site about the project approval process and about allowable activities and prohibited activities.

This document is to serve as guidance for the pre-approval process prior to conducting scientific research at Woolsey Wet Prairie in order to provide a process whereby research activities are conducted in accordance with the City of Fayetteville's Section 404 Permit and to avoid imposing adverse impacts to the site.

2.0 – Introduction and Background

From 2005 through 2009, the City of Fayetteville, Arkansas' Wastewater System Improvement Project (WSIP) entailed improvements to the City's sewer collection system, upgrading the Paul Noland Wastewater Treatment Plant (WWTP), and construction of the new (West Side) WWTP. The project's primary purpose was to implement corrective actions to eliminate/reduce odor and overflow problems associated with the Noland Plant and collection system and to provide wastewater treatment to areas outside the treatment area while reducing the total hydraulic loading to the system. WSIP construction activities involved discharges of fill into "Waters of the U.S." within the Illinois River Watershed and the Beaver Reservoir Watershed (within the White River Basin); therefore, the U.S. Army Corps of Engineers required permitting under Section 404 of the CWA. Unavoidable permanent alterations to wetlands during construction of the WSIP necessitated the city's Section 404 permit requirement for wetland compensatory mitigation to offset losses of "Waters of the U.S.". The wetland mitigation site was constructed immediately to the north of the West Side WWTP in a pasture that was a severely degraded remnant tall grass wetland prairie. In 2006, Bruce Shackleford, ECO, Inc. President, named the mitigation site "Woolsey Wet Prairie Sanctuary" in honor of Samuel Gilbert Woolsey, whose family settled the property in 1830 when prairies were abundant in Northwest Arkansas.

Woolsey Wet Prairie is part of the original prairie of Prairie Township, Fayetteville, Arkansas that extended westward to the Prairie Grove and Lincoln areas in Washington County and northward into Benton County. Conversion of an estimated 100,000 acres of both wetland and upland prairie habitat in Northwest Arkansas to production of wheat in the late 1800's and early 1900's was the beginning of the decimation of prairie habitat, America's most endangered ecosystem. Fire suppression and the introduction of non-native plant species have greatly contributed greatly to the near complete extirpation of prairie habitat. Today, less than 1% of the original habitat exists, and most of what is left is severely degraded.

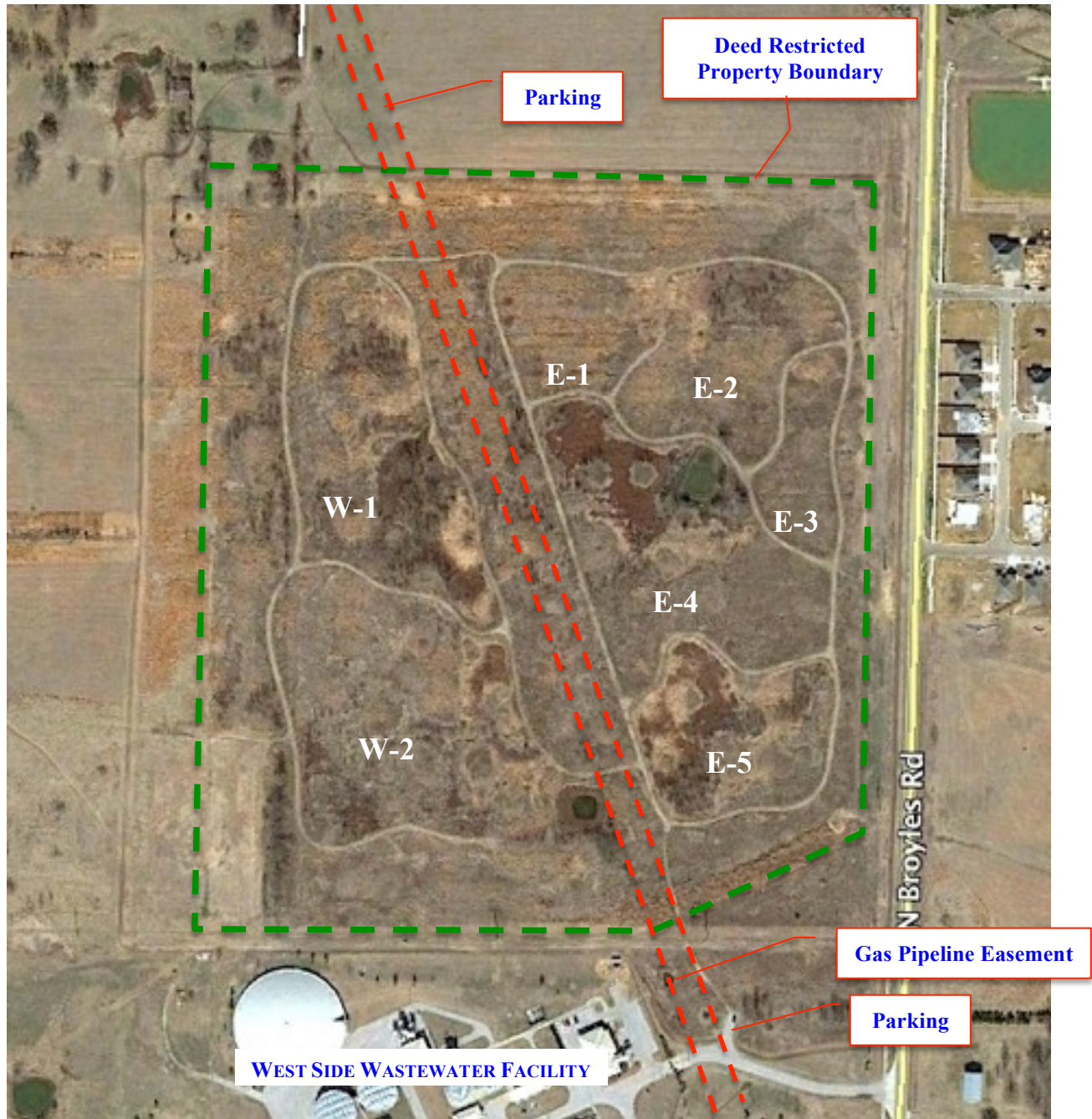
2.1 – Mitigation Site Concept and Design Team

The wetland mitigation site is located immediately to the north of the Westside WWTP that became operational on June 1, 2008. McGoodwin, Williams, and Yates Consulting Engineers, Inc. (MWY) of Fayetteville, Arkansas provided civil engineering design of hydrological features and ECO, Inc. of Benton, Arkansas provided ecological feature design, site management, and monitoring.

Modifications to the pre-existing hydrology at the mitigation site were achieved via the construction of low elevation perimeter earthen berms designed to provide a mechanism for water retention within seven wetland cells (Figure 1). The micro-topography within the wetland cells was not disturbed or altered during the construction of the berms. The presence of depressions between prairie mounds provides a diversity of hydrology, which, in turn provides diversity in wetland and upland plant communities and wildlife within a mosaic of habitat types.

Water level control structures with stop logs were constructed within the berms in order to provide the ability to hold and to release water as needed in order to maintain inundation/saturation within the wetland cells to desirable levels for the purpose of optimizing wetland plant community diversity. Construction of the earthen berms resulted in two cells (W-1 and W-2) within the West Mitigation Site, and five cells (E-1 through E-5) within the East Mitigation Site (Figure 1). The west and east mitigation sites are separated by a gas pipeline easement that is 80 feet in width. The easement has undergone the same adaptive management as the remaining acreage on the deed restricted property.

Figure 1 - Woolsey Wet Prairie Aerial Photograph



2.2 – Mitigation Site Adaptive Management

Operation of hydrological controls, herbicide applications, fire line installations, trail maintenance, and mowing activities are provided by Jacobs Engineering (formerly CH2MHill Companies, Ltd.) that manages and maintains the City's wastewater utility system. Prescribed burns are contracted by the City of Fayetteville through an informal bidding process. ECO, Inc. oversees Section 404 permit compliance, develops prescribed burn and herbicide application specifications, identifies problem areas where invasive plant species need to be controlled, and conducts annual monitoring and site adaptive management strategy development.

Although the deed-restricted mitigation site is comprised of 43.65-acres, adjacent buffer areas are managed around the perimeter of the mitigation site for a total of 65 acres that are targeted for adaptive management activities.

2.3 – Ecological Indicators

Subsequent to the implementation of ecological restoration activities, numerous rare plant and animal species have been observed at Woolsey Wet Prairie, as described below.

2.3.1 - Rare Plant Species Observed at Woolsey Wet Prairie Sanctuary

Eleven plant species tracked as elements of conservation concern (rare species) by the Arkansas Natural Heritage Commission (ANHC) have been found to naturally occur at the wetland mitigation site. The rare plants include sedges (family *Cyperaceae*), milkwort (family *Polygalaceae*), and Hawthorn (genus *Crataegus*) that are characteristic of unplowed tall grass wet prairie remnants. These rare species are as follows:

***Carex aggregata* (cluster sedge)** – This sedge is only known in Arkansas from a few sites in Benton, Carroll, Fulton, Newton, Sharp, and Washington counties. It typically grows in low open woodlands or seasonally wet grasslands. At Woolsey Wet Prairie, it is scattered among seasonally wet areas that are not inundated for long periods within all seven wetland cells.

***Polygala incarnata* (pink milkwort)** – This rare species of wildflower is known in Arkansas from remnant prairies and other historically open grassland habitats such as glades and savannas. An individual plant was found on a pimple mound in Cell E-4 in 2012 and was not observed in 2013. In 2014, the population increased to six plants, but none were observed in 2015 or 2016. It is known from scattered counties in Arkansas, but most of the records are historical and many of the sites where it was historically found have since been destroyed.

***Carex scoparia* var. *scoparia* (pointed sedge)** – This very rare species is known only from prairie-associated wetlands in Washington and Benton counties and from a wet depression on top of Rich Mountain in Polk County. It has been observed from only a single clump of plants in Cell W-1 at Woolsey Wet Prairie.

***Carex arkansana* (Arkansas sedge)** – This uncommon sedge is known to occur in Arkansas wet prairie remnants, open hydric oak flatwoods, and similar open wetland habitats and moist soil depressions. At Woolsey Wet Prairie, it is scattered in seasonally wet areas that are not inundated for long periods within all seven wetland cells.

***Carex opaca* (opaque prairie sedge)** – This rare sedge is primarily associated with unplowed wet tall grass prairie remnants, bottomland prairies, moist depressions of upland prairies, and margins of fens in Arkansas. At Woolsey Wet Prairie, it is scattered in seasonally wet areas that are not inundated for long periods within all seven wetland cells.

***Carex fissa* var. *fissa* (hammock sedge)** – Prior to its discovery at Woolsey Wet Prairie, this rare sedge was known in Arkansas from only two sites in Franklin and Lonoke Counties where it occurs in prairie-associated wetlands. At Woolsey Wet Prairie, it has historically been found in three depressional prairie swales in Cells E-2, W-1 and W-2.

***Carex pellita* (woolly sedge)** – Prior to being observed at Woolsey Wet Prairie, this species was known to be extant at a single Arkansas location in a fen in Marion County. It has since been found at three other sites in Benton, Washington, and Marion counties. It has been observed in Wetland Cells E-4, E-5, W-1, and W-2 where it grows in seasonally wet areas. Based upon observations from 2007 to 2016, the population density has increased.

***Eleocharis wolfii* (Wolf's spikerush)** – This rare sedge occurs in Arkansas primarily in wet areas in unplowed tall grass prairie remnants, but can persist in wet open areas in landscapes that were formerly dominated by prairie vegetation. It is common in several depressional swales within Wetland Cells E-2, E-3, E-4, E-5, W-1, and W-2.

***Rhynchospora macrostachya* (tall horned beaksedge)** – Prior to its observation at Woolsey Wet Prairie, this species was known in Arkansas from only a few scattered historical collections from remnant prairies. It has since been found in several prairie-associated wetlands in Franklin County. At Woolsey Wet Prairie, it was known from two natural prairie swales within the gas pipeline easement prior to construction of the berms. In the fall of 2006, Bruce Shackleford of ECO, Inc.

gathered seeds and successfully propagated over 50 individual plants during the 2007 growing season that were transplanted into marsh areas at the mitigation site during 2008. A 90 percent survival rate was observed and transplanted specimens produced large seed heads by the end of the 2008 growing season. This species has increased in density in several of the wetland cells and has been found within Wetland Cells E-4, E-5, W-1, and W-2.

***Crataegus reverchonii* (Reverchon's hawthorn)** – This small tree species has been confirmed to occur in Arkansas only in Benton and Washington counties. All sites where it grows are low prairies or woodlands. It is primarily a western species. Individual plants at Woolsey Wet Prairie appear to be *Crataegus reverchonii* subsp. *palmeri*, but both *palmeri* and the subspecies *reverchonii* have been reported for northwestern Arkansas. Additional study is needed to determine if both subspecies are present at the site. It has been observed within Wetland Cells E-4, E-5, W-1, and W-2.

In addition to these ten species, which occur within the boundary marked by wetland mitigation signs, an 11th species of state concern was located on City of Fayetteville property to the immediate north of Woolsey Wet Prairie.

***Artemisia ludoviciana* var. *mexicana* (Mexican white sage)** – Two distinct patches of this species were found in a fencerow and field margin along the south side of Persimmon Street, just west of Owl Creek. This species is known to occur in Arkansas in dry grasslands and glades in a few counties in the northwestern part of the state. It was last documented from the Fayetteville area in 1954 when it was collected from “West Mountain” (a site believed to be about two miles east of Woolsey Wet Prairie).

ECO, Inc. is in the process of developing an aerial image to show locations of ecologically sensitive areas that should be avoided where rare plant species exist during research project activities.

2.3.2 - Rare Avifauna Species Observed at Woolsey Wet Prairie Sanctuary
Woolsey Wet Prairie has become a popular destination for birders. The unique habitat types attract bird species not frequently seen elsewhere.

- **Two blue-winged teal hens were observed together with their broods and photographed by Bruce Shackleford in June 2008. This is the eighth breeding record for Arkansas, and the first with more than one brood of ducklings together.**

- **A grasshopper sparrow was sighted during the 2010 50th Annual Fayetteville Christmas Bird Count by local birders Andrew Scaboo and Brandon Schmidt. Since the inception of the Christmas Bird Count by Dr. Doug James in 1961, no one had previously reported a sighting of a grasshopper sparrow. This was a first for this 50-year event.**
- **In March 2011, Mike Mlodinow observed a northern shrike that was photographed by Joe Neal. This was the second state record for this species.**
- **On April 26, 2011, Mike Mlodinow observed a purple gallinule, the only known record north of Cleburne County in Arkansas for this bird. Mike also saw a merlin and a sora on this date.**
- **On July 1, 2011, Don Streinkraus observed two black-bellied whistling ducks, which was only the sixth record of this bird species in northwest Arkansas.**
- **In October 2011, Mike Mlodinow found a Cassin's Sparrow that was photographed by Joe Neal. This is the second state record for this species.**
- **The rare Henslow's sparrow and a Spotted Towhee were observed and photographed by Jacque Brown in October 2011. On the average, only one or two spotted towhees are seen in Northwest Arkansas each year, and they are not observed in some years.**
- **In early December 2011 Mike Mlodinow found a Brewer's sparrow that was photographed by Jacque Brown, David Oakley, and Mitchell Pruitt. This is the second known record for this bird in Arkansas.**
- **On December 16, 2012, Andrew Scaboo photographed a prairie falcon. This was a first for the annual Christmas bird count, and a first for Washington County.**
- **On April 24, 2013, three white-faced ibis's were observed and photographed by Joe Neal and Joan Reynolds.**
- **On April 25, 2013, Wilson's phalaropes were observed and photographed by Mitchell Pruitt, Joe Neal and Joan Reynolds.**
- **During April 2016, a burrowing owl was observed and photographed by Jay Jones.**
- **On May 29, 2017, a king rail was observed by UA-Fayetteville graduate**

student Alyssa DeRubeis. This was a very rare sighting for northwest Arkansas.

Woolsey Wet Prairie is an important site for a variety of birds with over 190 species reported since 2006. Of these, 20 are among the 36 species of birds listed as Arkansas Birds of Conservation Interest (ABCI) by the Arkansas Audubon Society.

2.3.3 - Rare Herpetofauna Species Observed at Woolsey Wet Prairie

In 2013, U of A professor Dr. J.D. Willson discovered some very interesting prairie associated reptile and amphibian species at Woolsey Wet Prairie as he began conducting various surveys with his students. To date, 25 species of herpetofauna have been observed (9 anurans, 1 salamander, 3 turtles, 1 lizard, and 11 snakes).

Among the most interesting finds are:

***Ambystoma texanum* (Small Mouth Salamander)** - This salamander species is very uncommon north of the Arkansas River Valley. Its presence is a good indicator that the habitat is good for other prairie-associated amphibian species.

***Rana areolata* (Crayfish Frog)** - This prairie-associated species is uncommon and declining throughout its range in the central US. In northwest Arkansas, it is restricted to remnant prairies, where it is threatened by development, agriculture, pollution, and road mortality. A good population of this species is present at Woolsey Wet Prairie.

***Regina grahamii* (Graham's Crayfish Snake)** - According to the Arkansas Natural Heritage Commission, this species of snake has a state ranking of *very rare*. This is a non-venomous species of snake that feeds upon recently molted crayfish and will retreat into crayfish burrows during hot weather. The large population of Osage Burrowing Crayfish (*Procambarus liberorum*) at Woolsey Wet Prairie creates ideal habitat for this snake. Prior to Dr. Willson's discovery, this species of snake has not been recorded in northwest Arkansas in almost 60 years.

***Lampropeltis calligaster* (Prairie Kingsnake)** - In March 2017, Jeff Hickie of Jacobs Engineering captured a Prairie Kingsnake that was the longest ever documented in the scientific literature, measuring 148 centimeters.

3.0 - Awards and Special Recognitions

Woolsey Wet Prairie has won awards and special recognitions for the City of Fayetteville, including:

April 2009 - Arkansas Environmental Stewardship Award (ENVY Award) Finalist presented by Arkansas Department of Environmental Quality

August 2009 - Governor's Conservation Awards - Corporate Conservationist of the Year presented by Arkansas Wildlife Federation in (the first time this award has been presented to a City since the inception of the AWF in 1936)

November 2009 - Golden Paddle Award presented by Illinois River Watershed Partnership

February 2011 - Designation as a Certified Wildlife Habitat by the National Wildlife Federation

October 2011 – Special recognition in the America in Bloom National Turf and Groundcover

July 2013 – Woolsey Wet Prairie was successfully nominated as The Arkansas Audubon Society's 32nd Important Bird Area (IBA) in the State of Arkansas. There are currently 33 IBA's in Arkansas.

January 2014 – “Woolsey Wet Prairie – After the Burn” The City of Fayetteville Government Channel Television Documentary produced by Neal Bilbe and narrated by Bruce Shackleford.

4.0 - Environmental Regulatory Requirements

On March 10, 2005, the City of Fayetteville received Individual Section 404 Permit No. 14207 from the U.S. Army Corps of Engineers (COE) Little Rock District for the portion of the WSIP in the Illinois River Watershed that involved 36 stream crossings and 15 wetland crossings during construction of the new Westside WWTP; sewer lines, and improvements to Broyles Road. The 404 permit required wetland compensatory mitigation due to the permanent alteration of 8.87 acres of wetlands. As required by the COE, the wetland mitigation site was deed restricted in perpetuity to guarantee preservation of the wetlands and upland buffers. A certified copy of the Notice of Deed Restriction was recorded with the Washington County Registrar of Deeds on January 5, 2007 and subsequently submitted to the Little Rock District COE. Consequently, the City of Fayetteville is required to manage and maintain the property as a wetland mitigation site in perpetuity.

4.1 – Prohibited Activities

Language within the Section 404 permit and the 2007 deed-restrictive covenant has the following restrictions:

Prohibited activities within the mitigation areas include, but are not limited to..... ditching, draining, dumping, construction of any structure, or any other activity that would adversely impact the natural state of the area without obtaining a revision of this Department of the Army permit. Specific activities for wildlife enhancement or any other activities involving alteration of this mitigation tract must have prior approval from the Corps of Engineers.

Specific language within the deed-restrictive covenant that addresses academic research is as follows:

Prohibited activities on the Property do not include; and the targeted natural state, or use, of the Property for compensatory mitigation, and as wildlife habitat specified within the Wetland Compensatory Mitigation Plan submitted to, and approved by, the Little Rock District U.S. Army Corps of Engineers and by the City of Fayetteville, and as required by Section 404 Permit No. 14207, does not prohibit or preclude access to wetland cells within the Property by parties and/or entities approved by the City of Fayetteville and the Little Rock District U.S. Army Corps of Engineers for the purpose of academic endeavors, wet prairie ecological research, and/or wet prairie monitoring and management that would be conducted in a manner to not adversely impact the targeted natural state, or use, of the Property for compensatory mitigation, and as wildlife habitat.

5.0 – Scientific Research Approval Process

For the purpose of compliance with the City's Section 404 permit and the deed-restrictive covenant restrictions, all parties seeking to conduct scientific research at Woolsey Wet Prairie must meet the requirements listed below. Approval will be granted on a case-by-case basis.

- 1) All research projects must be conducted in a manner to not adversely impact the targeted natural state, or use, of the property for compensatory mitigation, and as wildlife habitat.**
- 2) All research projects must comply with established City codes, the deed restrictions, and the City's Section 404 permit.**
- 3) Parties conducting research at the site shall be responsible for assuring that their project does not create unsafe conditions for the public visitors at the site.**

- 4) Parties conducting research at the site shall be responsible for preventing, removing, and/or relocating any equipment, instrumentation, and/or structures that may potentially be inadvertently damaged or destroyed by site adaptive management activities, such as prescribed burning, herbicide applications, mowing.**
- 5) No filling, leveling, ditching, construction of any permanent structure, will be allowed. This does not preclude the temporary installation of traps, sampling equipment, and/or instrumentation.**
- 6) All structures, instrumentation, and/or equipment must be completely removed from the site upon termination of the research project.**
- 7) All research projects shall not adversely impact ecologically sensitive areas where very rare plants exist.**
- 8) No research activities shall interfere with adaptive management and monitoring activities at the mitigation site.**
- 9) No research activities shall interfere with other research projects at the mitigation site.**
- 10) All parties who collect specimens at the site must possess and comply with any applicable state or federal scientific collection permit.**
- 11) All parties conducting scientific research shall access the site from the south parking area at the wastewater plant entrance, or from the north gate access to the city property from Persimmon Avenue.**
- 12) All parties conducting scientific research shall contact Jeff Hickle of Jacobs Engineering to schedule a site orientation to become aware of site restrictions.**
- 13) No motorized vehicles will be permitted within the site. Access is limited to foot traffic only.**
- 14) Parties conducting research at the site shall make the results/findings of the research available to the City of Fayetteville, ECO, Inc., and Jacobs Engineering.**

5.1 - Application for Proposed Scientific Project Approval

All proposed research projects must submit a written proposal and detailed scope of work, including sequencing/scheduling, marked aerial photographs showing locations of proposed activities, and mitigative measures to minimize impacts to ECO, Inc. and Jacobs Engineering prior to conducting research.

Written scientific research project proposals shall be submitted to:

bruceshackleford@sbcglobal.net

seth@ecoarkansas.com

jeff.hickle@ch2m.com

Applicants should contact ECO, Inc. or Jacobs Engineering should they have any questions.

Bruce Shackleford, ECO, Inc. - 501-765-9009

Seth Pickens, ECO, Inc. - 479-518-1819

Jeff Hickle, Jacobs Engineering - 479-455-5676

ECO, Inc. and Jacobs Engineering will subsequently advise the City of Fayetteville about the nature and potential impact of the proposed project. Applicants shall be aware that ECO, Inc. may confer with the COE after projects are approved by the City.

Applicants will be notified regarding the approval or denial of project activities. Subsequent to receipt of approval, applicant shall submit any changes to project scope/activities/scheduling to ECO, Inc. and Jacobs Engineering.

Successful applicants shall be aware that Jacobs Engineering will be periodically making herbicide applications and shall notify Jacobs Engineering prior to initial site visit and provide any updates to project field activities scheduling.

Jacobs Engineering will occasionally need assistance with control of invasive plant species, excluding herbicide applications. Successful applicants shall participate in volunteering to assist Jacobs Engineering with activities such as pulling up individual invasive plant species, whenever possible.