Exhibit H – Biological Resources Survey

EXHIBIT H – BIOLOGICAL RESOURCES SURVEY

CONTENTS

1.0 INTRODUCTION

The Dirty Creek Conservation Bank (Bank), consists of approximately 1,032 acres and is located approximately 16 miles south of Muskogee, and 6 miles north of Warner, in the northeast corner of McIntosh County, Oklahoma (Appendix A, Figure 2). From U.S. Highway 64, the Bank can be accessed via E133rd St. S/E100 to S 13th St E. The latitude/longitude for the center of the Bank is approximately 35.544, -95.362.

2.0 BANK CHARACTERISTICS

The Bank meets or exceeds the USFWS Minimum Requirements for ABB Conservation Banking Criteria as described within the Guidelines:

1. The Bank is located within a USFWS Oklahoma-designated ABB Priority Area (Appendix B).
2. The Bank is considered of high conservation value due to its proximity to other protected lands, in particular Camp Gruber.
3. ≥95% of the Bank is comprised of suitable beetle habitat.
4. ABB surveys conducted during August 2016 exceeded USFWS minimum capture rates (Howard and Hall 2016).
5. Sandy loam and silt loam soils are present throughout the Bank.

Other important considerations included in the site selection matrix for the Bank are:

1. Landscape position within a rural area with a moderate interspersion of undeveloped forested, shrub, and open/range habitat with very few cultivated agricultural fields, and low human population densities (Appendix A, Figure 3).
2. USFWS ABB survey data indicates that ABB captures have taken place within nightly flying distances from the bank.
3. The Bank is located in an area amenable to habitat management via management techniques outlined in Exhibit C.
4. Uniqueness of the Bank characteristics (habitat composition and infrastructure) allows for formal scientific investigations for the management and recovery of the ABB.

2.1 LAND USE HISTORY

The Bank property was owned by the same family for approximately 100 years until it was sold in 2016. This land was historically a heavily farmed tract, producing cattle, cotton, hogs, corn and other products. Historical aerial photographs dated 1938 demonstrate this land use.

In the 1940's the Bank property began to grow back into forest through woody plant succession resulting from a series of field abandonments over time. Cattle grazing through lease arrangements was the primary land use of the Bank until 2016 and is a prime factor in shaping the diverse pattern of forests on the land currently.

Using the 1973 aerial photo as a guide, the breakout of ecological succession phases on the tract have been identified. The farming of the early 1900's was the perturbation of ecological conditions that set the stage for the establishment of a robust cohort of shade-intolerant species such as pin oak, burr oak, water oak, ash and others.

3.0 BASELINE ECOLOGICAL CONDITION AND HABITAT EVALUATION

3.1 General Overview

The Bank was comprehensively evaluated using a combination of remote sensing, Geographic Information Systems (GIS) analysis, and on-site biological surveys. (Appendix A, Figure 5). Biological surveys were conducted for ABB, Red Imported Fire Ants (RIFA), exotic flora and fauna, and ABB habitat. Remote sensing analysis included evaluation and interpretation of current and historic aerial imagery, topographic data, and soils data. Surveys for ABB and RIFA were conducted by Dr. Dan Howard and Dr. Carrie Hall, of Greyfeather Ecological Solutions, LLC., in accordance with USFWS sampling protocols.

Advanced Ecology staff conducted the habitat inventory and characterization per standard forest inventory procedures and included measurements of additional habitat variables considered important to ABB habitat suitability (Howard and Hall). Site photographs depicting various representative habitats found on the Bank are shown in Appendix E.

3.2. SITE ANALYSIS

The Bank consists of a diverse matrix of forests, shrub lands, woodlands, and herbaceous areas. Generally herbaceous areas comprise about 25% of the Bank, while forests in various stages of maturity from young regeneration to mature forest make up 75% of the Bank.

3.2.1 Vegetative Species List

The higher topographic areas are categorized as an assortment of open fields with native grasses and forbs interspersed with forests and semi-open areas containing scattered trees and shrubs. Forests generally located on the more well drained sites include post oak (*Quercus stellata*), northern red oak (*Q. rubra*), blackjack oak (*Q. marilandica*), winged elm (*Ulmus alata*), eastern redcedar (*Juniperus virginiana*) and persimmon (*Diospyros virginiana*). Less well drained sites tend to be dominated by green ash (*Fraxinus pennsylvanica*) with the other upland species in a more minor canopy position. Mesic riparian areas also include chinquapin oak (*Q. muehlenbergii*), and burr oak (*Q. macrocarpa*).

The lower elevation communities are open fields of herbaceous vegetation and of areas dominated by various classes of woody vegetation. These forests include green ash, sugarberry (*Celtis laevigata*), pecan (*Carya illinoinensus*), silver maple (*Acer saccharinum*), slippery elm (*Ulmus rubra*), boxelder (*Acer negundo*), Osage orange (*Maclura pomifera*), honeylocust (*Gleditsia triacanthos*), pin oak (*Q. palustris*), burr oak, persimmon, cedar elm (*U. crassifolia*), American elm (*U. americana*), river birch (*Betula nigra*) and American sycamore (*Platanus occidentalis*).

Grass species observed throughout the Bank include little bluestem (*Schizachyrium scoparium*), Virginia wildrye (*Elmus virginicus*), brownseed paspalum (*Paspalum plicatulum*), Timothy grass (*Phleum pretense*), love grass (*Eragrostis spp.*), Indian woodoats (*Chasmanthium latifolium*), rattail smutgrass (*Sporobolus indicus*), various rosette or panic grasses (*Dichanthelium spp.*), and muhly grasses (*Muhlenbergia spp.*).

Forbs and vines located throughout the Bank include various vetch species (*Vicia spp.*), gayfeather (*Liatris spp.*), croton (*Croton spp.*), western ragweed (*Ambrosia psilostachya*), poison ivy (*Toxicodendron radicans*), Carolina elephant's foot (*Elephantopus carolinianus*), showy partridge pea (*Chamaecrista fasiculata*), dog fennel (*Eupatorium capillifolium*), *Aster spp*., greenbrier (*Smilax spp.*), Texas thistle (*Cirsium texanum*), blackberry (*Rubus spp*.), and wild grapevine (*Vitus spp).*

Shrub/midstory species include deciduous holly (*Ilex decidua*), huckleberry (*Vaccinium spp.*), eastern redbud (*Cercis canadensis*), fragrant sumac (*Rhus aromatica*), flameleaf sumac (*Rhus copallina*),

coralberry (*Symphoricarpos orbiculatus*), American beautyberry (*Callicarpa americana*), swamp privet (*Forestiera acuminata*) and flowering dogwood (*Cornus florida*).

3.2.2 Observed Species Associations

While there is much overlap and combinations of the species associations, canopy closure classes and successional areas, these vegetative associations help provide a more complete illustration of the diversity present on the Bank. (Appendix A, Figure 3)

Slippery Elm-Green Ash-Persimmon

Located on northeast section of property, this area contains various small drains that flow from the north adjacent property, into the big slough and Dirty Creek. Midstory consists predominantly of persimmon and deciduous holly, with river birch along the drains. Understory consists of *Smilax* spp., Indian woodoats and Carolina elephants foot. The eastern edge of the Stand becomes more open and has minimal midstory and understory woody vegetation.

Green ash

Found scattered horizontally along the central portion of the property in three areas, all adjacent to creeks or sloughs. It is characterized by a relatively younger, single-age cohort, comprised mostly of green ash; although sugarberry and pin oak can be found scattered in minimal densities amongst the midstory. The midstory and understory are relatively open, with Indian woodoats currently being the dominant understory species.

Mature Pin Oak-Cedar Elm

Located on the far western portion of the property, adjacent to several smaller creeks and Dirty Creek, this stand is characterized by the dominant presence of mature pin oaks that are assumed to have been standing in pasture for many years. The midstory contains a noticeable amount of young cedar elm and sugarberry 1-4" in diameter. A majority of the area shows in aerial imagery to have been in pasture until it was left fallow around 1985.

Burr Oak-Green Ash-Pin Oak

This area is classified as one contiguous stand located in the center of the property. Burr oak is the dominant overstory species, followed by green ash and pin oak. There are very old, very large persimmons located in this area. There are numerous drains and creeks meandering throughout the area. Deciduous holly, sugarberry, and honeylocust are in the midstory, with a Virginia wildrye and Indian woodoats herbaceous layer. This area is slightly concave in relation to the adjacent areas.

Osage-orange

This was a pasture and/or row crop field until it was left fallow around 1940. It is currently a near-monocultural stand of Osage-orange. It is supposed that these were planted as a source of fence posts, as was commonly done in earlier times.

Pin Oak-Green Ash

This area was made up entirely of pasture and riparian buffer until it was left fallow around 1950. Considerable variability occurs in the vegetation features within this area. It offers a diverse array of species composition, dominated by pin oak and green ash. Other species found within the overstory include sugarberry, pecan, American sycamore and river birch. Honeylocust, persimmon, green ash sugarberry and swamp privet comprise the midstory component of this association. The understory is comprised of *Smilax* spp., Carolina Elephant's foot, and Indian woodsoats.

Post Oak-Green Ash-Winged Elm

This stand is found on ridges and hilltops that contain the highest elevation points within the property. The vegetation component is relatively consistent, with the overstory being comprised of post oak, green ash, and winged elm. Pockets of blackjack oak and some eastern redcedars are also found dispersed throughout this area. The understory is dominated by Indian woodoats, coralberry and *Smilax* spp.

Mixed Hardwoods

This is the oldest, most mature forest on the property. Historical aerial imagery depicts the stand as being a mature, dense forest as far back as 1938. It is situated adjacent to Dirty Creek, acting as a natural levee. The forest component is very diverse but is dominated by silver maple, green ash, sugarberry, American sycamore, northern red oak and pin oak.

Bluestem-woodoats-cutgrass

Herbaceous communities occur along the topographic gradient of the site within the north central, central, and southcentral areas of the bank. These communities transition from high well-drained fields into moderately well-drained alluvial deposits in riparian zones, then to poorly drained meander scars altered by intermittent beaver activity in some years. These communities are seasonally dynamic and therefore exhibit high variability of species composition within and among years. These herbaceous areas include other near-dominants consisting of wooly croton, western ragweed, Virginia wildrye, panic grasses, greenbrier, rubus, and smartweeds. A minor component of these areas include woody shrubs or saplings, including American beautyberry, dogwood, redbud, and swamp privet.

3.2.3 Soils

Natural Resource Conservation Service (NRCS) soil survey data indicate that soils suitable for ABB habitat cover approximately 95% of the Bank. Dominant soils located within the proposed Bank boundary include Verdigiris silt loam, occasionally flooded, Verdigris silt loam, frequently flooded, Collinsville-Bates complex, 3 to 8 percent slopes, Dennis silt loam 1 to 3 percent slopes, Dennis-Verdigris complex 0 to 8 percent slopes, Taloka silt loam, 0 to 1 percent slopes, Parsons silt loam, 0 to 1 percent slopes, and Linker-Hector complex, 2 to 5 percent slopes. The Verdigris series consists of deep, moderately well drained, moderately permeable soils. The Collinsville series consists of very shallow and shallow, well drained or somewhat excessively drained, moderately rapidly permeable soils. Dennis series consists of deep, moderately well drained, slowly permeable soils. The Taloka series consists of deep, somewhat poorly drained, very slowly permeable soils. Parsons series consists of deep, somewhat poorly drained, very slowly permeable soils.

3.2.4 - ABB and RIFA

ABB surveys took place on the property August 5-8, 2016 (Howard and Hall). The survey resulted in a capture rate of 0.63 ABBs per trap night, which is well above the minimum required trap rate of 0.37 ABBs per trap night for establishment of mitigation lands.

No RIFA were found during the survey.

3.2.5 - Exotic Flora

Exotic plant species were not found at the site.

3.2.6 - Exotic Fauna

Signs of feral swine presence were observed in high abundance, with most activity limited to non-forested areas within the Bank.

3.3 HABITAT DESCRIPTIONS

A study of the fourteen available historic aerial photographs (1938 – 2015) was performed to understand the genesis of the various vegetation cover types on the Bank, with ground-truthing being utilized for confirmation purposes.

Forested areas are extensive on the Bank and reflect the marked reduction in open-ground agricultural land use on this property in the mid- to late 1950's. The general ages of the overstory trees in these areas are in the 50- to 70-year range.

Herbaceous areas are primarily open grazing pastures that supported the ongoing cattle operations prior to 2016. Maintenance has consisted primarily of mowing and occasional disking, judging from the historical imagery. They are vegetated with a wide variety of native grasses and forbs.

3.4 - VEGETATION CANOPY COVERAGE EVALUATION

An analysis of the vegetation on the Bank was conducted in March 2017. Vegetation variables assessed included canopy cover, midstory cover, herbaceous cover, and estimated stocking rates. Canopy coverage was determined using a densitometer and midstory coverage was ocularly estimated. The Above Ground Horizontal Vegetation Density (AGHVD) was determined using a 5-foot staff placed 1 chain (66 feet) away from plot center. Tree densities were estimated using various fixed-radius plot sizes (depending upon cover type class) (Appendix A - Figure 6).

3.5 - SUMMARY OF HABITAT SUITABILITY FOR ABB

The variations in land use, species composition, and forested areas that were identified during baseline condition assessments (described in sections 3.3 and 3.4) are providing an excellent matrix of vegetative structure for carrion species. The positive ABB sampling in 2016 demonstrates that the Bank provides good overall habitat conditions for ABB.

4.0 BANK PROPERTY CREDITABLE HABITAT AND PHYSICAL FEATURES

The following table is a summary of the various classifications of the Bank property in terms of the criteria described in the Guidelines for ABB habitat.

The Preservation classification represents acres of Covered Habitat currently functioning as suitable for ABB. The Buffer classification represents acres constituting of a pipeline right-of-way, wildlife food plots, fire lanes and unimproved roads that will provide ABB habitat at a reduced level, as described by the Guidelines.

TABLE 1 - CREDITABLE HABITAT AND PHYSICAL FEATURES

Location/Description	Acres
Perservation Area	
Preservation	1003.8
Total Preservation Acreage	**1003.8**
Buffer Area	
Roads/Trails	15.1
Food Plots	10
Easement ROW	2.8
Total Buffer Credit Acreage	**27.9**
Non-Credit Area	
Out Block 1 (north)	15
Out Block 2 (north east)	5.5
Out Block 3 (south)	15
Total Non-Creditable Acreage	**35.5**
Total Property Acreage	**1067.2**

APPENDICES

Appendix A: Figures

Appendix A Figure 1
American Burying Beetle
Conservation Priority Areas and Service Areas

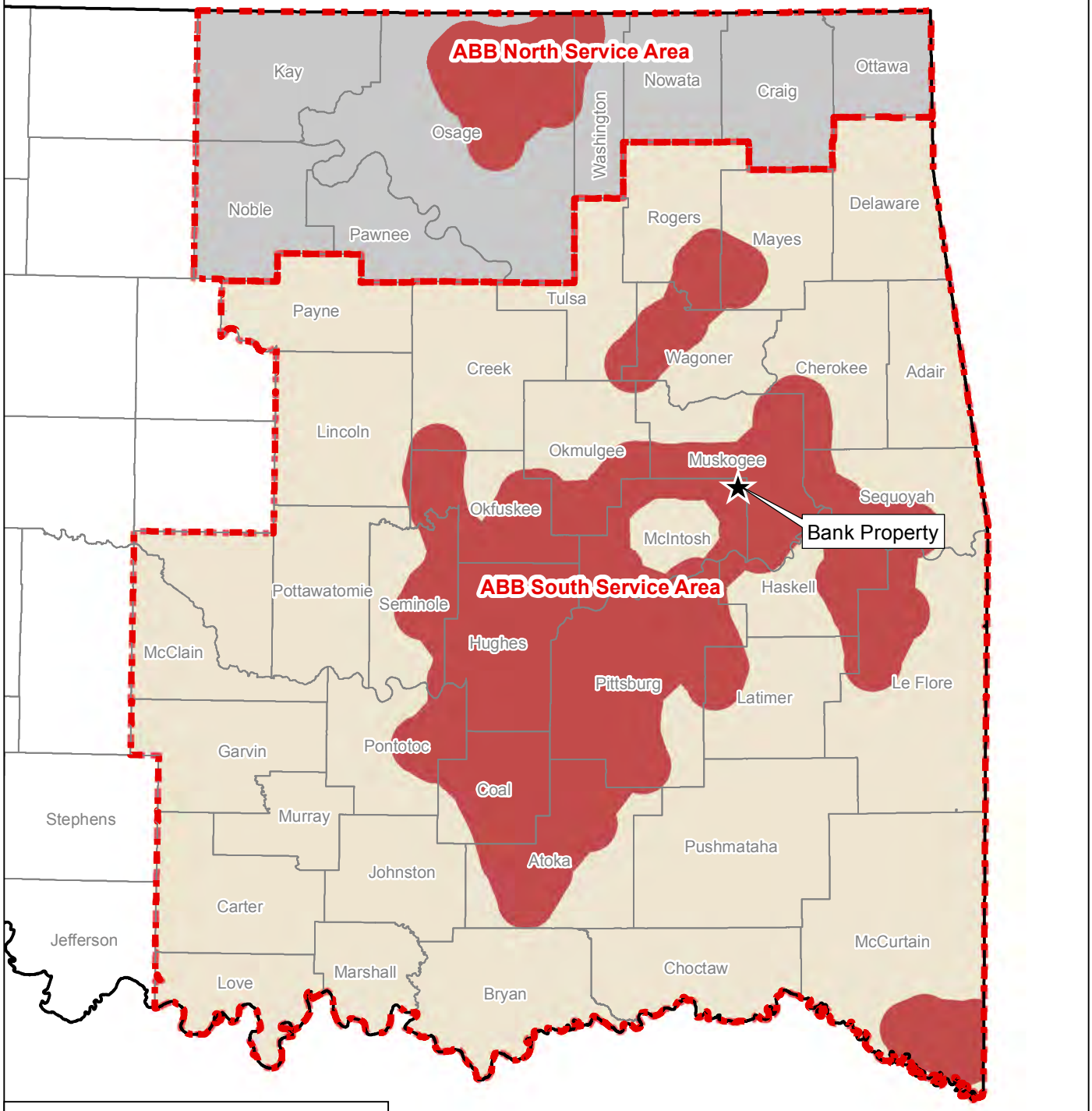

ABB North Service Area
ABB South Service Area
ABB Conservation Priority Areas

N W E S 2/23/2018

0 20 40 60 80 100 Miles

This map was generated by Advanced Ecology, LTD. using GIS (Geographical Information System) software. No claims are made to the accuracy or completeness of the data depicted in this map or to the map's suitability for a particular use. The information depicted may contain inaccuracies and is provided "as is".

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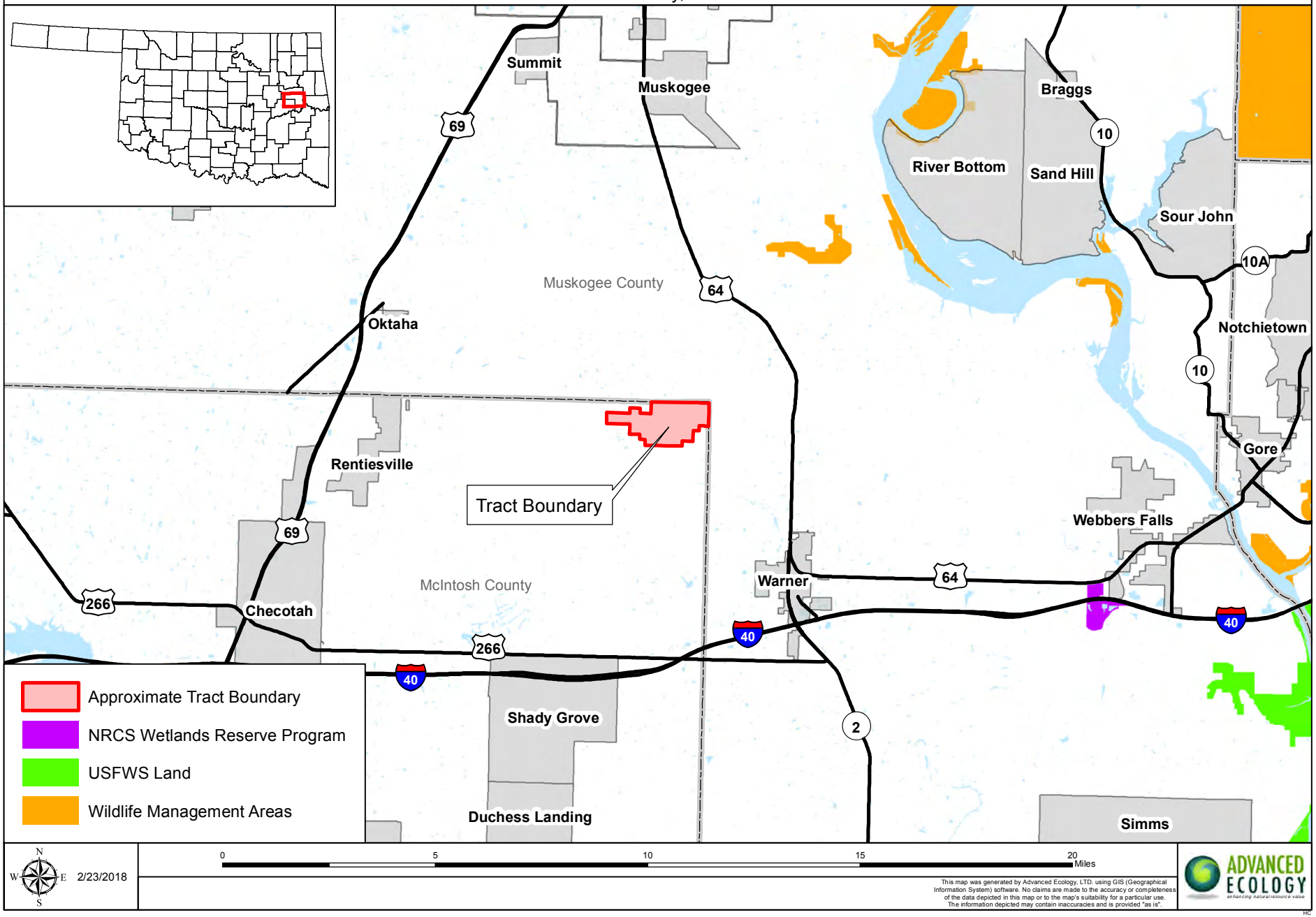
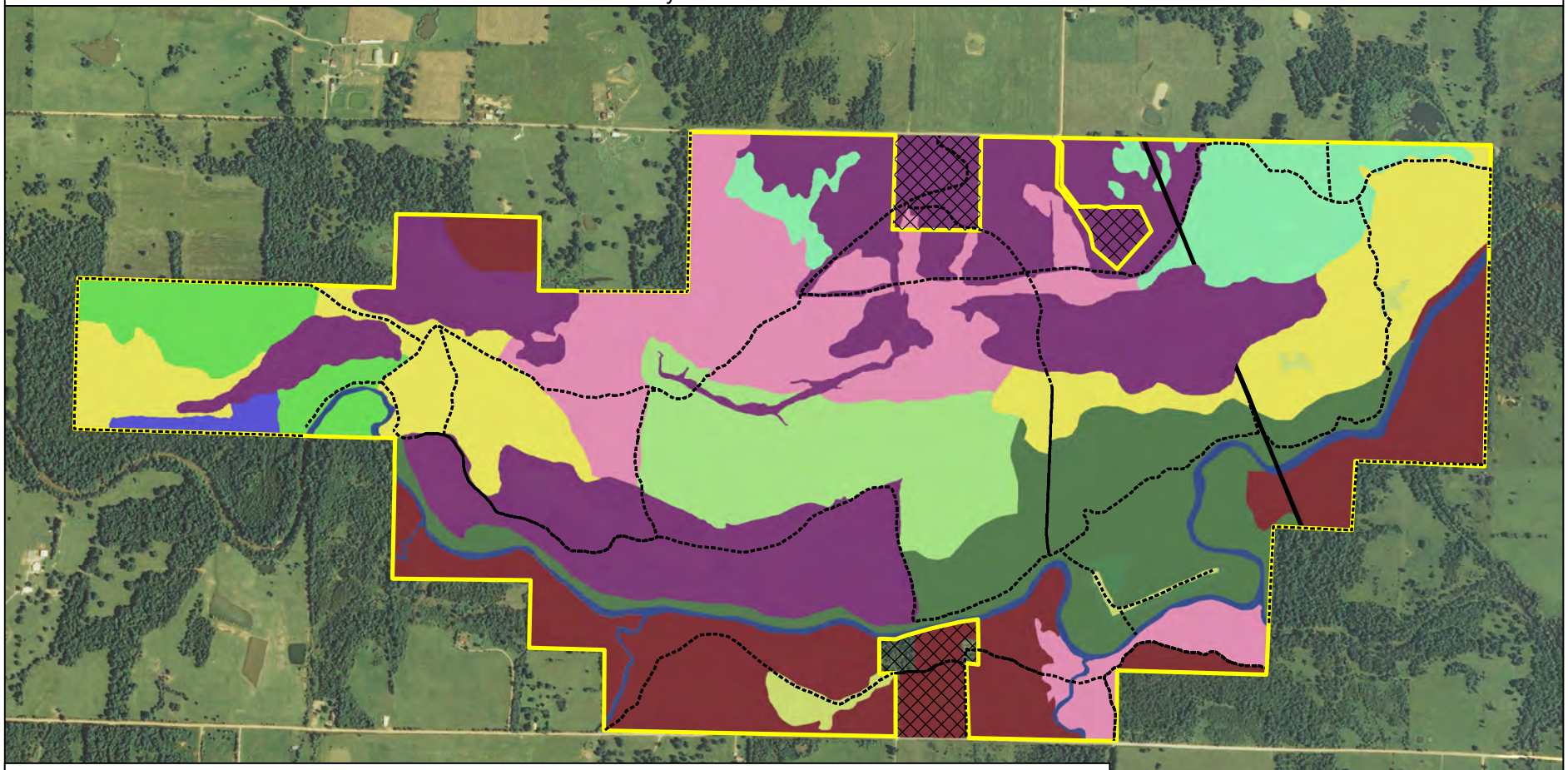
Appendix A Figure 2
Location Map
McIntosh County, Oklahoma



Appendix A Figure 3
Observed Species Associations
Dirty Creek Conservation Bank



Bank Boundary
Non-Bank
Burr Oak-Green Ash-Pin Oak
Food Plot
Green Ash
Mixed Hardwoods
Mature Pin Oak-Cedar Elm
Osage Orange
Non-Forested Areas
Pin Oak-Green Ash
Post Oak-Green Ash-Winged Elm
Slippery Elm-Green Ash-Persimmon
Water

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5/18/2018

0 2,000 4,000 6,000 8,000 10,000 Feet

Imagery: 2013 NAIP

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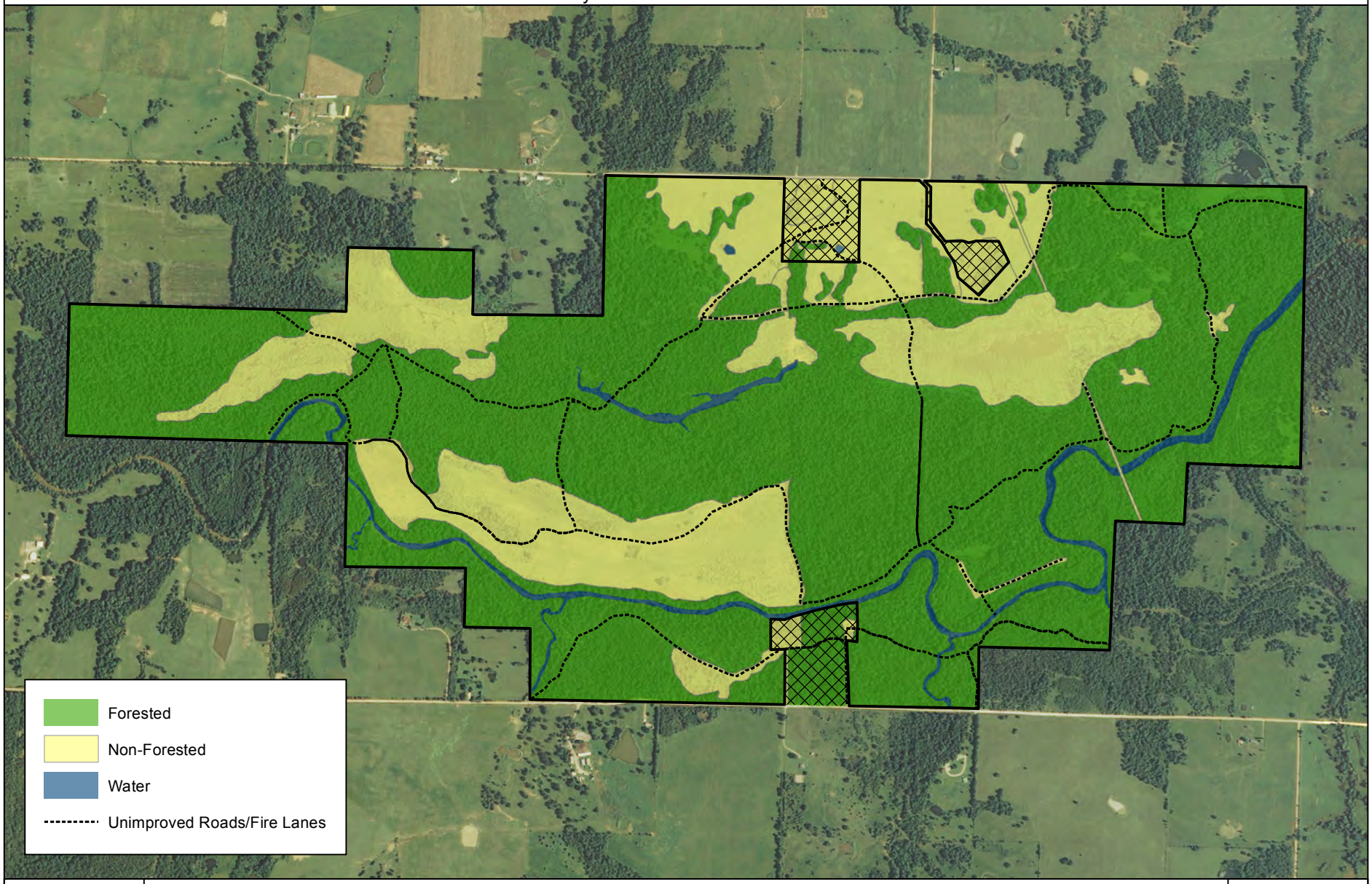
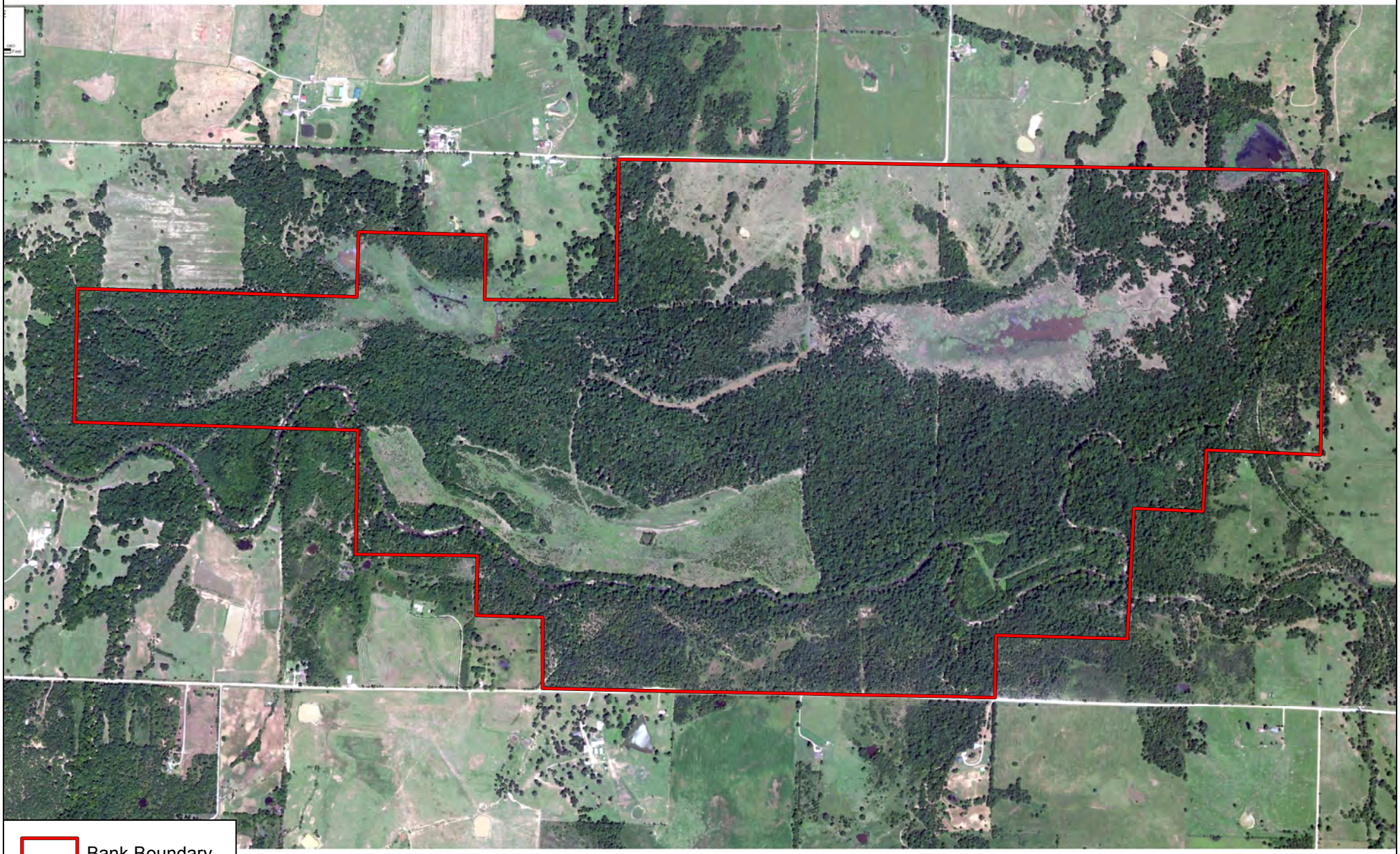
Appendix A Figure 4
Forested/Non-Forested Areas
Dirty Creek Conservation Bank



Appendix B: Historic Aerials

Figure 1 - 2015 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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0 1,300 2,600 3,900 5,200 6,500 Feet

1 Inch = 1,350 Feet

This map was generated by Advanced Ecology, LTD. No claims are made to the accuracy or completeness of the data depicted in this map or to the map's suitability for a particular use. The information depicted may contain inaccuracies and is provided "as is".

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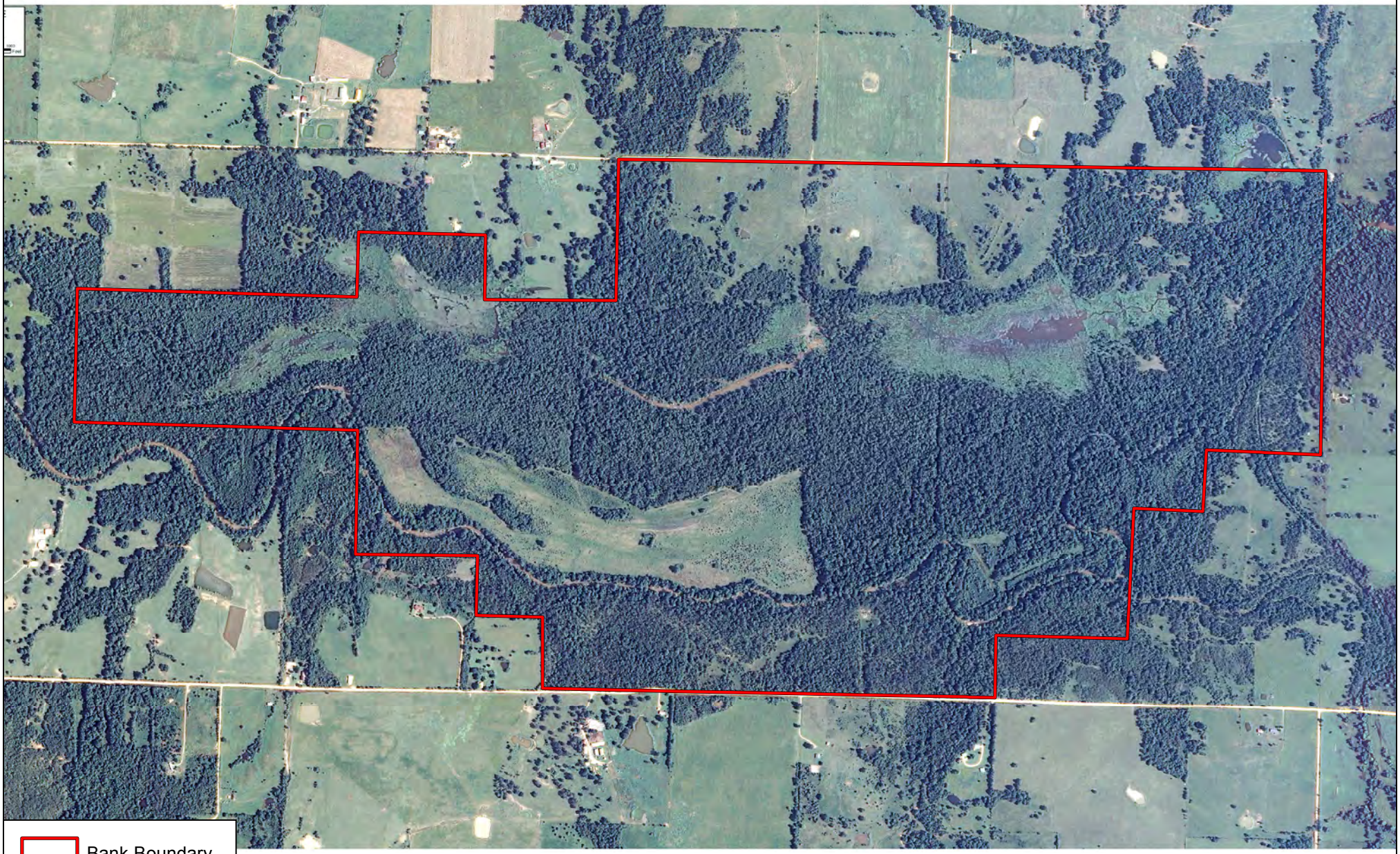
Figure 2 - 2013 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,350 Feet

This map was generated by Advanced Ecology, LTD. No claims are made to the accuracy or completeness of the data depicted in this map or to the map's suitability for a particular use. The information depicted may contain inaccuracies and is provided "as is".

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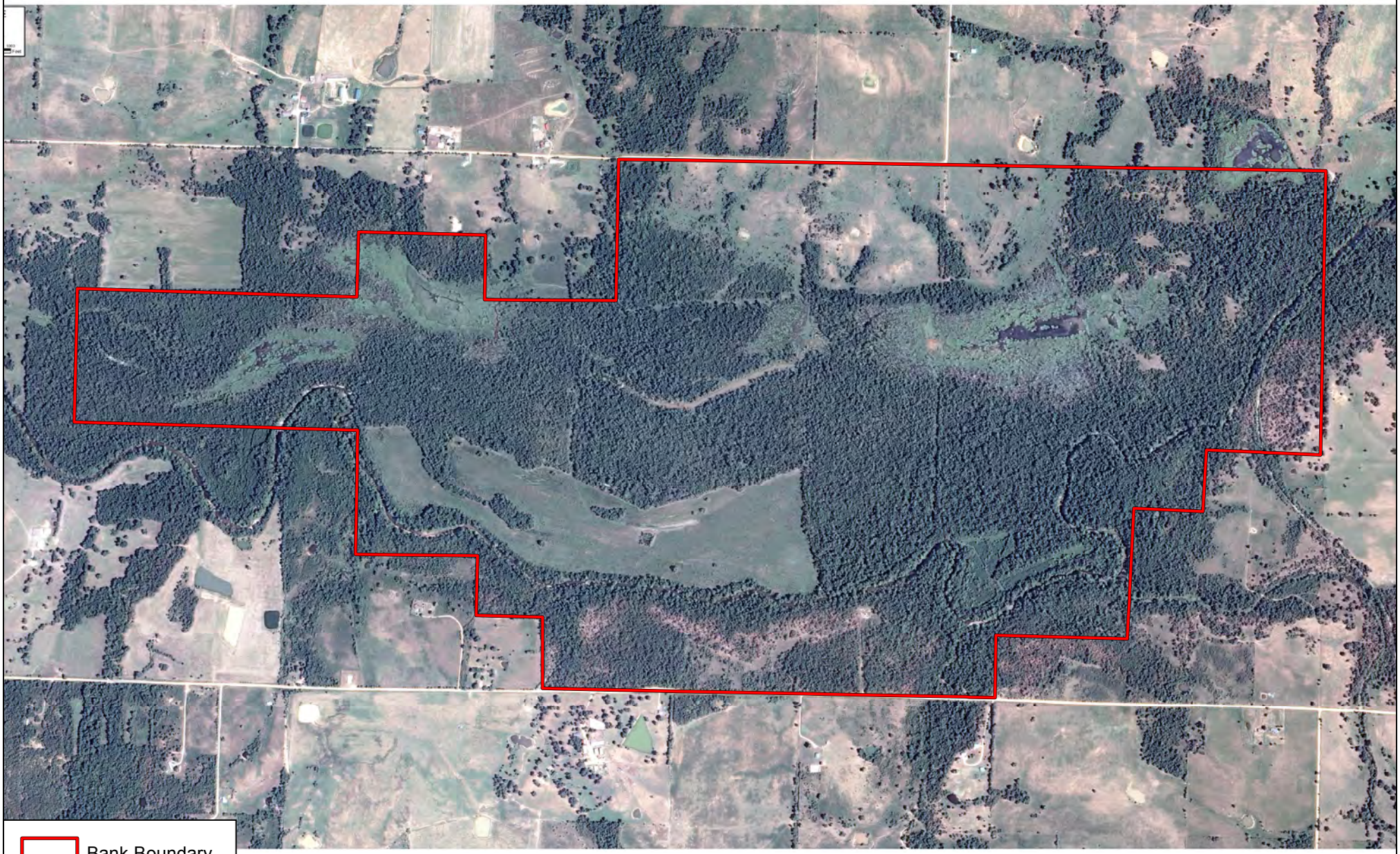
Figure 3 - 2010 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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This map was generated by Advanced Ecology, LTD. No claims are made to the accuracy or completeness of the data depicted in this map or to the map's suitability for a particular use. The information depicted may contain inaccuracies and is provided "as is".

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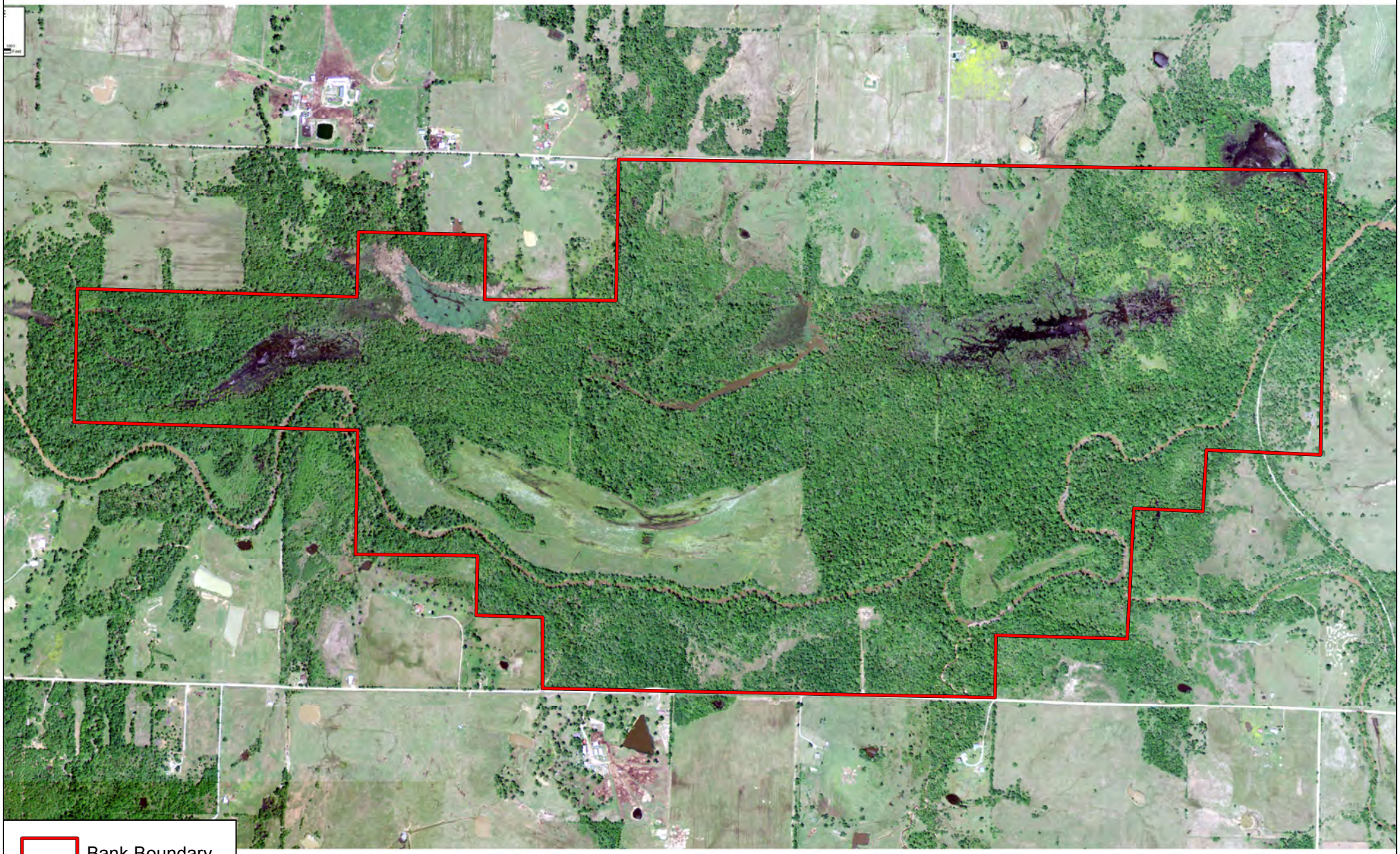
Figure 4 - 2008 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,350 Feet

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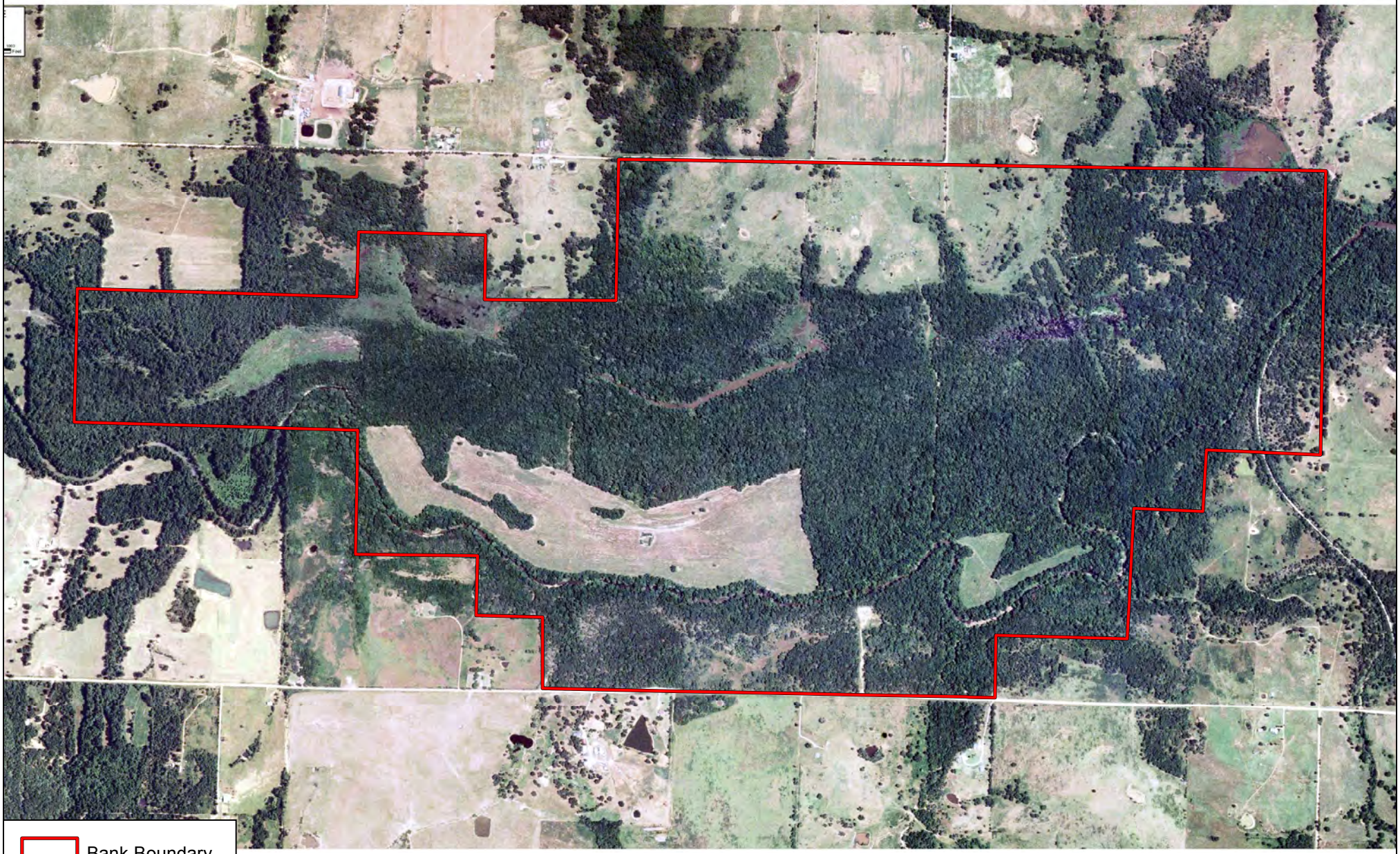
Figure 5 - 2003 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,350 Feet

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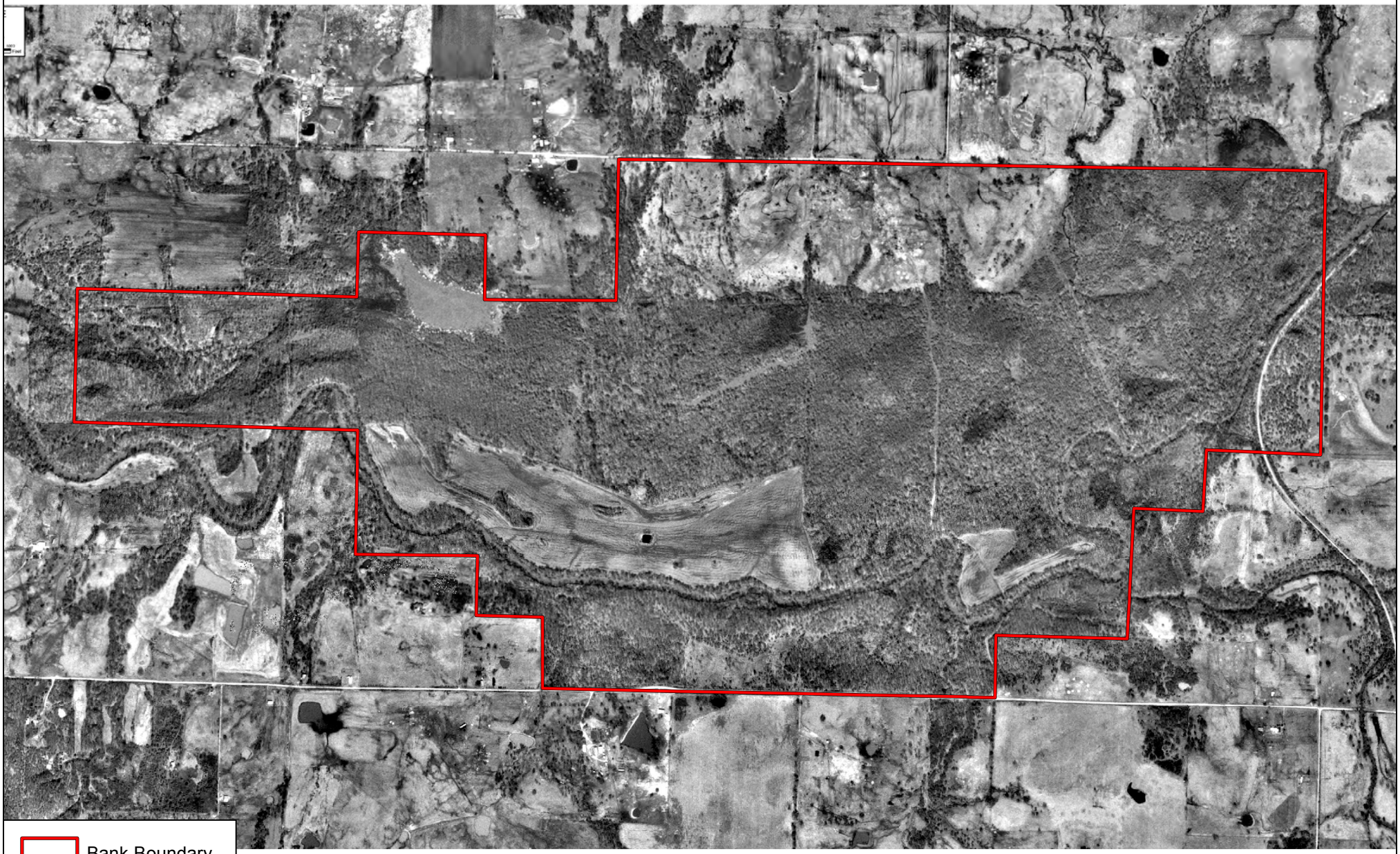
Figure 6 - 1995 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,350 Feet

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Figure 7 - 1984 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma

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1 Inch = 1,350 Feet

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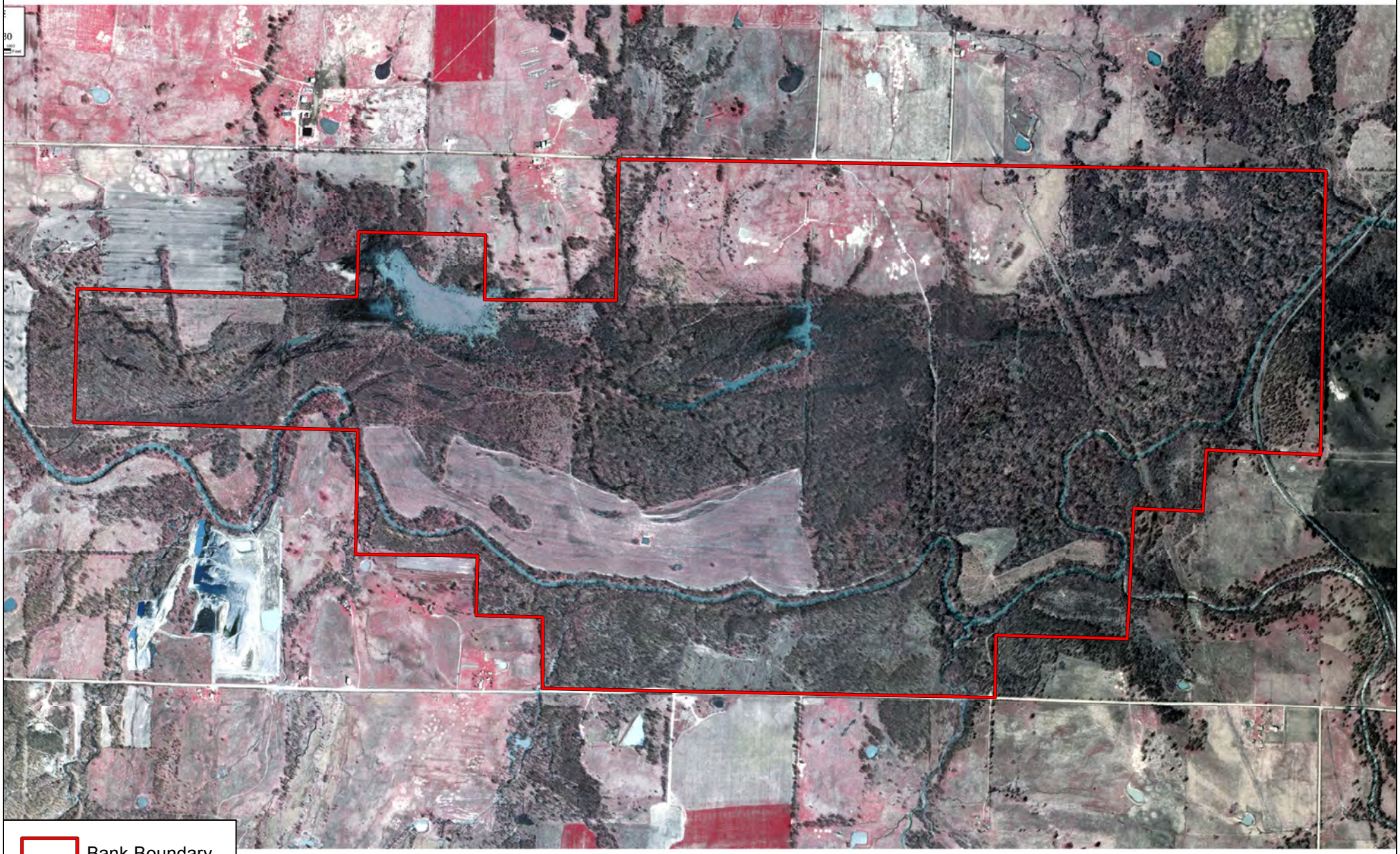
Figure 8 - 1980 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,350 Feet

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Figure 9 - 1973 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma

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1 Inch = 1,350 Feet

This map was generated by Advanced Ecology, LTD. No claims are made to the accuracy or completeness of the data depicted in this map or to the map's suitability for a particular use. The information depicted may contain inaccuracies and is provided "as is".

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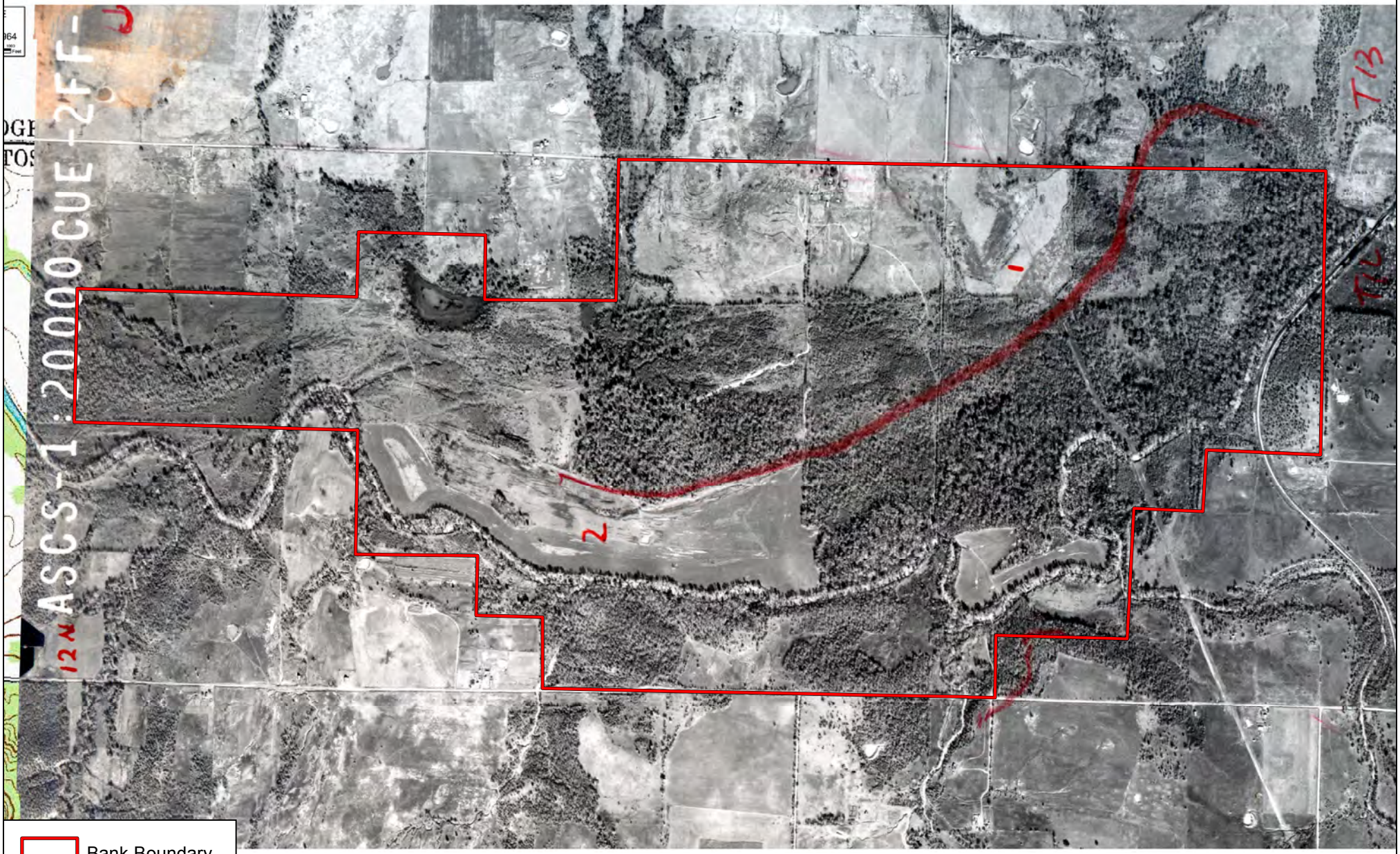
Figure 10 - 1972 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma

Figure 11 - 1964 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



Bank Boundary

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1 Inch = 1,350 Feet

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Figure 12 - 1956 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma

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1 Inch = 1,350 Feet

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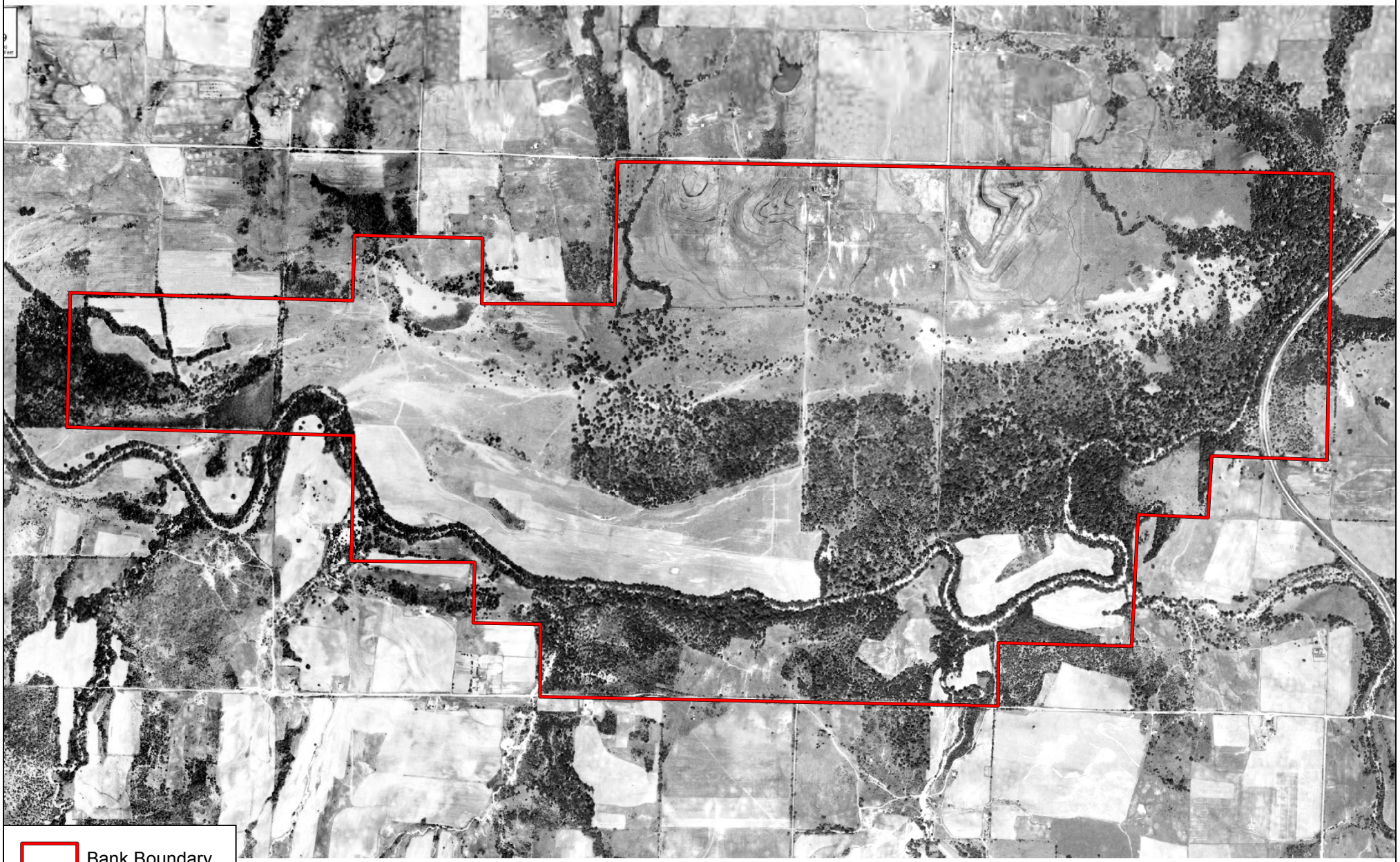
Figure 13 - 1949 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,335 Feet

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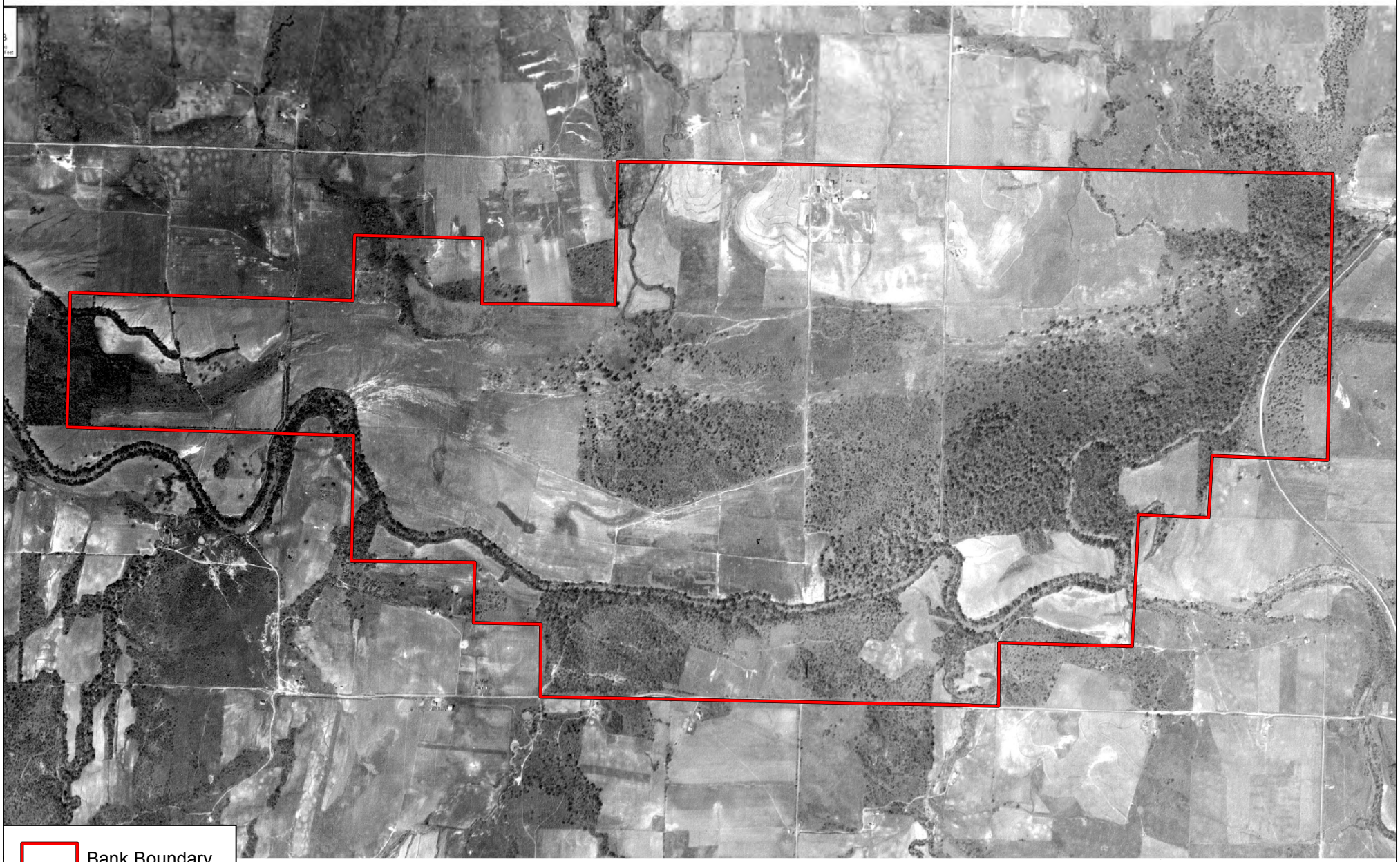
Figure 14 - 1938 Aerial - Dirty Creek Conservation Bank
McIntosh County, Oklahoma



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1 Inch = 1,335 Feet

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Appendix C: ABB Population Synopsis

Dr. Carrie L. Hall and Dr. Daniel R. Howard
dba Greyfeather Ecological Solutions, LLC.
17 Cutts Road
Durham, NH 03824

Advanced Ecology, Ltd. 23 August 2016

Dear Mr. Mark Brian and Advanced Ecology, Ltd. Team:

We thank you for the opportunity to work collaboratively with you in your endeavors to locate and procure habitat sites suitable for conservation of the American burying beetle (*Nicrophorus americanus* Olivier). We feel that our combined expertise and conservation ethic provide a rich and dynamic platform for pursuing ecological and economic activities that enrich biodiversity and safeguard species that are vital to the functioning of ecological systems and ultimately to our quality of life. We have truly valued this opportunity, and hope that further endeavors may again bring together our combined talents and interests.

The following provides a synopsis of our site assessment and American burying beetle (ABB) survey efforts for the Dirty Creek Ranch located west of Martin, Oklahoma, in McIntosh County. We have included the methods used for assessing ABB presence/absence and abundances at this location, and the results of this effort, delineated by trapping location.

This summary is formatted to address both the general and minimal habitat requirements outlined in the "*American Burying Beetle Conservation Strategy For Establishment, Management, and Operations of Mitigation Lands*" issued on 21 May 2014 by the U. S. Fish and Wildlife Service ("Service"). We provide our recommendations and conclusions based on habitat assessment and capture rates, commensurate with your interest in securing conservation easement of the property for the explicit purpose of conservation banking for the ABB.

Again, thank you for allowing us the privilege of working with you and your company in this important and timely project. We hope to continue this collaboration through future projects.

Sincerely,

Daniel R. Howard, Ph.D. Carrie L. Hall, Ph.D.

Trapping Methods:

American burying beetle trapping methods
After an initial remote/aerial pre-assessment during the week of 25 July 2016, the candidate property was censused for American burying beetles (*Nicrophorus americanus*; ABB) from 5 – 8 August 2016. American burying beetles were collected in modified 5-gallon above-ground baited pit-fall traps (Figure 1; Bedick et al. 2004, Leasure et al. 2012). Traps were baited with vertebrate organ meat (chicken livers) that had been aged for a minimum of two days. Traps were checked for three consecutive mornings for presence of ABBs and other Nicrophorine species, and bait was refreshed on the morning of the second trap night.

Results

This property is located within the southern designated American burying beetle Conservation Priority area as determined by the U. S. Fish and Wildlife Service ("*American Burying Beetle Conservation Strategy For Establishment, Management, and Operations of Mitigation Lands*" issued on 21 May 2014 by the U. S. Fish and Wildlife Service). The property is larger than the minimum acreage required by the Service (1,062 acres in total), and our surveys have confirmed the presence of ABBs on the site in areas of silt/loam complexes, specifically Dennis silt, Bates loam, and Verdigris silt loam, predominately.

American burying beetle trapping results
At the eight sites sampled at the candidate site, 15 ABBs were captured during 24 trap nights for a capture rate of 0.63 ABBs trap night^{-1} (Figure 2). Four of the eight traps attracted ABBs. Other captured *Nicrophorus* species include two species of congeners (47 *N. orbicollis*, and 43 *N. pustulatus*), as well as 200+ individuals of other taxonomic description. This capture rate is well above the minimum required trap rate of 0.37 ABBs per trap night for establishment of mitigation lands.

General habitat considerations
The soil characteristics and heterogeneous habitat structure of the site, along with the future management of the property will likely provide favorable habitat mosaic for ABB reproduction and recruitment. The presence of other *Nicrophorus* species suggests that the site has an intact ecological infrastructure, and we found no impact of Red Imported Fire Ants (RIFA) at the site during this survey effort. Management for ABBs should include forest structure manipulation to ensure an open understory and the promotion of forest floor above-ground botanical biomass, reintroduction of light grazing coupled with prescribed fire to promote the recruitment of native C4 grasses and forbs in the open meadow locations. General management practice could include regular hunting and/or more focused measures to control feral pigs.

Conclusions:
ABB abundance at this site is high, and all reasonable efforts should be made to protect this property under some form of negotiated conservation easement. Our assessments of the soil types and botanical structure at the sites (% loam soil, habitat patchiness, % canopy cover versus open grasslands) indicate that this property contains appropriate habitat for ABBs.

Figures

Figure 1: Modified 5-gallon above-ground baited pit-fall traps used for capturing American burying beetles at the prospective American burying beetle conservation site in McIntosh County, Oklahoma. This trap design is modified from that described in Bedick et al. 2004 and Leasure et al. 2012. Traps were installed at eight selected sample sites, and monitored for ABB captures for three days.

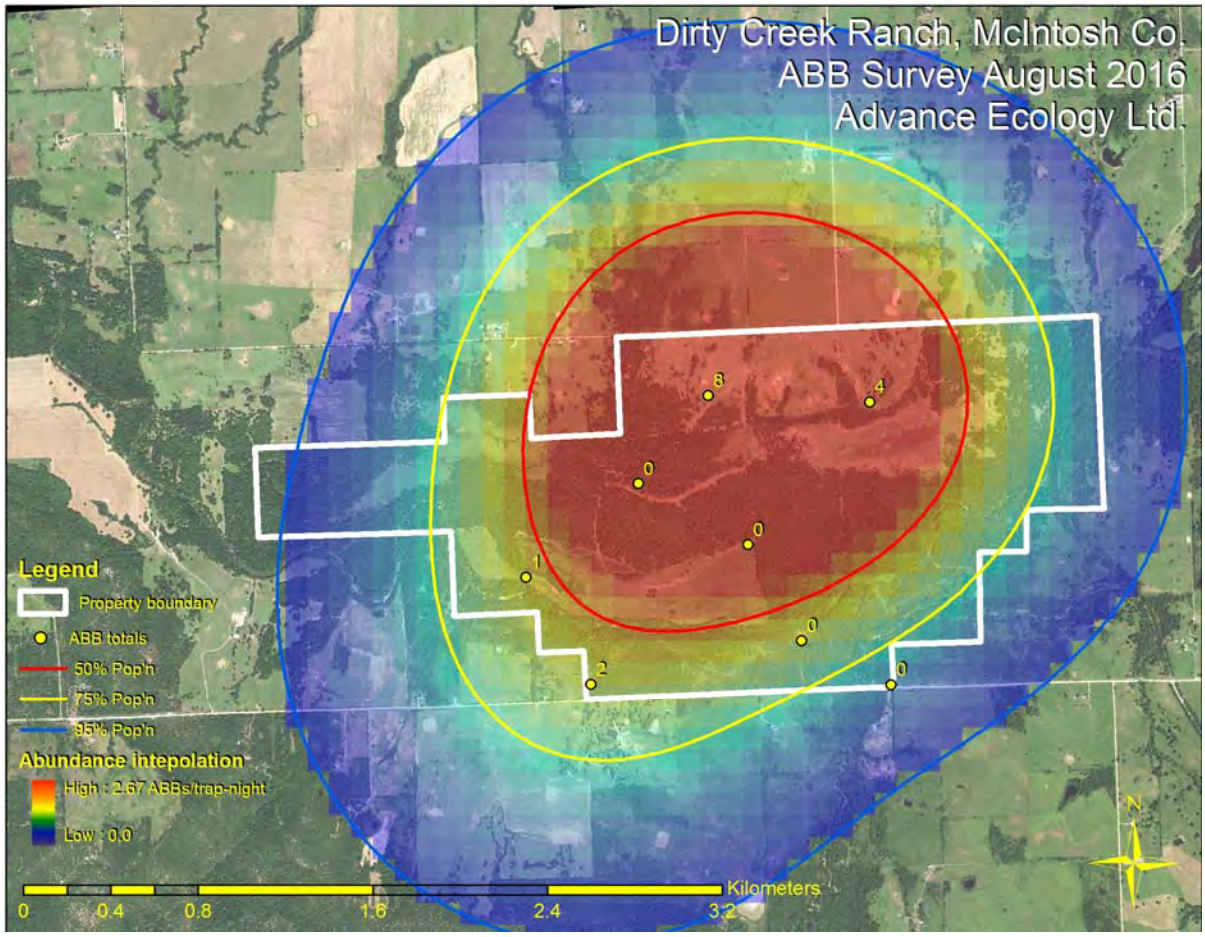

Figure 2: Map of the 1,062-acre Dirty Creek Ranch in McIntosh County, Oklahoma, showing sampling sites for American burying beetle surveys conducted 5 – 8 August 2016. Interpolated data shown in red are areas of highest abundance, while blue indicates areas of low abundance of ABBs. Population estimate kernels, indicated by red, yellow, and blue lines show the 50%, 75%, and 95% interpolated population probability respectively, based on sampling results. Overall trapping rate for the property was 0.63 ABBs trap night^{-1} (well above Service minima).

Appendix D: Vegetative Analysis

Appendix D. Descriptive analysis of the habitat classification found on the Proposed Dirty Creek Conservation Bank, assessed March 2017.

Plot	Trees/acre	Basal Area/acre (sqft)	Canopy Coverage (%)	AGHVD**	Herbaceous Coverage (%)	Midstory Coverage (%)	Average DBh
1	240	140	98	12	40	20	9
2	50	11	98	1	40	65	6
3	230	43	96	2	30	80	5
4	0	0	0	100	90	0	NA

** Above Ground Horizontal Vegetation Density

Appendix E: Site Photographs

Appendix E : Site Photographs

Exhibit I – Jurisdictional Determination and Delineations of Waters of the U.S. and/or Waters of the State – Not Applicable

Exhibit J – Cultural Resources

Cultural Resources Impact Statement For The
Dirty Creek Mitigation Bank

The proposed Dirty Creek Mitigation Bank is a 1062-acre area along Dirty Creek in the northeast corner of McIntosh County, Ok. Conservation activities on the site include preservation of existing habitat by using a prescribed burning program. The mitigation activities will impact the entire surface of the project area to a depth of less than 12 inches.

Determining the potential for finding archaeological sites relies on geology, topography, distance to surface water, soils, and previous archaeological investigations. In general, elevated areas close to water with well-drained soils are considered high probability areas for containing cultural resources on or near the ground surface. Those areas with buried soil horizons have the potential for containing deeply buried archaeological deposits. Determining the potential for archaeological sites within the project area includes examining modern aerial imagery, topographic maps, Government Land Office maps from 1898, soils information at http://websoilsurvey.nrcs.usda.gov/, and a site file search by the Oklahoma Archaeological Survey (OAS) in Norman, Ok.

Aerial imagery analysis included examining Google Earth images from 1995 to 2017. The 22-year span of images reveals most of the area has remained in hardwood bottomland with a large pasture area in the southern portion of the floodplain and a second pasture area near the northern boundary. Both areas were pasture before 1995. The southern pasture areas appear to have several areas with dark vegetation suggesting they remain wet. The northern pasture has evidence of terracing on the summit and shoulder of the landforms.

Topographically, the project area spans the Dirty Creek floodplain including portions of the adjacent upland ridge back slopes, shoulders, and summits. Soils within the project area are Verdigris series in the floodplain with Dennis, Coweta-Bates Complex on the adjacent back slopes, and Taloka on the ridge summit. Verdigris series soils are mostly frequently flooded deep silt loam with poorly developed soil horizons with isolated terrace remnants both in the floodplain and along the floodplain margins. Dennis series soils consist of silt loam 16 inches deep over silty clay loam and clay. Slopes in the Dennis series areas ranges from 1-5% with some severely eroded areas.

Coweta-Bates complex soils are shallow loam with gravel on narrow landforms with steeper slopes. Taloka series soils consists of 28 inches of silt loam over silty clay loam on ridge summits. Of the soil series, the Verdigris on terrace remnants and ridge shoulders with Taloka and similar soils have a high probability for containing intact cultural resources.

Examination of the 1898 GLO maps for the T12N/R18E and T13N/R18E revealed eight structures, associated fields, and several roads within one mile of the project area. Within the project area there are only three fields and four road segments. The fields may have barns or sheds along with rock or fence boundaries and the roads may have cuts, berms, bridge remnants, or other features to show their location within the project area. The modern topographic maps show no structures within the project area but several on the adjacent uplands along with the Rock Grove Cemetery to the north of the project area and second cemetery on the south side of a road used as the southern boundary of the project area.

The site file search by the OAS found no previously recorded archaeological sites within the project area but one of the nearby cemeteries was recorded as 34MI83 near the southern boundary of the project area. Other nearby documented archaeological sites include prehistoric open camp site at 34MS23 and 34MS34 roughly one mile to the east and historic period site 34MI87 roughly one mile to the west. A small cluster of four archaeological sites were recorded between 0.5 and 1.0 miles to the southwest of the project area. This cluster includes a Late Prehistoric artifact scatter (34MI73), a historic period house foundation (34MI74) and two trinomials for a rock shelter (34MI54 and 34MI55). It is unknown if there are two shelters or one based on the description of the shelter(s). The OAS search found the closest nearby previous archaeological investigations were limited to three areas investigated by the NRCS in 2017 to the north of the project area; no sites were recorded during the surveys.

Aerial imagery, topographic and soils information combined with GLO and previously recorded archaeological site information was used to delineate eleven areas with a high probability for containing intact archaeological sites. Terrace remnants in the floodplain along with well-drained landforms on the adjacent uplands with soil development over the B-horizon are most likely to contain artifacts and intact cultural

features of prehistoric and historic period sites. Of these, the southern pasture areas have a diminished probability based on the aerial imagery which shows areas which stay wet. The northern pasture area retains a high probability for artifact scatters, but terracing may have destroyed cultural features. The remaining high probability areas have little modern impacts suggesting their potential for intact cultural resources is greater than the terraced area or the more frequently flooded areas.

Analysis by:
Victor Galan, PhD - Geoarchaeology
Deep East Texas Archaeological Consultants

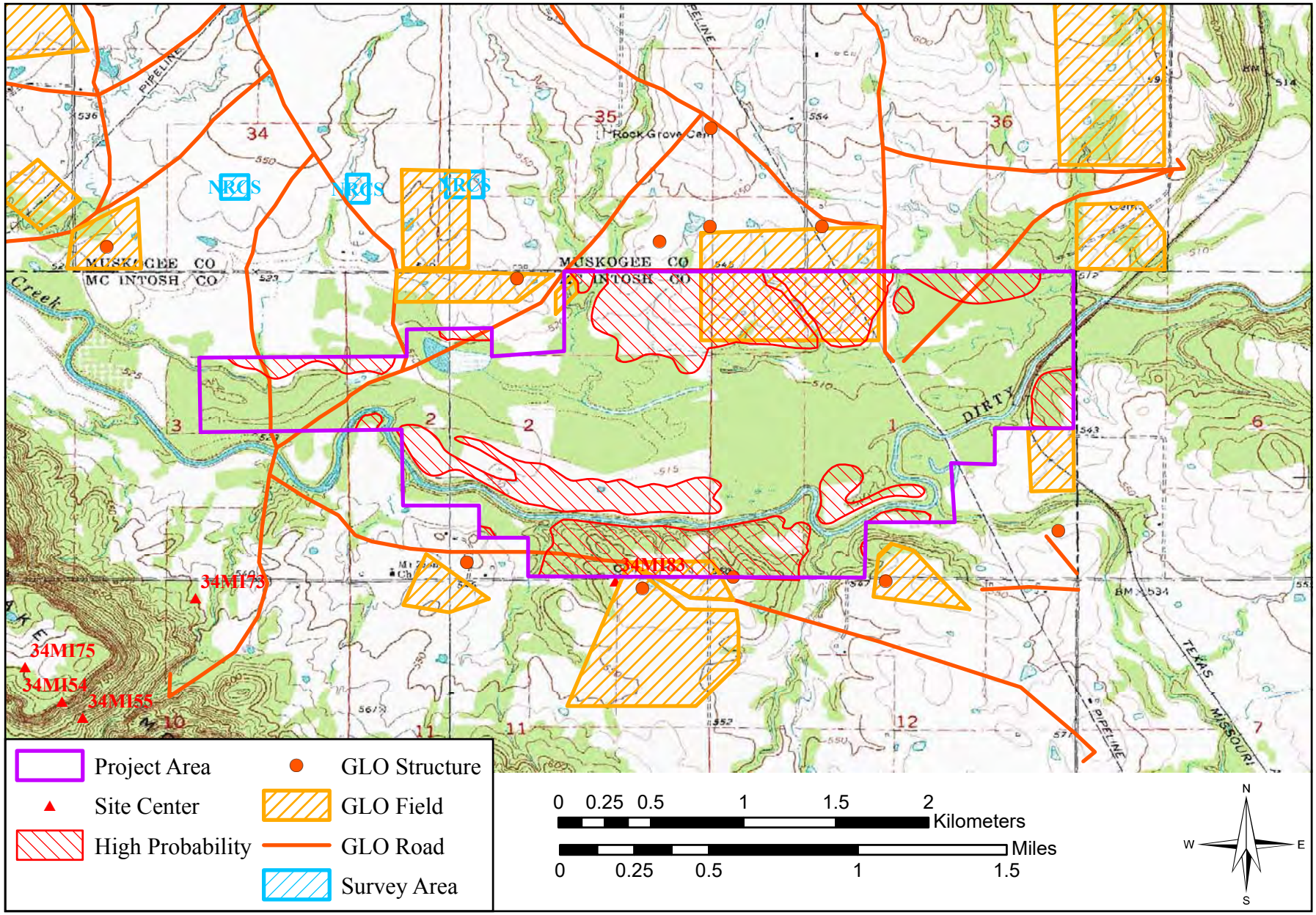

Figure 2. Previous investigations, documented archaeological sites, GLO structures, and GLO roads near the project area

Exhibit K – Other Documentation, Permits, Amendments, or Revisions